SEWING TECHNOLOGY

TRADE THEORY

NSQF LEVEL - 5

HANDBOOK FOR CRAFTS INSTRUCTOR TRAINING SCHEME

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Directorate General of Training

DIRECTORATE GENERAL OF TRAINING
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
GOVERNMENT OF INDIA

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A Comprehensive Training Program
under Crafts Instructor Training Scheme (CITS)
for Instructors

HANDBOOK ON TECHNICAL INSTRUCTOR TRAINING MODULES

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Secretary

सत्यमेव जयते

भारत सरकार
कौशल विकास एवं उद्यमिता मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
AND ENTREPRENEURSHIP



Foreword

In today's rapidly evolving world, the role of skilled craftsmen and women is more crucial than ever. The Craft Instructor Training Scheme (CITS) stands at the forefront of this transformation, shaping the educators who will train the next generation of artisans and technicians. This book aims to provide an in-depth understanding of the subject, exploring its significance, methodologies, and impact on vocational training.

The Craft Instructor Training Scheme was established with the objective of enhancing the quality of instruction in industrial training institutes and other vocational training institutions. By equipping instructors with advanced skills and knowledge, the scheme ensures that they are well-prepared to impart high-quality training to their students. This, in turn, contributes to the creation of a highly skilled workforce capable of meeting the demands of modern industry.

The initial chapters provide the importance of specialized instructor training. Following this, detailed chapters delve into the curriculum covering advanced techniques, safety protocols, and instructional strategies. Each section is designed to offer both theoretical insights and practical applications, ensuring a well-rounded understanding of the subject.

The book offers recommendations for overcoming obstacles and enhancing the effectiveness of the program, with the ultimate goal of producing highly skilled instructors capable of shaping the future workforce.

This book is intended for a diverse audience, including current and aspiring instructors, vocational training administrators, policymakers, and industry stakeholders. It serves as a valuable resource for understanding the intricacies of the subject and its pivotal role in vocational education.

I extend my heartfelt gratitude to all contributors who have shared their experiences and expertise, enriching this book with their valuable insights. Special thanks to the contribution of the development team, reviewers and NIMI that have supported this endeavor, providing essential data and resources.

It is my sincere hope that this book will inspire and guide readers in their efforts to enhance vocational training, ultimately contributing to the development of a skilled and competent workforce.

ATUL KUMAR TIWARI, I.A.S.
Secretary, MSDE

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त्रिशलजीत सेठी
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GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT &
ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

FOREWORD

The Craftsmen Training Scheme (CTS) implemented by the Directorate General of Training (DGT) provides skill training to the youth and ensures a steady flow of skilled manpower for the industry. It aims to raise quantitatively and qualitatively the industrial production by systematic training, and to reduce unemployment among the youth by providing them with employable skills.

The Craft Instructor Training Scheme (CITS) is an indispensable part of the Craftsmen Training Scheme (CTS). It offers comprehensive training both in 'skills' and in 'training methodology' to the instructor trainees to make them conversant with techniques of transferring hands-on skills.

I congratulate NIMI for taking the initiative of preparation of the course content for CITS. This will help institutionalize the mechanism for imparting training to the trainers all across the ecosystem. I also extend my gratitude to the Instructors and Officials of National Skill Training Institutes (NSTIs) and the DGT for their invaluable contribution in preparation of the CITS course content.

As we navigate the complexities of a rapidly changing world and the technological disruptions, the significance of CTS and CITS has increased manifold. It not only empowers individuals with practical skills but also lays the foundation for a prosperous future. I am confident that this book will serve as a guiding light to all instructor trainees for skill development and nation-building.

Trishaljit

(Trishaljit Sethi)

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PREFACE

The Craft Instructor Training Scheme is an indispensable module of the Craftsmen Training Scheme, which has been an integral part of the Indian skill development industry since its inception. This program aims to equip instructors with the necessary skills and teaching methodology to effectively transfer hands-on skills to trainees and promote a holistic learning experience. The first Craft Instructor Training Institute was established in 1948, followed by six more institutes across India in 1960. Today, these institutes, including the National Skill Training Institute (formerly Central Training Institute for Instructors), offer the CITS course, which is mandated by the Directorate General of Training (DGT).

The Craft Instructor training program is designed to develop skilled manpower for industries. The course aims to offer instructors an opportunity to improve their instructional skills, engage learners effectively, offer impactful mentoring, and make efficient use of resources, leading to a more skilled workforce in various industries. The program emphasizes collaborative and innovative approaches to teaching, resulting in high-quality course delivery. Overall, the Craft Instructor Training Scheme is a pivotal program that helps instructors grow in their careers and make a significant contribution to society. This program is essential for developing skilled manpower and promoting a robust learning environment that benefits both trainees and instructors alike.

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ACKNOWLEDGEMENT

National Instructional Media Institute (NIMI) sincerely acknowledges with thanks for the co-operation and contribution extended by the following experts to bring out this Instructional material **(Trade Theory)** for **CITS Sewing Technology (NSQF Level - 5)** under the **Apparel** Sector for **Instructors**.

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NIMI records its appreciation of the Data Entry, CAD, DTP Operators for their excellent and devoted services in the process of development of this Instructional Material.

NIMI also acknowledges with thanks, the invaluable efforts rendered by all other staff who have contributed for the development of this Instructional Material.

NIMI is grateful to all others who have directly or indirectly helped in developing this IMP.

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ABOUT THE TEXT BOOK

The Vocational Instructor Training Program is a comprehensive initiative designed to equip aspiring students with the necessary skills and knowledge to effectively teach in vocational education settings. This program encompasses a range of pedagogical strategies, instructional techniques, and subject-specific content tailored to the diverse vocational fields. Participants engage in coursework that covers curriculum development, assessment methods, classroom management, and the integration of industry-relevant technologies. Practical experience and hands-on training are emphasized, allowing participants to apply theoretical concepts in real-world teaching environments. Through collaborative learning experiences and mentorship opportunities, aspiring vocational instructors develop the confidence and competence to facilitate engaging and impactful learning experiences for their students. This training program aims to cultivate a new generation of educators who are not only proficient in their respective vocational fields but also adept at fostering the success and employability of their students in today's competitive workforce.

This text book covers communication, self-management, information and communication technology, entrepreneurial and green skills. It has been developed as per the learning outcome-based curriculum.

G C Rama Murthy,
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MODULE 1 : Concept of Drafting, Pattern making, Grading, Draping & Stitching

LESSON 1&2 : Revision of the CTS contents - Concepts of drafting

Objectives

At the end of this lesson, you will be able to

- explain about the concept of drafting, pattern making techniques, grading, draping and stitching.

Concepts of Drafting

Drafting

Drafting is a pattern making process using the measurements of different body areas to create basic patterns – or blueprints of essential pattern blocks. It is referred to as a pattern set:

1 Bodice front

2 Bodice back

3 Sleeve

4 Skirt front

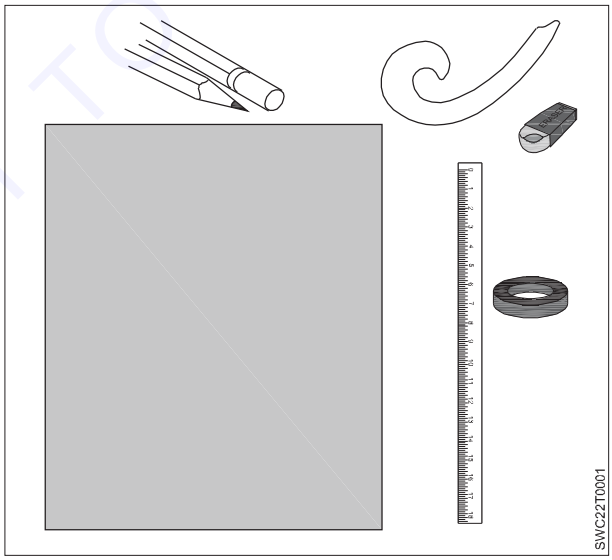
5 Skirt back

6 Trouser front

7 Trouser back

It involves measurements derived from sizing systems or accurate measurements taken on a person, dress or body form. Measurements for chest, waist, hip and so on, and ease allowances are marked on paper and construction lines are drawn to complete the pattern. Drafting is used to create basic, foundation or design patterns.

Drafting is the process of creating a flat pattern on paper from measurements. This method is used to create the basic shapes that will be used to create the garment. It's more mathematical and technical than draping.



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Tools use for Drafting

Drafting White Paper – A3 Size or A2 Size

Pencil

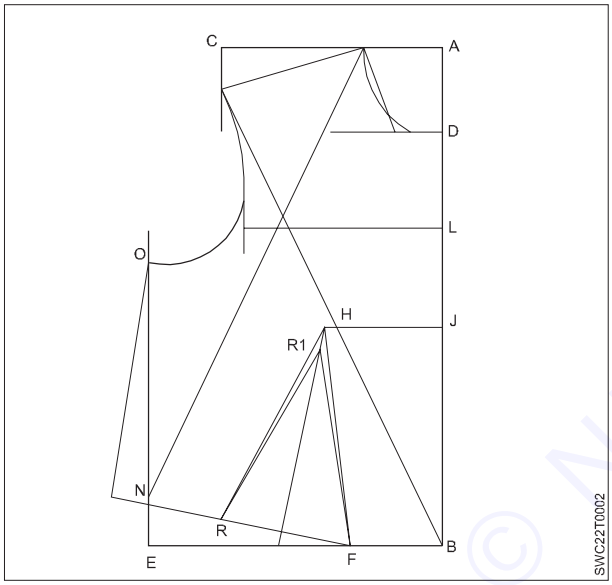
Eraser

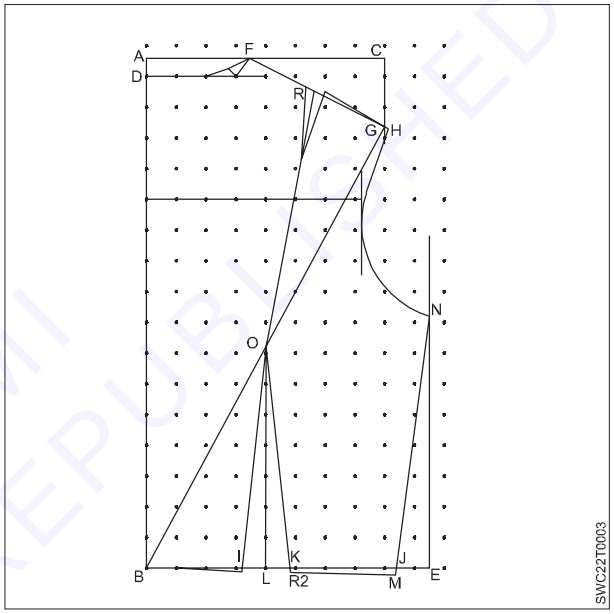
Ruler/Scale

French curve

Cello tape to stick the paper

Based on the measurements and with drafting formula or procedure, drafting will be made for Bodice front, Bodice back, Sleeve, Skirt front, Skirt back, Trouser front, Trouser back etc. Given below figure for the reference of drafting.





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Concepts of Pattern making

Pattern making is the process of creating a blueprint of the garment. A pattern is used as a template to cut out fabric that matches the required specifications to sew a garment. It factors in the type of fabric, the intended fit on the wearer, and any trims that will be used. The pattern is used to make 2D fabric sit properly on a 3D body.

Pattern making is the art of manipulating and shaping a flat piece of fabric to conform to one or more curves of the human figure. Pattern making is a bridge function between design and production. A sketch can be turned into a garment via a pattern which interprets the design in the form of the garment components.

A pattern is flat while the body is not. The body has height, width and depth. Within this roughly cylindrical framework there are a series of secondary curves and bulges, which are of concern to the pattern maker. Darts are the basis of all pattern making. They convert the flat piece of cloth into a three dimensional form, which fits the bulges of the body.

A patternmaker typically makes a pattern from a flat sketch with measurements or a two dimensional fashion illustration. The basic pattern is the very foundation upon which pattern making, fit and design are based. The basic pattern is the starting point for flat pattern designing. It is a simple pattern that fits the body with just enough ease for movement and comfort.

Pattern making involves three main methods

- Drafting
- Draping
- Flat paper patternmaking

1 Drafting

It involves measurements derived from sizing systems or accurate measurements taken on a person, dress or body form. Measurements for chest, waist, hip and so on, and ease allowances are marked on paper and construction lines are drawn to complete the pattern. Drafting is used to create basic, foundation or design patterns.

2 Draping

It involves the draping of a two dimensional piece of fabric around a form, conforming to its shape, creating a three-dimensional fabric pattern. This muslin is transferred to paper to be used as a final pattern. Ease allowances for movement are added to make the garment comfortable to wear. Advantage of draping is that the designer can see the overall design effect of the finished garment on the body form before the garment piece is cut and sewn. However, it is more expensive and time consuming than flat pattern making.

3 Flat Pattern Making

It involves the development of a fitted basic pattern with comfort ease to fit a person or body form. A sloper is the starting point for flat pattern designing. It is a simple pattern that fits the body with just enough ease for movement and comfort. Five basic pattern pieces are used for women's clothing. They include a snug-fitting bodice front and bodice back with darts and a basic neckline, a sleeve and a fitted skirt front and back with darts. However, as fashion changes frequently women's styles change frequently. These basic slopers are then manipulated to create fashions.

A basic sloper has no seam allowances, which facilitates its manipulations to various styles. It has no design interest, only construction lines are marked on it. It is necessary that the basic structure of a sloper should be such that adjustments can be introduced easily. For a good pattern making, accurate measurements are of utmost importance. The flat patternmaking method is widely used in the ready-to-wear market because it is fast and accurate.

Pattern making tools

1 Straight pins

The dressmaker used it for draping and fitting.

2 Straight pin holder

Pin cushion or magnetic holder which is used for wrist and table.

3 Scissors

There are different types of scissors such as paper scissors, fabric scissors, etc.

4 Pencils and pens

- Mechanical pencil and sharpener which is used for pattern work.
- Red and blue colored pencils are used to identify pattern changes. Black, green, red and blue felt tip pens for pattern information.

5 Rulers

- Tailors square (24 × 14) inch metal ruler with two arms forming a 90® angle that measures, rules and squares simultaneously.
- Also used to a triangle with the measurements to straight lines.

6 Curve rules

A French curve is one of the several curves used for shaping the armhole and neckline.

7 Hanger hooks or ringers

It is used to hold the patterns together for hanging on rods.

8 Pushpins

Pushpins are used for pattern manipulation. It also prevents pattern slippage when cutting several plies of paper together.

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9 Magic mend scotch tape

It is used to mend pattern work.

10 Black twill tape

Black twill tape is used for the placement of style lines on garments.

11 Notcher

It is used to indicate seam allowance, centerline, and also to identify the front and back of patterns.

12Tracing wheels

It is used to transfer pattern shapes into the paper.

13 Awl

It is used to indicate the ending of darts, pocket, trim, and buttonhole placements.

14 Metal weight

Metal weight is used to hold the patterns in place for tracing and marking.

15 Measuring tape

It is used to measure the size of the pattern.

16 Tailor's chalk

Tailor's chalk is used for making adjusted seams and style lines.

Pattern making is made from the drafting in the white paper. The white paper drafting will be traced into the brown colour thick pattern paper. It is traced all lines and curves get transferred into the brown paper.

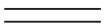
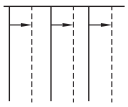
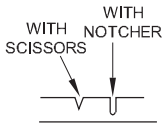
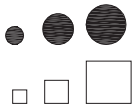
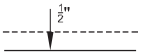
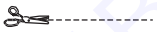
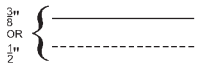
In the Brown paper, given below pattern making details should include:

- Grain lines
- Notches
- Balance points
- CF and CB info
- Design name
- Design code
- Size
- Number of pieces to be cut

Pattern symbols

TB	True Bias (45°)		Bias Grainline
CF	Centre Front		Grainline (Length grain and cross grain)
CB	Centre Back		Grainline on fold
F	Front		
B	Back		Centre bust point

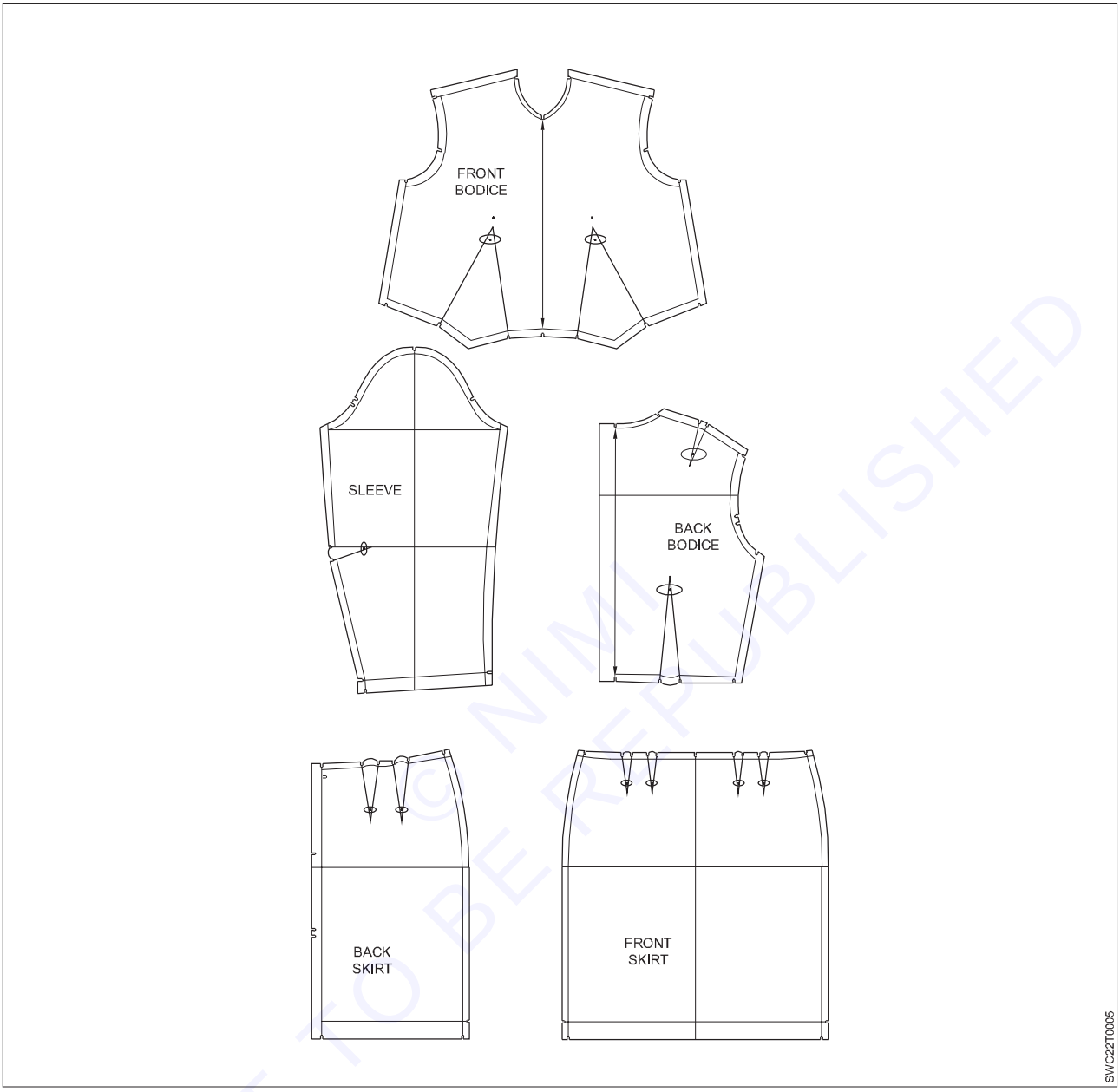
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Wl	Waist line	———	Cutting line
Ah	Armhole	- - - - - -	Stitching line
Ss	Side Seam		Dart
Nl	Neckline		Lengthen or shorten lines
Sh	Shoulder		Fold pleats
	Notches		Squares and dots used as match points, much like notches, or they're used to indicate where to start and stop sewing
	Button		Shifting lines
	Button hole		Cutting Line
	Zipper marking		Adjustment Line
	Seam Allowance Marking		

After the finalization of the pattern, it will be send it to the production

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Example for the Basic Pattern set with Pattern symbols



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Concepts of Grading

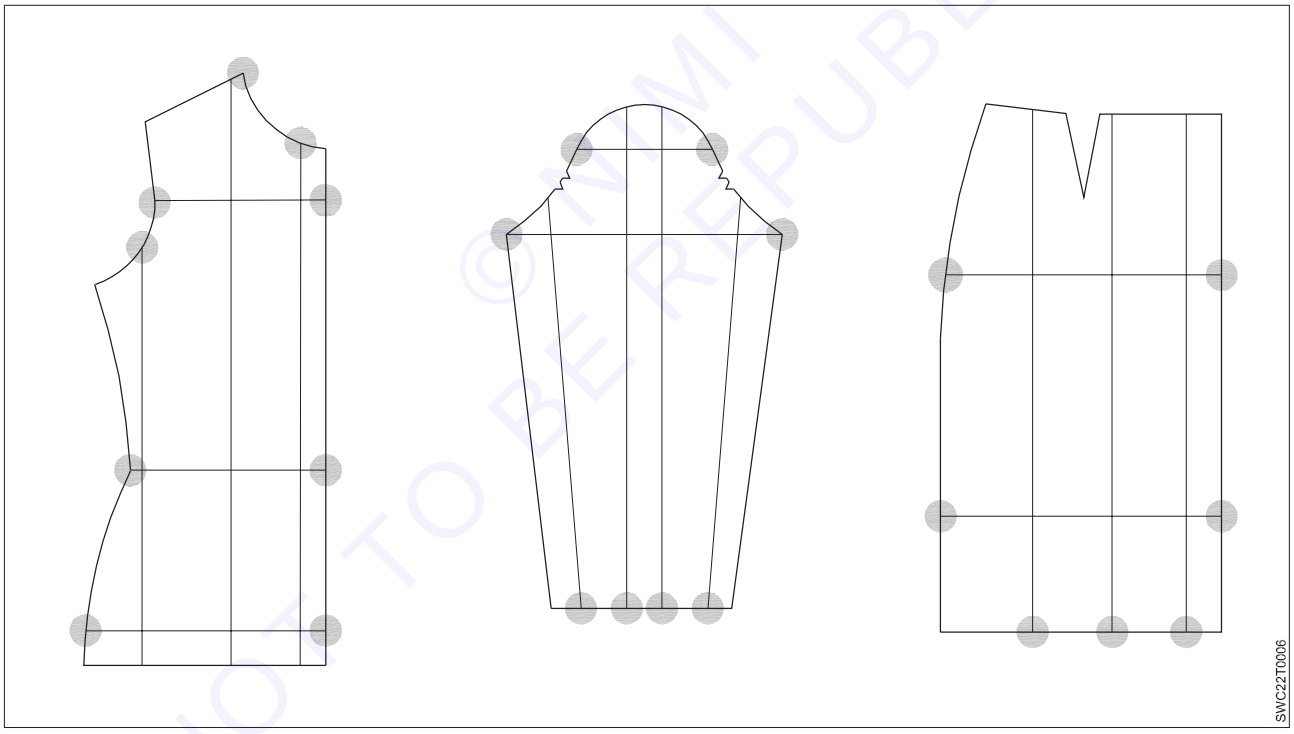
Pattern grading is a technique used to increase or decrease the size of a garment pattern according to the measurements in a given size chart. Pattern grading is the drafting process of enlarging or diminishing a style pattern into patterns for other sizes. The function of grading is to see that this is accomplished with proper fit for the other size without changing the style sense of the original model.

This can be done manually or digitally using computerized pattern making software. These increments are referred to as garment grading rules. For example, every clothing brand has own size chart and different grading rules.

Through pattern grading, can maintain the essence of the garment without altering the shape, fit, dimensions, design, or the balance of garment. With the use of pattern grading, it is possible to take one design and create alternate dimensions as the size of the dress changes. This allows designers and sewers of apparel to create one middle size, and then grade up or down as necessary.

Grading Terminology:

- Grade – The 'grade' of a pattern is the incremental increase or decrease in a pattern size at a given cardinal point. For example; a large majority of commercial patterns will have a 2″ grade. This means that there is a 2″ difference between sizes.
- Grading – The process of increasing or decreasing the dimensions of a base pattern style.
- Cardinal Points – The points on a pattern where it either increases or decreases. E.g.: Neck, shoulder, armhole, length, girth etc.



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- Base pattern – The original pattern created (usually the middle of the size run). This is an industry term, the base pattern would be whatever pattern is working with.

For example, given below size column, Medium [M] is the base size.

Size	XS	S	**[M]**	L	XXL
			Base Pattern		
Bust	32	34	**36**	38	40

- Trueing – is the process of smoothing and shaping angular and curved lines on a seam to create a nice transition. Trueing includes checking to make sure seam lengths match, corners are 90° angles where necessary, as well as folding darts to create proper seam pattern shape.
- Size Run – The sizes included in a specific style. For example; small, medium, large, XL … or, 4, 6, 8, 10, 12.
- Cut and Spread | Cut and Overlap – The process of manually grading a sewing pattern by cutting the pattern apart and increasing or decreasing its size.
- Pattern Shifting – The process of manually grading by shifting a pattern back and forth to increase or decrease its size.
- Suppression grading – This term is applied when the amount of suppression in a pattern is increased or decreased. Suppression is all forms of darts, seams, pleats and gathers which are used to control shapes or contours. It is nothing to do with styling. The suppression is to reduce the girth measurements in relation to another adjacent girth measurement.
- Balance –These are various interpretations of balance, but it refers to the relationship between the front length from CF neck over the bust to waist and floor, and back length from nape to centre back waist to floor.
- Nested (stacked) grading – This described the superimposing of one size on another so that the progression of increase is clearly visible.

Grading Techniques

The basic pattern grading methods are mainly divided into 2 types. They are

1 Manual pattern grading or two dimensional grading.

2 Computer-aided pattern grading or three dimensional grading.

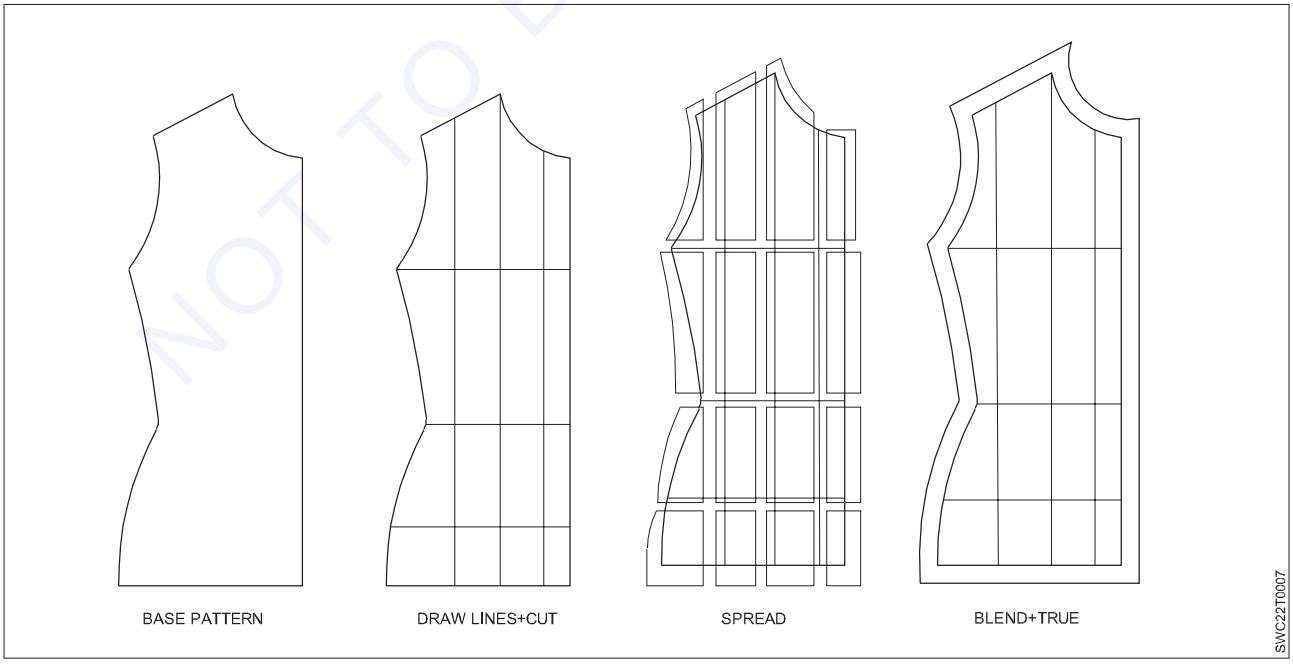
1 Manual pattern grading or two dimensional grading

The desired range of sizes is created, one by one, using a pattern template. Marks are made around the master pattern at the appropriate distances and the marks the later joined up to form the enlarge pattern.

There are two basic methods of pattern grading:

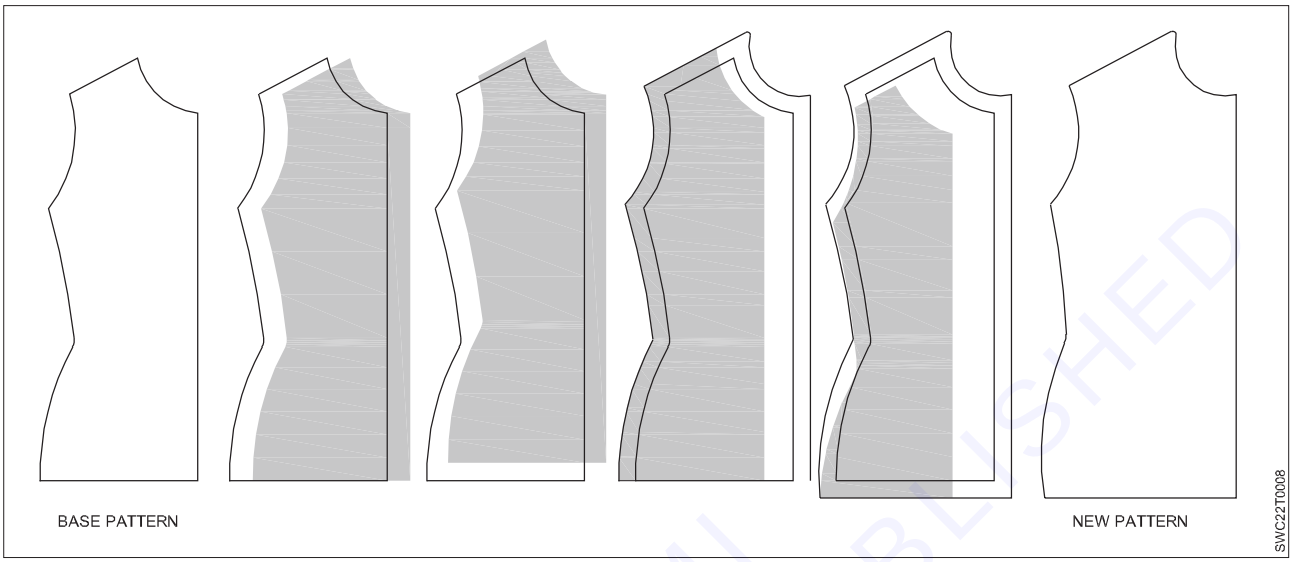
- **Cut and Spread**

Cut and Spread grading method are starts by the use of tracing and marking techniques from the original master pattern to a white paper. Ensure that all the marking lines like grain line, darts are visible here. In this method original patterns are cut vertically into 3 parts and spread the cutting pieces by a specific amount to grade up. Then overlap them to grade down. To do this process, only scissors, a pencil, measurement tape, and a ruler are required.



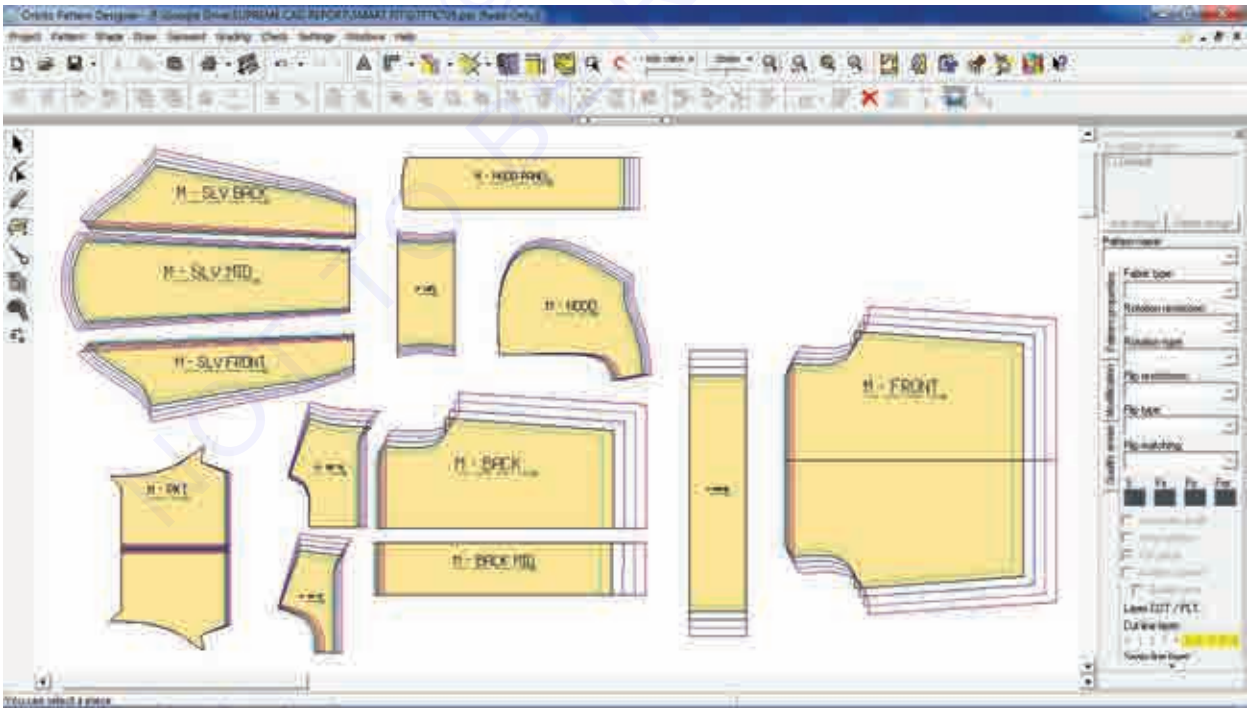
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Pattern Shifting: Pattern shifting is another process of pattern grading. When pattern maker or fashion designer want to increase or decrease the overall dimensions of a pattern to get different sizes is called pattern shifting. To make the pattern larger, transfer the original pattern onto another sheet of paper. To make it smaller, they will have to trim the edges to the desired dimensions. It is done by moving the master pattern a certain measured distance up and down and left and right using a special designed ruler. To get the same result as the cut and spread method designer redraw the outlines.



Computer-aided pattern grading or three dimensional grading

Computer grading (CAD) is the fastest pattern grading techniques., It is only used by larger fashion or apparel manufacturers for their production process. This method is used to get more accurate, precise, detailed patterns in a short time. Computer grading is the most recent development in grading technology. It is also the fastest method. Computer grading, however, is expensive and usually only large manufacturers can afford it.



Concepts of Draping

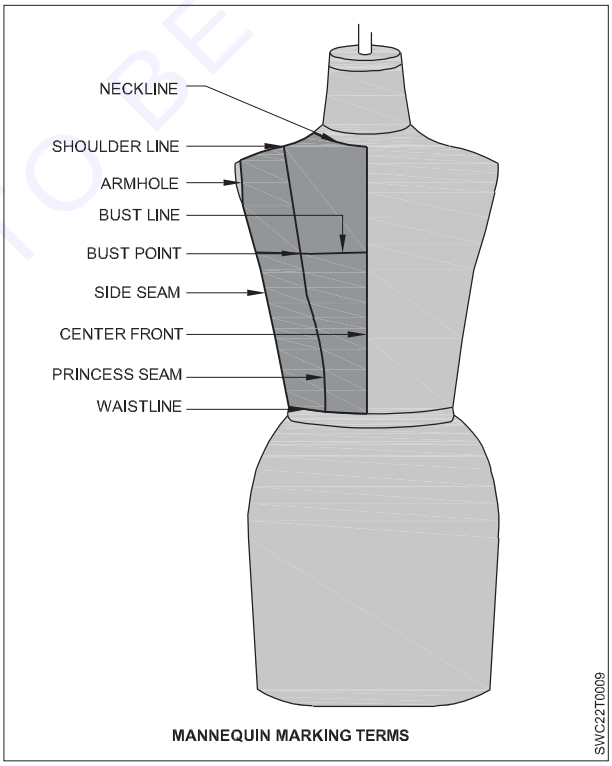
Draping is a technique used to make a 3-dimensional dress pattern with the aid of a dress form figure by pinning and placing fabric against the form to create a garment. Typically designers use muslin, which is cost-efficient and offered in a variety of weights.

The techniques for draping fabric necessitate an understanding of the fabric's characteristics. Designers and drapers must be able to distinguish between different fabrics to select the most suitable ones for achieving the desired flow and lines in each design.

Draping of Basic Block



Mannequin marking terms



MANNEQUIN MARKING TERMS

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Draping Tools

Draping tools are necessary to drape, measure, mark and draft designs.

1 **Awl:** It is a pointed metal instrument used for punching holes for belt eyelets.

2 **1/8-inch Clear Plastic Ruler:** It is a two-inch wide ruler divided into 1/8-inch grids.

3 **French Curve Ruler:** An irregular curve ruler used to shape and curve edges of collars, necklines, crotch seams, armhole and hip curves.

4 **Iron:** A steam-and-dry iron is used to smoothen and flatten and aid in blocking muslin.

5 **L-Square:** A metal or plastic ruler with two arms of different lengths meeting at right angles.

6 **Muslin:** An inexpensive fabric, on which the grain and cross grain are quite visible. Basically it is used to drape garments made of woven goods.

7 **Notcher:** A punching tool used to mark the edge of a sloper or paper pattern.

8 **Pencils:** Pencils are used in developing muslin patterns.

9 **Pin Cushion or Pin Dispenser:** A sewing tool that keeps pins organized in a convenient place.

10 **Scissors and Shears:** Shears are usually four-to eight inches long and made of steel Bent-handled shears are excellent for easy and straight cutting.

11 **Style Tape:** A narrow, woven tape that is used to define style lines on the dress form.

12 **Straight Pins:** Dressmaker pins with sharp tapering points that will not rust are used to anchor muslin or fabric to the dress form while draping.

13 **Tailor's Chalk:** A small piece of chalk, with two tapered edges. It is used to mark lines temporarily on different points of garment and other alteration points.

14 **Tracing Wheel:** It is a sharp, spike edged circular wheel with a handle, particularly used to transfer markings from the drape to the pattern paper.

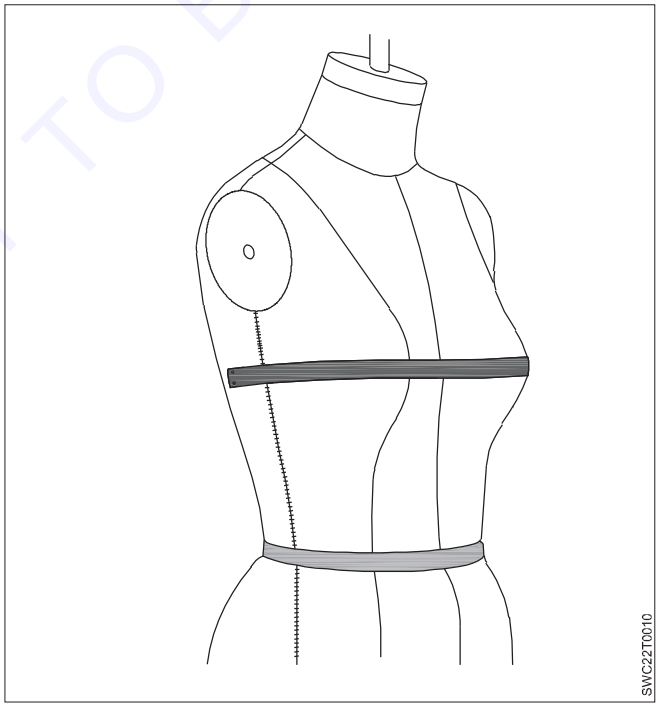
15 **Yardstick:** A wooden or metal ruler one yard in length (36 inches) that is marked in inches or metric terms, An aid for laying pattern pieces on the straight grain of the fabric or for measuring hemlines.

Pin the body form with style tape

Mark all major points and seams to create guidelines for the garment, which will keep the draping even.

Apply style tape to the fullest point of the bust, starting at the center front to the side seam. Repeat with the smallest part of the waist and widest hip point.

Along the backside, style tape should be placed horizontally at shoulder blade level reaching from CB to the armhole ridge.



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The important points that should be taken care of when draping the fabrics on dress forms are:

1 GSM of the Fabric (Weight)

2 The bias, selvage of the fabric

3 Pattern, texture and muslin mock-ups

4 Darts, seam location, finishing



Fashion Draping Techniques

As Draping is the art of creating a garment by arranging the fabric around a dress form. This is usually done by utilizing the fabric's natural fall. For the uninformed, draping involves different techniques such as pleating and gathering to create a dramatic effect. However, to master this art one needs to understand each and every aspect of draping, hence there are six basic steps for draping to get you started:

1 Prepping

The first step is to have perfect and accurate measurements of the garment or dress form. Next, part is to mark the center line of the dress by using a tape. This will help to keep the draping even across the dress. Need to cut the fabric in correct straight line of horizontal and vertical.



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2 Sketch

Preparing a sketch or illustration of your garment always helps in designing the garment. This helps us to give clear idea about how to go for draping. Here, the sketch will help to understand how to best manipulate the fabric in order to get the dramatic and creative effect.

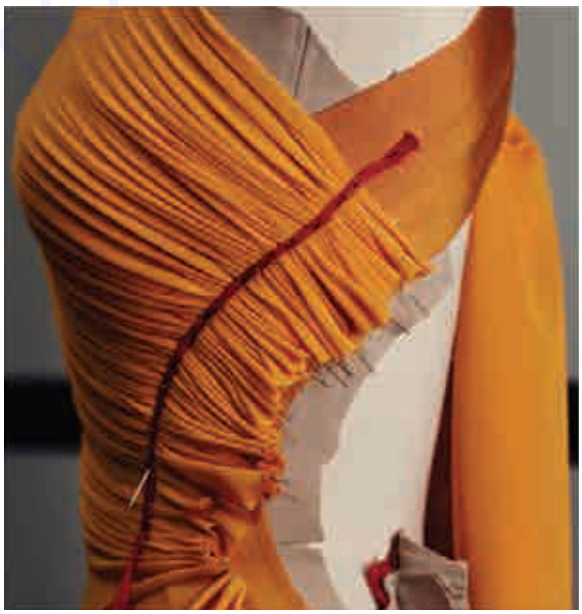


3 Muslin

This is the most common fabric used in draping process; it is flexible in its thickness and volume. Thus, giving a chance to designers for experiment and play around as your requirement.

4 Pinning

Pinning is a process which pulls the folds of the fabric together to create the draping design on the body form. Pinning will give you a good visualization of how the garment will look after completion. Simultaneously, use pencil to draw armhole, side seam, waist seam, neckline, darts etc., it will be useful for tracing into the drafting paper.



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5 Basting the Fabric

Once it is finished with draping and pinning on the body form, the next step is to baste the fabric. In this step, either sew the fabric to the foundation piece or sew the fabric itself to complete the draping process.

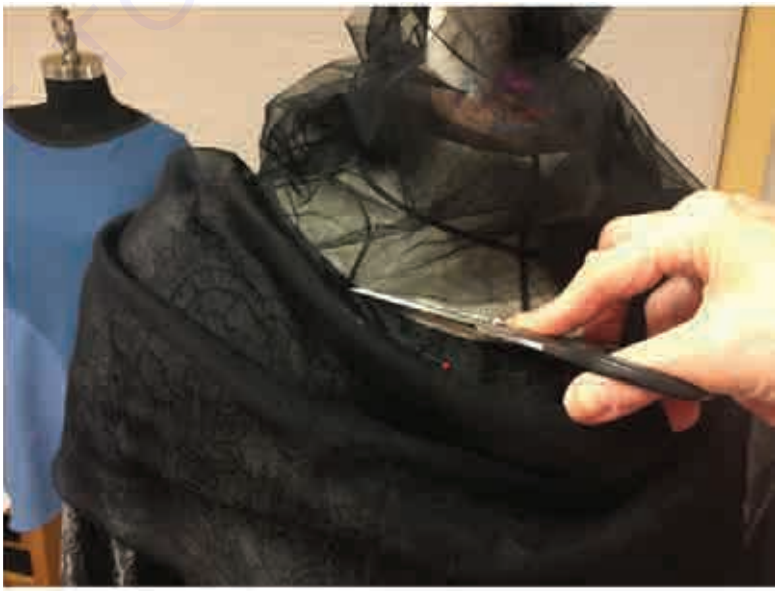


6 Trimming

The last step is common across various designing techniques. Here, trim off any excess fabrics that may remain after it is finished with draping. The raw edges of the draping should always be hidden neatly in the seams, so that it looks perfect and clean. It is required to add seam allowance and neatly pinned.

After finishing the draping, take out the pinned fabric from the body form. Open the fabric, use French curve to reshape of neckline and armhole, can use ruler for the straight lines. After that place the fabric in the drafting paper, by using the tracing wheel and trace the draping fabric into drafting paper.

This is the technique making the Pattern from the Fabric.



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Concepts of Stitching

Stitch Forming Devices

The basic principle of all machine sewing depends on consistent loop formation. During sewing the needle descends through the fabric to the bottom of its stroke and as the needle rises a loop of sewing thread is formed in the scarf of the needle. This loop of sewing thread is picked up by one of two stitch forming devices namely the hook or the looper. A third stitch forming device known as a spreader is used in some stitch types to carry the sewing thread from one stitch forming device to another.

The sewing machine hook is it rotary or oscillating shuttle interlocks the needle thread with the bobbin thread. A looper, used in chain stitch formations, interloops the thread that it carries with another thread.

Steps of Stitch Formation

There are five basic steps to the formation of all stitch types. They are:

1 **Penetration –** the needle penetrates the fabric carrying the needle thread

2 **Loop formation –** a loop of sewing thread is formed in the scarf of the needle as the needle begins to rise from the bottom of its stroke

3 **Conformation –** this is where the threads are arranged above, below or around the material being sewn

4 **Cast off –** is where the needle thread loop is freed from the lower stitch forming device

5 **Stitch setting –** when the thread is drawn onto or into the material

A series of repetitive stitches of one pattern is termed a stitch. The stitch could be formed in any of the three methods given below:

- **Inter looping:** It is created by passing the loop of one thread through the loop of another sewing thread.
- **Intra looping:** It is created by passing the loop of one thread through the loop of the same thread.
- **Interlacing:** One thread passes over another thread.

The six stitch classes included in the British Standard are as follows:

1 Class 100: Chain stitch

2 Class 200: Hand stitch

3 Class 300: Lock stitch

4 Class 400: Multi-thread chain stitch

5 Class 500: Over-edge chain stitch

6 Class 600: Covering chain stitch

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MODULE 2 :Study of different computer software in garment industry

LESSON 3 : Trade knowledge role of CAD in garment industry

Objectives

At the end of this lesson, you shall be able to

- explain about the details of CAD software.
- describe about the basic of paint, corel draw, adobe photoshop.
- explain about the importance of pattern.

Trade knowledge role of CAD in garment industry

Computers have influenced every sphere of our life in one way or other. Computers are making human life easier and comfortable. Computers are helping to design, analyse and manufacture the product with short span of time in engineering applications. A computer is a fast and accurate data manipulating system that is designed to automatically accept and store input data. Process them and produce output results under the directions of a stored program. Computer is a tool to increase productivity in many aspects of our life.

Computer-aided design (CAD) is the use of computer systems to assist in the creation, modification, analysis, or optimization of a design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing. CAD output is often in the form of electronic file for print, machining, or other manufacturing operations. Commonly used software used for CAD are AUTO CAD, MSVISIO, Smart Draw etc.

CAD software is used in the textile industry: Helps designers to draw accurately. It can see the products in 3D. It rotates the design and views it from all angles. To make changes and modifications quickly and easily. To experiment with different patterns, textures and colour ways. To develop basic or standardised designs. To improve the quality of the design.

Basic knowledge about various aspects of CAD operations

CAD (Computer-Aided Design) operations refer to the various tasks and processes performed using CAD software to create, modify, and analyze digital models of objects or systems. CAD operations are extensively used in industries such as architecture, engineering, manufacturing, and product design. Here are some common CAD operations:

1 **Drawing and Sketching:** CAD software provides tools to create precise 2D and 3D drawings. Users can sketch lines, arcs, circles, and other geometric shapes using specialized drawing tools. These tools often include options for controlling dimensions, angles, and alignment.

2 **Modifying and Editing:** CAD allows users to modify existing geometry. Operations like scaling, stretching, rotating, mirroring, and offsetting can be applied to selected elements. CAD software also offers features to trim, extend, fillet (create rounded corners), chamfer (create beveled edges), and join different entities.

3 **Parametric Modeling:** Parametric modeling is a powerful feature in CAD software that enables users to define and control geometric relationships between elements. By using parameters, such as dimensions or variables, users can easily modify the design by changing these parameters, which automatically updates related geometry.

4 **Assembly Design:** CAD software allows the creation and management of assemblies, where multiple components or parts are combined to form a complete product. Assembly operations involve positioning, aligning, and constraining parts relative to each other. Users can define relationships like mating, aligning, or restricting the movement of components within the assembly.

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5 **3D Modeling:** CAD software enables the creation of complex 3D models. Users can construct solid or surface models using features like extrusion, revolve, loft, sweep, and boolean operations (union, subtract, intersect). These operations allow for the creation of intricate shapes and forms.

6 **Analysis and Simulation:** CAD tools often incorporate analysis capabilities to evaluate the performance and behavior of designs. This includes stress analysis, thermal analysis, motion analysis, and fluid dynamics simulations. By simulating real-world conditions, engineers can identify potential issues, optimize designs, and ensure functionality.

7 **Documentation and Presentation:** CAD software provides tools for generating technical drawings, annotations, and documentation. Users can create detailed 2D drawings with dimensions, notes, symbols, and labels. Additionally, rendering and visualization features allow for the creation of realistic images or animations to present the design to clients or stakeholders.

CAD operations are highly versatile, allowing designers and engineers to efficiently create, modify, and analyze complex digital models. The specific tools and operations available may vary depending on the CAD software being used, but these are some of the fundamental operations commonly employed.

Basic knowledge about various aspects of Paint

The Paint Window – MS Paint

This is the view of the top of the Paint window.

At the very top is the Title Bar, just as in all programs, below it is a Menu Bar and below that is the **Ribbon**.

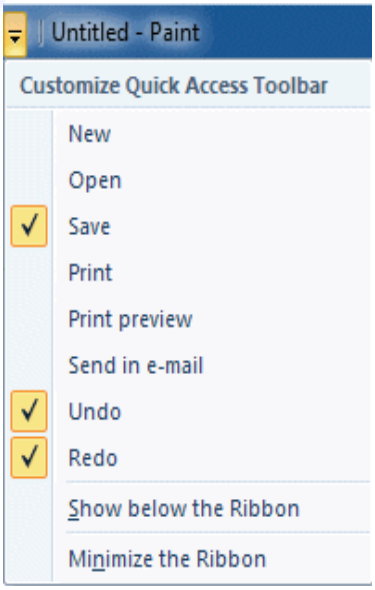


The Title Bar



At the left end of the Title Bar the first item shows a little paint palette. If clicked, this button opens a standard window menu, offering Restore, Move, Size, Minimise, Maximise and Close.

The next four items make up the **Quick Access Bar**, offering buttons for **Save, Undo**, Redo and Customise.

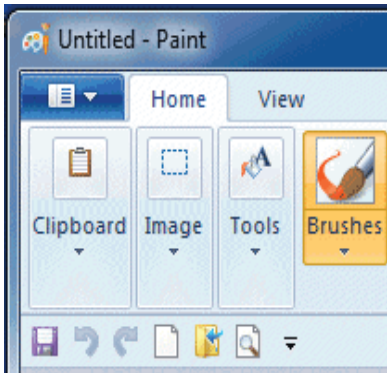


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How to move Quick Access Toolbar to below the Ribbon



To **Save, Undo** and **Redo** below the ribbon, move the cursor over the left end of the title bar until the **Customise** icon lights up. Click and a menu will appear.

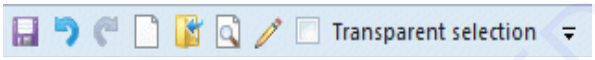


Near the bottom of the menu that appears, **Show below the Ribbon**. Click **Show below the Ribbon**.

To add **New**—for a new Paint page,

Open—to open a previously saved and closed picture, and **Print Preview**.

Adding Ribbon items to the Quick Access Toolbar



Many other items can be added to the Quick Access Toolbar. On the Ribbon, right click on anything you'd like to add to the Quick Access Toolbar and a menu will appear. This includes things offered in sub-menus. I've added the Pencil tool and Paste Transparent.

To remove items which added from the Ribbon, right click the unwanted icon and then click the Remove option.

Other things on the Title Bar

After the Quick Access items, see the title of the picture followed by the name of the program—Paint, of course. If haven't yet saved the picture, the name will be shown as "Untitled".



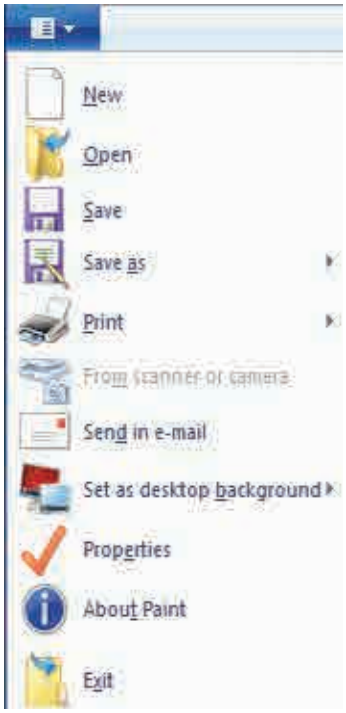
At the right-hand end of the Title Bar are the three usual window buttons, Minimise, Maximise and Close. If the Paint Window is already maximised—taking up of entire screen—the middle button will be Restore, which makes the window the size usually have it.

The Menu Bar



The Menu bar has three items on the left and a Help button at the far right.

Paint Button: First on the left is the **Paint Button**, which opens a very comprehensive menu, similar to that shown here, plus a list of pictures has recently saved. Most items are self-explanatory, but one—Save as— is very important if ever want to save a cutout without losing the rest of the picture.



Properties dialogue

The Properties dialogue, for instance, will give the information about the picture on which have currently working, and let nominate whether want to work in centimetres, inches or pixels.

There's an option that helps to set the current picture as a desktop background. Can change it often as per wish.

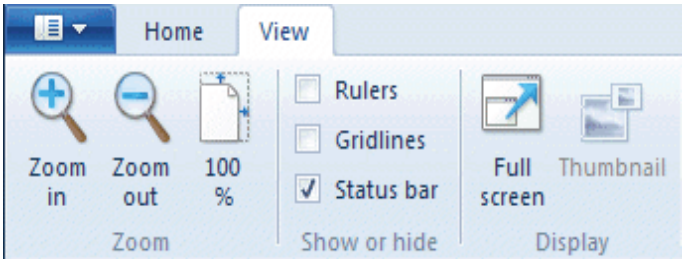
Home Tab

The Home tab contains the Ribbon, from which tools and colors are selected. When making use of the View tab, can flick back and forth between Home and View as often as required.

View Tab

Click on the View tab to bring it to the front and find a whole set of useful options available. These can be used alone or in conjunction with the Zoom Tool on the Ribbon or the slider on the Status Bar.

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Zoom in and **Zoom out** tools can be clicked repeatedly to get a closer or more distant view.

On the **Show or Hide** part of this tab, the option of hiding the status bar.

Gridlines are convenient to align shapes accurately.

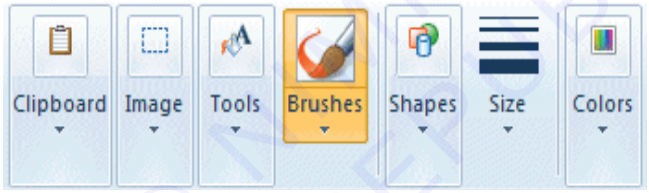
Rulers, To show or hide the horizontal and vertical rulers, click View Ruler at the top of the vertical scroll bar.

On the Display section, click for Full Screen View, press F11 for Full Screen View. In either case, come back to a normal view by pressing the Esc key.

Thumbnail is only available while zoomed in. It is useful to see how changes make are affecting the picture in normal view.

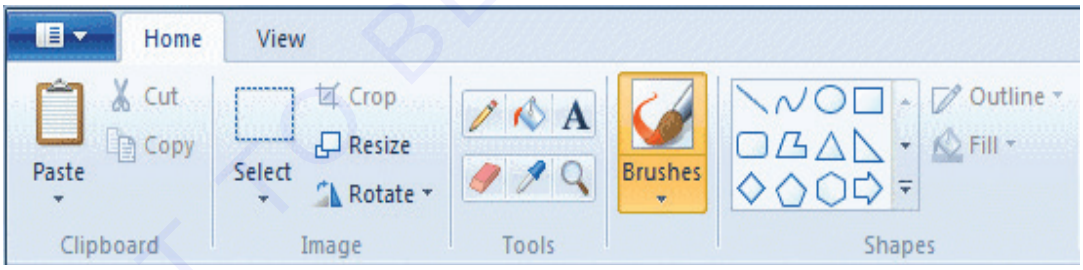
The Ribbon

All the tools, the color palette, and most commands are grouped together in the ribbon. The exceptions are Save, Undo and Redo, which are shown at the left end of the title bar, in the Quick Access Toolbar.



If choose to use a very small window, then the ribbon will appear like this. Drop-down arrows below each item will the access to everything in the menus.

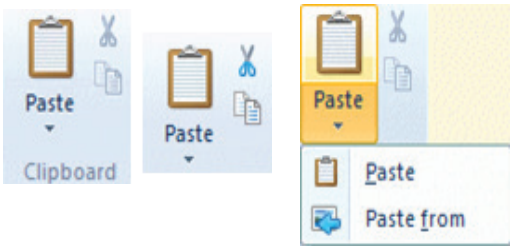
If using a very large window, then it will have many more menu items on display.



There is also an option to minimise the ribbon, it will disappear entire the ribbon, but pops into view if you click on the Home tab.

The Clipboard Menu

The clipboard menu offers three options—Cut, Copy and Paste.



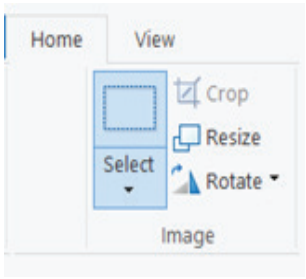
Only when a selection is active will the Cut and Copy icons show as being ready.

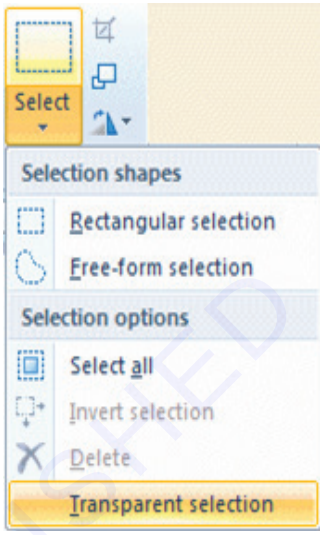
Paste is always active, would like to Paste from a picture on the computer. If previously drawn and saved a small flower and now wish to add it to the present drawing. Click the down arrow under Paste, click Paste from and navigate to the saved picture, click its name and click Open.

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Returned to the work space and see the added picture inside a selection rectangle, ready to drag to its permanent position.

The Image Menu—Select

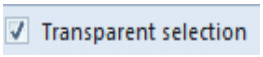




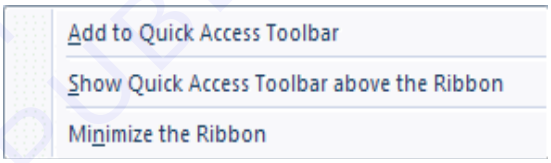
Depending on the size of the window, the Image Menu will look like one of these. When click the down arrow just below the dotted rectangle, or just below the word Image, a menu will offer the further choices.

Before using the buttons on the right of this menu, you select the part of the drawing that want to work with.

Transparent selection

At the bottom of the Select menu – select – Transparent selection. 

To make selections opaque, just click the checkbox to remove the tick.



Rectangular selection

After clicking the rectangular selection tool, position the cross-hair cursor at the top left of the part want to select, press the mouse button and drag down to its bottom right.

A dashed rectangle will appear around your selection, with the move cursor replacing the cross-hair one. Press this cursor down anywhere inside the selection and drag to move it, or drag while holding the Ctrl key to make a copy of it.

Freeform selection

Freeform selection, part of the drawing that to work with is crowded up closely with parts and don't want to include.



After clicking Freeform selection, drag the mouse around the area that want to draw a line around it. When release the mouse button, a selection rectangle will appear and it may seem that unwanted parts of the drawing have been included.

Copying a selection

Copy button on the ribbon, want to make multiple copies of a selection.



Draw a selection around the part to copy, using either the rectangular or the freeform selection tool. The cursor over the selection until the Move Cursor appears.

Hold the Ctrl key as begin to drag a copy to its new location. Click and want to continue copying, press the Ctrl key again begin to drag the second time. Repeat as many times as needed.

Painting with a selection

Select a tiny piece from a picture, choosing something with more than one color. Hold down the Shift key while drag it around to make an abstract pattern.

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Selection options

To the right of the selection icon, there are three options, Crop, Resize and Rotate flip.

Crop

The top button, a diamond shape with a line through it, crops the picture so that only the selected area remains. This has replaced the old Copy to option and to save cutouts from a drawing.

Click the Save icon after cropping to a selection, and the large drawing page will be replaced with the cutout.

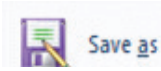
How to save a cutout

1 Save the picture.

2 Select the part to save as a cutout.

3 Click the Crop button.

4  Go to the Paint button and open the menu.

5 

Click **Save as**. Make sure to click Save as and not Save.

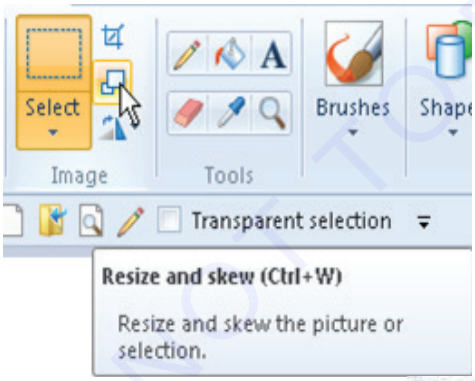
6 Type a name for the cutout and click Save.

It will return to the Paint window with the cutout displayed in it. Can view the name on the Title bar is the name used when saving the cutout.

Click the Open icon on Quick Access Toolbar or from the Paint Button menu.

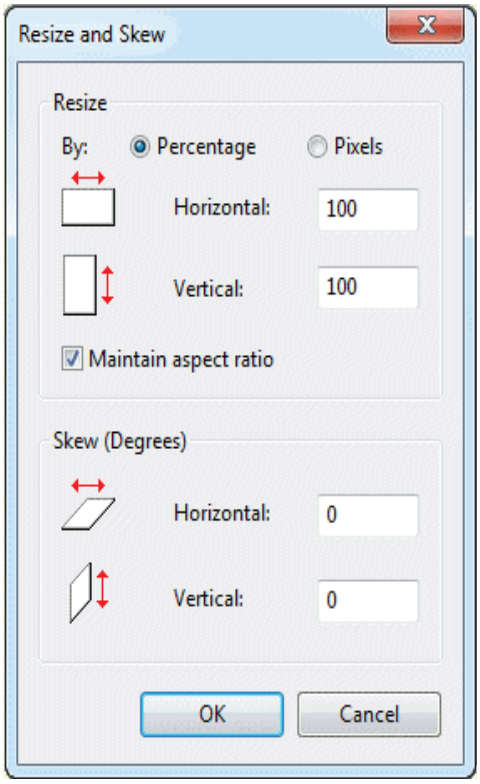
7 Open the picture to wish to continue working.

Resize and Skew



The second tiny button to the right of the large Select button will open the Resize and Skew dialogue.



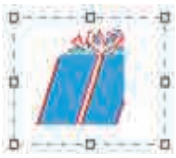


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Resize

Click the little blocks—or handles—on the selection rectangle. Cursor over the handle wants to pull or push until a double-ended arrow appears. Press down the mouse button and adjust the shape.

To do the size adjustment to be precise, use the Resize dialogue, which will appear when click the Resize icon. Only the top half of this dialogue is concerned with resizing.



The small square marked Maintain aspect ratio. While this is ticked, whatever typed into the Horizontal slot will be repeated beside Vertical and selection will stay exactly in proportion. Only remove the tick if want the selection to be fatter or thinner than it is.

Skew



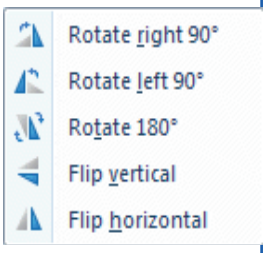
The bottom part of the same dialogue box show to skew the selection. When using this option, make the selection include a lot of border area to avoid having part of the picture chopped off. If this does happen, click Undo and make a wider selection before trying again.

Always have your background color—most probably white—on Color 2 when skewing and moving.

For example, this selection has been skewed 30 degrees both horizontally and vertically. The other blue box was skewed 20 degrees horizontally.



Rotate or flip



This menu to make mirror images of selections, either vertically or horizontally, and rotate an item 90 degrees.

To make a mirror image and looks symmetrical, copy half of the picture, flip it and join it to itself.

The Tools Menu

Pencil



The pencil tool can be used for free-hand drawing, or it can be used in a zoomed in view for pixel-by-pixel editing.

When working with the pencil tool, press with the left mouse button to draw with Color 1 and with the right mouse button to draw with Color 2. Color 1 in previous versions of Paint was referred to as the Foreground color, while Color 2 was the Background color.

The pencil's thickness can be changed in the Size tab to 1, 2, 3 or 4 pixels.



Fill with Color

The Fill with color tool, or the Flood Fill, is used to fill an area of a single color with a different color. Color 1 will be used to press the left mouse button on the area to be filled. Color 2 will be used to press with the right mouse button.

The Text Tool

To begin inserting text, click on the text tool.

The Text Toolbar appears.

Cursor may change into an insertion bar.

Type your text.

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Drag the cursor over the text so that it becomes highlighted.

Click the down arrow at the end of the Font Name box, so that a list of fonts drops down.



Run the cursor—without pressing any mouse buttons—up and down the font list. The appearance of the text typed will change appropriately.

Click the Background from Transparent to Opaque or vice versa, and change both Color 1 and Color 2.

Type more text, in a different color and a different font and size, right in the same text box.

The Eraser

Click the left button in the eraser icon, it help to erase any picture or drawing.

The Color Picker

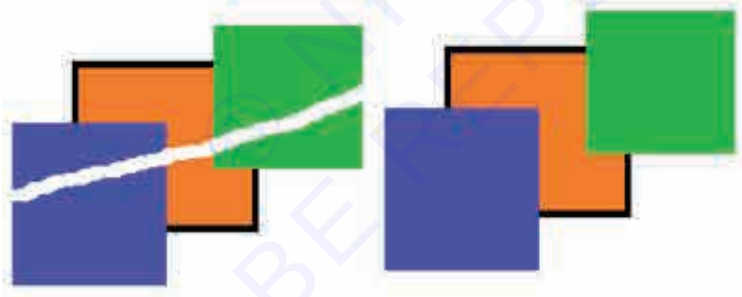
The Color Picker Tool is used to sample and match any color in the picture.

It's especially useful when colors in the picture are different from those on the palette.

This tool will change the color of Pencil tool.

The Magnifier

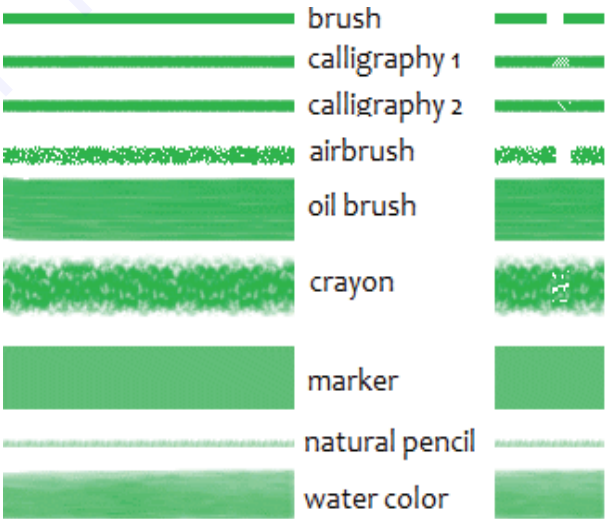
The Magnifier Tool can be clicked over an area to see the closer view. Left clicks give a closer view. Right clicks zoom out.



Brushes

Brushes are various widths and textures.

Widths are controlled by the brushes and the Size Tool together, textures by the brushes.



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It is very useful to fill the colors, to write the text using brushes in different texture and effects.

Shapes – Menu



Basics for All Shapes

In the Shapes Menu, the click the shape and draw and choose the line thickness.

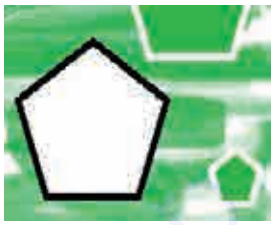
Click the Fill button and click on No Fill, Solid Color or a texture of own choice.

Click the down arrow below the Size picture and click on a line thickness.

Press a mouse button and drag to draw the shape.

If drawing with the left mouse button, Color 1 will be used for the Outline.

If drawing with the right mouse button, Color 1 will be used for the Fill.



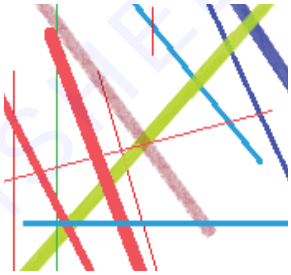
Straight Lines

Straight lines are the first button in the Shapes Menu.

Click the Line button. Click the Outline button and click on Solid Color or a texture.

Draw a line. It will be perfectly straight.

Hold down the Shift key while drawing a line, it will be precisely horizontal, precisely vertical, or precisely at 45 degrees.



Curved Lines

Drawing the curved lines.

Click the little arrow under the Shapes menu and click the Curved Line button.

Click the Outline button and choose Solid Color or a texture of own choice. Then click under the Size picture and choose a line thickness. Choose the colors.



Draw a line.



For a pointed curve, like this one, put the cursor somewhere near the finishing end of the line. With the mouse button pressed, move the cursor around slowly and watch the line following it. The line is perfect as required, release the mouse button.

Put the cursor somewhere close to the beginning of the line, press the mouse button and again move the cursor slowly around until required curved line appears, then release the mouse button.

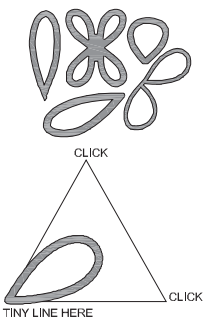


To make a smooth curve, after draw the line, put the cursor close to the beginning of the line.

With the mouse button pressed, move your cursor around slowly until required curved line appears, then release the mouse button.

Closed Curves

To draw a closed curve, first draw a triangle—to be erased later. Make the triangle short and fat or tall and skinny, depending on the finished required shape. Be sure to use a color other than the color use for the finished shape, then can erase it easily.



Having chosen the Curved Line tool, and set line thickness and color, put the cursor to put the required point of the shape.

Press the mouse button and move the cursor the tiniest bit, just enough to convince the program that drawn a very short line. Release the mouse button and click once on each of the other points of the triangle.

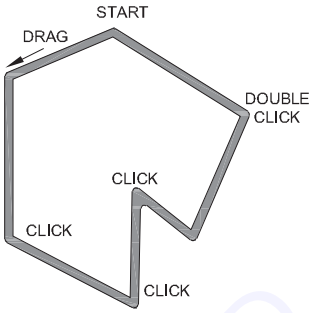
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Ellipse, Rectangles, Circles and Squares

To draw an exact shape—like a square or a circle—hold the Shift key while drawing and release the mouse button before let it go of the Shift key.

Freehand Polygons

To draw a freehand polygon, click the Polygon button in the gallery. After setting Line, Fill, hold a mouse button down and draw the first line of the polygon. Then release the mouse button and click where to want the next line to end. Keep clicking end points until want the last line to finish the shape, and then double click.



Line Thickness, The Size Tool



This tool becomes active only after when chosen either a Brush or a Shape, so choose the Brush or Shape and then click the down arrow under Size and choose a line thickness.

The line thicknesses offered vary according to the brush.

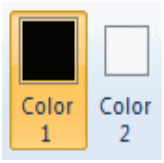
Colors

The Color section of the ribbon has three parts: Boxes showing the active colors—Color 1 and Color2, the Color Palette and the Edit Colors button.

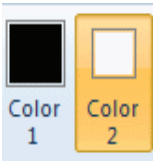
The Color Boxes

Color 1 is the **Foreground Color**, and is always black when open Paint or open a different Paint page.

Color 2 is the **Background Color**, and is always white when open Paint or open a different Paint page.



To change a color, make sure that its Color box is in focus, as shown by the yellowy background. If it is not, simply click it and then, in the Palette, click on the desired color.



An active shape or some active text in the page, the cursor over a color in the Color Palette will make the shape or text take on that color temporarily. Click to apply the change as per the desire.

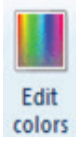
The Color Palette

The two top lines of the Color Palette show all the colors available whenever making a picture.

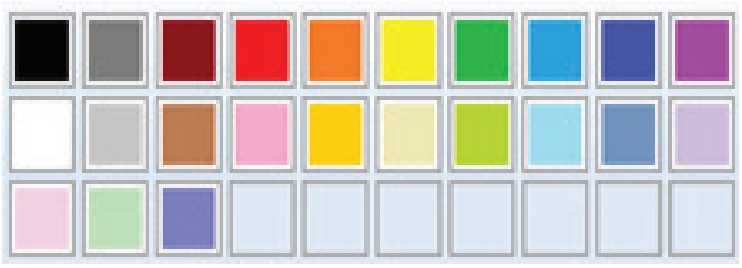
The line of blank squares at the bottom will show any colors have edited during this session. Once Paint is closed, those colors will vanish away.

Edit Colors

The Edit Colors button it will go into the Edit Colors dialogue. In this, extended color palette is available and click to



Add to Custom Colors button.



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As per the requirement, alter the depth of the chosen color by clicking any point on a sliding “dark to light” scale on the right of the dialogue, before click the Add to Custom Colors button.

Click O.K. in this box, only one color will be added to the squares under the palette. To add further colors, must return to the dialogue and add them one at a time.

The Status Bar

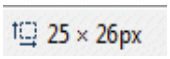
The Status Bar sits at the very bottom of the Paint Window, where it offers information and can be used to help to work. The features can view from left to right.

Cursor Position



The Cursor Position, which is helpful to check the position something precisely.

Selection Size

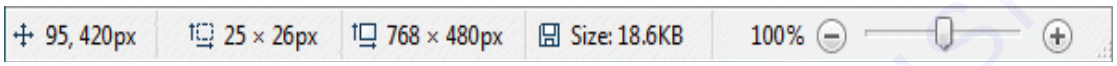


It shows the size of a selection of an object or drawing.

Image Size

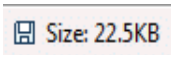


It shows the size of the entire picture, even if it is very large and so not all visible in the window.



Can change the units in the Properties dialogue this measurement will be in pixels, there is an option change into inches or centimeters.

Disk Size



When picture is saved, this will show its Size on Disk. In a very small window, this figure may not be shown.

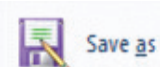
Zoom Slider



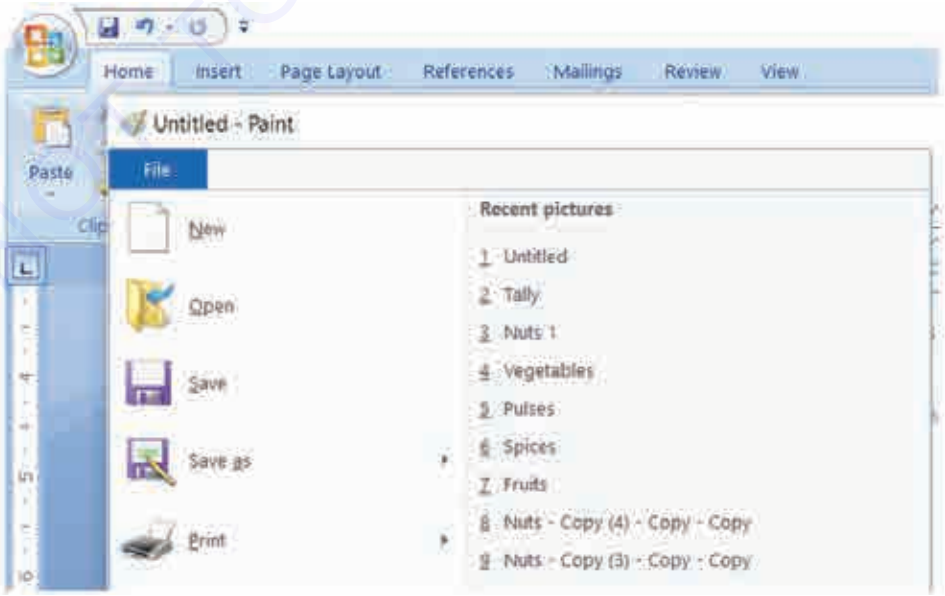
The Zoom Slider is convenient, while working in a zoomed-in and zoom out view. It can’t be use to view zoom in on a particular spot, use the Magnifier to view the spot.

Saving the Work

Saving a Copy—Save as

After completing the work or starting the work to save paint file, go to file and click **Save as**. 

Save allows to update a previously saved file with new content, whereas Save As allows to save a new file or an existing file to a new location with the same or different name.

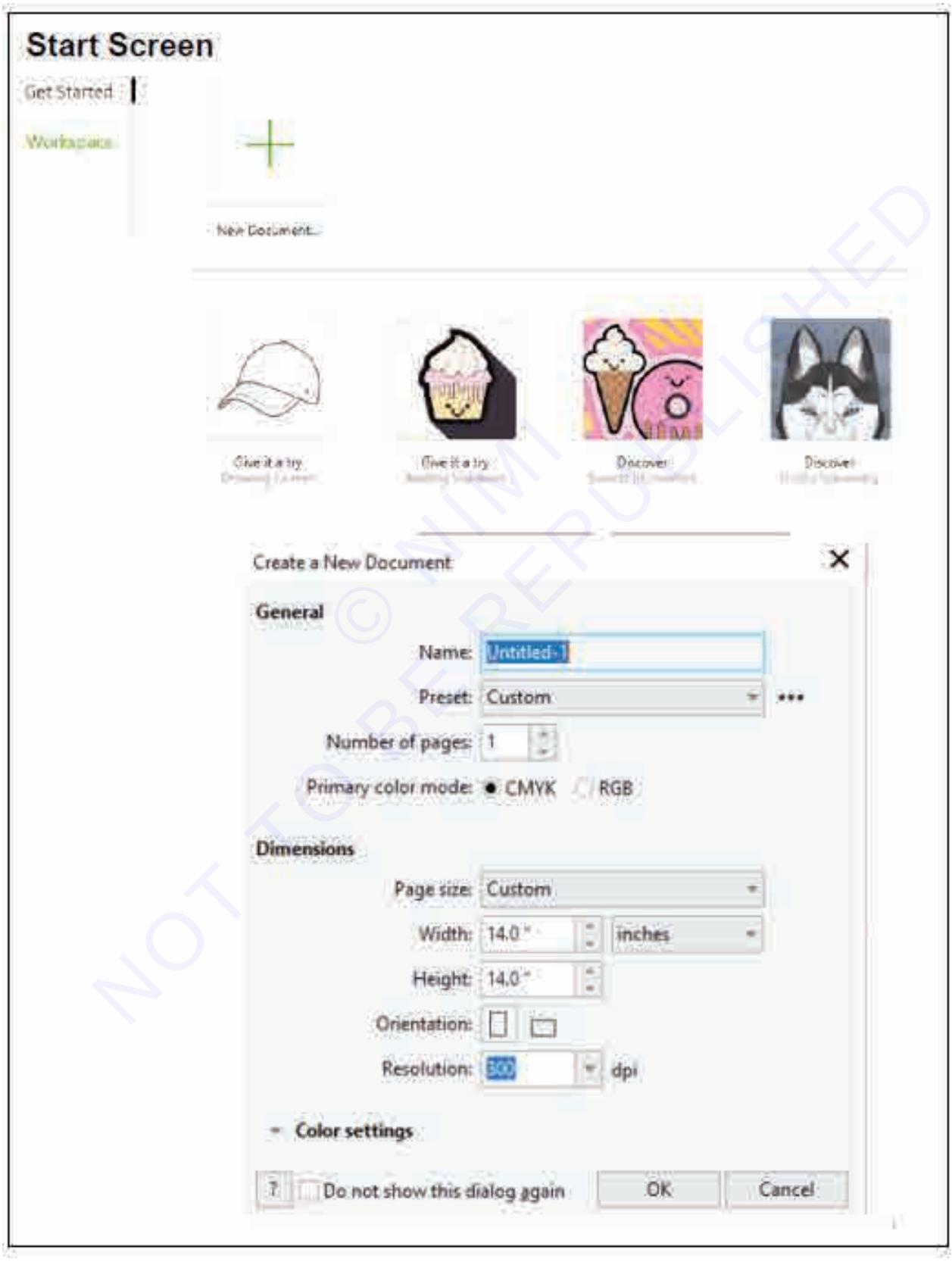


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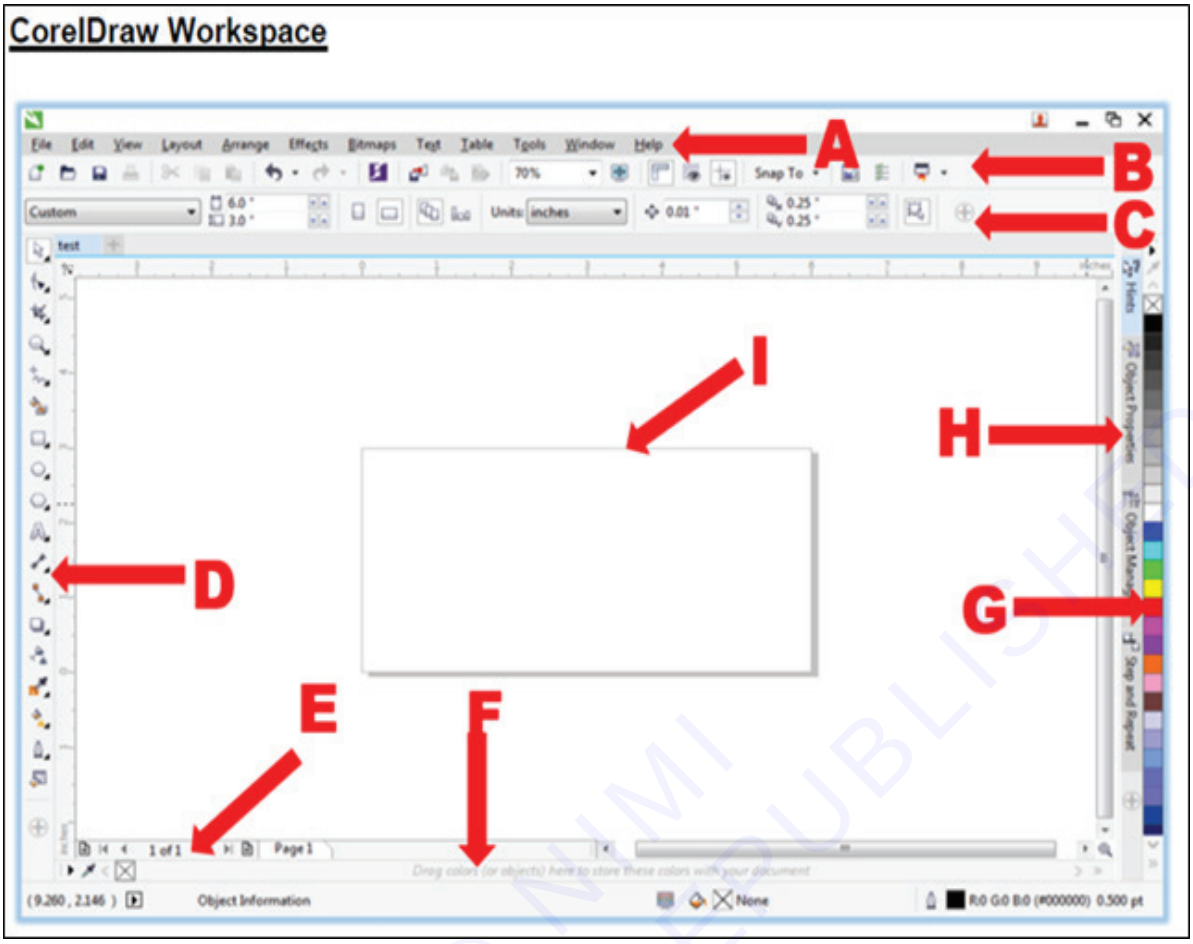
Corel Draw

The start screen will allow users to choose a blank new document, or pre-designed templates for new and also experienced creators.

Once you click new document, a pop up screen will appear that allows you to name your new design, choose a page size, choose the number of pages, and also choose a resolution for your design.



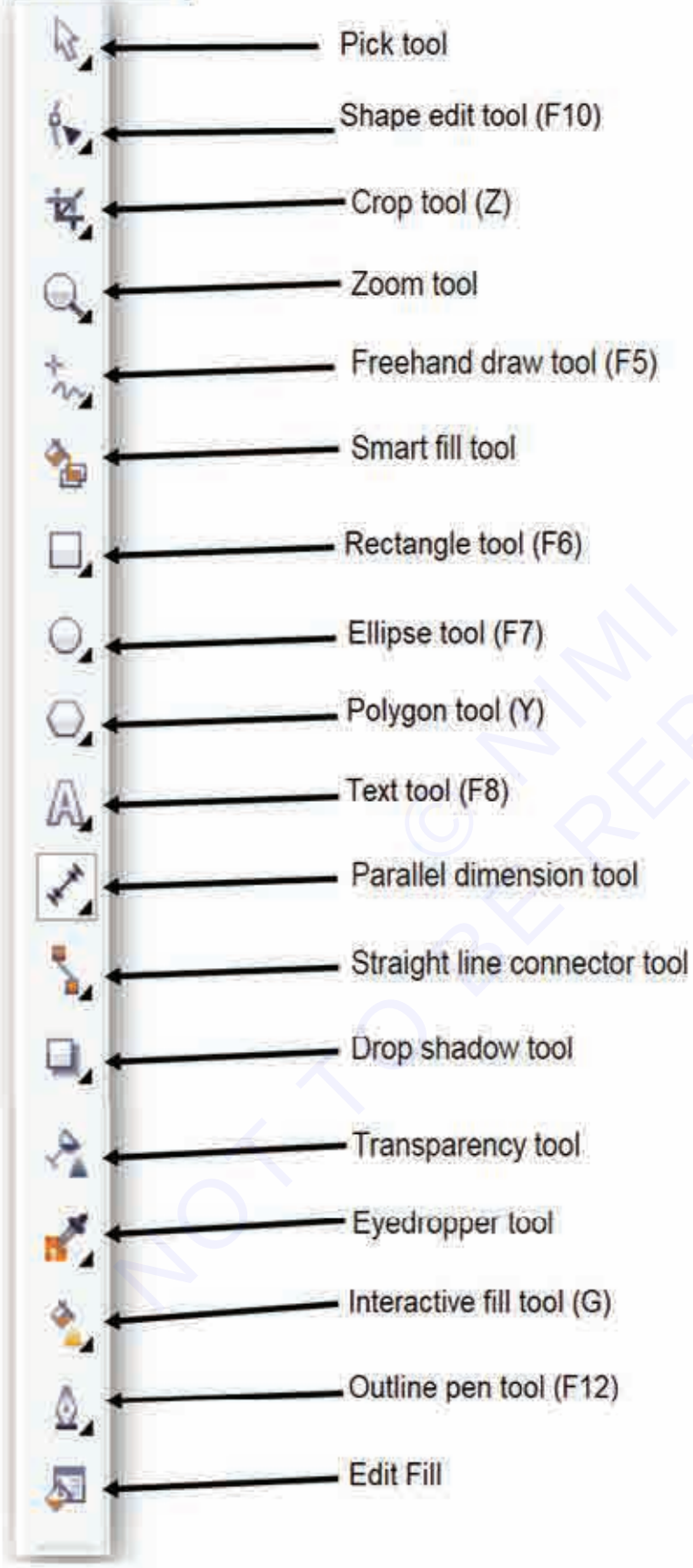
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Window Components	
A – Menu Bar	The area containing Pull-down options and commands.
B - Standard Toolbar	You can customize this or any other Toolbar or create additional Toolbars. But it stays the same unless you change it.
C - Property Bar	The Property Bar is dynamic. Property options change depending on what tool you are using. This enables you to access commands that are specific to the current tool or feature you are using.
D - Main Tool Box	The main tools you will use are accessed from this bar.
E - Page Navigator	The Page Selector is used to add and move between pages. When a file contains multiple pages, individual page tabs appear to the right of the Page Selector bar.
F - Status Bar	Contains information about object properties such as type, size, color, fill and resolution. The status bar also shows the current mouse position.
G - Color Palette	The Color Palette by default is located to the right of the work window. Like the Toolbars, it can also be relocated.
H - Docker Tabs	Dockers allow access to effects, styles, colors, and many other features of Coreldraw.
I – Workspace	Drawing area you will use to create your design. Size is adjustable. It is the printable area of your work area.

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Tool Overview



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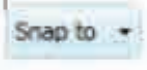
Pick Tool 	Selects objects or groups of objects and transform objects. Once selected, you can use the Pick Tool of move, stretch, scale, rotate, and skew objects.
Shape Tool (F10) 	Reshapes objects. Objects are reshaped by moving nodes, lines, and control points. Edit a curve, object or text character by moving nodes.
Crop Tool (Z) 	Crop tool allows you to select an area of an image and discard everything outside this area.
Zoom Tool 	Changes the current view of the drawing. You can also select magnification options from the Property Bar in the Zoom mode.
Freehand Tool (F5) 	Draws lines and curves. You can also use this tool to trace bitmaps.
Smart Fill Tool 	Creates objects from overlapping areas and applies a fill to those areas.
Rectangle Tool (F6) 	Draws rectangles and squares. Squares are created by using the Control key while drawing.
Ellipse Tool (F7) 	Draws ellipses and circles. Circles are created by holding down the Control key as you draw.
Polygon Tool (Y) 	A collection of objects which you can add to your drawing. They include such things as arrows, stars, talk bubbles, and flow chart symbols.
Text Tool (F8) 	Adds either Artistic or Paragraph text to your drawing.
Parallel Dimension Tool 	The Dimension tool creates size labels. The sizes are automatically calculated and represent the size of the objects in CorelDraw, it is not possible to enter sizes yourself. Different tools exist for horizontal, vertical and diagonal lines, you can choose them from the property bar.
Straight Line Connector Tool 	Combining two objects with a line.
Drop Shadow Tool 	Apply shadows behind or below objects. Access contour, blend, distort, envelope and extrude tools.
Transparency Tool 	Partially reveal image areas underneath the object. Apply a transparent effect to an object.
Eyedropper Tool 	The Eyedropper Tool allows you to select a color within an object, especially a bitmap, and allows you to apply that color to another object. You can also capture the color for a customized palette.
Interactive Fill Tool (G) 	Allows you to apply Fountain fills (gradients) using the mouse.
Outline Pen Tool (F12) 	Sets the outline style of an object or a line. This includes the line type, ends, color, and weight. The flyout gives quick access to some changes.
Edit Fill Tool 	Change properties of current fill.

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Standard toolbar

The standard toolbar, which appears by default, contains buttons and controls that are shortcuts to information about customizing the position, contents and appearance of tool bars.

Click this button	To
	Start a new drawing
	Open a drawing

Click this button	To
	Save a drawing
	Print a drawing
	Cut selected objects to the Clipboard
	Copy selected objects to the Clipboard
	Paste the Clipboard contents into a drawing
	Undo an action
	Restore an action that was undone
	Display the Connect docker and search for content such as clipart, photos, fonts, and more
	Import a drawing
	Export a drawing
	Publish to PDF
	Set a zoom level
	Display Full-screen preview
	Show or hide rulers
	Show or hide grid
	Show or hide guidelines
	Enable or disable automatic alignment for the pixels, document grid, baseline grid, guidelines, objects, and page
	Open the Welcome screen
	Open the Options dialog box
	Start Corel applications

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More about toolbars

In addition to the standard toolbar, Corel Draw has toolbars for specific kinds of tasks. For example, the Text toolbar contains commands relevant to using the **Text tool**.

The following table describes toolbars other than the standard toolbar.

Tool bar	Description
Text	Contains commands for formatting and aligning text
Zoom	Contains commands for zooming in and out of drawing page by specifying percentage of original view, clicking the Zoom tool, and selecting a page view.
Internet	Contains commands for web-related tools for creating rollovers and publishing to the internet.
Print merge	Contains commands for print merge items that combine text with a drawing such as creating and loading data files, creating data fields for variable text, and inserting print merge fields.
Transform	Contains commands for skewing, rotating and mirroring object
Macros	Contains commands for editing, testing, and running macros

To toggle between displaying and hiding a toolbar, click Window >Tool bars, and click the command with the toolbar name.

To lock all toolbars so that you don't inadvertently change their position, click Window> Toolbar > Lock toolbars.

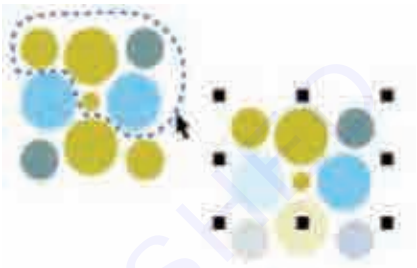
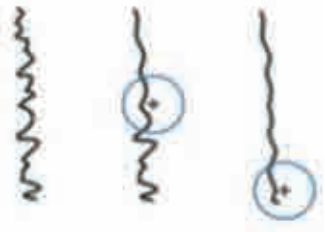
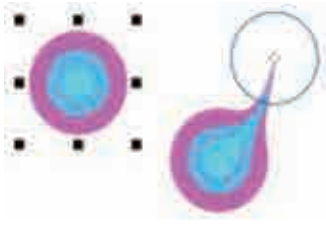
Exploring the toolbox

The toolbox contains tools for drawing and editing images. Some of the tools are visible by default, while others are grouped in flyouts. Flyouts open to display a set of related Corel Draw tools. A small flyout arrow in the lower-right corner of a toolbox button indicates a flyout. Access the tools in a flyout by clicking the flyout arrow. After that can open a flyout, can easily scan the contents of other flyouts by hovering over any of the toolbox buttons, which have flyout arrows. Flyouts function like toolbars when drag away from the toolbox.

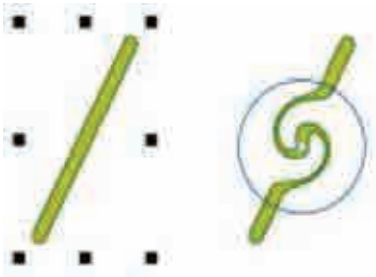
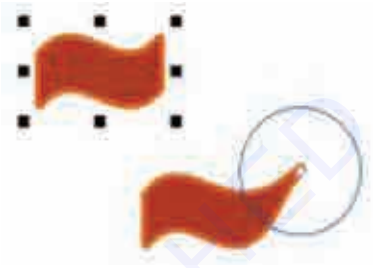
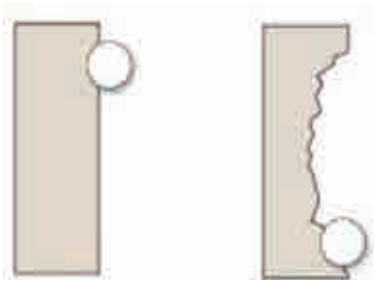
To toggle between displaying and hiding the toolbox, click Window > Toolbars> Toolbox.

To hide or display tools in the toolbox, click the Quick customize button  , and enable or disable the corresponding check boxes. The following table provides descriptions of the tools in the Corel Draw toolbox.

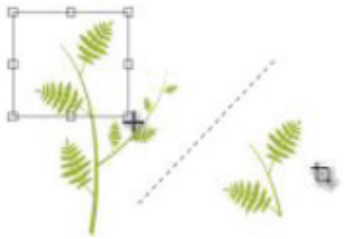
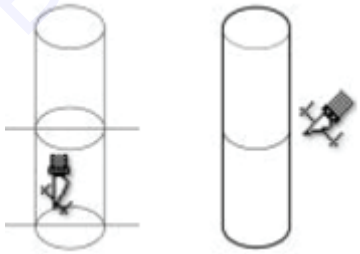
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	The pick tool lets you select, size, skew, and rotate objects.	
	The Free hand pick tool lets you select objects by using a free hand selection marquee	
	The Free transform tool lets you transform an object by using the Free rotation, free angle reflection, Free scale, and Free skew tools.	
	Shape edit tools	
	The Shape tool lets you edit the shape of objects.	
	The Smooth tool lets you smooth curved objects to remove jagged edges and reduce the number of nodes.	
	The Smear tool lets you shape an object by pulling extensions or making indents along its outline.	

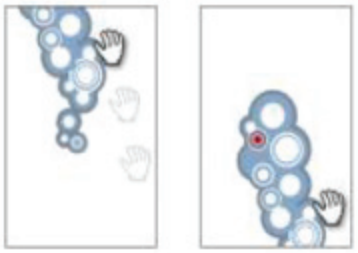
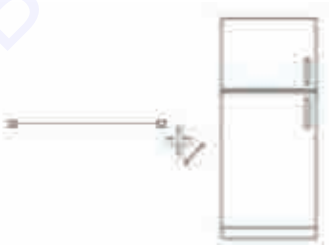
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	The Twirl tool lets you create swirl effects by dragging along the edge of objects.	
	The Attract tool lets you shape objects by attracting nodes to the cursor.	
	The Repel tool lets you shape objects by pushing away nodes from the cursor.	
	The Smudge tool lets you distort a vector object by dragging along its outline.	
	The Roughen tool lets you distort the outline of a vector object by dragging along the outline.	

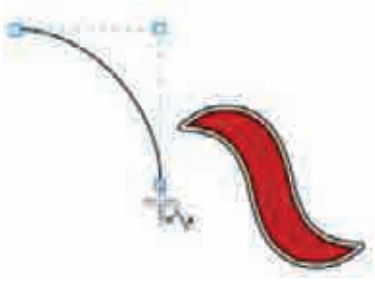
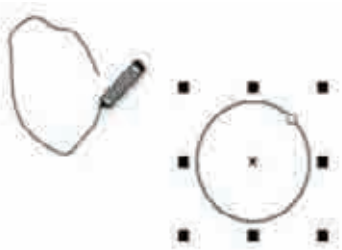
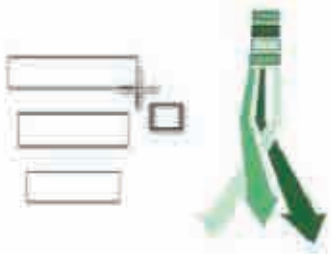
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Crop tools		
	The Crop tool lets you remove unwanted areas in objects.	
	The Knife tool lets you cut through objects.	
	The virtual segment delete tool lets you delete portions of objects that are between intersections.	
	The Eraser tool lets you remove areas of your drawing.	
Zoom tools		
	The Zoom too lets you change the magnification level in the drawing window.	

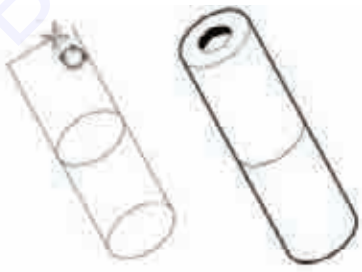
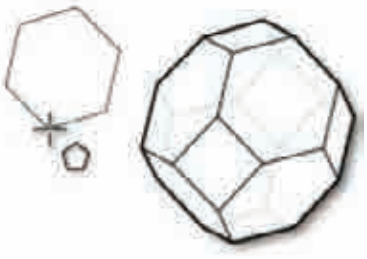
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	The pan tool lets you control which part of the drawing is visible in the drawing window.	
	Curve tools	
	The Freehand tool lets you draw single line segments and curves.	
	The 2-Point line tool lets you draw a Straight two-point line segment.	
	The Bezier tool lets you draw curves one segment at a time.	
	The pen tool lets you draw curves one segment at a time.	

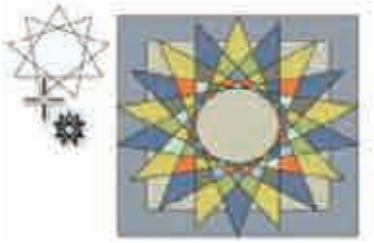
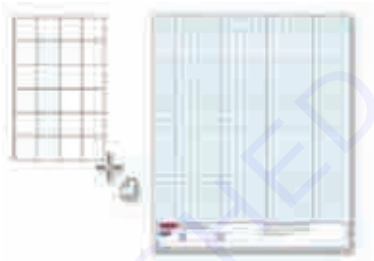
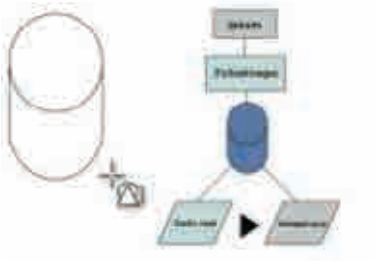
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	The B-spline tool lets you draw curved lines by setting control points that shape the curve without breaking it into segments.	
	The polyline tool lets you draw line and curves in preview mode.	
	The 3 –Point curve tool lets you draw a curve by defining the start, end, and center points.	
	The Smart drawing tool converts your freehand strokes to basic shapes and smoothed curves.	
	The Artistic media tool provides access to the preset, Brush, Sprayer, Calligraphic, and Pressure tools.	
	The Rectangle tool lets you draw rectangles and squares.	

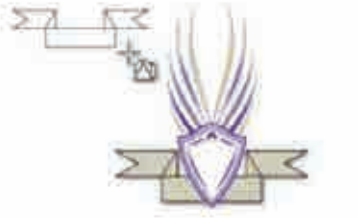
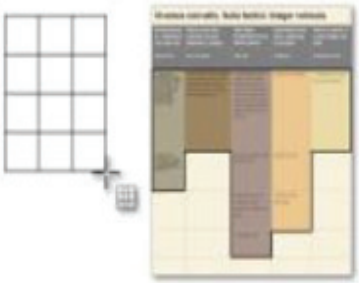
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	The 3-Point rectangle tool lets you draw rectangles at an angle.	
Ellipse tools		
	The Ellipse tool lets you draw ellipses and circles.	
	The 3-Point ellipse tool lets you draw ellipses at an angle.	
Object tools		
	The Polygon tool lets you draw symmetrical polygons and stars.	
	The Star tool lets you draw perfect stars.	

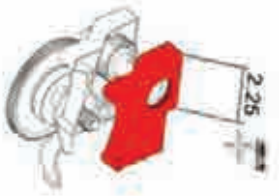
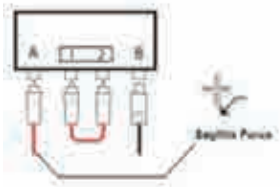
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	The Complex star tool lets you draw complex stars that have intersecting sides.	
	The Graph paper tool lets you draw a grid of lines similar to that on graph paper.	
	The Spiral tool lets you draw symmetrical and logarithmic spirals.	
	The Basic shapes tool lets you choose from a full set of shapes, including hexagram, a smiley face, and a right-angle triangle.	
	The Arrow shapes tool lets you draw arrows of various shape, direction, and number of heads.	
	The Flowchart shapes tool lets you draw flowchart symbols.	

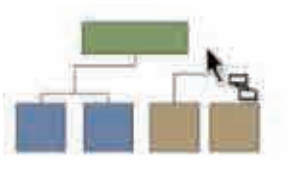
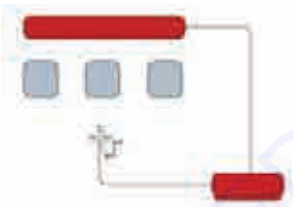
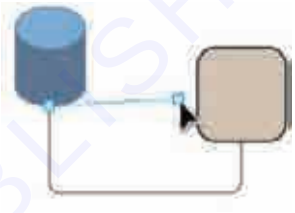
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	The Banner shapes tool lets you draw ribbon objects and explosion shapes.	
	The Callout shapes tool lets you draw callouts and labels.	
	Text and table tools	
	The Text tool lets you type words directly on the screen as artistic or paragraph text.	
	The Table tool lets you draw and edit tables.	

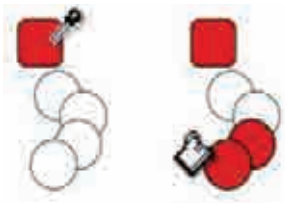
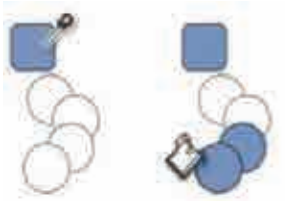
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	The parallel dimension tool lets you draw slanted dimension lines.	
	The Horizontal or Vertical dimension tool lets you draw horizontal or vertical dimension lines.	
	The Angular dimension tool lets you draw angular dimension lines.	
	The Segment dimension tool lets you display the distance between ends nodes in single or multiple segments.	
	The 3-point callout tool lets you draw a callout with a two-segment leader line.	
Connector tools		
	The Straight-line connector tool lets you draw a straight connector line.	

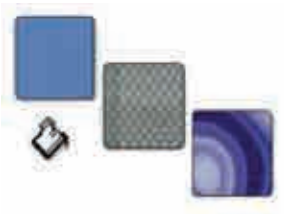
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	The Right-angle connector tool lets you draw a right angle connector line.	
	The Rounded right-angle connector tool lets you draw a right-angle connector line with curved corners.	
	The Edit anchor tool lets you modify connector line anchor points.	
	Interactive tools	
	The Drop shadow tool lets you apply a drop shadow to an object.	
	The contour tool lets you apply a contour to an object.	
	The Blend tool lets you blend two objects.	

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	The Distort tool lets you apply a Push or Pull distortion, a Zipper distortion, or a Twister distortion to an object.	
	The Envelope tool lets you shape an object by dragging the nodes of the envelope.	
	The Extrude tool lets you apply the illusion of depth to objects.	
Transparency tools		
	The Transparency tool lets you apply transparencies to objects.	
Eye dropper tools		
	The Colour Eyedropper tool lets you select and copy a color from an object on the drawing window or the desktop.	
	The Attributes eyedropper tool lets you select and copy object properties, such as line thickness, size and effects, from an object on the drawing window.	

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Interactive fill tools		
	The Interactive fill tool lets you apply various fills.	
	The Mesh fill tool lets you apply a mesh grid to an object.	
	The smart fill tool lets you create objects from enclosed areas and then apply a fill to those objects.	
Outline tool		
	The Outline tool opens a flyout that gives you quick access to items such as the Outline pen dialog box and Outline color dialog box.	
Fill tool		
	The Fill tool opens a flyout that gives you quick access to items such as the fill dialog boxes.	

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Property bar

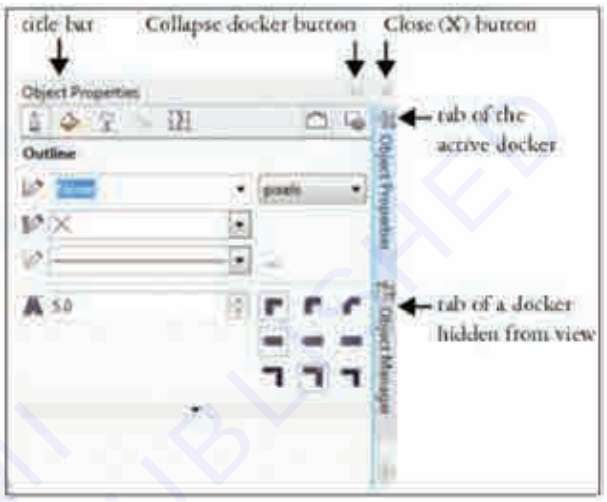
The property bar displays the most commonly used functions that are relevant to the active tool or to the task you're performing. Although it looks like a toolbar, the property bar content changes depending on the tool or task.

For example, when you click the Text tool in the toolbox, the property bar displays text-related commands. In the example below, the property bar displays text, formatting, alignment, and editing tools.



To toggle between displaying and hiding the property bar, click Window> Toolbars> Property bar.

To hide or display controls on the property bar, click the Quick customize button , and enable or disable the corresponding check boxes.

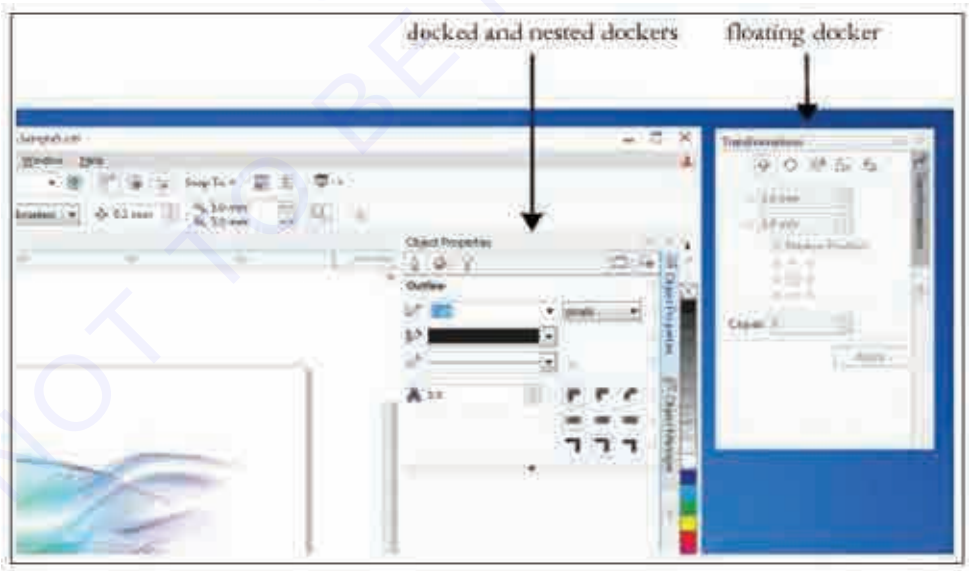


Dockers

Dockers display the same types of controls as a dialog box, such as command buttons, options and boxes, unlike most dialog boxes, you can keep dockers open while working on a document, so you can readily access the commands to experiment with different effects. Dockers have features similar to palettes in other graphics programs.

Dockers can be either docked or floating. A docked docker is attached to the edge of the application window, a toolbar, or a palette. A floating docker is not attached to a workspace element. If you open several dockers, they usually appear nested, with only one docker fully displayed. You can quickly display a docker hidden from view by clicking the docker's tab.

You can move dockers, and you can collapse dockers to save screen space.



To Open a docker

Click Window> Dockers, and click a docker.

To open or close dockers, you can also click the Quick customize button  on the right side of a docker, and enable or disable the corresponding check boxes.

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You can also close a docker by clicking the X button on its title bar. Clicking the X button on the title bar closes all nested dockers in a group. To close only a specific docker, click the X button on the docker's tab.

To move dockers

To move	Do the following
A docker	Drag the docker's tab to a new location.
To move	Do the following
Multiple nested dockes	Drag the title bar of the active dockers to a new location.

To dock a floating docker

Drag the docker's title bar or tab to an edge if the drawing window and position the pointer the pointer along the edge. When a grey preview of the docker's position appears, release the mouse button.

To collapse a docker

Click the Collapse docker button on the docker's title bar.

To expand a collapsed docker, clilck its tab.

Status bar

The status bar displays information about selected objects (such as colour, fill type, and outline, cursor position, and relevant commands). It also displays document color information, such as the document color proofing status.



See "Customizing the status bar" on page 646 for information about customizing the contents and appearance of the status bar.

Choosing a workspace

CorelDraw includes a collection of specialized workspaces, that are designed to help you increase your productivity. A workspace is a configuration of setting that specifies how the various command bars, command, and buttons are arranged when you open the application. You can choose a workspace from the Welcome Screen that displays when you first launch the application or you can switch to a different workspace from within the application.

The specialized workspaces in CorelDraw are configured according to specific workflow or tasks, such as page layout work or illustrating.

The following table describes the available workspaces.

Workspace	Description
Lite	This workspace makes CorelDraw's most commonly used tools. and features more accessible if you are new to CorelDraw, the Lite workspace is ideal for getting started
Default	This workspace has been redesigned to provide a more intuitive placement of tools and controls If you have experience using CorelDraw, or another photo-editing application, the default workspace is a good choice. Help topics are based on the Default workspace.
Classic	The Classic workspace is almost identical to the default CorelDraw X6 workspace It is best suited for experienced CorelDraw users who are looking for a seamless transition to a modern yet familiar environment in CorelDraw X7. Many elements of the workspace have been optimized for a more streamlined workflow

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Workspace	Description
Page layout	This workspace is optimized for arranging graphics and text objects so you can create compelling layouts for business cards, branding materials, product packaging, or multipage documents such as brochures and newsletters.
Illustration	This workspace is designed to make the process of creating book cover designs, magazine ads, storyboards, and other types of illustrations more intuitive and efficient
Adobe Illustrator	Simulates the Adobe Illustrator workspace by positioning the Corel Draw features where you would find the equivalent feature in Adobe Illustrator. This workspace is useful if you recently switched from Adobe Illustrator to Corel Draw and you are not familiar with the Corel Draw workspace.

To choose a workspace

- Click Window> Workspace, and choose one of the available workspaces.

You can also choose a workspace from the Welcome Screen or by clicking Tools > Customization, clicking Workspace in the list of categories, and then enabling the check box beside a workspace in the Workspace list.

Photoshop Basics: The Toolbox

The tool palette is probably one of the most frequently used parts of Adobe Photoshop. If you want to make the most of Photoshop, you need to understand how to use the tools effectively. You can pick up a tool in the toolbox simply by clicking on it. Keep the cursor on the tool without clicking on it, the name of that tool will appear on screen. It will look something like this:

The letter inside the brackets is the keyboard shortcut for that tool. Tools with little black arrows in the corner have hidden tools underneath. Whenever select any tool from the toolbox, a series of options will appear at the top of the screen in the Options Bar. Here is an example of what part of the option bar looks like when click on one of the selection tools:

Photoshop

Photoshop Basics: The Toolbox

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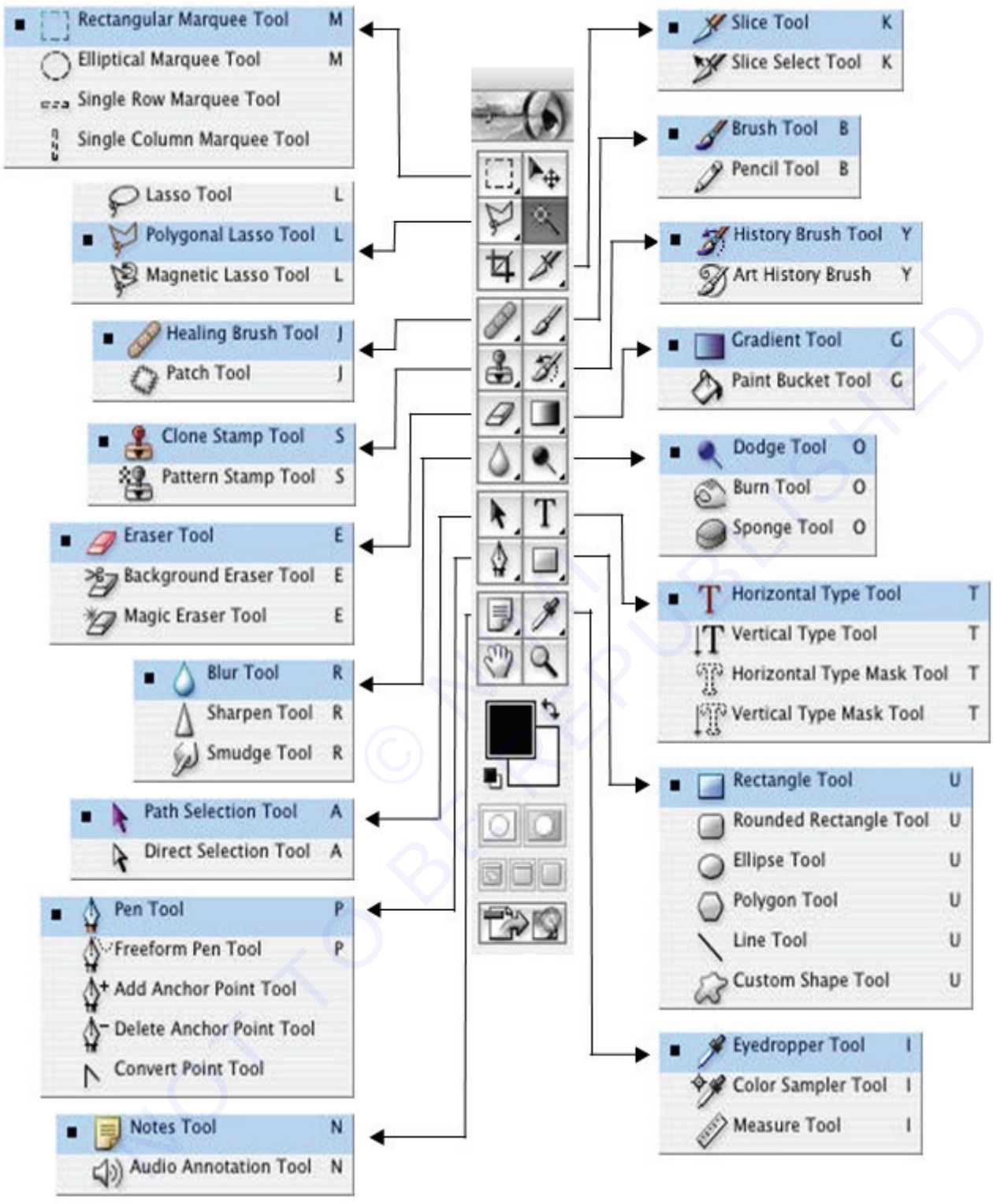


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The Toolbox

There is a whole range of 'hidden' tools in the Adobe Photoshop toolbox.



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Photoshop Basics: The Toolbox

A brief description of the tools in photoshop and what they do. The most frequently used tool are underlined.

Tool	Icon	Shortcut	Description
Rectangular Marquee tool		M	Allows you to make rectangular selections of the image.
Elliptical Marquee Tool		M	Allows you to make elliptical selections of the image
Single row Marquee tool			Allows you to select a single row of pixels stretching from one side of the image to the other
Single column Marquee tool			Allows you to select a single column of pixels stretching from the top of the image to the bottom.
Move tool			Allow you to move selections and layers around the canvas
Magic wand		W	The Magic Wand allows you to select parts of the image that are similar in colour Adjusting the Tolerance in the Options Bar when you click on this tool allows you to adjust how much the Magic Wand selects. If the tolerance is low, it will select only very similar colours If the tolerance is high, it will select colours from a wider spectrum. Very useful for removing backgrounds from an image
Lasso tool		L	The Lasso Tool allows you to make irregular, freehand selections of the image
Polygonal Lasso tool		L	The Polygonal Lasso Tool allows you to make polygonal selections of the canvas - such as triangles and other irregular, straight edged shapes
Magnetic Lasso tool		L	The Magnetic Lasso Tool is similar to the regular Lasso Tool although it automatic clings the edges of an image. You can adjust the settings of this tool in the Options Bar.
Crop tool		C	Click on this tool, select the area of your document that you wish to crop and hit 'Enter' on your keyboard to confirm the crop (if you're unhappy with the area you've selected, press the ESC key and try again).
Pattern stamp tool		C	The Pattern Stamp Tool allows you paint a pattern on the canvas You can specify the sort of pattern your would like using the Options Bar
History tool		Y	The History Brush is very similar to the Clone Stamp Tool with one important different instead of allowing you to clone part of the image, it allows you to clone part of the image as it appears in the previous stage of the History This means you can change an image and then regain portions of it using the History Brush
photoshop : the basis			
Art history brush		Y	The Art History Brush allows you to transform conventional images into works of art. Experiment by choosing different styles and brush types. It's best lo work on a new layer above the original image, this will preserve the original if you make major mistakes

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Eraser		E	Allows you to erase parts of the image. Erased areas are replaced with the Background Color
Background eraser		E	This makes the erased area transparent
Magic eraser		E	Much like the Magic Wand Tool, effective for removing areas of similar colour. Check 'Contagious' in the Options Bar to ensure the area you remove is smooth
Gradient tool		G	Click on this tool, draw a line in the canvas to create a gradient from the foreground colour to the background colour. Options to create more complex gradients can be found in the Options Bar.
Paint bucket		G	Fills an area of the screen with the foreground colour. The tolerance of this tool can be adjusted in the Options Bar.
Blur tool		R	Using this tool, you can blur part of the image, strength of the blurring can be adjusted in the Options Bar.
Sharpen tool		R	Use this tool to sharped the image.
Smudge tool		R	Use this tool to smudge the image.
Dodge tool		O	Use the Dodge Tool to lighten parts of the image, you can choose to lighten shadows, highlights or midtones using the Options Bar. You can also set the exposure of the Dodge Tool.
Burn tool		O	The Burn Tool darkens parts of the image. Like the Dodge Tool, you can choose to darken shadows, highlights or midtones using the Options Bar. You can also set the exposure of the Burn Tool
Sponge tool		O	The Sponge Tool can be used to saturate or desaturate the image, that is, make the colours more or less vivid.
Slice tool		K	The Slice Tool allows you to divide the image into segments which can be exported to form a HTML table. This is useful for web design because parts of the image can be individually optimised or used as hyperlinks Dividing such an image into smaller parts also makes it appear to load faster in browsers.
Slice select tool		K	This tool allows you to move and resize slices.
Healing brush		J	The Healing Brush allows you to fix blemishes, scratches and other imperfections in images. Hold down the option key to select an area of the image which is similar to the one you want to repair. Use the healing brush to paint over the imperfection.

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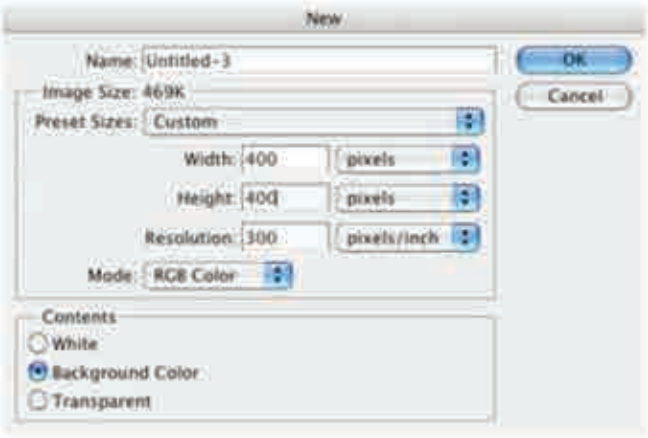
Patch tool		J	This is another image retouching tool which allows you to patch areas of the image. There are three ways to do this. First, click on the Patch Tool and select an area of the screen that is to be patched up. Click on Source in the Options Bar. Drag the selected area to the region of the image you want to use as the patch. Clicking on Destination in the Option Bar enables you to do the reverse: select the patch, then drag it to the area you wish to patch up. Using the Options Bar, you may also patch up the selected area with a pattern.
Brush tool		B	The Brush Tool is much like a conventional paint brush. When you click on the Brush Tool, you are able to select a range of different brushes from the Option Bar. You can also set the Opacity and Flow of the brush. Select the colour of the brush by clicking on 'Set Foreground Color' selector.
Pencil tool		B	The Pencil Tool is much like a conventional pencil, except you can choose a whole range of shapes and sizes for the nib using the Options Bar. You can also set the opacity of the pencil.
Clone Stamp Tool		C	The Clone Stamp Tool allows you to clone parts of an image. A common use
Path selection tool		A	This line allows you to select vector graphics (the sorts of lines and shapes you can draw with the Pen Tools in Photoshop)
Direct selection tool		A	This allows you to manipulate vector graphics such as lines, shapes and text
Horizontal type tool		T	Creates horizontal type, you can adjust the size and font in the Options Bar.
Vertical type tool		T	Creates vertical type, you can adjust the size and font in the Options Bar.
Horizontal type mask tool		T	This creates a horizontal text shaped selection which can be manipulated in various ways.
Vertical type mask tool		T	This creates a horizontal text shaped selection which can be manipulated in various ways.
Pen tool		P	The pen tool is used to create paths, which can be made into selections or objects that can have a stroke around the outside or be filled with colour (like triangles, rectangles and other shapes).
Freeform pen tool		P	The Freeform Pen Tool allows you to create freehand paths.
Add anchor point tool			The Freeform Pen Tool allows you to create additional anchor points on a path, essentially giving you the ability to manipulate it in very flexible ways.
Delete anchor point tool			Allows you to change paths by deleting anchor points.
Convert point tool			Another tool for manipulating anchor points of a path.

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rectangle tool		U	Draws rectangular paths.
Round rectangle tool		U	Draws rounded rectangular paths.
Ellipse tool		U	Draws ellipses.
Polygon tool		U	Draws polygons.
Line tool		U	Draws lines.
Custom shape tool		U	Draws custom shapes.
Note tool		N	Creates post-it notes which can be positioned throughout the document. Useful if you're working with other people.
Audio annotation tool		N	Creates audio annotations which can be positioned on the canvas. Useful if you're working with other people.
eye dropper		I	The Eye Dropper Tool is used to select colours from the canvas. The selected colour becomes the Foreground Color.
Color sampler tool		I	Selects colour information from a specified point in your image. You can store up to four different colours. These can be cleared using the Options Bar.
Measure tool		I	Used to measure areas on the screen. Values appear in the Options Bar.
Hand tool		H	Used to scroll around your document.
Zoom tool		Z	Select a particular area of the screen to zoom into. Holding down the Option/Alt button enables you to toggle between zoom in and zoom out.
Foreground/ Background color			If you click on the foreground or background colour, you will be presented with a dialogue box allowing you to select the colour you desire.

Photoshop basics: Starting a new document

When you launch Adobe Photoshop, you can start a document by selecting File>New. You will be presented with a dialogue box asking you to specify the size and various other parameters.



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Selecting the Preset Sizes submenu allows to choose from a range of preset document sizes, such as A4, 640x480, Standard PAL. There is an exhaustive list of options. If working in video or print, two mediums which require very specific page and screen sizes, this drop down menu quickly becomes a necessity.

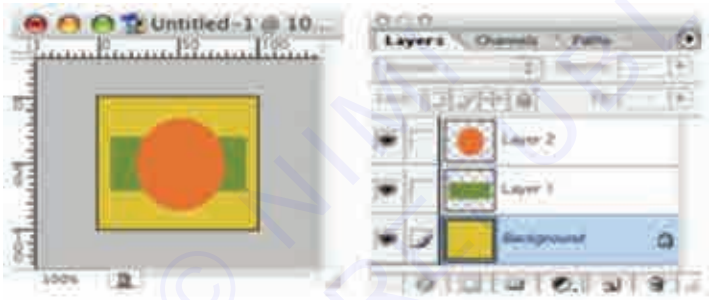
Manually input of the desired size of any image. Click the drop down menu to the right of the height and width fields, can find different forms of measurement – pixels, inches, centimeters, millimeters, points, picas and columns.

The resolution of the document depends on what the image is intended for. If it's for the web, set the resolution to 72 pixels/inch. If creating a print layout, the minimum resolution should be 300 pixels/inch. The higher the resolution, computer will perform in slow.

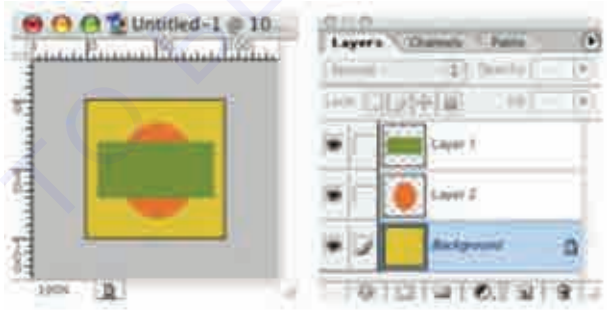
Select a range of colour modes, including Bitmap (black and white), Greyscale (shades of grey), RGB Color (colours are created using a combination of red, green and blue – best for onscreen work such as images intended for Web Pages), CYMK (colours are created using a combination of Cyan, Yellow, Magenta and black – this is best for work that is going to be printed, such as posters and magazines) and Lab Color. When you launch Photoshop with an image in the clipboard, Photoshop will automatically set the width and height of the new image to the dimensions of that picture (so, if the image is 50 pixels wide and 70 pixels high, Photoshop automatically puts these figures into the width and height fields.

Photoshop basics: Working with layers

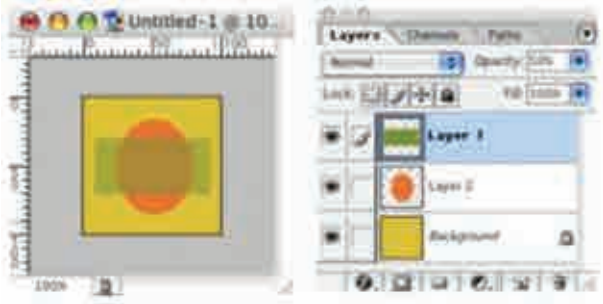
One of the most useful aspects of Photoshop is its ability to work with multiple layers. That is, can have multiple images stacked on top of each other. Here's an example of what the document might look like if working with three different layers.



In this example, there are three layers. A thumbnail image of each layer is shown in the Layers Palette. Simply by dragging layers, can rearrange their order.



It can also adjust the Opacity of each layer.

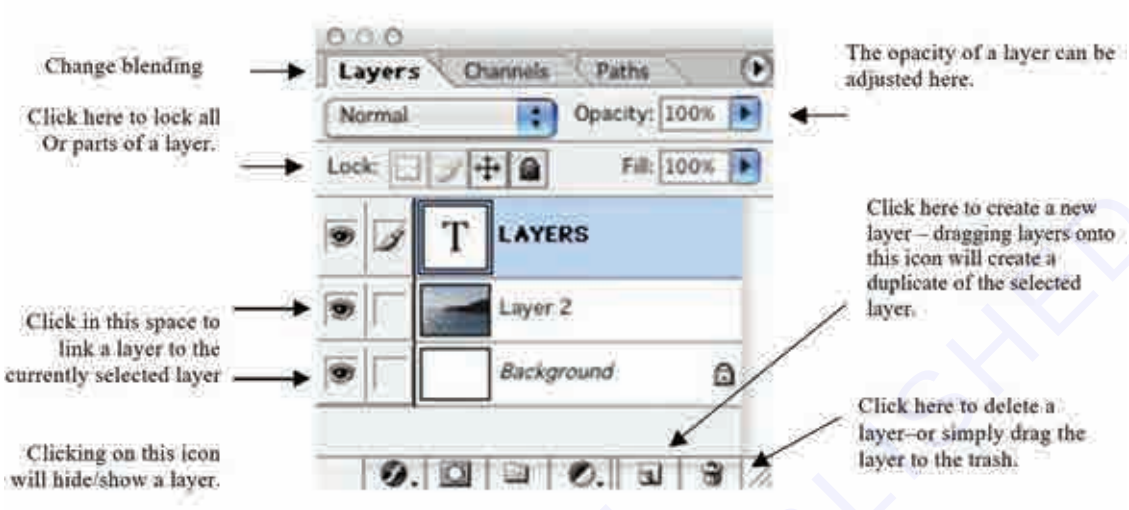


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Here, the opacity of the top layer has been reduced to 50%. Experimenting with layers and their opacity can produce complex and sophisticated images.

Photoshop basics: The Layers Palette

When working with layers, need to use the Layers Palette. This palette allows to reorder layers, change their opacity, create new layers, hide layers, link layers and delete layers.



When working with multiple layers, it can manipulate the way a layer is blended with the layer beneath it. Here are examples of the layer blending modes available in Photoshop.

Blending Mode	Example
Normal	
Dissolve	
Darken	

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Multiply	
Color burn	
linear burn	
lighten	
Screen	
Color dodge	

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Linear dodge	
Overlay	
Soft light	
Hard light	
Vivid light	
Linear light	

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Pin light	
Difference	
Exclusion	
Hue	
Saturation	
Color	

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Luminosity	

Photoshop basics: Selection

It is useful to produce sophisticated imagery hinges on ability to use the selection tools. Need to select parts of the image, use the following tools in the toolbox.

Rectangular marquee tool	
Elliptical marquee tool	
Single row marquee tool	
Single column marquee tool	
Magic wand	
Lasso tool	
Polygonal Lasso tool	
Magnetic Lasso tool	

Because selection is so important when start creating sophisticated images, Adobe Photoshop has an entire menu dedicated to the ways in which can select parts of the image. Here's a quick summary of the feature to find in this menu:



MENU ITEM DESCRIPTION

All This allows selecting the entire image.

Deselect Deselects currently selected area.

Reselect Reselects previously selected area.

Inverse Selects the inverse of current selection.

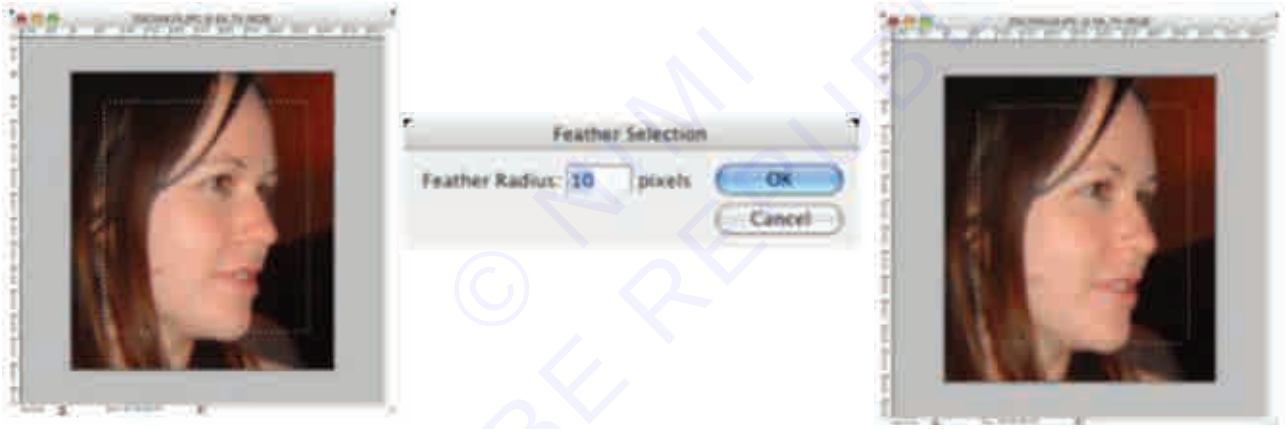
Colour Range

It is allows to select a particular colour. When the select this item, it will be presented with a dialogue box. It can toggle between a black and white picture of the Selection and the Image itself. When click on the 'Image' button, can choose the colour that is required to select using the eye dropper. The selected colour range will be displayed in the dialogue box.

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Feather This menu item allows to feather the area selected. In the following example, a rectangular area around the picture has been selected and feathered by 10 points. Notice what happens when the selected are, which has been feathered, is deleted.



(Notice the slightly rounded corners on the rectangular selection)



When the feathered area is filled, the image slowly fades into the fill colour.

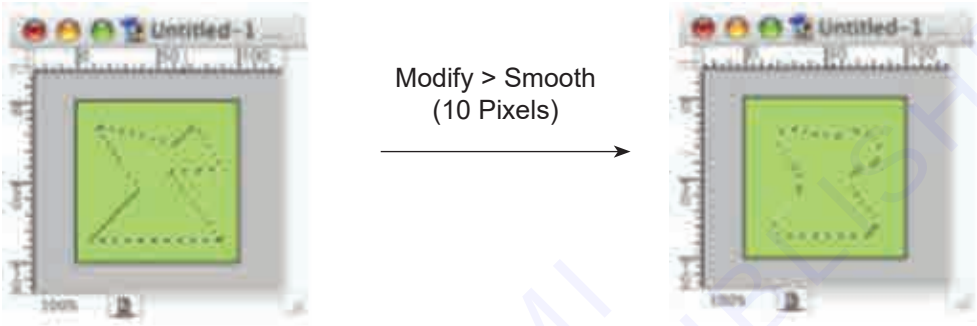
Modify>Border… This constrains the image by creating a border around it. In the following example, the entire area has been selected. A border of 15 pixels has been created using the background colour

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Fills the border with the background colour.

Modify>Smooth… This smoothen the selected area. In the example, an irregular selection has been made with the Polygonal Selection Tool and it has been smoothed by 10 pixels.



Modify>Expand… Expand allows to increase the selected area by a specified number of pixels. In the example, a selection has been made with the Lasso Tool. It has been expanded by 10 pixels.



Notice that the selected area has increased by ten pixels around the perimeter.

Modify>Contract… Contract allows to decrease the selected area by a specified number of pixels. In the example, a selection has been made with the Lasso Tool. It has been contracted by 10 pixels.



If look closely, can notice that the selected area has decreased by 10 pixels all the way around the perimeter.

Grow…

Using Grow will increase the selected area to encompass nearby areas of similar colour. Here, an area has been selected with the Lasso Tool and the Grow… function has been performed. Notice how the selected area increases each time to incorporate areas of similar colour…





Similar… Similar… allow to select area of a similar colour or tone to the area currently selected. In this example, a small area of the picture has been selected with the Lasso Tool. Choosing similar has selected areas of the picture that are similar in colour.





Transform Selection Transform Selection enables to manually resize the selection.

Load Selection Allows to load saved selections.

Save Selection If frequently selecting the same area or a similar shape, area able to save these selections for later use. Saved selections can be reused by going to Selection>Load Selection.

Photoshop basics: The Edit menu

The Edit menu contains a range of powerful ways to manipulate the image working with. While using the features under this menu quite frequently no matter what sort of image are creating. Here's a brief summary of the features can find in this menu.

Menu Item Description

Undo Allows to undo the previous action.



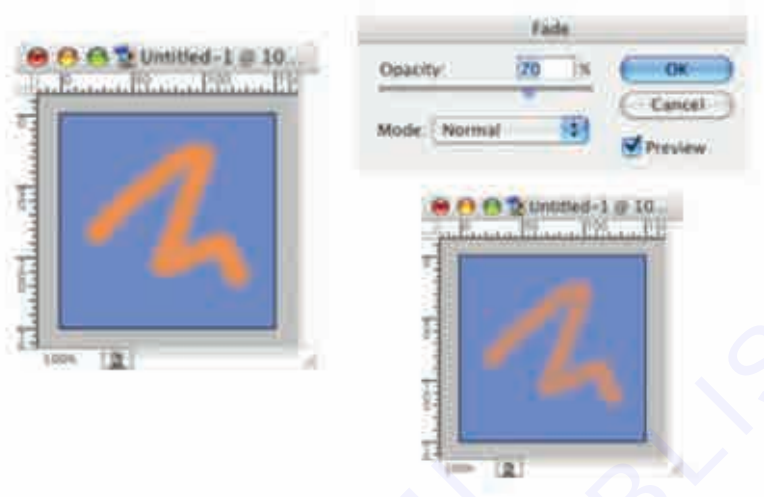
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Step Forward Allow to move forward in the history.

Step Backwards Allow to move backwards in the history.

Fade

Fade allows to fade brush strokes after drawing them, can apply various blending modes to the brush. In this example, a squiggle has been drawn on a layer above the background using the Brush Tool. It has been faded to 70% of its original opacity.



Cut Allow to cut out the selected area to paste somewhere else.

Copy Copies the selected area.

Copy Merged Copies all of the visible layers into one image.

Paste Pastes the copied selection, creating a new layer.

Clear Clears the selected area.

Check spelling… Basic spell checker.

Find and Replace

Text…

Allows you to find and replace text, much like the type of feature you find in a word processor.

Fill… Fills the selected area. You can choose from the foreground colour, background colour, pattern, 50% grey, black and white.

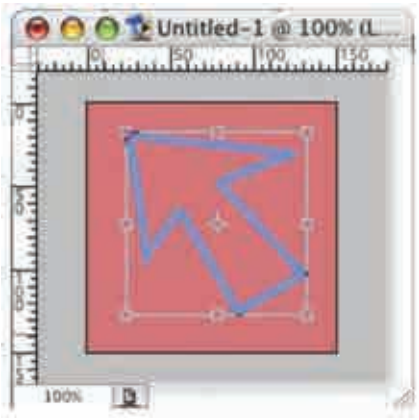
Stroke… Creates a stroke around the selected area. In the example, a five pixel stroke has been added to the selected area.



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Free Transform

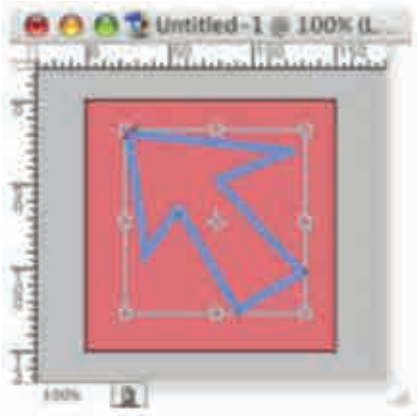
Free Transform allows to manually rotate and resize the selected area by dragging handles around the selection area.



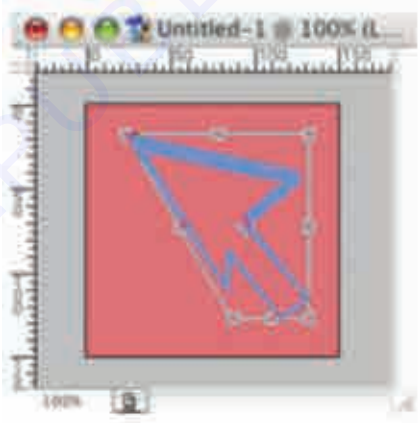
Transform

Under this menu can find an array of vitally important ways to manipulate the image, including:

Scale, Rotate, Skew, Distort, Perspective, Rotate 180º, Rotate 90º Clockwise, Rotate 90º Counter Clockwise, Flip Horizontal and Flip Vertical. Some of these functions are self-explanatory. The less obvious ones have been described here.



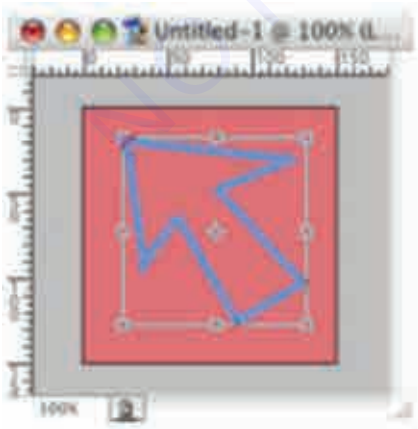
Skew



Distort

Distort allows you to move the corners of the image horizontally and vertically, it provides more freedom than skew.

Perspective





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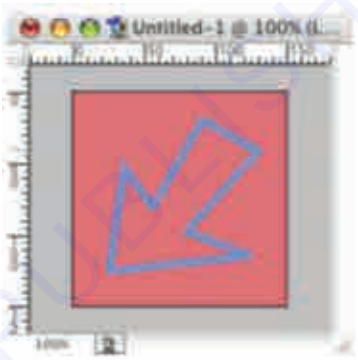
Flip Horizontal





Flip Vertical





Define Brush

Makes the selected area into a brush that can be used when using the Brush Tool, Eraser and other tools that rely on different shaped brushes.

Define Pattern

Turns the selected area into a pattern.

Purge Allow to clear undo, the history and clipboard.

Preset Manager Allow to manage the objects that appear by default in the Brushes, Swatches, Gradients, Styles, Patterns, Contours, Custom Shapes and Tools.

Photoshop basics: The image menu

The Image menu is where it can adjust the colour and size of the image. There are a number of fundamental, frequently used image manipulation functions under this menu.



Menu Item Description

Mode > This menu item allow to set the colour mode of the document. The most frequently used modes include Bitmap, Grayscale, RGB Color and CYMK Color. If the image is entirely black and white, chances are accidentally set the mode to Greyscale or Bitmap when creating the document. Changing the colour mode will often flatten the image into one layer.

Adjustments > This menu essentially contains a range of important colour manipulation functions. Under this submenu, can find: Levels, Auto Levels, Auto Color, Curves, Color Balance, Brightness/Contrast, Hue/Saturation, Desaturate, Replace Color, Selective Color, Chanel Mixer, Gradient Map, Invert, Equalize, Threshold, Posturize, Variations.

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Duplicate This allow to create a copy of the document in a new window.

Image Size… Allow to chance the size of the image.

Canvas Size… Allow to change the size of the canvas, the image will not change, only the size of your workspace (unless, of course, to make the workspace smaller than the picture, in which case the original image will be cropped).

Rotate Canvas> This allow to rotate the entire document 180º, 90º CW, 90º CCW, as well as by other values. It also enables to flip the entire document vertically and horizontally.

Crop Crops the image to the selected area.

Photoshop basics: The Filter menu

The Filter Menu contains a range of powerful ways to manipulate images. Examples of some of these filters have been shown below. When creating advanced imagery in Photoshop, it will need to have a good understanding of these filters. The best way to get to know them is simply to experiment.

Menu item	Example
Normal This is the Unprocessed Version of the image that has been used for these examples.	
Artistic > Colored pencil	
Artistic > cutout	
Artistic > Dry Brush	

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Artistic > Film Grain	
Artistic > Palette Knife	
Artistic > Plastic wrap	
Artistic > Poster Edges	
Artistic > Rough Pastels	

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Artistic > Smudge stick	
Artistic > Sponge	
Artistic > Underpainting	
Artistic > Watercolor	
Artistic > Gaussian blur	

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Artistic > Motion blur	
Artistic > Radial blur	
Artistic > Smart blur	
Brush strokes > Accented edges	
Brush strokes > Angled strokes	

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Brush strokes > Cross Hatch	
Brush strokes > Dark strokes	
Brush strokes > Ink Outlines	
Brush strokes > Spatter	
Brush strokes > Sprayed strokes	

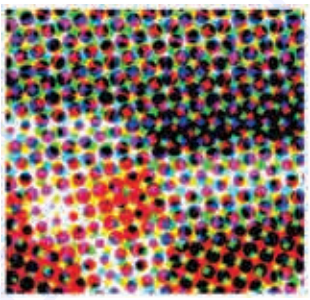
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Brush strokes > Sumi-e	
Distort>Diffuse glow	
Distort>Glass	
Distort>Ocean ripple	
Distort>Pinch	

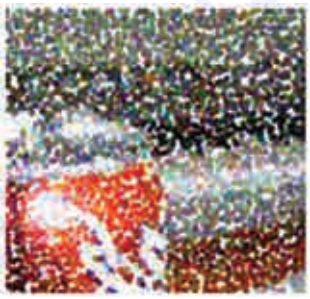
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Distort>Polar coordinates	
Distort>Ripple	
Distort>Shear	
Distort>Spheris	
Distort>Twirl	

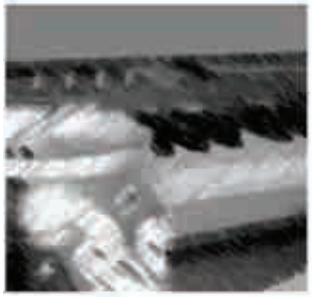
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Distort>Wave	
Noise>Median	
Pixelate > Color halftone	
Pixelate > Crystallize	
Pixelate > Fragment	

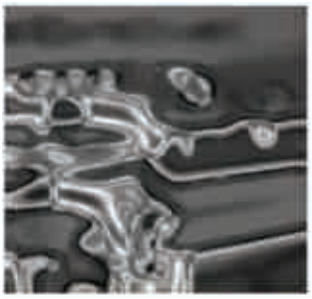
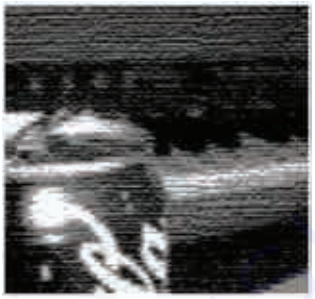
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Pixelate > Mezzotint	
Pixelate > Mosaic	
Pixelate > Pointillize	
Render > Clouds Creates a random cloud in the selection based on the background and foreground colour	
Render > Difference cloud	

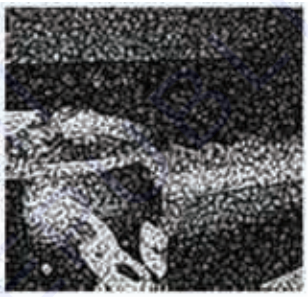
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Render > Lens Flare	
Sharpen > Sharpen More	
Sketch > Bas relief	
Sketch > chalk and charcoal	
Sketch > charcoal	

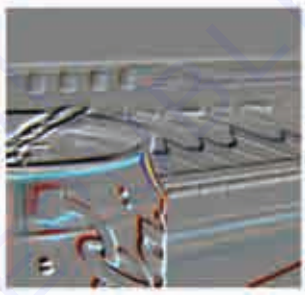
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Sketch > chrome	
Sketch > Conte Crayon	
Sketch > Graphic pen	
Sketch > Halftone Pattern	
Sketch > Notepaper	

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Sketch > Photocopy	
Sketch > Plaster	
Sketch > reticulation	
Sketch > Stamp	
Sketch > Torn edges	

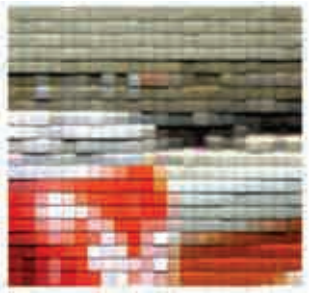
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Sketch > Water Paper	
Stylize > Diffuse	
Stylize > Emboss	
Stylize > Extrude	
Stylize > Find Edges	

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Stylize > Glowing Edges	
Stylize > Solarize	
Stylize > Tiles	
Stylize > Trace contour	
Stylize > Wind	

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Texture > Craquelure	
Texture > Grain	
Texture > Mosalic Tiles	
Texture > Patchwork	
Texture > Stained class	

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Texture > Texturizer	

Knowledge about Importance of Pattern

Patterns are classified into two types: Flat patterns and slopers. Flat patterns are used to generate the fundamental design of a garment, whereas slopers are used to create specific size patterns, shape of the body with full fitting. From the sloper, pattern are get develop, sloper is base for the pattern. Patterns can be created either by hand or by computer.

The pattern-making process begins with the collecting of body measurements. These measurements are used to develop a basic block pattern, which is then corrected to obtain the desired garment shape. After creating the pattern, it can be used to cut cloth and sew outfits.

Pattern making is a complex and time-consuming procedure, yet it is necessary for efficient and accurate garment manufacture. Garment producers may save waste and ensure correct fit by generating accurate paper patterns.

Uses of Paper Patterns

- Paper patterns are very useful for not only beginners but also for experts as there is no risk involved of the material being wrongly cut.
- It is essentially very useful to the beginner as it is one of the best methods of learning than cutting the material directly.
- Paper patterns are time and labor-saving as they can be preserved and used whenever required.
- One can easily make adjustments in paper patterns in order to ensure a perfect fitting.
- One can easily bring changes in the design if they are using the basic paper pattern while garment manufacturing.
- The use of paper patterns will ensure one cuts a garment with a minimum amount of fabric.

Benefits of pattern

Increased efficiency: Patterns can help to streamline the garment manufacturing process by reducing the amount of time and fabric that is wasted.

Improved quality: Patterns can help to ensure that garments are made to the desired specifications, which can lead to improved quality and customer satisfaction.

Reduced costs: Patterns can help to reduce costs by reducing the amount of fabric that is wasted and by improving the efficiency of the manufacturing process.

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Safety precautions in garment industry

In a garment unit, everyone needs to take care of the following points at the factory level.

- First aid box
- While using machine, need to wear shoes or shock resistance foot wears.
- Maintain accident register
- Fire extinguishers with marked area
- Emergency lights on the floor and in the path to the exit
- Fire alarm
- Exit signs
- Exit doors should be kept open while the factory is working
- Yellow lines on the shop floor to differentiate a pedestrian pathway and space for machines
- Factory layout and evacuation plans
- No obstruction in the aisles on the shop floor
- No cables left loose or visibly hanging
- Enough light to the shop floor
- Broken needle record policy
- Canteen for workers
- Enough toilets for workers and members of staff
- Safety measures followed at every workstation
- Adequate pure drinking water supply
- Encourage workers to use safety masks where needed

Department wise safety measures

Following are few examples of work safety that must be followed in the shop floor.

Fabric Store

- Don't keep fabric roll on the floor. Store fabrics on the racks or on pallets
- Keep enough space for walking and fabric and other item movement
- Must have air ventilation and enough light.

Cutting Section

- Wear metal hand gloves while operating cutting machine
- Don't use loose wire. All power supply must be covered
- Wear mask

Stitching floor

- Use Needle guard while operating on a sewing machine
- Keep walking space free of obstacle
- Wear mask in the sewing floor
- Keep enough space at each sewing workstation for operator movement
- Provide height-adjustable chair to workers
- Enough light

Finishing section

- Wear a mask while working on a chemical process
- Keep steam pipelines insulated

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SOFTWARE - 1
(4 - 28)

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MODULE 3 : Pattern Design Software Tools and its Applications - Software - 1

LESSON 4 - 28 : Menu and commands

Objectives

At the end of this lesson you shall be able to:

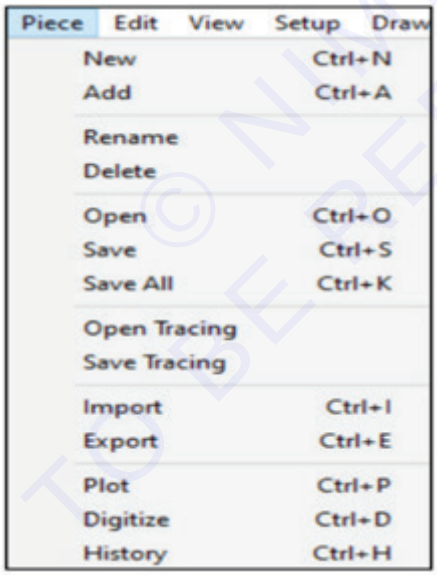
- learn about each menu and their commands of Reach PDS
- access various menu, sub menu or a command as per their needs while working on REACH PDS.

Menu bar

A menu is a list of items. Listed under each menu item are submenus. A menu is arranged in a hierarchy. At the top level of the hierarchy is the menu bar. Menus drop down from the menu bar, and the lower levels are submenus. In REACH PDS, a menu item either carries out a command or opens a submenu. The menu also lists out the hot keys that are associated with a particular feature. Clicking on ate menu headings using a mouse can activate the menu. Alternatively, you can use the Alt Key to activate the menu and scroll using the cursor keys.



1 Piece menu



NEW (Ctrl +N): Create a new Style, Piece or clear the tracing. You will see a dialog box as shown below:

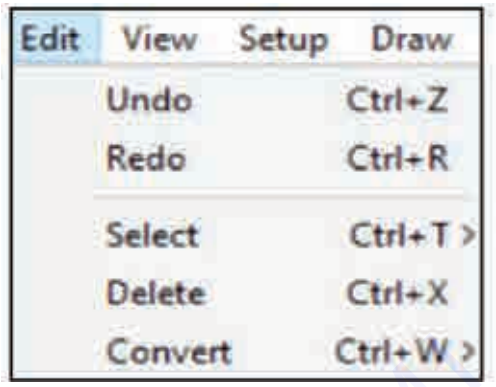


- **Style -** To create a new Style.
- **Piece -** To create a new Piece or to delete unwanted blocks.
- **Tracing -** To delete all tracings.
- **Add (Ctrl +A):** It is used to add a piece from an existing folder.

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- **Rename:** It is used to rename a piece.
- **Delete -** It is used to delete a piece.
- **Open (Ctrl +O):** It is used to open a different style file,
- **Save (Ctrl +S):** It is used to save a piece. Click on save option.
- **Save All (Ctrl +K):** It is used to save all pieces. Click on Save All option.
- **Open Tracing:** – It is used to open a tracing that is already saved.
- **Save Tracing:** To It is used to save a Tracing.

2 Edit menu



- **Undo (Ctrl + Z) :** You can undo the last actions you took by just clicking Undo on the menu toolbar. Shortcut key for Undo is CTRL+Z. A maximum of 20 steps is allowed in RPDS.
- **Redo(Ctrl + Y):** If you later decide you didn't want to Undo an action, click Redo on the menu toolbar. Short cut key for redo is CTRL+R. A maximum of 20 steps is allowed in RPDS.
- **Select (Ctrl + T):** To select a Tracing in Area/ Internal/ Tracing/ Grade Area as shown in Figure:



- **Tracing in area:** This is to select all our tracings using area selection/window method.
- **Internal:** This is to select all our internals elements created inside a piece. Notch is not selected using this tool.
- **Tracing:** This is to select a tracing segment wise. This will enable you to select individual tracing segments instead of tracings within selected area.
- **Grade area:** This is to select single/multiple grading points by using area selection/window method.
- **Delete (Ctrl +X):** This is to delete all our selections.
- **Convert (Ctrl +W):** This is used to convert one segment to another.

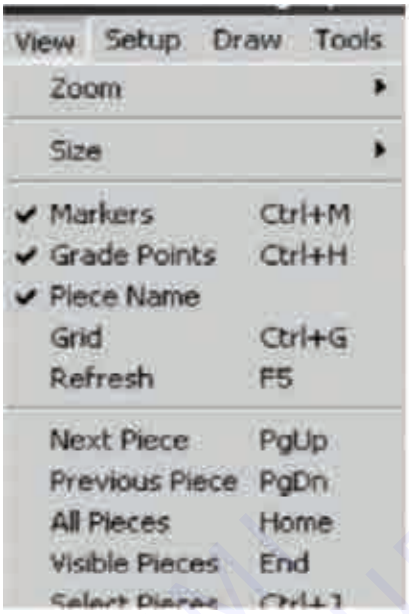
3 View menu

Zoom: It is used to focus on a selected area by either increasing or decreasing its overall size.

The following various options/features available in the ZOOM sub-menu:

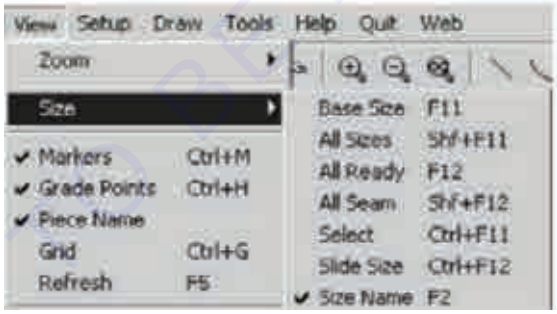
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- **Zoom in (Ctrl + Pg Dn):** It is used to focus on a smaller section at a time by increasing its overall size for greater detail.
- **Zoom Out (Ctrl + Pg Up):** It is used to focus on a larger section at a time by decreasing its overall size for greater detail.
- **Zoom All (Ctrl + Home):** It is used to focus everything on the screen.



Size: To view the required size.

- **Base Size:** It is used to view only the Base Size on screen.
- **All Sizes:** It is used to view All Sizes as nested on the screen.
- **All Ready:** It is used to view all the components/patterns to the ready mode/sewing line mode.



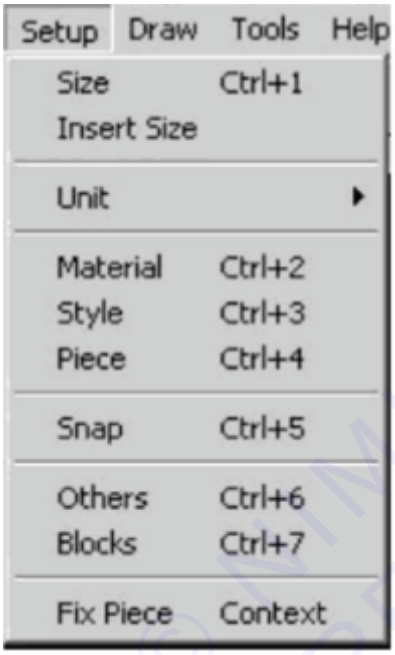
- **All Seam:** It is used to view all components with seam allowance.
- **Select:** It is used to view some particular sizes in the list of sizes.
- **Slide Size: I**t is used for shifting one Size name to other size names.
- **Size Name:** It is used to view the size name.
- **Markers:** Markers are basically used to identify the point type, starting point, grade points, etc. These identifications are also used to apply grade rules to the pieces are stored in the library.It is used to view/ hide all markers on the piece contour or trace contour which is in the working area.
- **Grade Points:** It is used to view/ hide all Grade Points on the piece contour in the working area.
- **Piece Name:** It is used to view/ hide all displayed Piece Name on pieces.
- **Grid:** It is used to view/ hide Grid with rulers.
- **Refresh:** It is used to Refresh working area.

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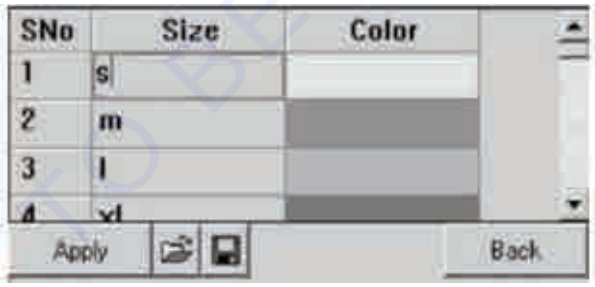
- **Next Piece:** It is used to view in nearest next piece in Piece bar.
- **Previous Piece:** It is used to view in nearest previous piece in Piece bar.
- **All pieces :** It is used to view all pieces in working Area/Piece bar.
- **Visible pieces:** It is used to view all or single piece in working area/piece bar.
- **Select pieces:** It is used to select a particular piece and do a few modifications.

(Note these modifications you can see from the tablet menu at the right bottom of the screen.)

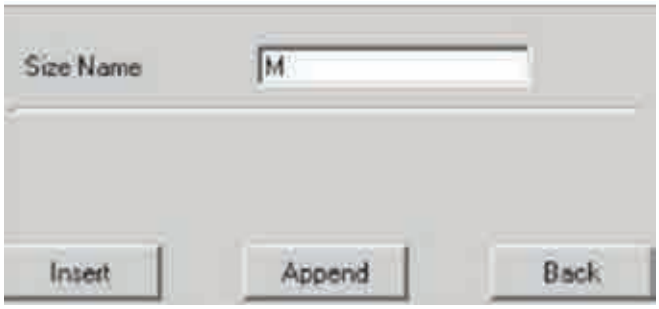
4 Set up menu



- **Size (ctrl +1):** It is used to create the Size table and save the size table as a file.



- **Insert Size:** It is used to insert a size in size chart which is already created.
- Enter the new size name and click on Insert to insert the smallest size.
- Click on Append to add a largest
- **UNIT:** It is used to set the working unit for current working window.



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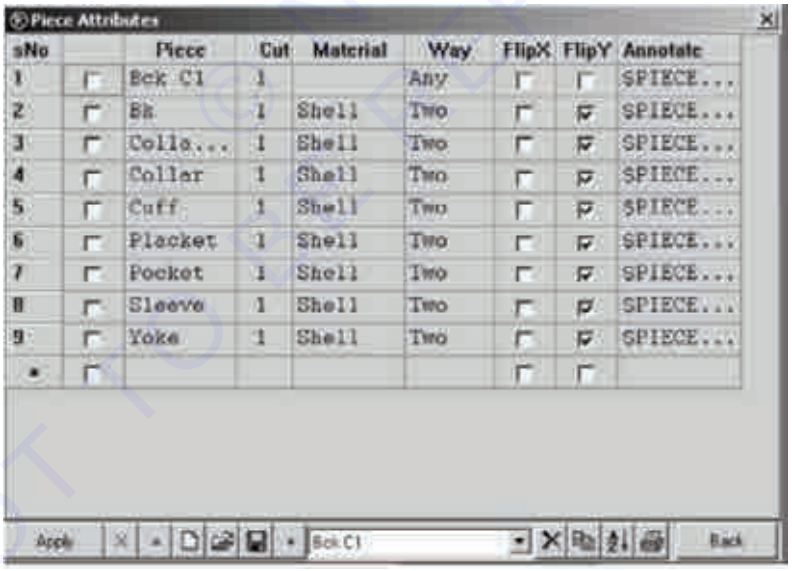
- **Mms:** To work in Millimeters.
- **Cms:** To work in Centimeters.
- **Inches:** To work in Inches with decimal format.
- **Inches (8):** To work in Inches with fraction of 1/8th's format.
- **Inches (16):** To work in Inches with fraction of 1/16th's format.
- **Inches (32):** To work in Inches with fraction of 1/32th's format.
- **Inches (64):** To work in Inches with fraction of 1/64th's format.

Material (Ctrl + 2): It is used to create a new type of material for the piece to be created.

Style (Ctrl + 3): It is used to describe all the style details. Here you can enter Style Name, Base Size, Client, Season, Order Number and Unit for printing purpose.



Piece (Ctrl + 4): It is used to create or modify the Attributes of pieces you have created. You have to define the Number of Cuts/Copies you want in Marker, Material, Way, Flip X, Flip Y, annotation for each piece as shown in dialog box.



- **Snap (Ctrl + 5):** It is used to setup distance in pixels between the Cursor and the selected point or internal or notch etc.
  - Normally Snap Selection value for all attributes of the pieces is 10 pixels. That is when cursor is at a distance of 10 Pixels it sticks to the particular attribute e.g. tracing point, Pattern Point, Tracing Segment, etc.
  - If you increase these pixels value you cannot select the required one, as all the attributes will be close by in patterns or Tracings. If you decrease these pixels value then you cannot select the point. Take the cursor exactly on the screen. To overcome these snap distance and snapping of point attributes use CTRL Key/ SHIFT Key to click or select these points.

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- **Others (Ctrl + 6):** It is used to configure the grading process, by selecting few options by Check box selection. Process All Pieces will process all the graded pieces if any changes are made. Auto Grade option will automatically grade the piece, when you edit any part of the Piece You can set the accuracy level from one decimal point to 4 decimal points.



- **Blocks (Ctrl + 7):** It is used to create different pattern pieces with blocks method.
- **Fix Piece:** It is used to work on a single piece even when there are two or more pieces overlapped.

5 Draw menu



- **Line (Shift + F1):** It is used to draw a line using line commands.
- **Normal Line:** It is used to draw any line with or without a measurement.
- **Horizontal:** It is used to draw a horizontal line.
- **Vertical:** It is used to draw a vertical line.
- **Parallel:** It is used to create a parallel line corresponding to a selected line.
- **Perpendicular:** It is used to create a perpendicular line corresponding to a selected line.
- **Intersect:** It is used to intersect or join two lines.
- **Trim:** It is used to trim extra lines.
- **Rectangle:** It is used to create a rectangle.

Curve (Shift+ F2): It is used to draw all Curved Lines.

- **Arc:** It is used to create an arc.
- **3 Point Bezier:** It is used to create a Bezier curve by selecting the starting & ending points in the screen & then adjust it according to the shape of the curve required.
- **4 Point Bezier:** It is used to create a Bezier curve by selecting the 3 points on the screen & then adjust it according to the shape of the curve required.

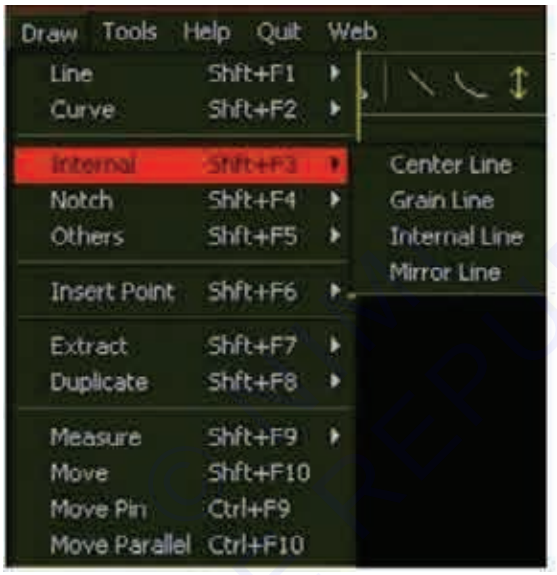
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- **Spline & Intersect:** It is used to create a spline curve (free hand) by selecting point by point. (To end spline, Hold Ctrl + Left Mouse Button and Click.)
- **Circle:** It is used to create a circle.

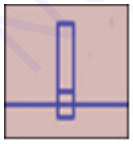
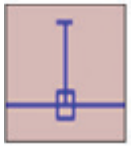
Note: You can see the measurement of the curve as you draw, simultaneously in the status bar. You can also make minor adjustments to the length of the curves, without changing the shape of the curves using the measure tool. You can change the shapes, as well as, the measurement of the curves using the move tool on the curve points.

Internal (Shift+ F3): It used to draw the following internals lines on a pattern.

- **Center line:** It is used to make a mark as center of a pattern.
- **Grain Line:** It is used to draw a Grain Line in any pattern to make a Grain Line.
- **Internal line:** It is used to draw internals inside a pattern.
- **Mirror Line:** It is used to draw Mirror Line inside a pattern.



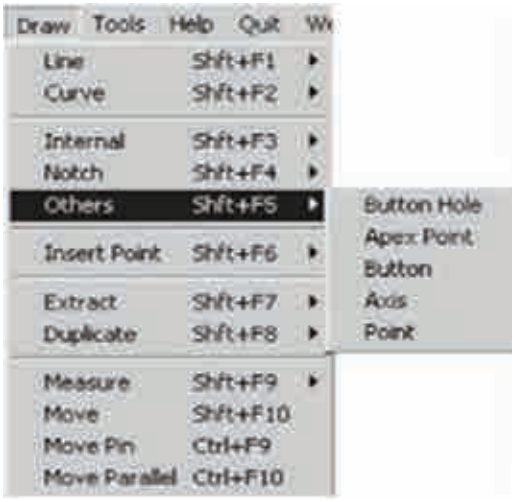
Notch: It used to draw the following types notch marks on a pattern.

- V Notch 
- I Notch: 
- U Notch : 
- T Notch : 

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Others: It is used to create other marks on the patterns other than Line, Curve and Internals.

The following options/features available in the OTHERS sub-menu



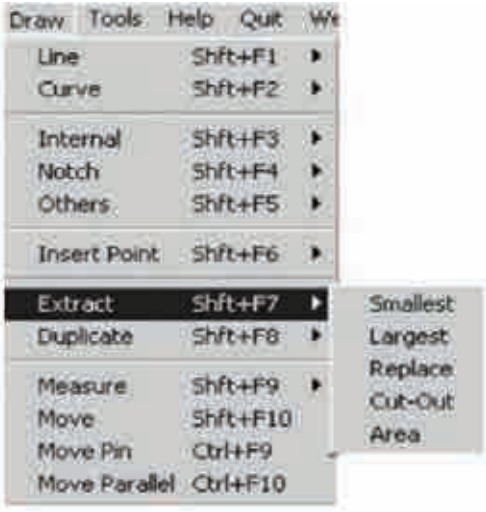
- **Button Hole:** This is used to make a mark inside the patterns so as to enhance the clarity of the pattern.
- **Apex Point:** Apex point is a marking inside the pattern pieces. It is used as a bust point inside the patterns.
- **Button:** This is a marking equivalent to Button Hole. To make sure that buttons are placed on the same place so that it gives exact matching.
- **Axis:** Axis is used as a ruler and also a guideline to create and alter the pattern pieces.
- **Point:** Point is used to create points on the blocks or on the blank screen so as to get at the corner points on the pattern.

Insert Point (Shift+ F6): To insert a point in a segment there are three options in Menu Tablet.

- In Pattern
- In Tracing
- Delete



Extract (Shift+ F7): This is an amazing tool to create a pattern from the tracing that you have drawn. This is used to generate/ extract a pattern from the tracing that we have created. As soon as you click on it you will see as shown below:



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- **Smallest:** It is used to extract the smallest portion of pattern from the tracing that has been created.
- **Largest:** It is used to extract the largest portion of pattern from the tracing that has been created.
- **Replace:** Replace option is used on a pattern piece with an updated trace segment.
- **Cut out:** Cut-out is used on a pattern piece with closed internal lines only.
- **Area:** It is used to extract an area of the pattern from the tracing that has been created.

Duplicate (Shift+ F8): It is used to duplicate the following segment.

- **Pattern:** To duplicate a pattern piece to pattern piece.
- **Pattern segment:** To duplicate a pattern segment to trace segment.
- **Trace segment:** To duplicate a trace segment to trace segment.
- **Internals:** To duplicate internals to trace segments.

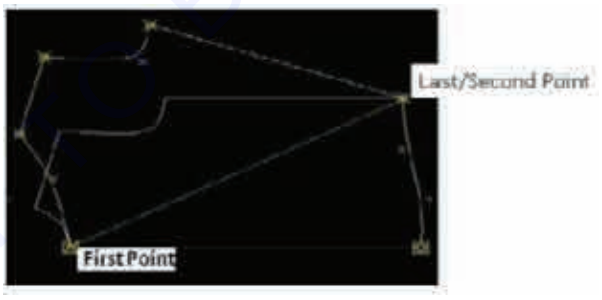
Measure (Shift+ F9): It is used to measure the following segments:

- Pattern segment
- Trace segment
- Internal Segment

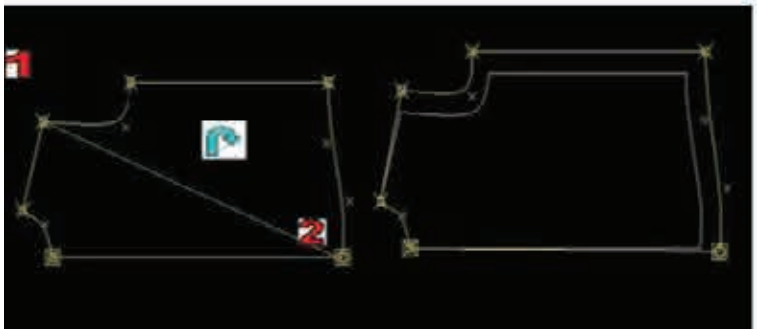
Move (Shift+ F10): This is used to move a Pattern, Internal, Tracing, Pattern Point, and Tracing Point etc. The following options/features available in the MOVE sub-menu

- **Length:** It helps to move as per the mentioned length in the working area. (If you want to move with specific value)
- **Angle:** It helps to move as per the mentioned angle in the working area. (If you want to move with specific angle)
- **Anywhere:** It helps to move anywhere in the working area.
- **Horizontal:** It helps to move only in the horizontal direction.
- **Vertical:** It helps to move only in the vertical direction.

Move Pin (Ctrl +F9): This is used to move a Pattern with Move Pin length parameters using a specific value. First select the segment to be moved by clicking on two points on the pattern in a clockwise direction. Thus, enclosing the segment to be moved. Then move the segment by clicking on the pattern segment.



Move Parallel (Ctrl +F10): This is used to move the segment parallel by Click on the two points between which you want to move the segment) parallel in a clockwise direction.



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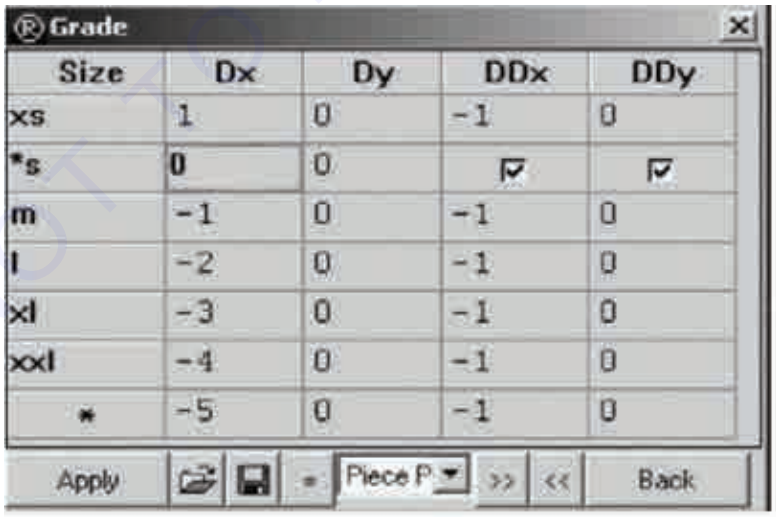
6 Tools menu



- **Grade (F3):** This option is used to grade pattern points, internals, buttons, notches etc. These below mentioned options you can see from the tablet menu at the right bottom of the screen.



- **Tabular:** This Grading method allows you to enter grade values for all sizes so as to enable uneven grading between the sizes in the style. You will see a dialog box as shown below. Grade value should be typed or entered only on DDx and DDy. As Dx and Dy displays only the difference.



- **Regular:** This grading method allows you to enter grade values for all sizes, one at a time, so as to enable even grading between the sizes in the style.
- **Copy:** To copy the grading of both X and Y values.
- **Copy X:** To copy 'X' grading value of existing point to other points.

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- **Copy Y:** To copy Y grading value of an existing point to other points.
- **Cancel:** To delete the grading value of a particular selected point.
- **Cancel X:** To delete the grading value of X to the particular selected point.
- **Cancel Y:** To delete the grading value of Y to the particular selected point.
- **Symmetry X:** To change the sign of X grading i.e. small size points changes to big size and vice versa
- **Symmetry Y:** To change the sign of Y grading i.e. small size points changes to big size and vice versa.
- **Free:** This is to remove the grading point. Select this option and then click on the required points.
- **Free All:** To delete whole grading and grading point for a particular piece.
- **Block:** To copy grading values of more than one point of a piece and pasting the values to another piece with the same grading point co-ordinates.
- **Factor:** Grading tool dialog box for copying block method & pasting.
- **Grade Rule:** To Create/ apply the Grade values as a rule. (Select the grading points and click on save, so as to save the grading values. Click on open to apply a grade to the newly created piece with grading points. All these options are there in Menu Tablet.)
- **Angular:** This grading method allows you to enter grade values by an angle for all sizes.
- Back: It is used to go to the previous list of the sub-menu.

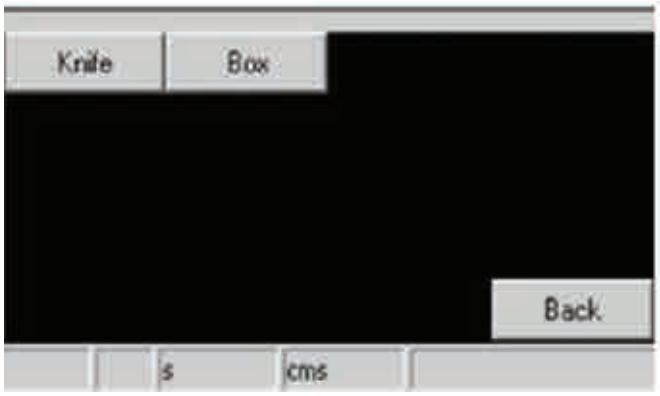
Stack (F4): To stack nested piece at a particular point or line, first select the option from Tablet Menu and then click on the point where you want to stack.

At Point: To stack a pattern at a particular point both X and Y values are Zero.

- **On X:** To stack a pattern at X-axis for a particular point.
- **On Y:** To stack a pattern at Y-axis for a particular point.
- **Center:** To stack at the center of a pattern so that grading is uniformly spread to all sides.
- **Value:** To stack at a particular point with a particular value. You need to enter in the Menu Tablet.



- **Darts (Ctrl + F2):** This option enables creation of dart on pattern as internal lines.
- **Pleats (F6):** This option enables creation of knife and box pleat.
- **Knife:** This option used to create knife pleats.
- **Box:** This option used to create box pleats.



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Fullness (F7): To add fullness to the pattern that is being created.

- Input the Depth of the slash.
- Select the direction you want the fullness to be spread (Clockwise, anticlockwise, or in both the directions).
- Click on Apply.
- Click the start point where you want the fullness to be incorporated.
- Move the mouse to the end of the pattern you want the fullness to be incorporated. Click on the pattern segment.
- The fullness will be incorporated between the two points clicked.



JOIN (F8): To join two pieces to make a single piece.

(Place two patterns to be fused or joined on the PDS working area. Single-click on the Join option from the Tools menu. Click clockwise on the first and the second point of the first pattern segment. Then click anticlockwise on the first and second point of the second pattern segment. The two patterns will be fused. The first pattern selected will be replaced with the new joined pattern and will be added to the piece table.)

OPEN (F9): To double a Piece or to open a facing you have drawn as an internal.

These options are displayed in the Menu Tablet. Select from the options before you click on the pattern segment.



All sizes or tracing:

- Click on All Sizes button in Menu Tablet.
- Click on the center line or any line to open your pattern or tracing.
- The pattern or tracing is opened.

Note: Same existing piece on fold or half of the pattern will be replaced with the new one. You will lose the earlier pattern. In case, you want the previous pattern then make a copy of the pattern.

Facing : To open a facing:

- Draw a tracing line on the pattern that you want to open a facing by choosing Draw/ line option.
- Click on Open from Tools Menu. Click on facing button displayed on Menu Tablet.
- Click on the original contour of pattern.
- Click on tracing line you have drawn on the piece.

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- You will see that the Original contour becomes the mirror line for the Facing line.

SPLIT (F10): This is used to cut the pattern as a two parts.

- Select the pattern you want to cut from the piece table.
- Using any of the drawing tools, draw a tracing across the contour of the pattern into the required shape of the pattern to cut.
- Single-click on the option Split from the Tools menu.
- Select the suboption.



To Split patterns there are options displayed in Menu Tablet. You can choose anyone of them before you split the pieces.

Flip (Ctrl+F1): This is used to flip the patterns or tracings with two below mentioned choices:

- After you choose anyone of the option in the Menu Tablet. Choose the horizontal or vertical direction.
- Then click on the patterns to be flipped.

Rotate (Ctrl +Tab): This is used to rotate a Pattern/ Selection/ Tracing. After selecting one option you will see a dialog box as shown in the diagram.

- The Angle option will rotate the piece.
- The step angle will move the piece to a selected step angle specified.



Align two Points (Shift + F2): We can align a pattern based on two points.

- Align Pattern horizontally.
- Align pattern vertically.
- Align pattern by angle specified.

Fold (Ctrl +F3): It is used to fold the patterns.

- Select the Pattern you want to fold.
- Click on the first point contour of the pattern segment and move the mouse to the second point of the contour.
- When the mouse reaches the second contour, the pattern will be folded between the two contours.
- Once the fold is as desired, click at the point.
- The pattern will be folded permanently.

Parallel (Ctrl+F4): It is used to create a parallel line of any segment as per the input distance. The created line will be in the form of Tracing.

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Note: Input negative values for parallel lines inside the pattern and positive for parallel lines outside the pattern.

Seam (Ctrl+F5): Seam is the option that enables extra allowance to the pattern that you have created.

- First select the Pattern Segment you want to incorporate the Seam Value by selecting the first last point of the pattern segments in a clockwise direction.

Note: If you want to add the same value of seam allowance for the whole pattern, you need to double-click on any pattern point.

Shrink (Ctrl + F6): It is used to add shrinkage to the pattern for warp and weft.

Input Positive values, if you want to increase the pattern dimension; and Negative values if you want to decrease the pattern dimension.

Note: The shrinkage values incorporated will always follow the grain line as the Warp and Cross Grain as the Weft. However, if the grain line is not drawn on the pattern, then the Warp will always be considered on the Y-Axis (Vertical) in the PDS

Angle (Ctrl + F7): It is used to see the intersected angle between any two segments.

- Click on the first, second (Middle Point), and the third points of the Pattern/ Tracing.
- The enclosed angle between the three segments will be displayed in the status bar.

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Shortcut keys

Lists of Keyboard Shortcuts for Options and Tools in REACH PDS

Sl. No.	Options/tools	Short cut keys
1	New	Ctrl + N
2	Add	Ctrl + A
3	Open	Ctrl + O
4	Save	Ctrl + S
5	Save All	Ctrl + K
6	Import	Ctrl + 1
7	Export	Ctrl + E
8	Plot	Ctrl + P
9	Digitize	Ctrl + D
10	Undo	Ctrl + Z
11	Redo	Ctrl + R
12	Select	Ctrl + T
13	Delete	Ctrl + X
14	Convert	Ctrl + W
15	Zoom In	Ctrl + Pg Dn.
16	Zoom Out	Ctrl + Pg Up
17	Zoom All	Ctrl + Home
18	Markers	Ctrl + M
19	Grade Points	Ctrl + H
20	Grid	Ctrl + G
21	Next Piece	Pg Up
22	Previous Piece	Pg Dn.
23	All Pieces	Home
24	Visible Pieces	End
25	Select Pieces	Ctrl + J
26	Size	Ctrl + 1
27	Material	Ctrl+2
28	Style	Ctrl+3
29	Piece	Ctrl +4
30	Snap	Ctrl+5
31	Others	Ctrl+6
32	Blocks	Ctrl+7
33	Line	Shift + F1
34	Curve	Shift + F2
35	Internal	Shift + F3

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36	Notch	Shift + F4
37	Others	Shift + F5
38	Insert Point	Shift + F6
39	Extract	Shift + F7
40	Duplicate	Shift + F8
41	Measure	Shift + F9
42	Move	Shift + F10
43	Move pin	Ctrl + F9
44	Move Parallel	Ctrl + F10
45	Grade	F3
46	Stack	F4
47	Darts	Ctrl + F2
48	Pleats	F6
49	Fullness	F7
50	Join	F8
51	Open	F9
52	Split	F10
53	Flip	Ctrl + F1
54	Rotate	Ctrl + Tab
55	Align 2 Points	Shift + F2
56	Fold	Ctrl + F3
57	Parallel	Ctrl + F4
58	Seam	Ctrl + F5
59	Shrink	Ctrl + F6
60	Angle	Ctrl + F7

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Reach PDS

Tool Bar

	Create new Patterns
+	Add Pattern from another style
	Open new style
	Save Pattern
	Undo Last Change
	Redo Last change
	Select
	Delete select option
	Convert drawing
	Mark Starting zoom area
	Zoom Out
	Zoom all
	Draw lines
	Draw curves
	Draw internals
	Draw Notches
	Other Markings
	Insert Point In curve
	Extract Pattern
	Duplicate drawing
	Measure Length

	Get enclosed angle
	Move
	Move Pin
	Move Parallel
	Grade Patterns
	Stack Patterns
	Create Darts
	Create Pleats
	Create fullness
	Join two Patterns
	Open a Pattern
	Cut a Pattern
	Flip Pattern
	Rotate Patterns
	Align Pattern Direction
	Fold the Pattern
	Create Parallel
	Add seam to the Pattern
	Add hem to the Pattern
	Define matching points

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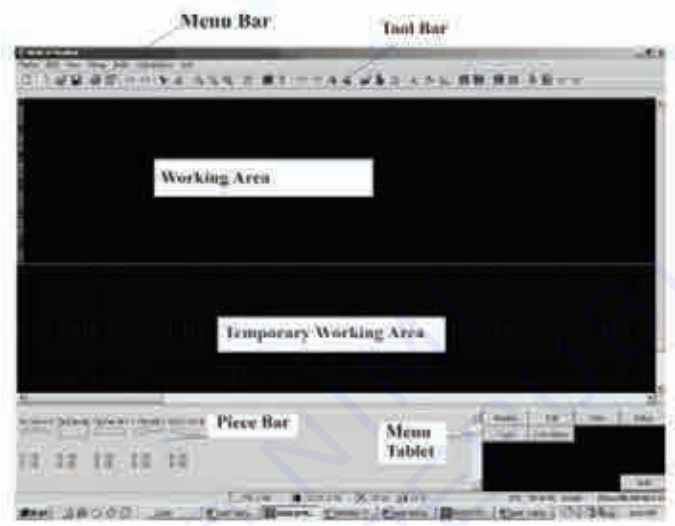
Overview of reach marker

Objectives

At the end of this lesson, you will be able to

- learn about the features of reach marker
- understand with the window arrangements of reach marker

Overview of reach marker: REACH MARKER is a marker making software in the REACH CAD family. It is used to estimate the consumption of the garment or lay planning. REACH MARKER can work with a large number of pattern pieces and with a wide size range. These markers can be plotted.



Menu bar: A menu is a list of menu items. Choosing a menu item opens a submenu and enables REACH MARKER to carry out a command. Menus are arranged in a hierarchy. At the top level of the hierarchy is the menu bar; menus drop down from the menu bar, and at the lower levels are sub menus. In REACH MARKER, a menu item either carry out a command or opens a submenu.

Tool bar: A toolbar is a window below the menu that displays numerous buttons. Each button is associated with a particular feature. Clicking on a tool bar button using the left mouse click will activate the corresponding tool. If you hold the mouse over a button on the tool bar, REACH MARKER software displays brief feature information of that tool.

Working area: This is the area used to create actual markers by dragging and placing the pieces from the Piece bar.

Temporary working area: This is the area that is used to place the pieces when user is modifying a marker. It is also used to place pieces from piece bar as well as from working area so as to reduce time in creating the markers. Matching of pieces are also carried-out in temporary working area.

Piece bar: Piece Bar is the area where you can view the pieces generated from REACH PDS through a VARIANT. This has a size-wise breakup of pieces and the quantity. You can choose from different sizes of a piece by clicking on the corresponding sizes.

Menu tablet: Menu Tablet displays the submenus and the dialog boxes for the Menu option or Tool Bars.

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Reach Marker

Tool Bar

	Create New Marker
	Add Marker
	Open Existing Marker
	Save Marker to file
	Plot Marker
	Generate Marker Report
	Undo Last Change
	Redo Last Undo
	Mark Start of Selection area
	Cut Selection to Clip board
	Reach Marker - Release 1.03
	Reach Marker - Release 1.03
	Reach Marker - Release 1.03
	Place the Piece
	Insert Fabric in Marker
	Remove Fabric in Marker
	Rotate the Piece(s) Clock wise

	Rotate the Piece(s) Counter Clock wise
	Flip Piece(s) Horizontally
	Flip Piece(s) Vertically
	Open Half Piece(s)
	Close Opened Pieces
	Fabric Markings
	Align the piece in Marker
	Duplicate Placement
	Measure length In Marker
	Marry Pieces
	Divorce Pieces
	Match Pieces
	Cancel Matching
	Buffer Pieces
	Block Pieces
	Fine Rotation
	Fine Rotation- Anti clock wise

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Digitizing

Objectives

At the end of this lesson, you will be able to:

- understand the details of digitizer tools and importance.

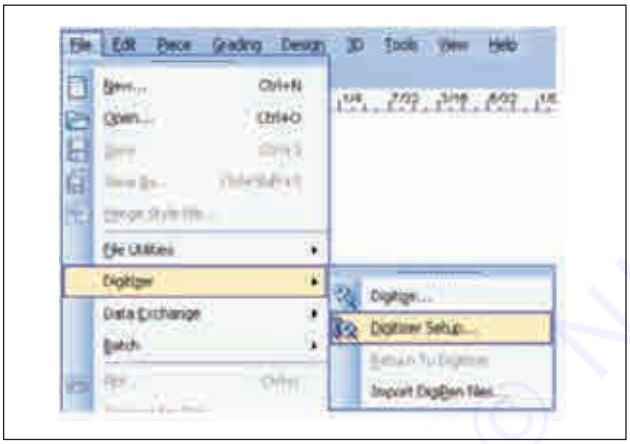
Digitizing - Tools & Importance

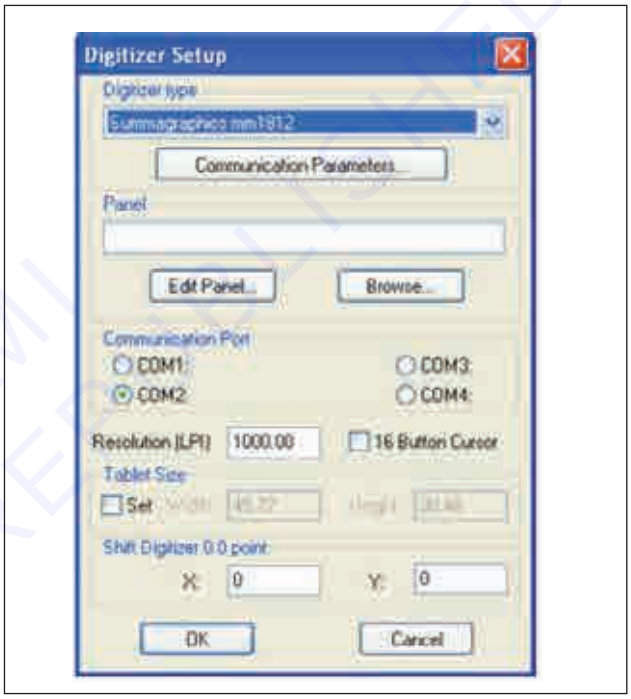
Digitizer Settings

Open PDS and go to **File > Digitizer > Digitizer Settings.**

1 The Digitizer Settings window will appear:

2 File>Digitizer>Digitizer Settings





Digitizer Settings

3 Check to Make sure that your Digitizer Type and Communication Parameters are set correctly for your type of digitizer.

4 **Go to Category:** Digitizer Install for a full listing of digitizers and their appropriate settings.

Digitizer Window Overview

1 Digitize
- Location:

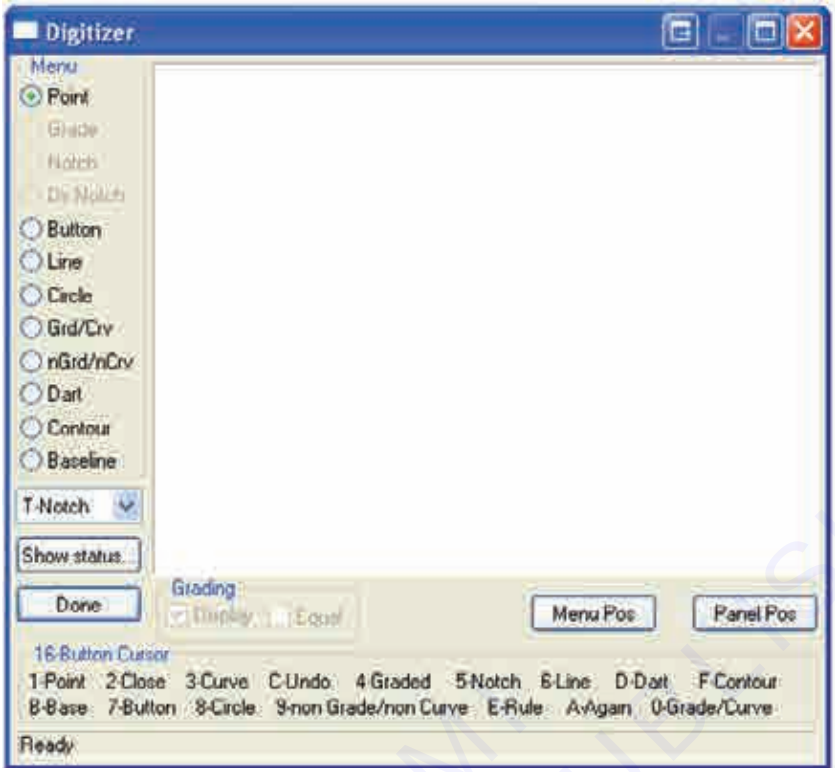
2 Menu
- File>Digitizer>Digitize

3 Toolbar
- General

4 Toolbox
- Windows Tools

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Icon: Digitize



To Set Up Digitizer

The Digitize Window is divided into sections to separate its functions, and contains buttons for additional functions.

1 The Menu Section contains each of the functions that a digitizer is capable of using these buttons can be used for understanding the use of each function without the use of the digitizer. These functions define a type of object that can be placed within a digitized piece, and using the mouse, you can click on a function, and click anywhere on the blank space to the left to test the function.

The meaning of each of these options are as follows:

Button	Function
Point	Creates a graded, non-curve point along a contour
Grade	Marks the nested locations of a graded point
Notch	Creates a notch on an external contour
Dir.Notch	Creates a directional notch on an external contour
Button	Creates a button or drill hole on the inside of a closed piece
Line	Creates a two-point internal line segment
Circle	Creates a circle using center location and radius
Grd/Crv	Creates a graded curve point
nGrd/nCrv	Creates a non-graded, non-curve point
Dart	Marks the first leg, second leg, and tip of a dart
Contour	Begins a complex internal contour within a closed piece
Baseline	Marks the baseline of a piece

1 The Digitizer Status Button opens a window that will display the current status of the digitizer, as well as the default modes for types of internals.

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2 The Internal Commands Button opens a window where you can set the default settings for internals that are created using the digitizer.

3 The Piece Information Button allows you to modify the piece information for the current piece you are working on. You can change the piece information one by one as you digitize, or more easily - fix them from within the PDS workspace.

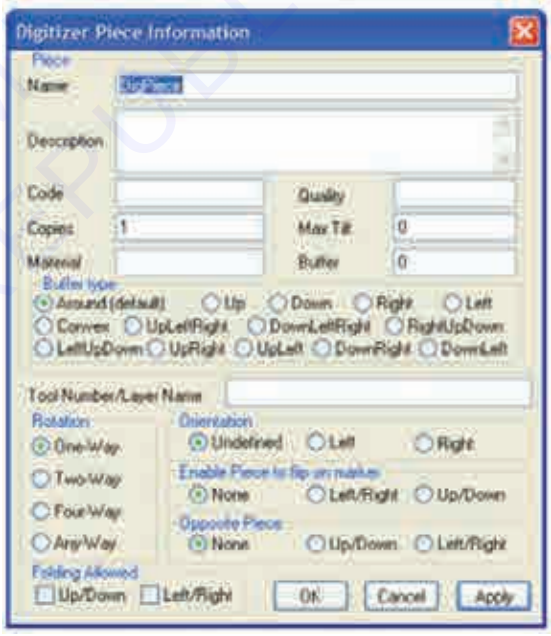


1 Digitizer status Window

2 Internal Commands Window

3 Piece Information Window





Testing Digitizer Calibration

1 Take an 8.5x11" sheet of paper and tape it to your digitizer board.

2 Digitize around the perimeter of the piece using only four grading, non-curve points total(You can use the crosshairs on the digitzer puck to be as accurate as possible while digitizing).

3 Click '"Done"' to send the piece to the workspace.

4 Find the Piece, and bring it to the workspace.

5 Press F8 to see the length of each contour between grading points.

Note: The human hand will never be able to perfectly recreate the exact size and shape of any contour digitized in. Your measurements can be as far as .1 or even .2" off depending on the size of your pattern.

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SOFTWARE - 2
(4 - 28)

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MODULE 3 : Pattern Design Software Tools and its Applications - Software - 2

LESSON 4 - 6 : Introduction to PDS

Objectives

At the end of this lesson you shall be able to explain

- understand about the software working application of pattern design software, marker, 3D, digitizer, and plotter
- describe about the software tools of PDS introduction.

Introduction to PDS

Pattern making process is necessary to run an apparel business smoothly. Before it accomplished manually, but now it's quite impossible to run it perfectly considering time, situation and business volume. Usually, pattern making software abbreviated as CAD which elaborated as computer aided design. In fact, it has known as design making software which can assist to optimize the sketches. Once pattern making task was tough and clumsy because all tasks handled by a skilled technician. But now it becomes very easy due to the advancement of computer technology.

- PDS is an integrated system which is used for pattern making, pattern grading, measuring as well as marker making. Some company also delivers automatic fabric spreader, automatic fabric cutter, end cutter, CAM cutter, plotter, and pattern cutter devices to smooth the operations.
- It is an essential element in garment export house, fashion school or medium and large size garment business.
- PDS system is not only useful for clothing business but also helpful to other professionals to create a dynamic design.
- PDS system is a unique process where a pattern maker can transform a sketch into a digital image and then can be printed out through a plotter.
- Moreover, by this practice pattern maker can justify image efficiency before print out through 2D / 3D special visual effects.
- The PDS (Pattern Design Software) is an integrated CAD program that allows you to design and implement your patterns in a user-friendly environment.
- With the PDS import patterns once created in other CAD systems, draft the own patterns, modify patterns using editing tools, add grading, and more.

PDS refers to the Pattern Design Software, which offers pattern-makers virtual design tools for drafting their designs. The program is typically used by members of the sewing industry and supplies them with efficiency-improving tools that reduce the time required to bring products to market. For instance, it is equipped with digitizers that can convert complex pieces into digital formats in mere seconds. It also keeps track of measurements both through the graphic representation—the visual pattern itself—and a dynamic chart that updates in real-time. Alterations to measurements in the pattern will immediately be shown on the chart and the same goes for changes to the chart, allowing 2-way editing in a trice.

The program also includes tools for fabric importing for virtualization, multi-device and multi-format support, and a Windows-based, mouse and pointer controlled working system. A user can even generate a representation of his pattern as completed and donned by a model through photorealistic 3D rendering, which is supported by the software: there are model presets that users can try in advance, although it is also possible to alter model parameters to get a specific body shape as the model.

Pattern Making Software's Name

1 **Lectra:** It is one of the worldwide renowned CAD software for garment entrepreneurs. They have developed a high-end CAD solution for the fashion industry. Pattern makers love to use Lectra for its simplicity and powerful features. It also admired in fashion and apparel, furniture, automotive as well as other industries like composites, textiles, and leather. Their cutting solutions are perfect for smooth operations. Their headquarters situated in Paris in French.

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2 **Gerber Accumark:** It is one of the popular CAD software for garment manufacturers. This software is user-friendly along with advanced features. It's a comprehensive and full-featured CAD pattern making software for the apparel industry. Their software and hardware solutions are perfect for fashion & apparel, aerospace, construction, packaging, furniture, automotive industry, technical textiles, digital printing, graphics industries. Their headquarters situated at West Tolland in the USA.

3 **GT CAD Software:** You will be glad to know that it's a Bangladesh-based company. They can deliver quick service regarding pattern design and marker making software. It is an integrated and accurate pattern making software for perfect fitting garments. Their interface has designated very simply so that everyone can handle it quickly.

4 **Optitex:** It exists 2D and 3D pattern making option with a lot of advanced features. You can use their package by paying low subscription to get lifetime customer support. It was a startup venture of Silicon Valley. Their CAD, pattern, cutting solutions are easy to use for all apparel industries.

5 **Etelestia:** Telestia formed by the Fashion School SITAM-AB in Greece on 2004. It is a comprehensive and full-featured CAD pattern making software for the apparel industry. Their 2D & 3D CAD/CAM solutions are perfect for Pattern-Designing, Grading, detailing, marker layout and CAD drafting in Garment industry.

6 **Tuka Cad:** It's appropriate for Pattern-Designing, Grading, and Marker-Making in Garment industry. You can use their service by paying low monthly subscription to get their premium service. They also provide free online unlimited training for their subscribers. Their software's are perfect for accurate measuring. Their headquarters situated in Los Angeles in the USA.

7 **Fashion CAD:** They have an integrated pattern making software for high-end customers. Their CAD solutions are user-friendly for pattern drafting, modification, grading, pattern cloning, detailing, and marker making. It is an Australia-based company.

8 **Richpeace:** They have a complete CAD solution for pattern making, pattern treatment, grading, detailing, editing, pattern cutting. It can be downloaded from their official websites by paying low yearly subscription. Their headquarters situated at tianjinshi in China. They also provide different types of cutting & sewing machine, embroidery, quilting machine.

9 **Gemini CAD Systems:** They provide integrated software and hardware solutions for pattern creation, modification, measuring, grading, pattern cutting including 2D and 3D pattern making option. It is a Romania-based company.

10 **PAD Systems:** It's powerful but easy software for pattern designing, grading, pattern alteration, cloning. It has some user-friendly Interface for making innovation. Thus, you can choose it for your production unit. It invented by iWork Ltd, a Hong-Kong based company.

11 **Tanya Contour:** It exists many custom features for pattern creation, grading, pattern tampering, marker-making, mass customization and custom-made tailoring.

12 **Romans CAD:** It is innovative and dynamic software for manufacturers and designers to accomplish Pattern Making, Pattern Treatment, Grading, and Marker Making Solution. Their sophisticated solutions are especially admired in footwear and leather goods industries to accomplish the critical task. Their headquarters situated at rungis in French.

13 **Dimension CAD:** It is an advanced pattern making, grading, editing, eliminating, and marker making solution that will make more efficient your production process and reduce operating cost. It is also an idle and affordable pattern making software for home based or commercial businesses. It situated in San Diego in the USA.

Companies overall profit and loss mostly depends on pattern and marker making section efficiency. Thus, an owner should select a premium CAD solution to chase the goal. You are requested to click my dropbox link to get a fantastic guideline regarding pattern making process.

I think you will get a clear instruction that may assist you to learn pattern making task quickly. There are a lot of resources on this topic in the online world. If you wish to learn pattern making job properly through the internet, I am humbly requesting you to search more or go through the referred link to get such type of books.

The PDS interface main elements

1 **The pattern design area (desk)** is the place where to create or modify the pattern.

2 **The pieces bar** is where can see and select all available pieces.

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3 **The 3D window** is where you can see a simulation of the design interactively in 3 dimensions.

4 **The toolbar** has customizable groups of icons of common functions.

5 **The left panel** has tabs and sub panels, including the **Toolbox, Grading table, View & selection attributes, Piece properties, 3D properties** and more. Some open automatically, depending on the action.

6 The bottom panel has tabs with different tools, such as the **Pieces Table, Style Sets, Map Zones table** and more.

7 **The information bar** displays context sensitive information and function operation instructions, depending on the current action.

Patternmaking 2D Software Tools
(General Tools)

PDS ⟶ Pattern Design, Grading, Export, Import
Plotting
Digitising

PDS 15 Double click (takes 15 minute to open)

⟶ Base screen

1 To Create a New Pattern

Go to Piece → New piece → Create Rectangle piece.

Short form → Right click → Create Rectangle piece → ok.

Default 30/20 cm → Length - 30cm , Width - 20 cm

2 To Change Inch/cm/mm

Go to Tools → Preference → Main folder→ working unit → unit→ cm/inch/mm → Ok.

Unit	Tolerance	0.001
	Decimal format	0.315
	Use square	inch/square feet .

View

Piece Window	1
Grading Table	2
Tool Box	3
Style Set	4
Compare Length	5
Piece Table	6
View & Selection	10

1 To Send the Pattern to Piece window from work area → Delete button

2 To Move Piece → Drag and drop → select the piece / press space bar red line is selected then move, (the mouse gets sticked with piece).

3 To Open Piece Window → 1 (in Key Board)
To Close Piece Window → 1(repress)
To Open Grading Table → 2
To Close Grading Table → 2 (repress)
To Open / Close Tool Box → 3
To Open/Close Style Set → 4
To Open/Close Compare Length → 5
To Open/Close Piece Table → 6

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4 In Tool Bar → Select Tool

Point on Contour (o)

Dart Tool (ctrl + Alt +D)

Seam (S)

Draft (D)

Text (T)

5 Compare Length → To check / compare any two parts (e.g) Armhole circumference & sleeve circumference, Collar band & Neckline.

6 Piece table

Piece Name	Code	Material	Quantity	Pair	Opposite	Rotation
Front	Cut 2	Shield/lining	1	√	Up/down	1 way
Back	Cut 1		1		Right/left	2way 4way(90˚/180˚/360˚)

Piece Table

Select the piece / Double click → Piece Property will Open

Piece Name → Piece / Shorts /Front/Back

Quantity 1 → 1 no.

2 → 2 no.

Pair →√ 2 pairs of front → opposite /mirror piece

→ Up/Down or→ ☐

→ left/right → ☐

Rotation → 1 way ☐

2 way ☐

4 way ☐

8 way ☐

Tool Box

1 My Favorite Tools →

Select Tool	Point on Contour	Seam	Dart	Draft

2 Windows Tools →

New	Save	Redo	Copy	Excel	Plotter
Open	Undo	Cut	Paste	Plot	Digitizer

3 General tools →

Select Tool	Compare length tool	Delete	Arrange on work area
Select segment	Select internals	Measure	

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4 Update pieces →

Replace old	Remove active	Separate piece
Refresh old	Save active as new	Swap piece

5 Points & Notches →

Point on Contour	Add on Point	Start Point
Reference Point	Notch	Add Point to Notches
Button	Line of Button	Circle

6 Movement

Move Point	Move Along Contour	Move Proportional
Move Fixed Segment	Move Points	Multiple Move
Move Piece	Move or Copy Internal	

7 Rotation

Rotate Piece	Rotate Contour/ Text	Rotate
Rotate Segment	Rotate Horizontal	Rotate Vertical
Rotate CW	Rotate CCW	Flip Horizontal
Flip Vertical	Flip Along	Text Direction

8 Build & Cut

Join Piece	Cut Piece	Cut Along Internal
Fold Out	Fold In	Fold onto Point
Build Piece	Trace Segment	Trace Piece
Build Zone	Trace Zone	Draft Zone

9 Contour

Draft	Circle Tangent	Arc	Trim
Wave	Round Corner	Cut corner	Swap Segment
Smooth	Join contour	Split Contour	Trace & Trim
Segment to Flip Internal	Extend Internal	Extend Internal by Rectangle	Trim Internal by Rectangle

10 Half Symmetry

Set Half	Set Mirror Line	Copy & Flip all Internals

11 Base Line

New Base line	Rotate to Baseline	Baseline Direction	Base Line Perpendicular

12 Seam

Seam	Basic Seam	Copy Seam	Seam Segment

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13 Darts & Pleats

Dart	Close/Re Open Dart	Rotate by Dart
Add Fullness	Dart by Pivot	Paste Dart param
Remove Excess	Fix Dart	Pleat
Pleat Lines		

14 Grading Tools

Prev. Point	Next Point	Copy Grading	Paste Grading

Annotation (Font size) / Description Text

Double click the Pattern Piece → Main → Description Text → Double click

→ Font Size → 1cm / 2cm → (Depends on the size of the piece) small or big , e.g. Collar[0.5 cm], Shirt Front [1 cm]

→ Angle (25°) → Annotation will be in angle at 25°

→ Centered → Annotation will be centered to Grain line

Ruler

View → Ruler → On/(Ctrl + Shift + Num +)

Ruler → Click/ OFF

Guideline

View → Guide line → Horizontal /Vertical

Go to end of Ruler Horizontal/ Vertical and Drag a Guideline

Bias Guideline → First take a Vertical / Horizontal Guide line → Double click → Select Angle and give 45° → Apply

- o Horizontal
- o Vertical
- o Angle 45°

then vertical guideline changes to 45°

To Move the Guideline → Select the Guideline and Double click,

Distance from the line [10 cm]

the pattern / [ ]

- o Horizontal
- o Vertical
- o Angle 45°

- First select the guide line
- Then select the angle arrow, in the box
- Then select angle point

i Control key + Guideline → Duplicates the Guideline

ii To fix the Guide line → Drag the guideline and merge with the point (point red)

iii Shift + Guideline → Rotate the guide line to 90° from actual position

Segments

1 General 2 Insert 3 Contour

4 Edit 5 Piece

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GENERAL TOOLS

Select Tool → 1 Go to Tool Bar & Select the tool

2 Right click select tool (Deselect)

3 End (To Deselect) when draft, curve, round corner etc tool is selected and to deselect use END in keyboard

New(Ctrl+N) → New Sheet Open

Open(Ctrl+O) → Opens an already existing sheet / file

Save (Ctrl+ S) → Saves the sheet / piece with the extension .PDS (e.g. zabla.PDS)

Print (Ctrl+ P) → used to take print

Plot (Ctrl+L) → Driver format to give print in plotter

arrange for plot

Arrange on working Area → Length , Width, Gap.

plotter setup → plotter select ; plotter/cutter setup

Excel report → single click

- To take necessary information of the pattern, in Excel print format this excel report is used .
- The file can be saved in desktop or any other folder.

Digitize → To digitize the pattern

X PDS REPORT

Report contains
- Piece information
- Internal information
- Material information

Excel file: c:\user\CSCTI pc12\desktop\tab.xls

ZOOM

Zoom rectangle → Ctrl + num

Zoom In → Num +

Zoom Out → Num -

Zoom All → Home

Zoom Real Scale →

Zoom selection → Ctrl + Home.

EDIT

Undo → Ctrl + Z → 1 step back (can do upto 32 steps back)

Redo → Ctrl + Y → 1 step forward

Cut → Ctrl + X → Cuts the piece / pieces

Copy → Ctrl + C → Copy a piece / pieces can also place in the same file or in another file

Paste → Ctrl +V → Pastes the piece in the same file or in another file which is copied

Delete → Shift + Del → Deletes the selected item from work area or even in piece window

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Piece properties

Piece Properties	
Main	
Protected	
Name	Collar
Unique PieceName	Uoo19
Quantity	1
Pair	√
Code	Cut 2
Material	
- Description Text	
Adjust	adjust
Font size	2.00 cm
Angle	
Centered	
Half	

We can also change the Name

Quantity 1 or 2 or 4 (Cuff- 4; Collar- 2)

Click Pair if you want Double

SELECT ALL (Ctrl +A)

It Selects all the pieces in the work area and also all the pieces in the piece window.

REMOVE ACTIVE PIECE

It Removes the piece from the work area not from the piece window.

UPDATE PIECE

Replace Old

Refresh Old

Remove active

Save active as New

Separate piece

Swap piece

Online help → F1 Software Manual

Tool bar Option → To/add/ remove buttons tool

ARRANGE WORK AREA →(Ctrl + K)

It arranges all the patterns in the screen, which are fairly placed in the screen to near each other.

ARRANGE FOR PLOT →

It arranges the pattern pieces according to the plotter paper width

width = 36”, 42”, 56”

Gap = 0.5cm/1cm/2cm gives a gap between pattern

Arrange for plot
Plotter
Width _90cm
Gap 2cm
Length ___
ok

ARRANGE ON WORK AREA WITH LARGE GAP → (Ctrl + Shift + K)

It arranges the pattern pieces with more gap between each pattern

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Toolbar Reference Guide

The most commonly used design and editing tools are represented as icons in the toolbar. You can access commands with the click of a mouse; there's no need to navigate through a series of pull down menus. You can add or remove different types of notches, create darts, add seam allowances pleats and buttons and view everything on the screen as you are working.

You can customize the toolbars to add/remove and decide which tools you want to access quickly.

The following toolbars are available: (click on a toolbar to view more details)

General

Tool Name	Shortcut	Description
Select Tool	End	Selects pieces, points, or objects, and move by clicking and dragging or using the space key.
Select Segment Tool		Selects a segment.
Compare Length		Compares the length between segments and lines.
New	Ctrl +N	Creates a new file.
Open	Ctrl +O	Opens an existing file.
Save	Ctrl +S	Saves a file.
Print	Ctrl +P	Prints the pieces in the Working Area..
Plot	Ctrl +L	Plots the pieces in the Working Area.
Plotter Preview		Shows how the pattern will be plotted through a preview dialog.
Arrange on Working Area	Ctrl +K	Arranges all the pieces in the Working Area as they would be for plotting.
Arrange for Plot		Arranges and spreads the pieces currently in the piece list in the Working Area.
Arrange on Working Area with Gap		Arranges for plot with a large gap, only for pieces currently in the Working Area.
Arrange All		Arranges all the pieces in the Working Area for plot.
Arrange Two Overlapped Pieces		Arranges and spreads overlapping pieces two at a time.
Excel Report		Exports the current file to Excel format.
Digitize		Digitally inputs a paper pattern.
Zoom By Rectangle	Ctrl+Num+	Drags a rectangle over the area you are zooming in on.
Zoom In	Num +	Zooms in on a specific piece.
Zoom Out	Num -	Zooms out on a specific piece.
Zoom All	Home	Zooms in on all pieces in the Working Area.
Zoom Real Scale		Selects an area to zoom in real scale.
Zoom Selection	Ctrl +Home	Zooms in by selecting a piece.
Undo	Ctrl +Z	Undoes the last action.
Redo	Ctrl +Y	Redoes the last action.

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Cut	Ctrl +X	Cuts the selected piece(s) and stores it (them) on the clipboard.
Copy	Ctrl +C	Copies the selected piece(s) and stores it (them) on the clipboard.
Paste	Ctrl +V	Pastes piece(s) saved to the clipboard.
Replace Old		Removes selected pieces from the Working Area and saves them to the Pieces window.
Refresh Old		Refreshes selected piece(s) in the Pieces window according to the changes done in the Working Area.
Remove Active		Removes selected piece(s) from the working Area without saving changes.
Save Active As New		Saves the selected piece as a copy and removes it from the Working Area.
Separate Piece	F9	Removes all but the selected pieces.
Swap Pieces		Replaces selected edited piece(s) in the Working Area with the original piece(s) in the Pieces window.
Help Index		Opens the Help menu

PATTERNMAKING 2D SOFTWARE TOOLS

(Contour & Piece Tools)

Contour

Tool Name	Shortcut	Description
Round Corner	Ctrl +R	Transforms an angular corner into a rounded corner.
Cut Corner		Cuts an angular corner in a specified distance.
Align Points	G	Aligns multiple points vertically, horizontally or by a specified angle
Align Vertical		Aligns objects vertically, according to a selected object
Align Horizontal		Aligns objects horizontally, according to a selected object
Align By Line		Aligns objects on a selected line
Smooth		Reshapes a line by deleting unnecessary support points, to end hold Shift on last click.
Join Contours		Connects two non-closed internal contours.
Split Internal Contour		Splits an internal contour into separate segments
Segment To Flip Internal		Creates an internal contour from a contour segment with a flip.
Extend Contour as Curve		Creates a contour from the selected segment and extends it.
Circle to Contour		Converts the selected button or circle into a contour.
Extend Internal		Extends an internal line, dart or circle up to the contour, or by a specified length.

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Extend Internals By Rectangle		Using the rectangle selection tool, extends the ends of the internal contours.
Trim	Shift +T	Cuts off an internal line up to a meeting point with another line.
Trim By Rectangle		Using the selection rectangle to select internal contours, then trim internal contours.
Trace and Trim	Ctrl+Shift+T	Cuts off two internal lines at their intersection point.
Lines Between Segments		Adds internal contours between two segments.
Hole OverCut		Converts a closed internal contour into a non-closed one for cutting purposes.

Piece

Tool Name	Shortcut	Description
Walk	W **F11:** Flips the walking direction **F12:** Adds notches to rotating and stationary pieces **Ctrl+ F12:** Adds a notch to a stationary piece **Shift +F12:** Adds a notch to a rotating piece	Walks pieces together.
Walk Segments	Shift+Alt+D	Walks by segments
Measure	Ctrl +D	Measures the distance between two points, or along a straight or curved line.
Join Pieces	J	Joins two pieces into one piece.
Cut a Piece	C	Drafts a cut line on a piece and splits it into two pieces.
Cut a Piece Along Internal	Ctrl+Shift+C	Cuts a piece along an internal line.
Build Piece	B	Automatically builds a new piece from selected sections of existing piece(s).
Trace Segments	Ctrl+ B	Builds a new piece by following along segments in/of a piece/overlapping pieces.
Trace Piece	Ctrl+Shift+B	Builds a new piece out of overlapping pieces.
Build Piece Zones	Ctrl+Shift+Z	Builds a new zone in a selected section of a piece
Trace Piece Zones	Shift+Z	Builds a new zone in a piece by following along segments.
Swap Zone Segment		Swaps between internal lines to determine the border of a zone.
Draft Zone		Drafts a zone on the current mapped piece.

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Fold Out	Ctrl+Shift+F	Folds out a facing or lapel line or any selected internal line.
Fold In	Shift+F	Folds in a part of a piece along a selected internal line.
Fold Onto Point		Folds in a part of a piece along two selected points.
Fold Line to Line		Folds one segment onto another segment.

Contour Tool Bar

Round Corner:

- Select the piece
- Select the Round Corner Tool
- Select the point of the piece to be round cornered

  Radius 1cm → ok

  The corner gets rounded.

Cut Corner: It cuts the corner

- Select the piece
- Select the point of the piece to be cut
- Radius 1cm → ok
- The corner gets cut

Align points (G):

- Select the Align Tool,
- Select the first point → vertical , - Select last point
- Align all between the selected points→ ok

  Select Vertical /Horizontal

Align vertical : Select the Align Vertical Tool

- Select the Reference point to keep Vertical
- Drag a rectangle or point for alignment.
- Select the point to make Align Vertical

Align horizontal: Select the Align Horizontal Tool,

- Select the Reference point to keep Horizontal .
- Select the points or / Rectangle select point to make Align Horizontal.

Align by line:

- Select the first point along a line to determine the desired angle
- Select second point along a line to determine the desired angle
- Drag a rectangle or select point for alignment
- The selected point gets aligned.

Smooth : Used to smooth the curve shape

- Select the first point & second point → Then press shift key
- Then select the points which is ok for shape. This gives a smooth curve.

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Joint contours : (Shift + J)

It joints the splitted internal lines

Split internal contours : It splits the Internal lines,

- Select point on internal contour for division.

Segment to flip internal: The internal segment is

- First select the segment to flip internal tool, flipped
- Select the point to be stable
- This creates a flip to opposite point slide.

Extend contour as curve : This extends the line Segment.

Segment to Extend
Points _2__ Extension Direction Extend by _2cm_

- First Select the two points of the internal or external
- Then only the Extend Contour will be highlighted

Extend internal (E)

Size _____
Extend _____
Extension Amount _____

- First select the point to be extended
- Then select the Internal Contour
- Then give extension amount = 3
- Then again click the button Extension Amount

CIRCLE OF CONTOUR

- First put a circle (Internally), Using Circle (Circle Alt + C)
- Then Select the Internal Circle & Select the Contour Circle Tool
- Put No. of Points _8__
- Ok
- Now move the points (Only to Change / amend the circle)

EXTEND INTERNALS BY RECTANGLE

- First put 2 or 3 internal line in the pattern
- Then Select the Internal Lines and Select the Internal by Rectangle.
- Create a point on the shaped contour Yes /No.
- Automatically extends the lines 2/3 to the pattern edge / perimeter line

  This Extends the line along with grading

TRIM (SHIFT + T)

If two lines are inter selected both internal lines

- Then Select the Trim Tool.
- Then Select the line to be trimmed.

TRIM BY RECTANGLE

- To Trim more line at same time
- Select the Trim Rectangle tool and
- Select the multi lines. Then it Trims.

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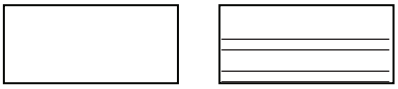
Trace and trim: (Control + Shift + T)

- It traces the line and Trims the line
- First Select the Trace & Trim tool
- Then Select the line to be Traced & Trimed
- Select the point to be trace then select the Perimeter line upto be extended.

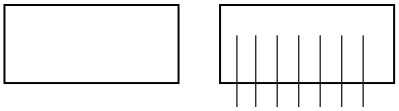
  The line gets extended.

lines between segments :

- First Create a new piece of different measurement
- E.g. Length – 27.95 cm - Width – 14.23 cm
- Then if you want Horizontal line, Select the points 1,2,3,4
- Then give OK.



- If you want Vertical lines, Select the points 4,1,2,3



Hole overcut

- First put an internal circle, Using Circle Tool
- Use circle to Contour Tool and Put No. of Points in the cirle.
- Then use Hole Overcut Tool
- Select a point on closed internal for hole overcut.

  Used while cutting for cutting circles to reduce confusion (i.e) Where to start, Where to stop.

Piece tools

Walk (W) :

- Used to check the circumference of Sleeve and Circumference of Armhole

First Join the front & back part of the bodice at the shoulder point and keep the sleeve part ready.

- Select a point on the moving piece
- Select a point on the stationary piece
- F11 to Flip the Piece
- Now Check the Measure
- The measurement of the sleeve crown should match to the measurement of the armhole.

Walk segment (Shift + Alt + W)

Measure (Ctrl + D) :

X	=	20.8 (Horizontal)
Y	=	4.76 (Vertical)
Angle	=	14 o (Angle)
Distance	=	21.4 (Diagonal of line)
Segment Length	=	31.1

Select the first point then select the second point.

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Join piece (J) :

- Click inside a piece / point to combine piece
- Click inside the second piece
- Give OK

(i.e) where the piece should be joined at top or bottom side

- Change direction
- Delete Seam
- Move pieces along side only

Ok Cancel

Change Direction → If want to change direction, Click √ Change direction

Delete Seam → If you click delete seam → √

(i.e) If the yoke and back part has seam in it and you want to join the yoke & back part without seam,then this option delete seam is used.

Cut piece:

- First put an Internal Line, (e.g) Princess line , frock yoke
- Select the Cut Piece tool
- Select the Internal Contour

Cut a piece along internal: (Ctrl + Shift + C)

- Cut by Internal contour
- If the internal line is Zig-Zag or other shape, then Select this tool Cut a piece along internal
- Select the Internal line & cut
- Deselect the tool
- The piece comes separate

√ Seam - If you want cut piece with seam, Click this option.

Build piece (B):

- Select the piece part first / It turns green
- Again Click inside the piece – The piece can be moved separate
- (i.e) It creates a new piece of the selected shape / pattern.

Trace segment:(Ctrl + B)

- Select the tool to trace a piece / pattern
- Trace the line of the new piece / Select the segment clockwise.
- Finish;
- Deselect the tool – Now move the piece- Now the piece is traced.

Built piece zone

- Creates a Separate Zone.

Trace piece (Ctrl + Shift + B):

- If two piece in a pattern overlaps and to remove the overlapping portion separately.

This Trace piece tool is used.

Fold out

If the pieces is in fold. To remove the fold

- Select fold out tool and click the fold line.
- Automatically the piece gets Unfold.

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Fold in :

It is used to fold and see the yoke forward fold.

First Select the grade point of yoke forward

- Select Piece Contour Segment
- Select the Second Point for fold.

Fold onto point :

It is used to fold the piece onto the selected point.

- Click a point on external / contour to fold
- Click a point on internal / contour to fold onto.

From the selected first point it folds to the selected second point.

Patternmaking 2D software tools

(Insert & Edit Tools)

Insert

Tool Name	Shortcut	Description
Add Point on Contour	O	Adds a point along a line.
Add Point	Shift +O	Adds a point outside of a contour line; the contour line will shift towards the new point.
Set Piece/Contour Start Point		Sets selected contour point as the start point of the piece.
Add Reference Point		Adds a point with None attribute to be used as a reference point.
Add Relatively Point or Notch	Ctrl +Shift+A	Adds a point or notch relative to the selected point
Add Notch	N	Adds a notch on a segment.
Add Notch On Point	Shift+N	Adds a notch on a corner point to place it on the previous/next segment.
Add Points to All Notches	Ctrl +Shift+N	Adds a point to any existing notch
Grade Notch		Displays and sets grading of a single notch relative to a selected grading point for all sizes.
Add Seam	S	Adds/changes seam allowance.
Basic Seam		Creates a basic seam for the same pieces.
Remove Seam	Shift+S	Removes the seam allowance from the entire piece.
Round Corner on Seam		Creates a round seam corner
Create Arc on Seam		Creates an arc seam
Create Wave on Seam		Creates a wave seam
Cut Seam Angle		Customizes a corner for the seam allowance.
Copy Seam		Copies the seam from a selected segment.

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Paste Seam		Pastes a copied seam to a selected segment.
Replicate Seam		Replicates the seam shape from one piece to another.
Match Seam		Places one piece over another and matches the shape of their seam.
Seam Segment		Applies seam allowance by clicking over segments.
Convert Internal to Seam		Converts an internal line into a seam.
Add or Rotate Dart	Ctrl+Alt+D	Drafts a dart, shifts a dart, or shifts a dart Apex
Close/Reopen Dart		Closes or opens a dart
Rotate Piece By Dart		Rotates the piece according to the dart.
Add Fullness		Slashes and spreads a piece at a selected area to add fullness
Create Dart By Pivot Points		Slashes and spreads a selected area in the piece to set a dart
Edit Dart By Pivot Points		Adjusts a dart while maintaining two fixed pivot points
Close Dart By Pivot Points		Closes a dart while maintaining two fixed pivot points
Cutting Dart By Arc		Arcs dart legs and cuts out selected dart
Fan		Slashes and cuts a piece thus creating a fan effect
Dart Parameter Copy/Paste		Copies/Pastes dart parameters
Remove Excess		Removes excess material from within a piece
Circle	Ctrl+Alt+C	Selects a center and diameter to define a circle
Circle Through 3 Points		Selects three points to define a circle
Add Button	Ctrl+Alt+B	Creates a button or a drill hole
Add Several Buttons		Adds several buttons in a row
Add Several Lines		Adds several lines in a row
Text	T	Allows you to type additional text on a piece in any location
Text Direction		Sets the text location and direction inside the piece
Pleat	L	Adds a pleat between two selected points
Pleat Lines	Shift+L	Draws pleat lines (axis lines) from which to create pleats
Select Pleats	Ctrl+Shift+L	Selects multiple pleats (allowing you to edit multiple properties at once)
Arc	A	Creates an internal arched line or reshapes a contour as an arched line
Wave		Creates an internal waved line or reshapes a contour as a waved line

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Edit

Tool Name	Shortcut	Description
Delete	Backspace	Deletes objects such as points, internal lines, pleats, darts or buttons
Draft	D	Drafts contours and internal lines. Hold down the SHIFT key to draft curved points.
Two Circle Tangent	Ctrl+Shift+Alt+C	Creates a line that runs between two selected points on two circles
Move Point	M	Moves a selected point
Move Point Along Contour	Shift+M	Moves a single point along an existing line
Move Points Proportionally	Ctrl+M	Reshapes and trues a line by moving its points proportionally
Move Points Parallel	Ctrl+Shift+M	Moves a line of selected points equally and in the same direction, thus maintaining the length of the line
Move Points	Ctrl+Alt+M	Moves a chain of points using DX, DY, Distance and Angle values for each point
Multi Move	Q	Moves several points and internal objects from a single piece or multiple pieces
Move Subsegment		Moves a segment without changing a specified sub-segment (a smaller segment)
Rotate Subsegment		Rotates a sub-segment without changing a specified segment
Move Piece		Moves a selected piece across your work area
Move Piece on Piece		Places one piece over another according to matching segments
Move Internal	|	Moves internal elements on the same piece
Select Internals	Shift+I	Selects multiple internal lines or elements. This helps to clean up patterns
Rotate Piece	R	Rotates a piece around a center point
Rotate Contour or Text	Alt+R	Rotates a contour or text
Rotate		Rotates a piece or several pieces, internal objects or the baseline by a specified number of degrees
Rotate Segment		Rotates a segment around a pivot point
Rotate Selected Line Internally	-	Rotates a piece internally to a selected line
Rotate Selected Line Vertically	Shift+-	Rotates a piece vertically to a selected line
Rotate Clockwise	[	Rotates a piece in a clockwise direction
Rotate Counter Clockwise	]	Rotates a piece in a counter clockwise direction

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Flip Horizontally	Shift+=	Flips a piece from left to right (Y axis)
Flip Vertically	=	Flips a piece from top to bottom (X axis)
Flip Along Line	Ctrl+=	Flips a piece along a selected line
New Baseline	Ctrl+/	Redraws and centers the baseline
Rotate to Initial Baseline	Shift+/	Rotates the piece so that the baseline is horizontal
Set Baseline Direction	/	Rotates the baseline parallel to two selected points
Set Baseline Perpendicular		Rotates the baseline perpendicular to two selected points
Set Half Piece Line	H	Creates a mirrored half of a piece along a selected segment
Set Mirror Line	Ctrl+Alt+H	Creates a mirrored piece for the piece's contour alone along a selected segment
Open Half	Shift+H	Opens a halved piece and protects it from changes
Close Half	Ctrl+H	Reverses the Open Half
Copy Flip All Internals		Copies and flips all internals from one piece to another.
Swap Segments		Swaps an internal segment with an external contour
Create Parallel	P	Creates a line parallel to the selected line
Extend in Parallel	Shift+P	Extends the selected line in a parallel motion

Grading

Tool Name	Shortcut	Description
Prev Point	Left Arrow	Selects the previous grading point.
Copy Grading	Shift+C	Copies X & Y Grading values in order to paste them on a different grading point .
Paste Relatively		A mode in which the grading values will be pasted relatively to the piece center (flips grading around the piece center).
Paste Grading	Shift+V	Pastes both X and Y grading values to a selected point.
Paste X Grading	Shift+X	Pastes only the X grading values to a selected point.
Paste Y Grading	Shift+Y	Pastes only the Y grading values to a selected point.
Paste DD Grading		Pastes the diagonal distance value (dd) to a selected point.
Clear Grading		Clears all grading values in the selected grading point.
Flip X Grading		Flips the grading values from + to – along the X axis.
Equal X Grading		Equals X grading for all sizes.

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Clear X Grading		Clears the X grading values for selected points.
Flip Y Grading		Flips the grading values from + to – along the Y axis.
Equal Y Grading		Equals Y grading for all sizes.
Clear Y Grading		Clears the Y grading values for selected points.
Graded Nest		Stacks separate pieces to create a graded nest.
Grade Proportionally		Grades the intermediate points between two grading points proportionally.
Stack Point		Stacks grading on a selected point.
Next Point	Right Arrow	Selects the next grading point.

Darts

Tool Name	Shortcut	Description
Add or Rotate Dart	Ctrl+Alt+D	Adds a dart
Close/Reopen Dart		Closes or reopens a dart
Rotate By Piece Dart		Rotates a piece by a dart.
Add Fullness		Slashes and spreads to add fullness.
Create Dart by Pivot Points		Creates a dart by pivot points.
Edit Dart By Pivot Points		Edits a dart by pivot points.
Close Dart By Pivot Points		Closes a dart by pivot points.
Cutting Dart By Arc		Arches and cuts a dart.
Fan		Slashes and cuts a piece thus creating a fan effect
Dart Parameter Copy/Paste		Copies and pastes dart parameters
Remove Excess		Removes excess material within a piece.
Create Dart		Creates a dart.
Multiple Dart		Creates multiple darts.
Copy Dart		Copies a dart.
Paste Dart		Pastes a dart.
Close Darts		Closes a dart.
Fix Dart		Fixes a broken dart.
Select Darts		Selects multiple darts (so you can edit multiple properties)

Basic Figures



Views

Tool Name	Shortcut	Description
Style Set	4	Shows or hides the current style set.
Grading Table	2	Shows or hides the grading table.
Rules Library	Ctrl+Shift+Alt+R	Shows or hides the grading rules library.
Compare Length	5	Measures and compares segment lengths.

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Calculator	Shift+1	Shows or hides the calculator window.
3D View	7	Shows or hides the 3D View window.
Shader	9	Shows or hides the shader window.
3D Properties	8	Shows or hides the 3D properties of the selected stitch.
Stitches	0	Shows or hides the stitch data.
Rulers	Ctrl+Shift+Num+	Shows or hides the rulers.
Pattern Shaders		Shows or hides pattern shaders.
Fabric Full Screen		Fills the screen with the fabric pattern.
Clip Fabric Pattern		Shows the fabric pattern clipped to the pieces.
Control Points		Shows or hides control points.

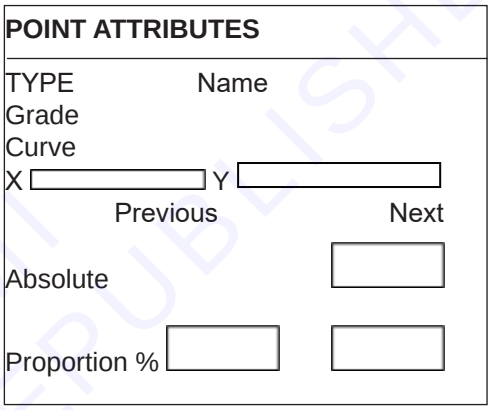
INSERT TOOLS

ADD POINT ON CONTOUR (O) :

It is used add point on line

Normal Point • (Small)

Grade Point • (little big) For Grade point press Shift

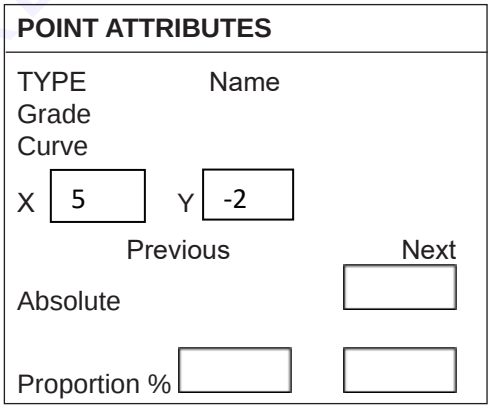


Add point (Shift + O):

Adds a point beside a segment

- Click a Point at 5 cm distance
- This creates a point at a distance of 5 cm in

x axis and (-2) in y axis



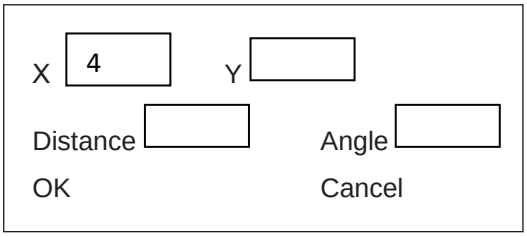
Set piece / contour start point:

Add reference point :

- It is used to insert a reference point.
- Select the Tool Add Reference Point
- Click where you want the reference point (Or)
- First select a point / then from that point to

Create a reference point

- If you want Dialog Box (Press Alt)
- If Shift + Selects the existing notch



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Add notch (N)

- Select the Tool Add Notch
- It Adds a Notch on a line segment

With (Shift +) It selects the existing notch

Give Seam allowance and try the add notch,

The notch also comes in the seam allowance

Add notch on point (Shift + N) :

- Select the Tool Add Notch on Point
- It adds a notch to a point only but not in the line segment
- Select a notch to an Point

By using the tool you cannot create a notch in the line segment

Add points at all the notches

(Ctrl + Shift + N) :

- This creates a point to all the Notches, which is in the pattern

Add Point to all Notches
* Current piece only
OK

Grade notch:

Add seam (S):

- It is used give seam allowance for selected line segment
- First Select the Seam point
- Drag the cursor to the end of the seam in a clockwise direction
- Enter exact seam allowance in the Dialog Box
- Press OK

Basic seam:

- Select the piece to give seam allowance.
- Select Basic Seam tool
- Dialog Box appears
- Give Seam Allowance 2
- Select Current Piece

Set Basic Seam Line
Seam Width
Piece 2
All Piece in the File
All Piece on the Work area
All Selected Piece
• Current Piece only

Remove seam : (Shift + S)

- This tool is used to remove the given seam allowance of the entire piece
- The seam allowance for the entire piece is removed

Remove seam on segment (Ctrl + Shift + Alt+ S)

- It is used to remove the seam allowance of the particular line segment
- Select the first point of Segment.
- Drag the cursor to the end of the segment, where you would like to remove the seam
- Now the seam allowance of the line segment is removed.

Round corner on seam :

- Select the Base point for round a corner on Seam
- Select the Corner Point on Seam to be Rounded
- Dialog Box appears. Give Radius 1 cm

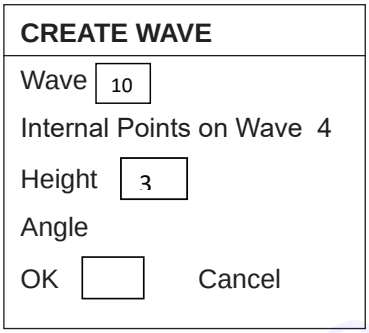
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- Give OK
- The seam gets curved.

Create arc on screen:

Create wave on seam :

- Select the base Point for Wave on Seam
- Select the first point for the wave on Seams
- Select the second point for the wave
- Select the top of the wave (or use Shift to modify it)
- Use TAB for change wave numbers – click mouse



Copy seam :

- It is used to Copy the seam allowance from one pattern to another
- Select first seam point (with Shift – seam segment
- Drag the cursor to the end of the seam in a clockwise direction
- Select the first point for Paste Seam
- Select the last point for Past Seam

Paste seam :

- It is used to Paste the copied seam from another pattern
- Select first point for Paste Seam
- Select last point for Paste Seam

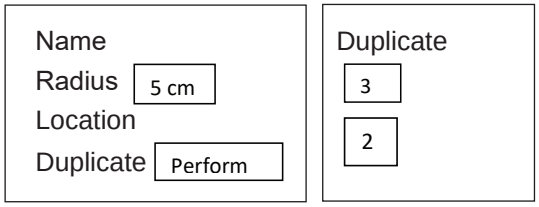
Replica Seam :

Match Seam :

Seam Segment :

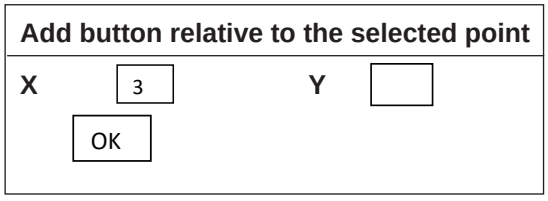
Circle : (Ctrl + Alt + C)

- Select the location for the circle centre
- Move the mouse pointer to define the Radius
- A Circle is created



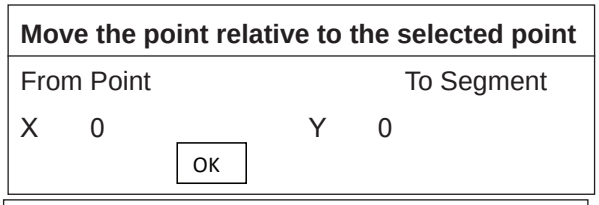
Add button (Ctrl + Alt + B)

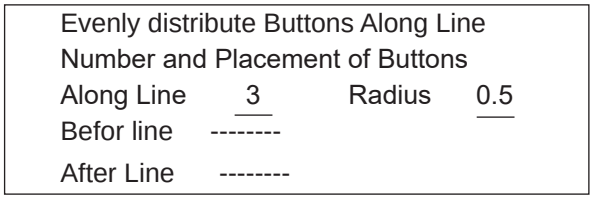
- Insert a Button
- When the measurement is mentioned X 3cm
- It adds a button at 3 cm on the X axis



Add several buttons

- Select the first point for the line of Buttons
- OK
- Select the last point for the line of Button
- OK





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Add several lines

- Select the first point for the several lines Ok ⟶
- Select the last point for the several lines Ok ⟶

(Blank length -0.45 negative measure should not be there)

Evenly distribute lines Along Segment		
Line Numbers	40	
Line Length	12	Cancel
Blank length	0.45	points on line -----
	OK	

TEXT (T)

- Add Text to piece (Type the matter) → Ok
- A Text Box Opens, Type the text inside it (armhole, neck) , give Ok

TEXT DIRECTION

- (Text should be typed first) (e.g, Neck , Armhole)
- Drag to create a line for text direction
- Select text to move and rotate according to a line

Ctrl – No move ; Alt – Perpendicular ; Shift – Backward.

PLEAT (L)

- Select the Pleat start point (along external line)
- Select the second pleat point (must be on external line)

Fill the dialog box → √

OK / Enter → Both side

↑----------

↑---------- ↑ This arrow shows the

↑---------- pleat direction

Pleat
Name
Pleat Type → knife Pleat
Depth → 1 cm
Variable
Dashed line
Notch side view
Multiple pleat
Number of pleat → 3
Distance → 0.5
Variable distance → 0.5
Distribution direction

PLEAT LINE (Shift + L)

- Select the first point for pleat line on external line ⟶ OK
- Select the second point on external line for pleat line.

ARC (A)

- Select Arc first point ⟶ OK
- Select Arc second point ⟶ Ok
- Select Arc top (Press Shift to modify the Arc curve) press mouse

Create Arc	
Number of points	
Along Arc	⟶ 8
Radius	⟶ 14
Distance	⟶
OK	CANCEL

WAVE

- Select the first point of Wave
- Select the second point of Wave
- Select the Top of Wave (or use Shift to modify)
- Use TAB for change Waves numbers

Create Wave	
Wave	⟶ 10
Internal Point	⟶ 3
Height	⟶ 2
Angle	⟶ 0
*Internal Wave	* Contour Change
OK	CANCEL

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Dart

Add / rotate dart : (Ctrl + Alt + D)

- Select the first point for the new dart → OK
- Select the second dart point Clockwise → OK
- Select Dart tip (Centre)

Main	
Dart Type	→ Dart
Depth	→ 12
Width	→ 4
Overlap	→ None

Close / reopen dart

Rotate piece by dart

This option rotates the piece along with the dart.

- Select the dart for Rotate piece to Left side
- If press Shift to rotate Right side.

Main	
• Amount on first point	→ 4
CW	→ 2
CCW	→ 2
Amount in second point	
• Angle Dashed line	→ 5
• Parallel slash & spread	
Number	
Distance	
Variable distance	

Add fullness

- Select the Fullness opening point on the contour → OK
- Select the Pivot point on the piece contour → Ok

Create dart by pivot points

- Select external dart contour point for dart opening → Ok
- Select point for dart tip (Centre) into Piece
- Select the first pivot point along external contour → Ok
  (On pattern line, for the portion not to move / or disturb)
- Select the second pivot point along external contour
- Rotate contour point around pivot for dart opening
- Mention Dart depth & Dart width/opening

Selecting first & second pivot point should be in clockwise direction only.

Edit tools

Delete (backspace)

- Deletes everything notch, Dart, Pleat, Line, Point etc. (except Piece)

Draft (D)

- Used to draw a line using pencil tool.
- Draws a external or internal contour → OK
- Crete a point on the snapped contour too → Yes
- Click to create new internal contour points → Ok

D+ (>) = Draw a Horizontal straight line.

Shift + (>) = Draw a vertical straight line

Control + (>)= To release the lock (Horizontal or Vertical)

Shift = Curve

Two circle tangent (Ctrl + Shift + Alt + C)

- It is used to draw a tangent line between the two selected points.
- Select the First point for Tangent line
- Select the Second point for Tangent line
- Set the distance from first & second point
- OK

Set Line Distance	
From First Point	→ 2
From Second point	→ 2
OK	

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Move point (M)

- Used To move the point to new location.
- Select Point to Move. → OK
- Measurement Box appears
- Give measurement → Ok

Move Point

From Last point

→ X 2.0 ↑ Y 0

OK Cancel

Move point along contour (Shift + M)

- Moves a point along contour.
- Select the point → OK
- Move to new point location on the contour.
- Mention the Distance → 1 cm → OK
- The Selected point shifts to the new location along the contour.

Move Point along Contour

Distance 1

Min. Distance → 68.5

Max. Distance → 70.5

Ok

Move point proportionately (Ctrl + M)

- Select the first point on line segment to be dragged proportionately.
- Click on the end point of the segment.
- Select the point on the segment and drag.
- Move to new segment location.
- Give measurements → OK

Move Segment Proportionally

From Last point

→ X 8 ↑ Y -4

OK Cancel

Move points parallely (Ctrl + Shift + M)

- Select the first point of the segment to be moved
- Click on the end point of the segment
- Again click on the end point of the segment
- Move to new segment location.
- Give Value in dialog box.

Move Segment in a parallel motion

From Last point

→ X -3.5 ↑ Y 2.1

OK Cancel

Move points (Ctrl + Alt + M)

- Select the first point on the segment to be dragged proportionately
- Click on the end point of the segment
- Click the point on the segment and drag
- Move to new location

Move Point Distance

	Name	dx	dy	Distance
1	9	1	1	
2	1	0	1	
3		0	1.5	
4		0	1	
	OK		Cancel	Preview

Multi move (Q)

- Used to move multiple pattern also in the work area.
- Drag a rectangle around points and internal objects to be moved.
- Select the point in rectangle to drag.
- Move the point to new location

Move Object selected by a rectangular area

From Last point

→ X 2 ↑ Y 0

Move piece

- Used to move the piece in Work area.
- Move and drag piece.

Move piece on piece

- Used to keep one piece on another like joining(e.g.) Shoulder, Yoke Keeping back on front part.

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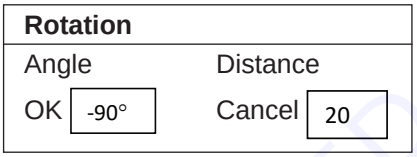
- Move and Rotate piece to place it on another piece.
- Select point on stationary piece, Line direction to next point will be used.
- Select moving piece point to move piece on piece.

MOVE INTERNAL (I)

- Used to move any internal like (Button , Circle, Line , Text)
- Select the Internal object and Move the Internal object.

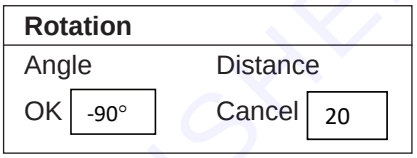
ROTATE PIECE (R)

- Used to Rotate the piece along with the annotation
- Select a piece or a Rotation Centre
- Rotate to new position.



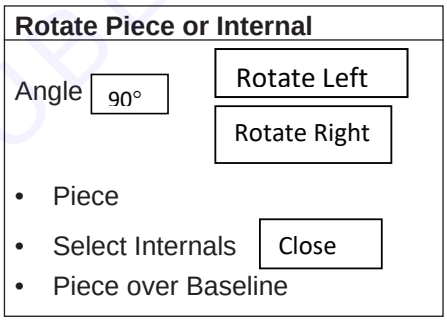
ROTATE CONTOUR OR TEXT (Alt + R)

- This option Rotates the piece excluding the Text/Annotation
- Select Rotate Contour or Text
- Rotate to the new position.



ROTATE

- **Piece**
- Only the piece rotates along with Grain line & Annotation
- **Piece over Baseline**
- The Grainline stays , the Piece & Annotation rotates
- **Select Internals**
- Select the internal Grainline first,Here the Grainline only rotates but not the piece



ROTATE SEGMENT

- Set Center first
- Select first point of the Segment you like to Rotate.
- Select the last point of the desired segment.

ROTATE TO HORIZONTAL (-)

- Rotate Selected line Horizontally
- Rotate piece Horizontally according to selected line
- Select first point, Select Second point.

ROTATE TO VERTICALLY (Shift + -)

- Rotate selected line Vertically
- Select the first point, select the Second point.

ROTATE CLOCKWISE ( ])

- Rotates the Piece in Clockwise Direction.
- Select the Tool, Select a piece or a Rotation centre.

ROTATE COUNTER CLOCKWISE ([ )

- Rotates the Piece in Anticlockwise Direction.
- Select the Tool, Select the Piece.

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FLIP HORIZONTAL (Shift + =)

- Select the Tool, Select the Piece
- It is used to Flip the pattern Horizontally.

FLIP VERTICAL (=)

- Select the Tool, Select the Piece.
- It is used to Flip the pattern Vertically.

FLIP ALONG LINE (Ctrl + =)

- Select the required line to flip internals or piece along it,Click inside the piece.
- Select Internal to flip along the line
- Select the Mirror line
- Click inside the piece

NEW BASE LINE (Ctrl + /)

- It is used to move the Grainline / Baseline or Create the new Baseline.
- First keep the Grainline / Baseline outside the pattern. Select Grainline + (I)), Now move the Grainline outside. The grainline is moved.
- Select the tool New Baseline. The Grainline /Baseline gets fitted into the pattern.

ROTATE TO INITIAL BASELINE (Shift + /)

(E.g.) If the pattern is in Tilted / Flip / Angled position. Then to bring the pattern to original position.

- Select the Rotate to Initial Baseline Tool
- Click the piece
- The Grainline get set as before / pattern piece

SET BASELINE DIRECTION (/)

- Select the first point to determine the Baseline direction.
- Select the second point to determine the Baseline direction.
- The grainline changes to the direction as selected.
- e.g If you select vertical line the grainline changes to vertical direction.

SET BASE LINE PERPENTICULAR

- Select the first point to determine the Baseline direction.
- Select the second point to determine the Baseline direction.
- The baseline now becomes perpendicular to the line selected.

SET HALF PIECE LINE (H)

- Select the first point for the Half line (Shift + Alt)
- Select the second point for the Half line.
- New half Piece is created (It is Shadowed. If you do amendment in one side, the other side also changes.)

SET MIRROR LINE (Ctrl + Alt + H)

- Select the first point for the Mirror Line
- Select the Second point for the Mirror Line
- The pattern second half is opened.

- If you move any point or amend changes in one side, both the side gets changed.
- If you remove the mirror X in piece properties, then you can change / amend in one side only, the other side does not change.

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OPEN HALF (Shift + H)

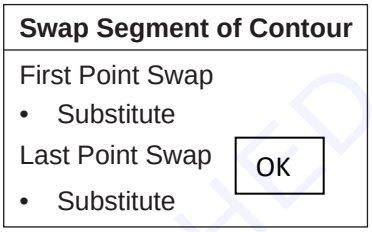
- Select the piece
- Select the open half tool.
- The pattern piece gets opened.

CLOSE HALF (Ctrl + H)

- It Closes the open half piece only. Other piece cannot be closed.After closing it becomes like Shadowed piece (Set half).

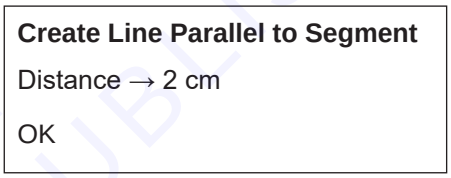
SWAP SEGMENT

- Used to Swap External segment with an Internal contour
- Select the first point of the contour segment (External)
- Select the last point of the contour segment (External Line)
- Select the first point of the internal contour to Swap
- Select the second point of the internal contour to swap (Internal Line)
- Then Delete the external line.



CREATE PARALLEL (Shift + P)

- It is used to extend the line parallelly
- Select a first contour point to create parallel
- Select a last contour point to create parallel
- Enter the distance for parallel line → 2cm → OK



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Introduction of Marker

Marker

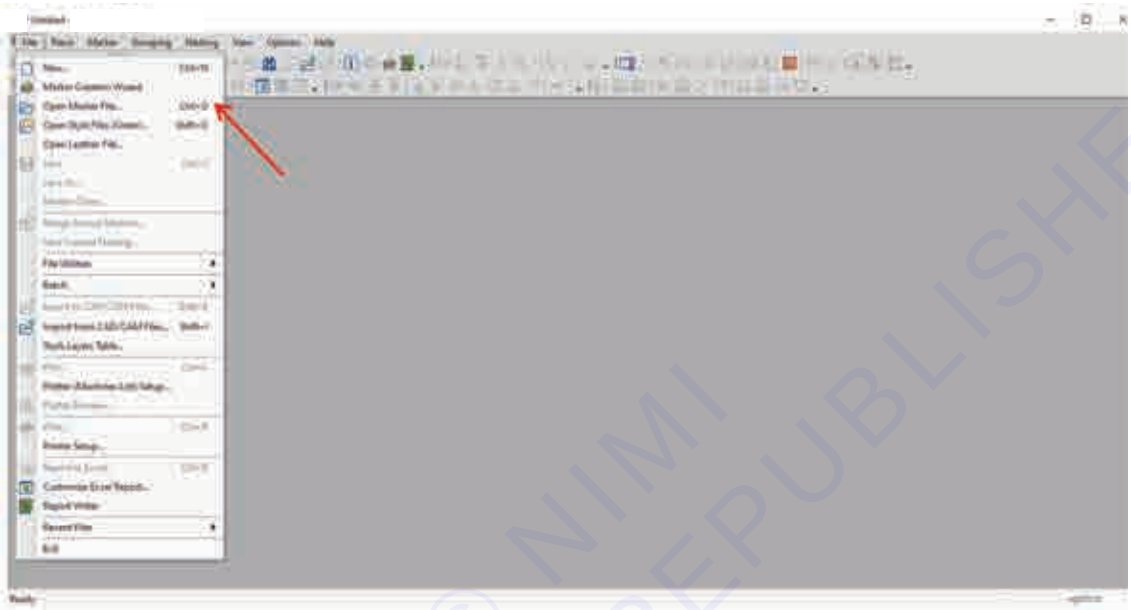
- is a diagram of a precise arrangement of pattern pieces for a specific style and the sizes to be cut from a single spread.

This marker is computerized marker making.

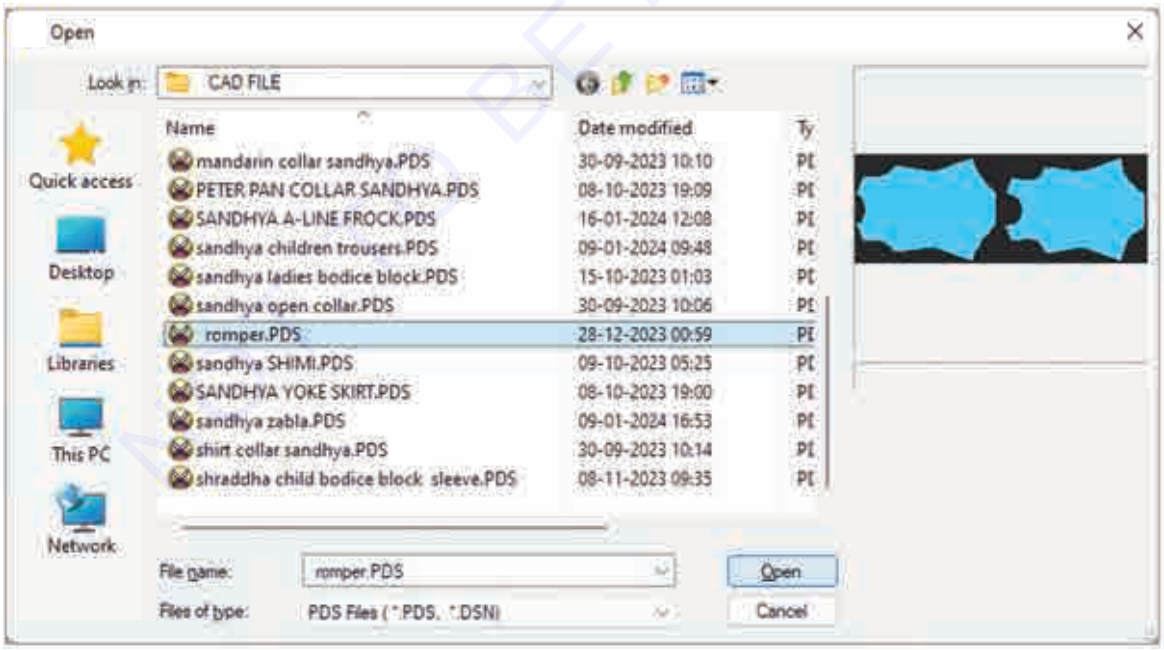
In PDS Software, as per the below details, need to make the Marker.

This is the Icon of PDS Marker. Click the Icon.

Go to File menu, and click open marker file, which is already made and saved pattern.

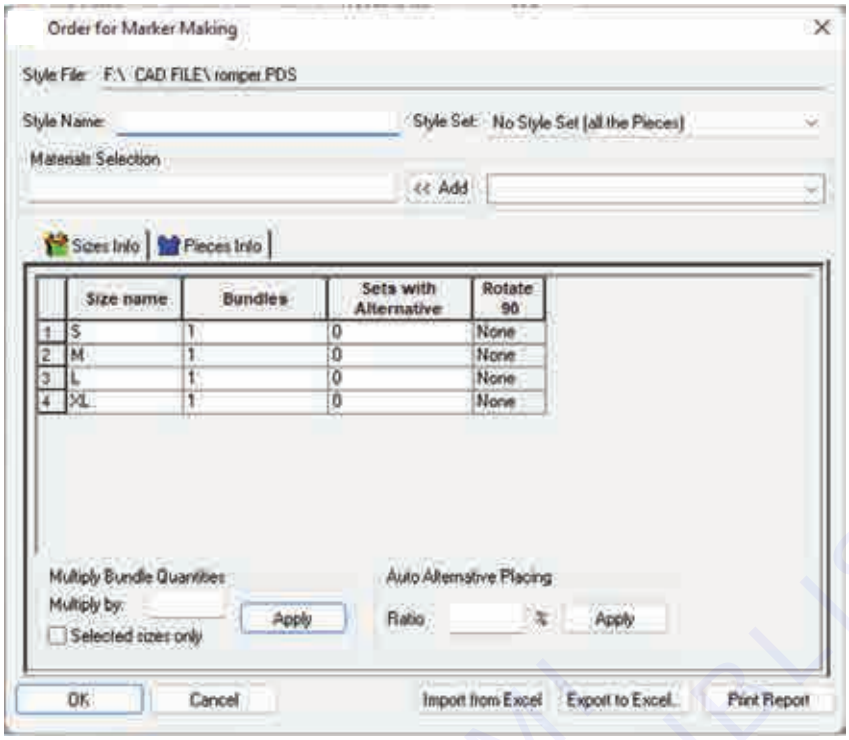


Click open marker file → choose to open the file → open

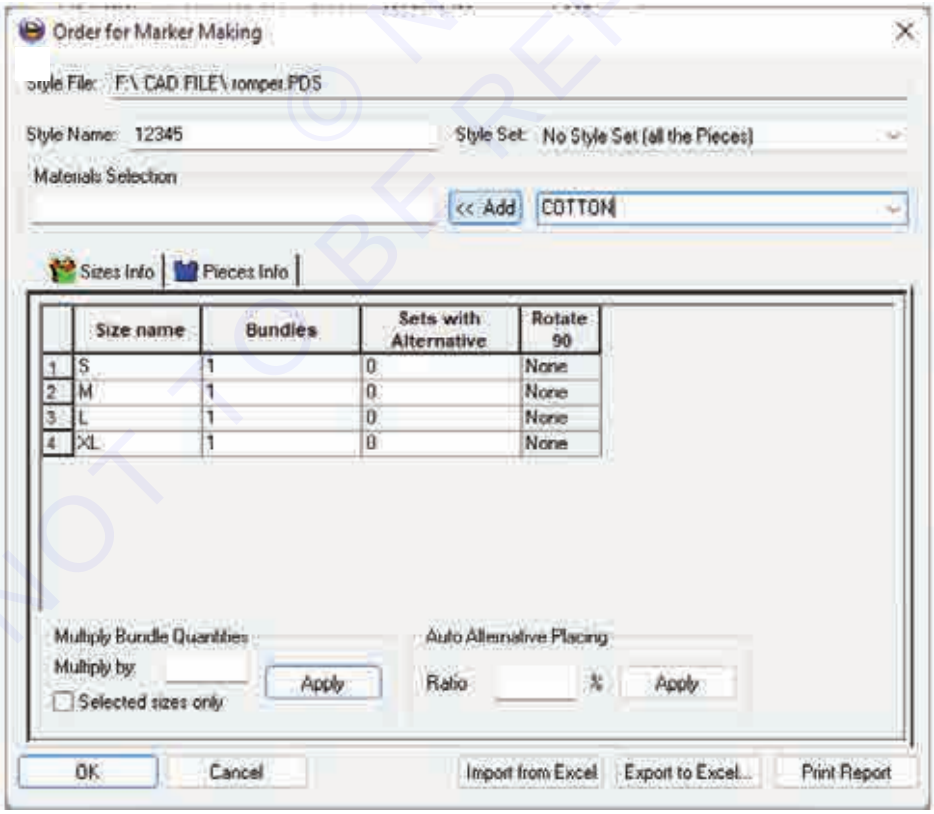


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After open the file ⟶ order for marker making dialogue box get open

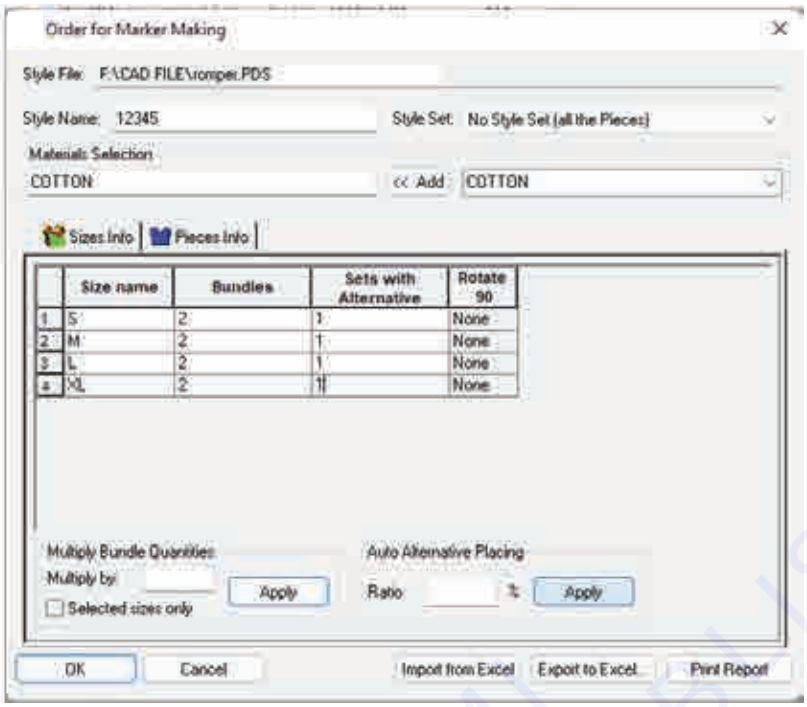


Click the style name and enter the name or number ⟶ click materials selection ⟶ cotton (as per requirement)

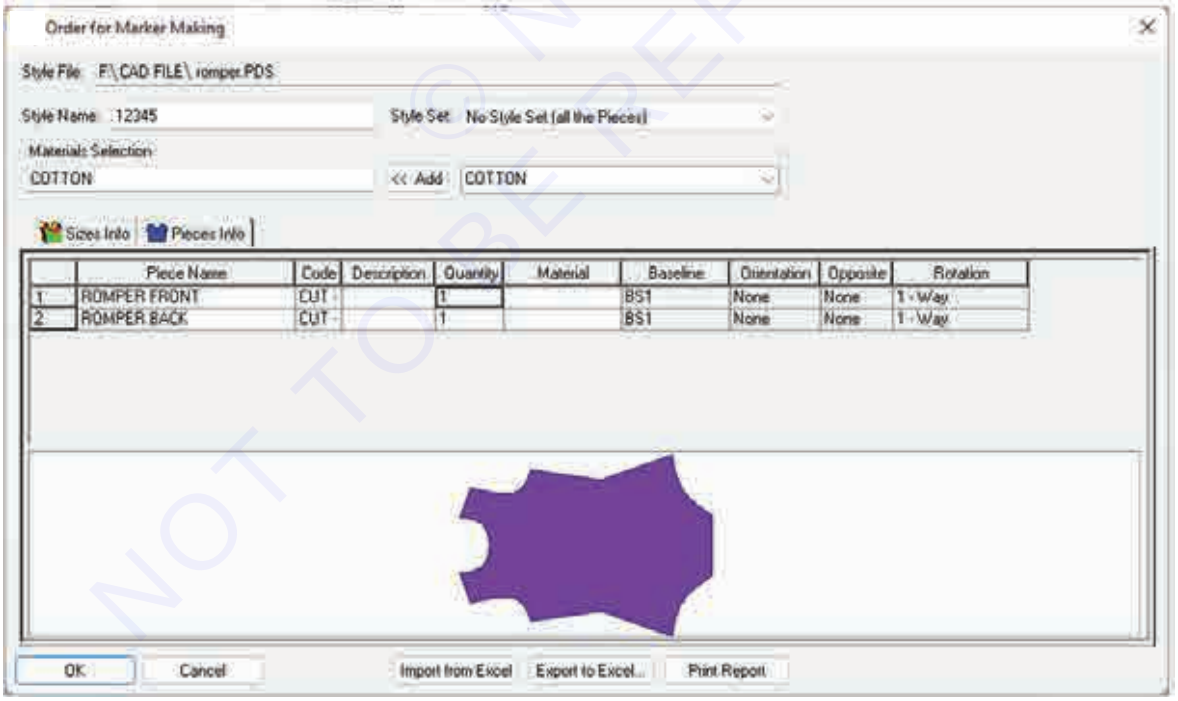


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Click the bundles → enter the number of pattern sizes → next sets with alternative →

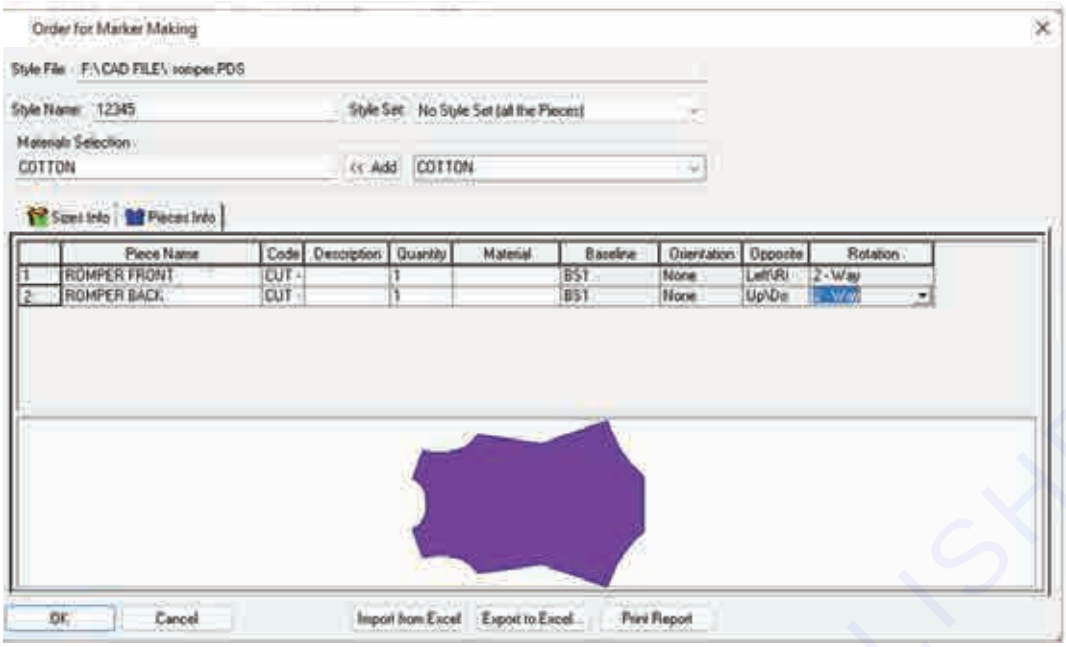


Click pieces into → click rotation → select the scroll button → selcet as per requirement one way or 2 way

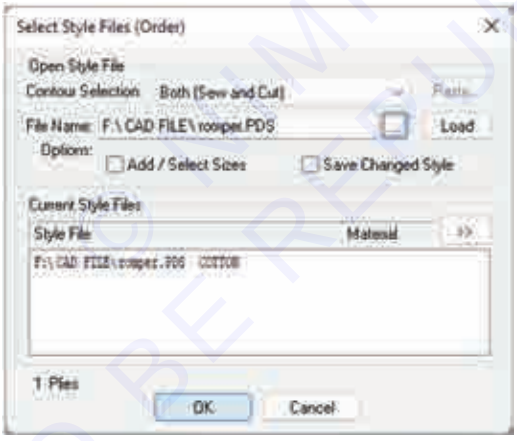


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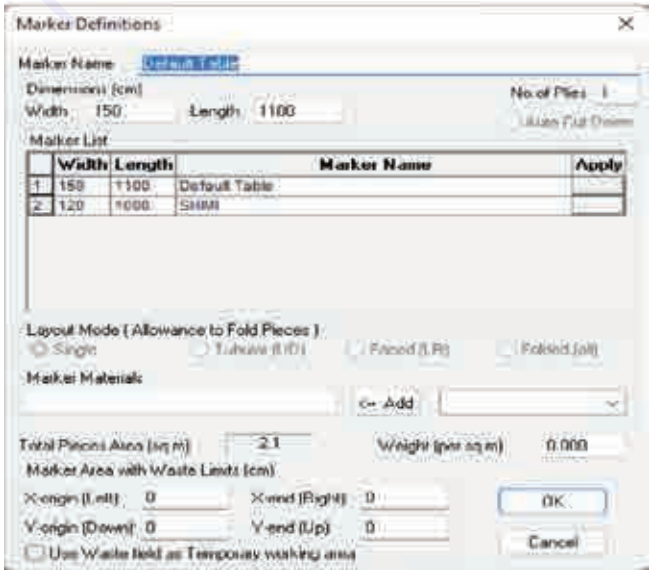
Click opposite option ⟶ click the scroll option left /Right or up/down of the frabric used in the marler ⟶click ok.



Dialogue box got open ⟶ Click ok.

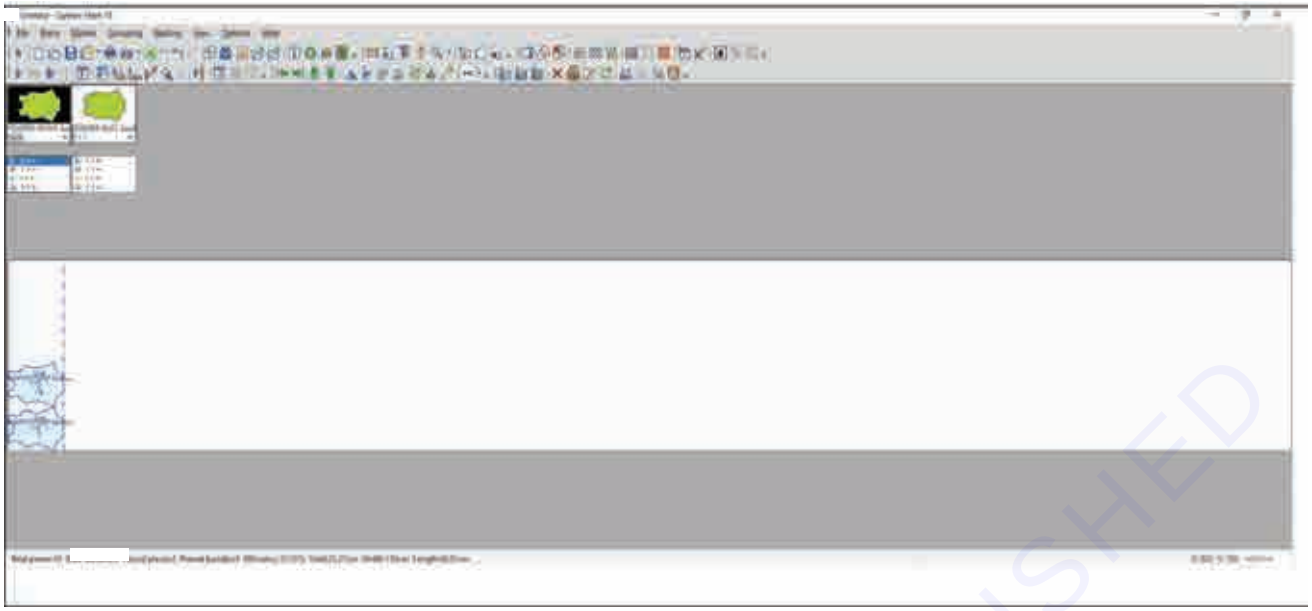


Click ctl+M ⟶ marker definition get open ⟶ Marker name (can write) ⟶ width can enter ⟶ Length can enter ⟶ click marker material scroll down⟶ Click cotton (as per cloth material) ⟶ Click ok.



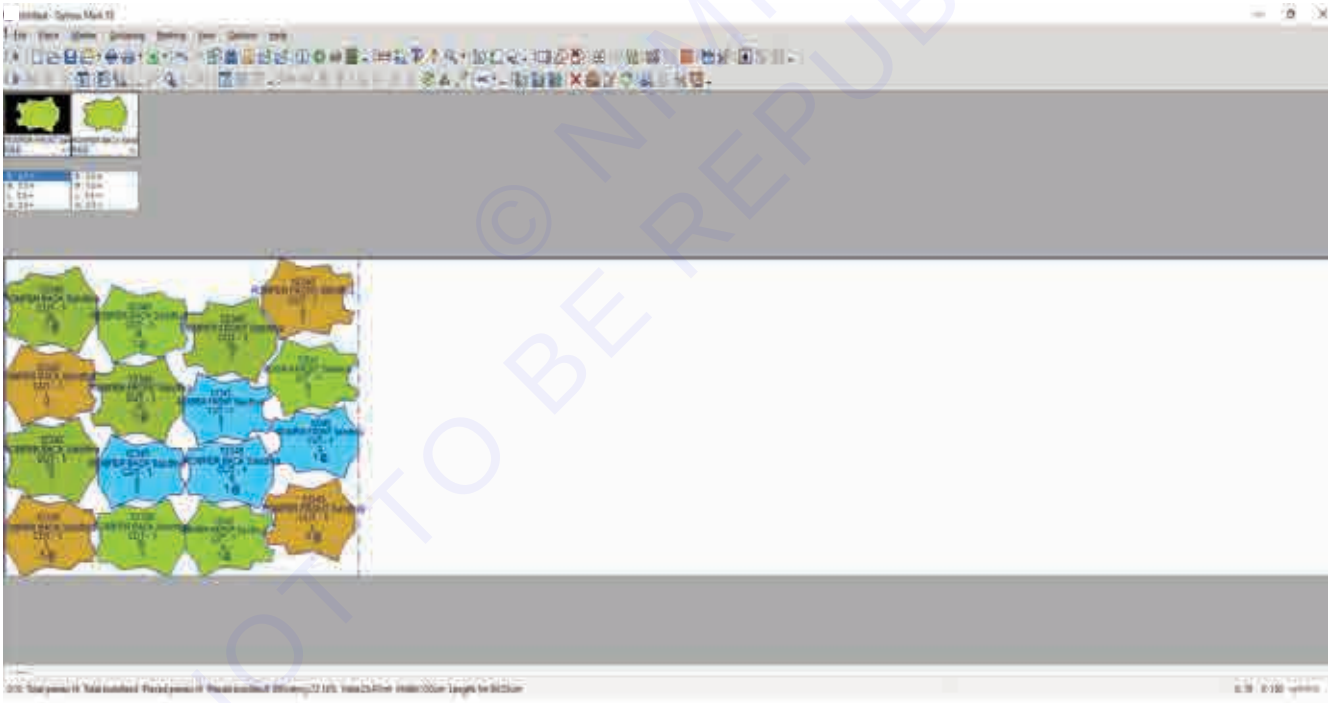
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This marker page get open ⟶ need to pull all the pattern and place inside the marker.



use shift +N,can get all the patterns placed in the marker.If want to clear.Press ctrl+c ⟶ same ctrl+s.

Marker efficiency will display bottom of the marker.



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Introduction of 3D

The fashion industry in particular has come a long way and has grown into one of the largest industries in the world. On account of the growth of this industry, the use of technology in this field has increased.

Digital fashion illustrations really started during the 90s as more affordable and capable technology made it possible for illustrators to experiment with this fledging art form writes Tallon (2008). At present, fashion designers are increasingly using fashion-designing software. Fashion design software greatly aids the work of a fashion designer and help in more effective performance. The main advantages of using Computer Aided Designs (CAD) for creating designs are the capability to quickly try out numerous design ideas and reduce lead time simultaneously. Thus CAD software packages help the designer in experimenting with a number of textures, colours and patterns for producing the perfect design. They provide a variety of sketch backgrounds and tools for designing and at repeating perns and texture mapping.

These CAD software aid the designer right from the stage of designing to the production of perfectly fit garments. La Mode and Der Mode (2009) are of the opinion that the garments have become a new medium for graphic artists. The common 2D software used in the field of designing are CorelDraw, Adobe Photoshop, Lectra CAD, TukaCAD and Reach CAD. In garment designing, 3D designing is still a new concept. Literature are available on 3D software like V Stitcher, Modaris 3D, Lectra fashion PLM, My label,Assyt bulmer, 3D Studio Max, Maya, Animation master, Cinema 4D and Poser but is common in use among the garment designers. General purpose software like 3D Studio Max is used by the graphic designers, but not by garment designers.

Library has a collection of books, newspapers, videos and music kept for people to read, use or borrow. Design library helps the user to recollect and reuse the designs with or without modifications. This is an age of information technology and as on date design libraries do not exist in the digital format. If the designs are presented in the digital format these groups of people will be highly benefitted. Faculty members of fashion design can be visually presented with nuances of garment styles and the use this as a teaching aid to show the effect of colours and textures on different personalities. The fashion designing students will avail an enriched knowledge repository on garments at the click of a button.

Fashion designers and the textile and garment manufacturer can use this as a way to promote their business by presenting their fabrics as different garment styles without physically making a garment. Orders can be approved online or by digital visual presentation. Also retail textile and garment showrooms and tailors can replace catalogs with digital libraries which reduces the cost of preparing and maintaining catalogs for every season. It will be very useful for the consumer to select and purchase garments in showrooms or for placing orders for garment designs with the tailor.

Garment designs for the 3D human figure are usually presented as sketches or photographs, which is 2-dimensional. In 2-dimensional sketches it becomes hard to imagine how it will be in the other angles, say for example side view. According to Watanabe (2009), fashion design drawings will be more convincing if the model and the garments are portrayed with a certain 3-dimensional effect. Miller (1997) is of the opinion that 3D computer visualisation is a very effective way to communicate design ideas. Design library in the 3D becomes the need of the day for the following reasons:-

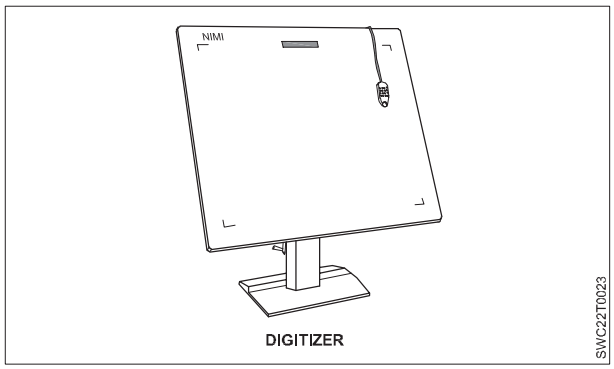
- In this age of information technology, it is essential to have a database of garment designs in the 3D image. Traditional garments are a treasure to our heritage. Hence it is necessary to store them in the 3D form for the future generation to view our rich culture.
- Before the dress is sewn, the tailor cannot know for sure what the dress will look like and what the effect will be when it is worn on the human body. For a new fashion design, the tailor can only imagine the results, depending on his experience and talent. With 3D designs, there is no need to physically produce the product. The styles can be presented to the consumer and tested for their acceptance or rejection.
- Fashion show is the presentation of a designer collection using a human model. This involves lot of time, manpower and money. The 3D images can present a virtual fashion show at a minimal cost
- Clothing is three dimensional, which means it is perceived in the round. As we visualise some of our designs on paper or view them from catalogs and magazines, it is important to remember that this view point is only two dimensional shapes observe Amaden and Crawford (2005). 3D catalogues will be of great interest to the consumer while shopping through internet
- 3D designing also enhances e-business capabilities by allowing user to create an e-store with the 3D collections prepared by the garment manufacturing companies

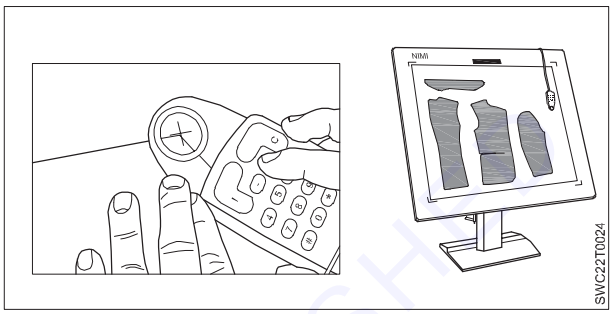
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Introduction of Digitizer (Digitize pattern)

The invention of a computerized digitizer by Dr. H.J.Gerber in 1964 brought revolution in the apparel production technology. A typical system has two main functions- Pattern grading and marker planning with a number of other options available such as- Pattern design system- A programme which enables patterns to be constructed directly from block patterns or by modifications to existing styled patterns.

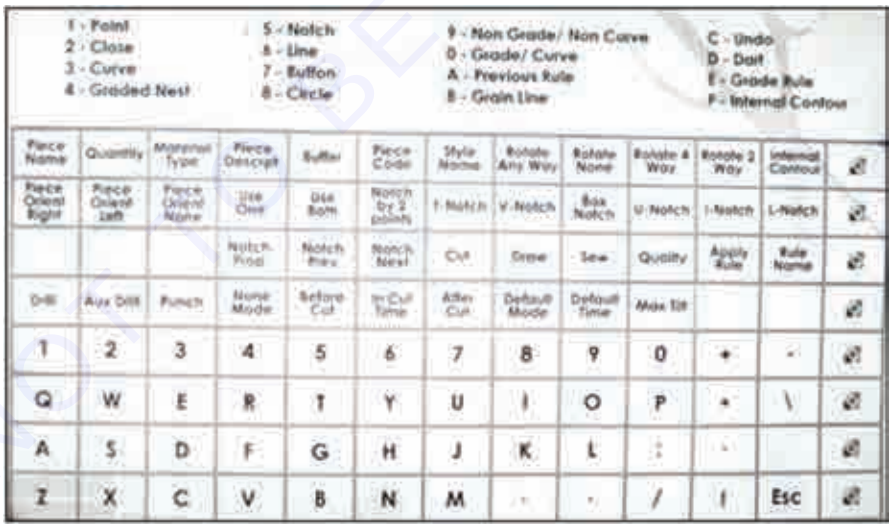
Digitizer tablets or graphics tablets are pressure-sensitive data input devices that allow users to select and draw images with a special pen called a stylus or a mouse-like device called a puck. The device captures the movements and pressure applied by the stylus and translates them into digital data that can be interpreted by the computer.





Pucks feature a series of buttons and a lens with crosshairs that allows users to select images with greater accuracy. Both pens and puck scan be wireless devices or attached to digitizer tablets via cords or wires. Typically, pucks are used to trace highly detailed engineering drawings or medical X-rays while pens are used for a variety of sketching and tracing applications. With digitizer tablets, producing an image creates a series of X, Y coordinates as either a continuous stream or a series of endpoints. Pens that record vector graphics in three-dimensional space are also available. The drawings that users produce with digitizer tables are stored as mathematical line segments. Outputs can be sent to computer aided design (CAD) applications, graphics programs, or related software applications.

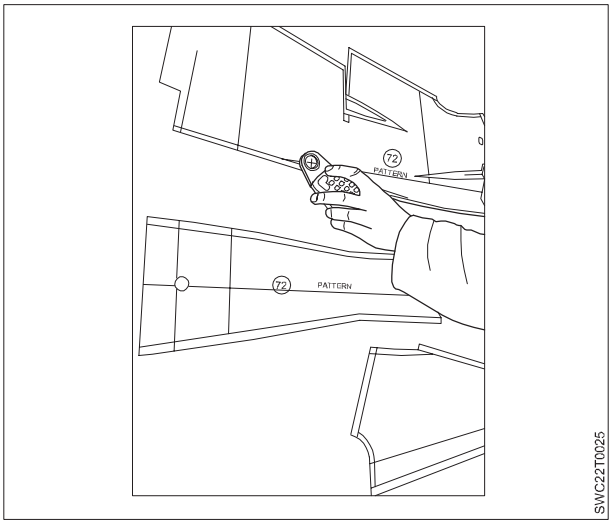
In garment industry, Pattern paper gets stick on the digitizer board, by using the puck, the whole shape of the pattern gets traced and saved in the CAD software.



Digitizing the pattern

- It is the digitizing work table and a puck or free floating cursor which is used to convert shapes into the format understood by the computer.
- Underneath the plastic surface of the table, there is a fine printed network of wire lines, similar to that of graph paper, which when used in conjunction with the cursor, provides a high resolution grid for defining any position on the table's surface.

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- The cursor itself has two hairlines engraved on the viewing glass and the intersection of these two lines is used as the datum point.
- When the cursor is placed on a line and the correct button pressed/pushed, the x and Y co-ordinates of the point's location are registered by the computer.
- This is repeated around the pattern until the outline and internal marks such as darts and pockets positions are all entered.

Introduction of Plotter

Plotters are one of the most important peripheral devices for CAD/CAM systems. They are used in the process of production in textile and garment industry. They printing a natural-size patterns and markers made in any CAD system.

Plotter uses multicolored automatic pens to create lines on paper and reads computer orders. It can create charts, maps, graphs, drawings, and more. It uses one or more automated pens to draw a line.

A plotter is basically a type of printer technology. It is a computer output device which is used to create high-quality images, large-formats images and diagrams and drawings on flat surfaces or papers. It has flat bed which helps in printing on flat surfaces. This device operates on vectors graphics. It is not likely a simple traditional printer that generates images by spraying tiny dots of ink on paper or toner (like desk jet and LaserJet printers) instead plotters uses pens, pencils, or other drawing tools to move across the paper, producing continuous, detailed lines. This device interprets commands from a computer to draw lines on paper with one or more automated multicolored pens. A plotter can draw continuous point-to-point lines directly from vector graphic files or commands.

Types of Plotter

There are various types of plotter available for various applications, requirements and projects. Following are the types of plotter:

Electrostatic Plotters

In electrostatic plotters, the images are produced on paper by using raster graphics rather than vector graphics. By using toner ink, dot matrix pixels are generated on the paper. The high voltage charges are created on the paper by the plotter, and these charges hit the toner ink for drawing computer-aided designs (CADs). These are much faster and economical in price, but they produce lower quality images than pen-plotters.

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Electrostatic Plotter

Pen Plotters

It is a type of plotter which uses a mechanical pen or pencil to draw lines on paper. They are often used for monochromatic technical drawings and illustrations. Pen plotters are appreciated for their precision and versatility. They provide accuracy and speed which make them popular.

Pen plotter with plotting width 170 cm. Plotting speed 100-1200 mm/s. Device is dedicated for plotting of patterns and markers for garment, upholstery and textile production.



Inkjet Plotters

These type of plotters use inkjet technology and colored inkjet pens to provide high-quality color images and graphics. They are best suitable for applications that require vibrant, detailed output, precision work such as graphic design, architectural renderings, and fine art in a less time. They are commonly used for a large printer, like billboards, banners, and big signs that are used for roadside indication.



Inkjet Plotter

Cutting Plotters

The cutting plotter is a large-scale cutting machine that uses knives/blades instead of pens to cut the design from a material (such as plastic films or vinyl films) that is lying on the flat surface area of the plotter. The plotter receives a command from the computer, and the knife executes it to cut the media to the appropriate dimensions very precisely. They are commonly used for decals, scrapbooking and card making.

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Cutting Plotter

Drum Plotters

Drum plotters, as name suggests, they use a rotating drum to move the paper left and right while one or more fixed pens write up and down. These plotters are capable of producing large-format images and were popular in the past for applications like map making and technical drawings. The plotter's ability to draw in numerous colors is enhanced by the use of multiple pens. In some LaserJet printers drums are used to print on the pages.



Drum Plotter

Flatbed Plotters

A flatbed plotter works with paper that is put on a flat surface in a stationary position. In this plotter, the writing pen moves in both the x and y axes. There are various types of pens available in a number of sizes and colors. The paper lay down on the flat surface while the pen (connected to the moving arm) moves and draws on the paper. The paper's size is governed by the size of the flat surface on which it is placed. Larger flatbed plotters have the ability to print up to 60-inches in length on the paper. They are capable of printing on other materials such as plastic, cardboard, or even metal.



Flatbed Plotter

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Applications of Plotter

Plotters are widely used in different fields of industries due to their precision and ability to produce large-format, high-quality graphics. Some of them are:

1 Textile and Fabrics Industries

2 Architectural and Engineering Industries (CAD,CAE,CAM)

3 Graphic Design and Fine Arts

4 Education Sector

5 Advertising and Signage Industries

6 Research and Development

7 Mapping and Geographic and Information System(GIS)

8 Prototyping

Advantages of Plotter

Plotters have several advantages that make them suitable for specific tasks and industries in every field:

- **Precision and Accuracy:** Plotters are well known for their precision and accuracy, making them perfect for applications that demands detailed, précised and error-free drawings.
- **Large Formats:** Plotters are good in handling oversized drawings, diagrams and maps. They can handle large paper sizes and media. Large format plotters and wide format plotters are best suitable for this purpose.
- **Vector-Based Graphics:** Plotters can scale images without loss of quality which means they use vector graphics and point-to-point drawing lines, ensuring that drawings remain sharp and clear at any size and that gives the high quality images.
- **Multicolored Output:** Plotters are capable of printing high-quality and précised images and diagrams with the help of automated multicolored pens.
- **Cutting Capabilities:** Cutting plotters are versatile tools which use knives to cut pieces from materials including vinyl's, papers, plastic, fabrics, etc.
- **Durability:** Plotters are much more durable as compared to printers and are designed for long-term commitments and withstand the demands of professionals and industries.

Disadvantages of Plotter

Below are the disadvantages of plotter:

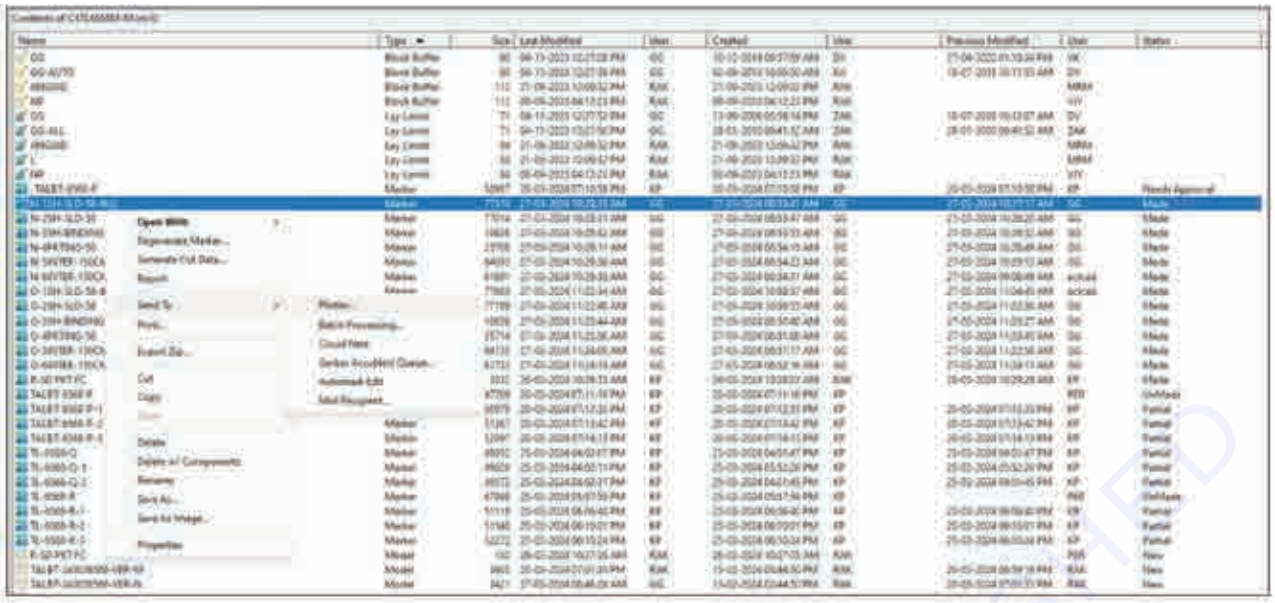
- **Speed:** Plotters are slower than printers specially when producing high-quality and detailed images
- **Cost:** Due to their high-quality detailing and precision work they proved expensive economically and maintenance for small businesses and individuals
- **Maintenance:** Maintaining a plotter is a challenging task than printers. Setting and calibrating a plotter is more complex as compared to printer, requiring careful adjustments for desired output quality.
- **Complex setup:** Plotters, especially pen plotters, require regular maintenance, including pen replacement, cleaning and calibration, for ensuring high performance.

Select the Pattern files and Open – Marker Print

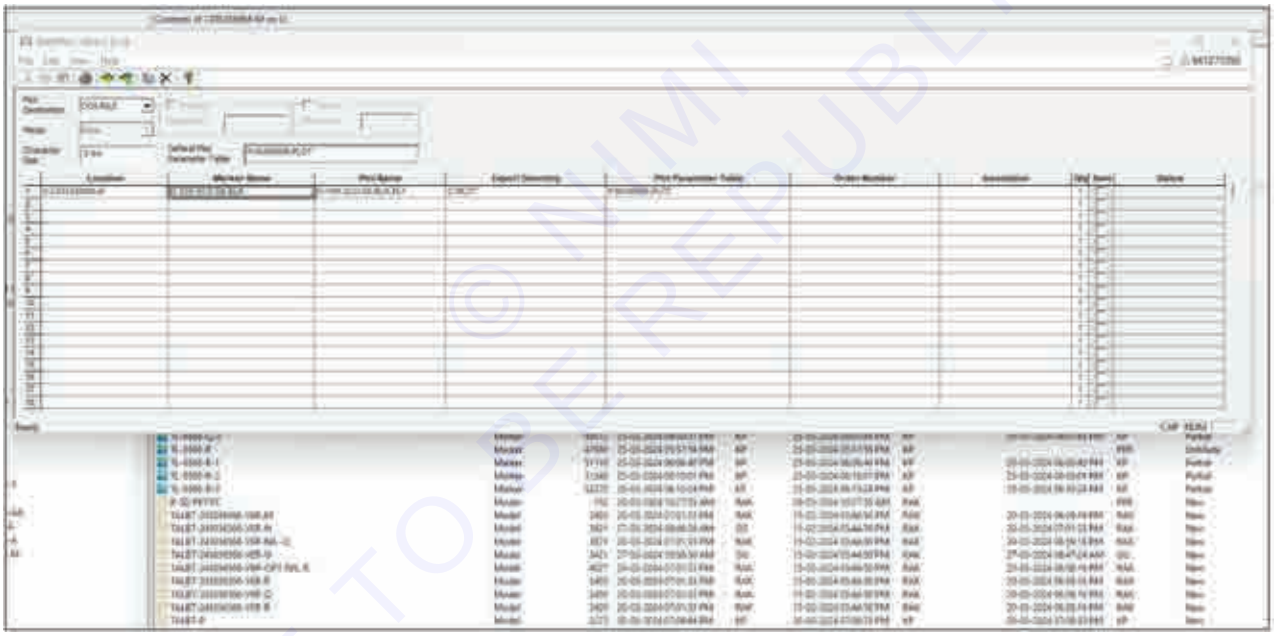
Follow the steps to print the marker

Click the marker file –> Send to –> Plotter

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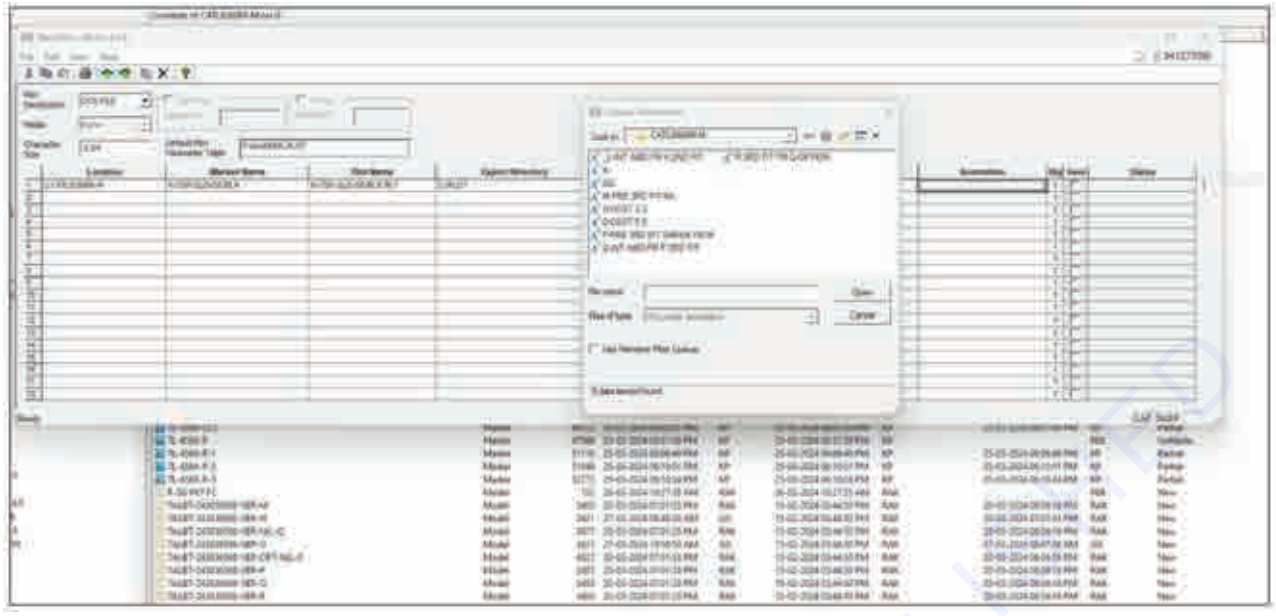


Dialogue box get open –>Marker Name get displayed

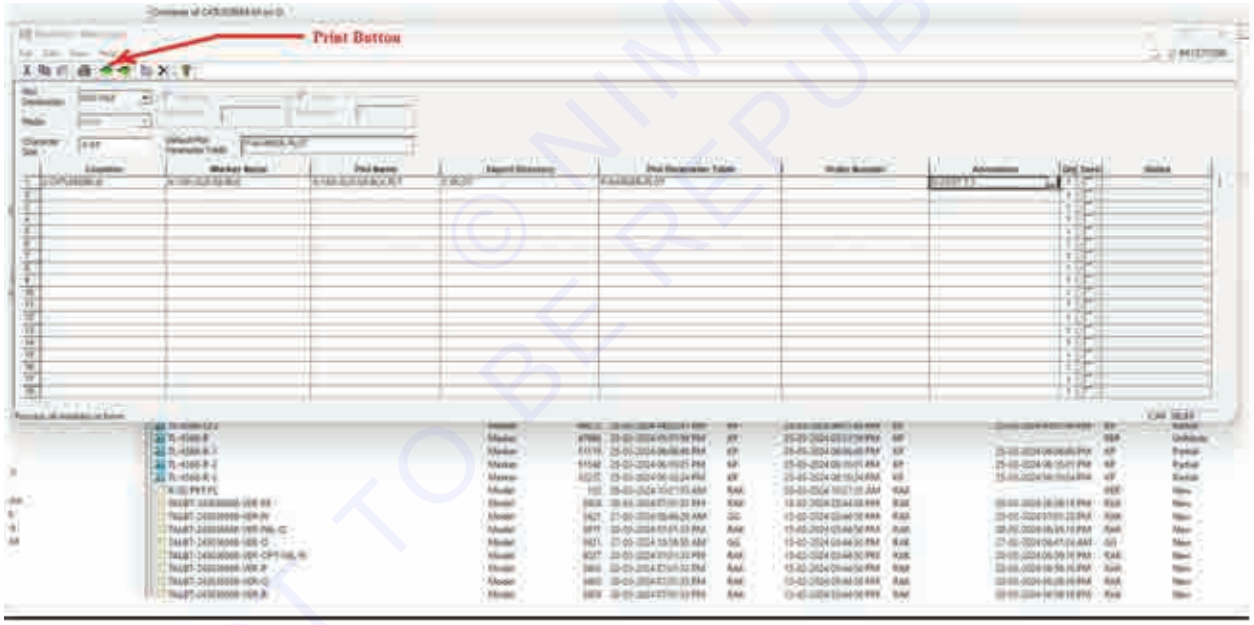


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Click the Annotation –> Select the Final Version of pattern (Final version means after all the correction incorporate in the pattern) –> Open



Click the Arrow button at the top –> To print the plotter



Starting of system software screen menu and Details about the Tool bars command details – Refer the page introduction of PDS

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LESSON 7 & 8 : Children Size Charts & Bodies Block

Objectives

At the end of this lesson, you will be able to:

- understand about the Children size chart, measuring techniques and Upper bodice block and lower block

Children Size Charts & Bodies Block

The Children bodice block is a flat replica of a body that is the basis for any pattern for the upper body of a child. The flat pattern of a child bodice block helps to draft any upper garment of a child.

A block is the basic body shape; they contain all the basic body measurements plus garment ease.

The block pattern is the sewing pattern previously created for the clothing style that has been perfected for a good fit. The block pattern is commonly used to efficiently build a new clothing style with minimal need for pattern revisions and corrections.

The measurements required in order to draft this block:

1 Neck (around)

2 Bust (around)

3 Waist (around) at Natural Waist position

4 Armhole (around)

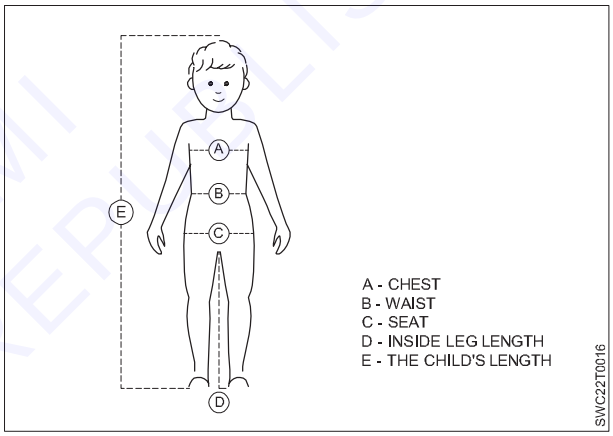
5 Front Waist Length (High Point Shoulder aka HPS to natural waist)

6 Bust Height (HPS to apex of bust aka Bust Point)

7 Bust Point distance

8 Centre Back Length

9 Shoulder to Shoulder



It is quite difficult when it comes for selection of correct clothes sizes for kids - infants, girls and boys. Most of the parents go for age of the children when shopping different clothes for their kids. Still a size chart helps a lot to select right garments.

Here 3 set of size charts are shown for

- Infants (0 Month to 4 years)
- Girls (4 Years to 12 Years) and
- Boys (4 Years to 12 Years)

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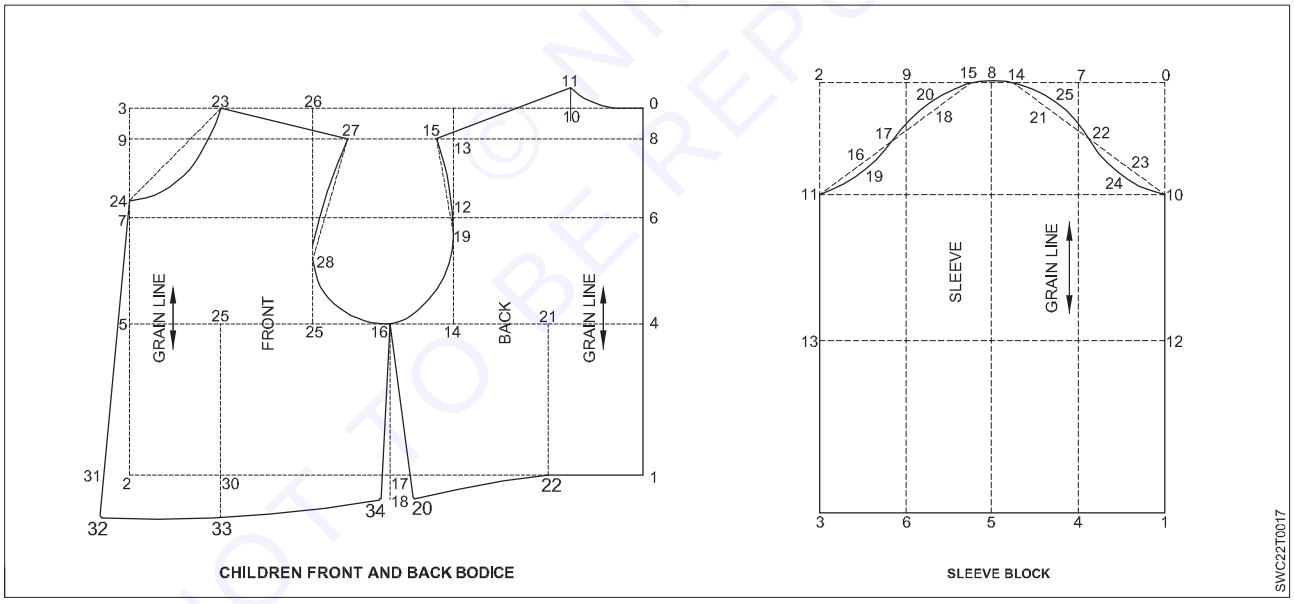
Body measurements are shown in centimeter and inches. Measure directly on the child's body. See the measurement position of the kid's body in the Fig. Measure the whole length, from head to foot, of the child to get the correct size in cm or inches. Follow the size chart:

Infant sizes							
Age (M= Month & Y= Years)	**0-3 M**	**3 - 6 M**	**6 - 12 M**	**12 - 18 M**	**18 - 24 M**	**2 - 3 Y**	**3 - 4 Y**
Length (cm)	56	68	76	86	92	98	104
Chest (cm)	41	45	49	51	53	54	55
Waist (cm)	44	45	48	50	52	54	56
Age (M= Month & Y= Years)	**0-3 M**	**3 - 6 M**	**6 - 12 M**	**12 - 18 M**	**18 - 24 M**	**2 - 3 Y**	**3 - 4 Y**
Length (inches)	22	26.7	30	34	36.2	38.5	41
Chest (inches)	16	17.5	19	20	21	21.5	22
Waist (inches)	17.5	18	19	19.5	20.5	21.25	22

Girls Size chart									
Age (Years)	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Length (cm)	104	110	116	122	128	134	140	146	152
Chest (cm)	56	57	58	61	64	67	70	73	76
Waist (cm)	54	55	56	57.5	59	60.5	62.5	65.5	64.5
	-	-	-	-	-	72	75	78(1/2)	82
Age (Years)	**4**	**5**	**6**	**7**	**8**	**9**	**10**	11	12
Length (inches)	41	43.5	45.5	48	50.5	53	55	57.5	60
Chest (inches)	22	22.5	23	24	25	26	27.5	29	30
Waist (inches)	21	21.5	22	22.5	23	23.5	23.8	24.5	25.3
Seat (cm)	-	-	-	-	-	28	29.5	31	32

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Boy's Size chart									
Age (Years)	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Length (cm)	104	110	116	122	128	134	140	146	152
Chest (cm)	56	57	58	61	64	67	70	73	76
Waist (cm)	54	55	56	57.5	59	61	63	64.5	66
Seat (cm)	-	-	-	-	-	72	75	78	81
inside leg length (cm)	-	-	-	-	-	61	63	66	69
Age (Years)	**4**	**5**	**6**	**7**	**8**	**9**	**10**	11	12
Length (inches)	41	43.5	45.5	48	50.5	53	55	57.5	60
Chest (inches)	22	22.5	23	24	25	26.5	27.5	29	30
Waist (inches)	21	21.5	22	22.5	23	24	24.5	25.5	26
Seat (cm)	-	-	-	-	-	28.5	30	31	32
inside leg length (cm)	-	-	-	-	-	24	25	26	27



CHILDREN FRONT AND BACK BODICE

SLEEVE BLOCK

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LESSON 9 : Ladies measurement chart & Ladies Blocks

Objectives

At the end of this lesson, you will be able to:

- understand the ladies size chart, measuring technique and upper bodies block and lower block

Ladies measurement chart & Ladies Blocks

A basic bodice pattern is also called a sloper or a block, and it closely resembles the shape and size of the body. It contains all the basic body measurements plus garment ease.

It can be used as a base for pattern making. It is one of the main pattern blocks to draft the pattern.

A - Bust - Measure the bust at the fullest part. Measure all around the body (total circumference).

B - Waist - Measure the waist where the body bends. It helps to bend side to side to identify exactly where to measure. You can put an elastic band around the waist to mark the correct placement.

C - Hip - Measure the hips at the fullest part, usually around the seat.

D - High Hip - Measure around the fullest part, about 3 - 4" below the waist. This is helpful when fitting a slim skirt or pants (to get an accurate idea of the shape of the hip, or the belly).

E - Front Waist Length - Start at the shoulder (right next to the base of the neck), and measure to the waist, placing the tape over the fullest part of the bust.

F - Back Waist Length - Measure from the base of the neck (in the center, not the side), to the center of the waistline.

G - Arm Length - Measure from the top of the arm (find the bone at the shoulder/top of the arm) to the wrist (find the bone at the side of the wrist), WITH THE ELBOW BENT. It's important to keep the elbow bent to allow for movement when you make a sleeve.

For pants, need to take a few extra measurements on the lower body. Refer to the sketch, above, for the measurement points.

H - Thigh - Measure the thigh just below the crotch, at about the fullest point. Measure all around the thigh, keeping the tape horizontal and level with the floor (this part is tricky, because the tape always wants to dip).

I - Ankle - Measure the ankle all around, at the narrowest point (where the ankle flexes).

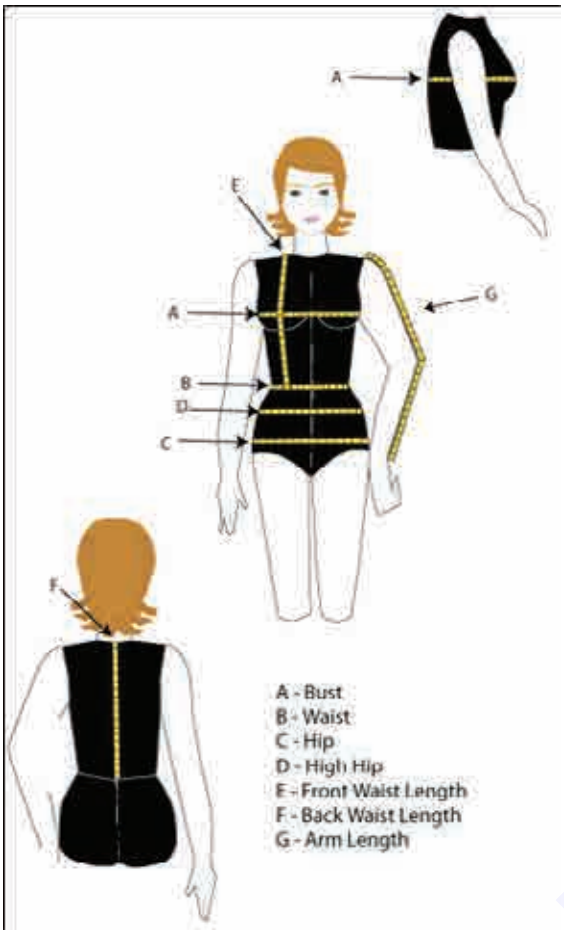
J - Inseam - Measure the inseam along the inner thigh and calf, from just below the crotch to the ankle. This is impossible to do on them self! If helper is not available, dangle the tape measure with the "1" at the floor, and measure up to the crotch point. Later, with the foot flat on the floor, measure the distance from the ankle to the floor and subtract that measurement from the inseam.

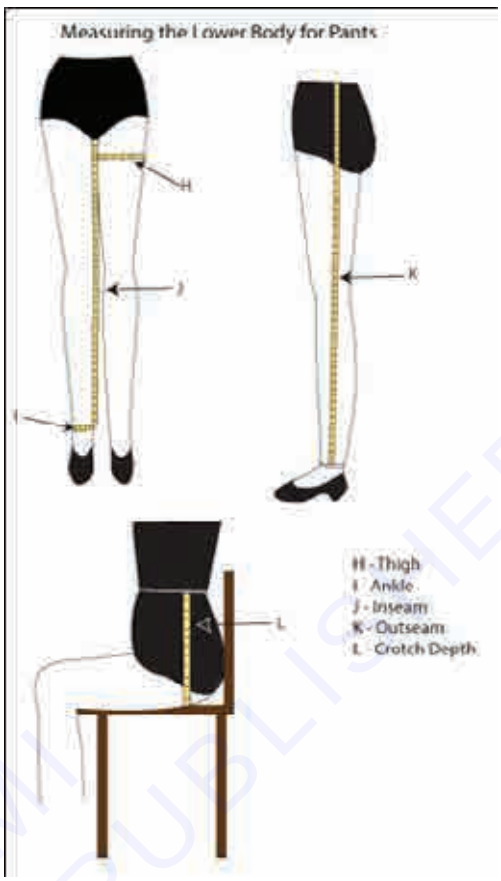
K - Out seam - Measure along the outer thigh and calf, from the waist to the ankle. Again, this is impossible to do them self. As above, dangle the tape, with the "1" at the floor, and measure up to waist. Stand up straight! Don't have to look at the number on the tape until remove it from the body. If look down while taking the inseam or out seam measurement, result will be inaccurate number/measurements! And again, deduct the distance from the ankle to the floor.

For a skirt length, measure the out seam from the waist to the knee.

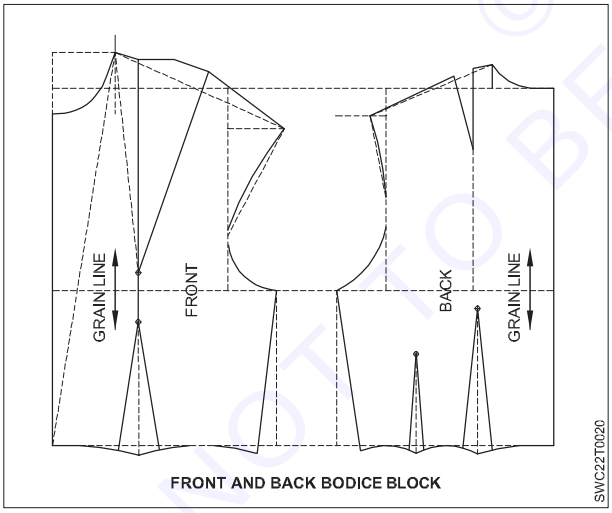
L - Crotch Depth - Sit on a firm chair and measure from the waist to the top of the chair seat. It may be easier to use a ruler for this measurement.

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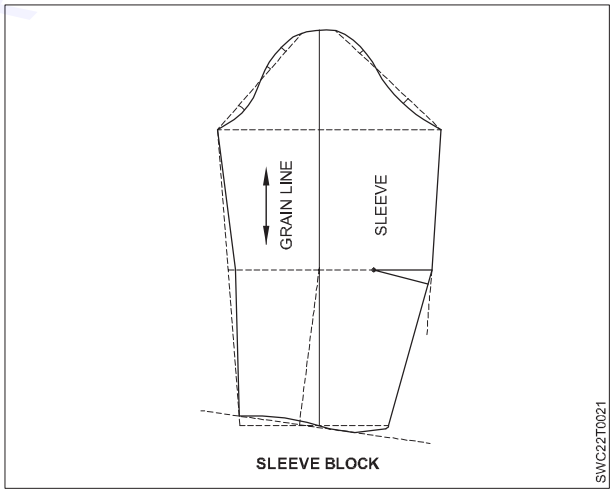




Front and Back Bodice Block

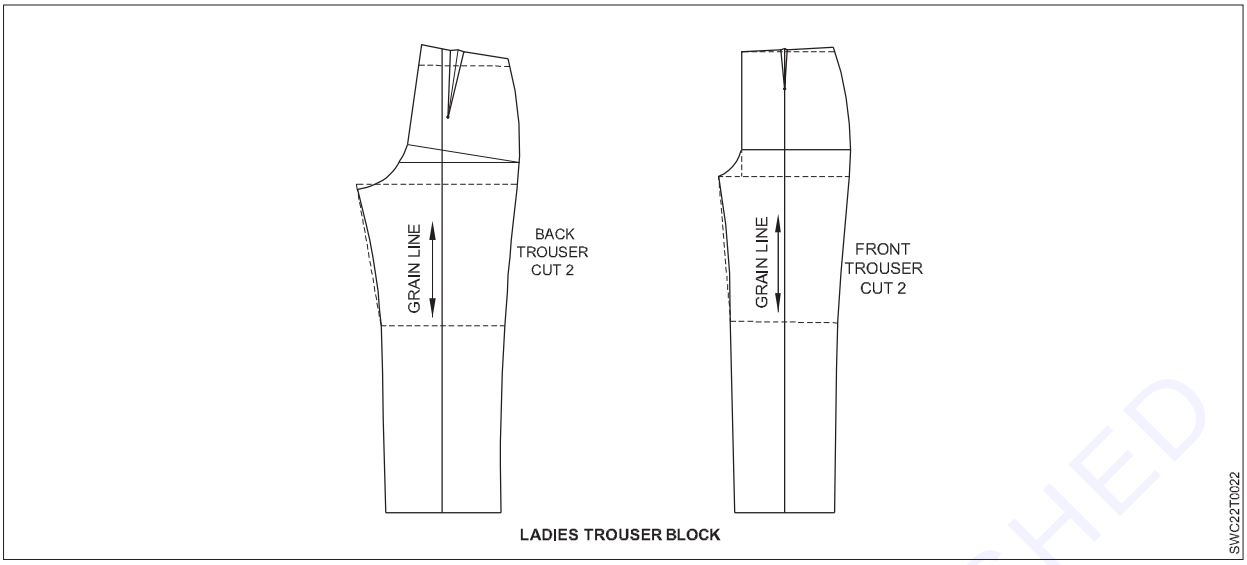


Sleeve Block



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Ladies Trouser Block



Ladies Measurements in Cms

UK	4	6	8	10	12	14	16	18	20	22	24
USA	0	2	4	6	8	10	12	14	16	18	20
Neck Circumference	34cm	35cm	36cm	37cm	38cm	39cm	40cm	41cm	42.4cm	43.8cm	45.2cm
Shoulder	11.5cm	11.8cm	12cm	12.3cm	12.5cm	12.8cm	13cm	13.3cm	13.6cm	13.9cm	14.2cm
Chest	28.8cm	30cm	31.2cm	32.4cm	33.6cm	34.8cm	36cm	37.2cm	39cm	40.8cm	42.6cm
Side Neck Point to Bust	24.8cm	25.2cm	25.6cm	26cm	26.4cm	26.8cm	27.2cm	27.6cm	28.2cm	28.8cm	29.4cm
Bust	76cm	80cm	84cm	88cm	92cm	96cm	100cm	104cm	110cm	116cm	122cm
Rib Cage	63cm	67cm	71cm	75cm	79cm	83cm	87cm	91cm	95cm	99cm	103cm
Bust Span	17cm	17.9cm	18.8cm	19.7cm	20.6cm	21.5cm	22.4cm	23.3cm	24.5cm	26.7cm	26.9cm
Top Arm	24.6cm	26cm	27.2cm	28.4cm	29.6cm	30.8cm	32cm	33.2cm	35.2cm	37.2cm	39.2cm
Wrist	14.5cm	15cm	15.5cm	16cm	16.5cm	17cm	17.5cm	18cm	18.7cm	19.4cm	20.1cm
Sleeve length	57cm	57.5cm	58cm	58.5cm	59cm	59.5cm	60cm	60.3cm	60.5cm	60.8cm	61cm
Armscye Depth	19.8	20.2cm	20.6cm	21cm	21.4cm	21.8cm	22.2cm	22.6cm	23.2cm	23.8cm	24.4cm
Back Width	31.4cm	32.4cm	33.4cm	34.4cm	35.4cm	36.4cm	37.4cm	38.4cm	39.8cm	41.2cm	42.6cm
Waist	60cm	64cm	68cm	72cm	76cm	80cm	84cm	88cm	94cm	100cm	106cm
Front Side Neck Point to Waist	41.8cm	42.2cm	42.6cm	43cm	43.4cm	43.8cm	44.2cm	44.6cm	45cm	45.4cm	45.8cm
Back Side Neck Point to Waist	41.8cm	42.2cm	42.6cm	43cm	43.4cm	43.8cm	44.2cm	44.6cm	45cm	45.4cm	45.8cm
Hip	84cm	88cm	92cm	96cm	100cm	104cm	108cm	112cm	117cm	122cm	127cm
Top Hip	70cm	74cm	78cm	82cm	86cm	90cm	94cm	98cm	104cm	110cm	116cm
Waist to Hip	19.7cm	20cm	20.3cm	20.6cm	20.9cm	21.2cm	21.5cm	21.8cm	22.1cm	22.4cm	22.7cm
Waist to Knee	57cm	57.5cm	58cm	58.5cm	59cm	59.5cm	60cm	60.5cm	61cm	61.5cm	62cm
Thigh	45cm	48cm	51cm	54cm	57cm	60cm	63cm	66cm	69cm	72cm	75cm
Knee	30.8cm	32.3cm	33.6cm	35cm	36.4cm	37.8cm	39.2cm	40.6cm	42cm	43.4cm	44.8cm
High Ankle	19.5cm	20cm	20.5cm	21cm	21.5cm	22cm	22.5cm	23cm	23.7cm	24.4cm	25.1cm
Ankle	22.5cm	23cm	23.5cm	24cm	24.5cm	25cm	25.5cm	26cm	26.7cm	27.4cm	28.1cm
Waist to Floor	101cm	102cm	103cm	104cm	105cm	106cm	107cm	108cm	109cm	110cm	112cm
Body Rise	25.9cm	26.6cm	27.3cm	28cm	28.7cm	29.4cm	30.1cm	30.8cm	31.8cm	32.8cm	33.8cm
Crotch Length	64cm	66.5cm	69cm	71.5cm	74cm	76.5cm	79cm	81.5cm	85.3cm	89cm	92.8cm
Crotch Depth	28.8cm	29.9cm	31cm	32cm	33.3cm	34.4cm	35.5cm	36.6cm	38.3cm	40cm	41.7cm

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Ladies Measurements in Inches

UK	4	6	8	10	12	14	16	18	20	22	24
USA	0	2	4	6	8	10	12	14	16	18	20
Neck Circumference	13.39"	13.78"	14.17"	14.57"	14.96"	15.35"	15.75"	16.14"	16.60"	17.24"	17.80"
Shoulder	11.5cm	4.63"	4.72"	4.82"	4.92"	5.02"	5.12"	5.22"	5.35"	5.47"	5.59"
Chest	11.34"	11.81"	12.28"	12.76"	13.23"	13.7"	14.17"	14.65"	15.35"	16.06"	16.77"
Side Neck Point to Bust	9.76"	9.92"	10.08"	10.24"	10.39"	10.55"	10.71"	10.87"	11.1"	11.34"	11.57"
Bust	29.92"	31.5"	33.07"	34.65"	36.22"	37.8"	39.37"	40.94"	43.31"	45.67"	48.03"
Rib Cage	24.8"	26.38"	27.95"	29.53"	31.1"	32.68"	34.25"	35.83"	37.4"	38.98"	40.55"
Bust Span	6.69"	7.05"	7.4"	7.76"	8.11"	8.46"	8.82"	9.17"	9.65"	10.51"	10.59"
Top Arm	9.76"	10.24"	10.71"	11.18"	11.65"	12.13"	12.6"	13.07"	13.86"	14.65"	15.43"
Wrist	5.71"	5.91"	6.1"	6.3"	6.5"	6.69"	6.89"	7.09"	7.36"	7.64"	7.91"
Sleeve length	22.44"	22.64"	22.83"	23.03"	23.23"	23.43"	23.62	23.72"	23.82"	23.02"	24.02"
Armscye Depth	7.8"	7.95"	8.11"	8.27"	8.43"	8.58"	8.74"	8.9"	9.13"	9.37"	9.61"
Back Width	12.36"	12.76"	13.15"	13.54"	13.94"	14.33"	14.72"	15.12"	15.67"	16.22"	16.77"
Waist	23.62"	25.2"	26.77"	28.35"	29.02"	31.5"	33.07"	34.65"	37.01"	39.37"	41.73"
Front Side Neck Point to Waist	16.46"	16.61"	16.77"	16.93"	17.09"	17.24"	17.4"	17.56"	17.72"	17.87"	18.03"
Back Side Neck Point to Waist	16.46"	16.61"	16.77"	16.93"	17.09"	17.24"	17.4"	17.56"	17.72"	17.87"	18.03"
Hip	33.07"	34.65"	36.22"	37.8"	39.37"	40.94"	42.52"	44.09"	46.06"	48.03"	50"
Top Hip	27.56"	29.13"	30.71"	32.28"	33.86"	35.43"	37.01"	38.58"	40.94"	43.31"	45.67"
Waist to Hip	7.76"	7.87"	7.99"	8.11"	8.23"	8.35"	8.46"	8.58"	8.7"	8.82"	8.94"
Waist to Knee	22.44"	22.64"	22.83"	23.03"	23.23"	23.43"	23.62"	23.82"	24.02"	24.21"	24.41"
Thigh	17.72"	18.9"	20.08"	21.26"	22.44"	23.62"	24.8"	25.98"	27.17"	28.35"	29.53"
Knee	12.13"	12.68"	13.23"	13.78"	14.33"	14.88"	15.43"	15.98"	16.54"	17.09"	17.64"
High Ankle	7.68"	7.87"	8.07"	8.27"	8.46"	8.66"	8.86"	9.06"	9.33"	9.61"	9.88"
Ankle	8.86"	9.06"	9.25"	9.45"	9.65"	9.84"	10.04"	10.24"	10.51"	10.79"	11.06"
Waist to Floor	39.76"	40.16"	40.55"	40.94"	41.34"	41.73"	42.13"	42.52"	42.91"	43.31"	44.09"
Body Rise	10.2"	10.47"	10.75"	11.02"	11.3"	11.57"	11.85"	12.13"	12.52"	12.91"	13.31"
Crotch Length	25.2"	26.18"	27.17"	28.15"	29.13"	30.12"	31.1"	32.09"	33.58"	35.04"	36.54"
Crotch Depth	11.33"	11.77"	12.20"	12.59"	13.11"	13.54"	13.97"	14.40"	15.07"	15.74"	16.41"

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LESSON 10 : Digitizer - Tools and Importance

Objectives

At the end of this lesson, you will be able to:

- understand the details of digitizer tools and importance.

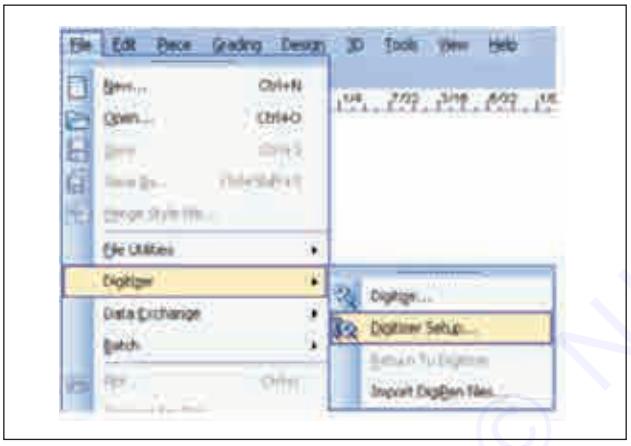
Digitizer - Tools and Importance

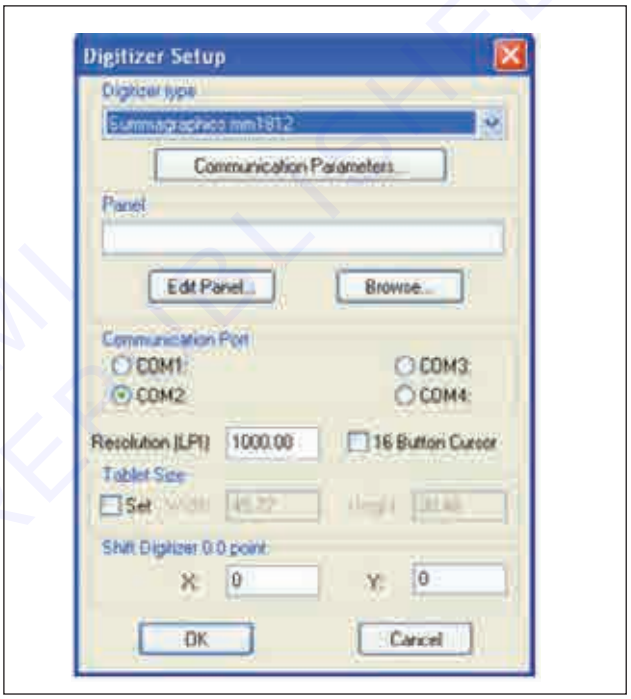
Digitizer Settings

Open Optitex PDS and go to **File > Digitizer > Digitizer Settings.**

1 The Digitizer Settings window will appear:

2 File>Digitizer>Digitizer Settings





Digitizer Settings

3 Check to Make sure that your Digitizer Type and Communication Parameters are set correctly for your type of digitizer.

4 Go to Category: Digitizer Install for a full listing of digitizers and their appropriate settings.

Digitizer Window Overview

1 Digitize
   - Location

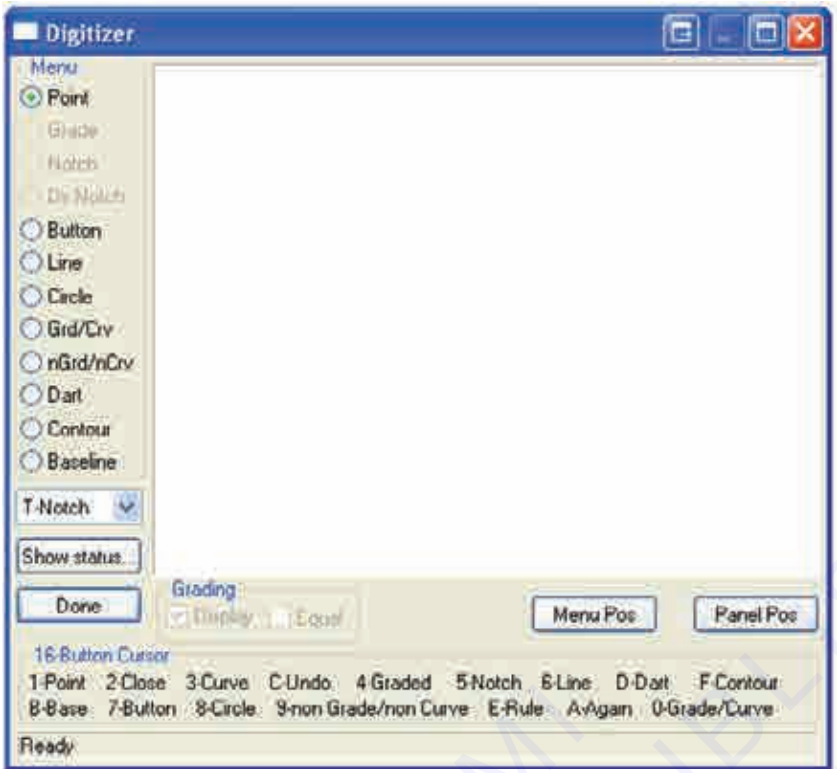
2 Menu
   - File>Digitizer>Digitize

3 Toolbar
   - General

4 Toolbox
   - Windows Tools

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Icon: Digitize



To Set Up Digitizer

The Digitize Window is divided into sections to separate its functions, and contains buttons for additional functions.

1 The Menu Section contains each of the functions that a digitizer is capable of using these buttons can be used for understanding the use of each function without the use of the digitizer. These functions define a type of object that can be placed within a digitized piece, and using the mouse, you can click on a function, and click anywhere on the blank space to the left to test the function.

The meaning of each of these options are as follows:

Button	Function
Point	Creates a graded, non-curve point along a contour
Grade	Marks the nested locations of a graded point
Notch	Creates a notch on an external contour
Dir.Notch	Creates a directional notch on an external contour
Button	Creates a button or drillhole on the inside of a closed piece
Line	Creates a two-point internal line segment
Circle	Creates a circle using center location and radius
Grd/Crv	Creates a graded curve point
nGrd/nCrv	Creates a non-graded, non-curve point
Dart	Marks the first leg, second leg, and tip of a dart
Contour	Begins a complex internal contour within a closed piece
Baseline	Marks the baseline of a piece

1 The Digitizer Status Button opens a window that will display the current staus of the digitizer, as well as the default modes for types of internals.

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2 The Internal Commands Button opens a window where you can set the default settings for internals that are created using the digitizer.

3 The Piece Information Button allows you to modify the piece information for the current piece you are working on. You can change the piece information one by one as you digitize, or more easily - fix them from within the PDS workspace.

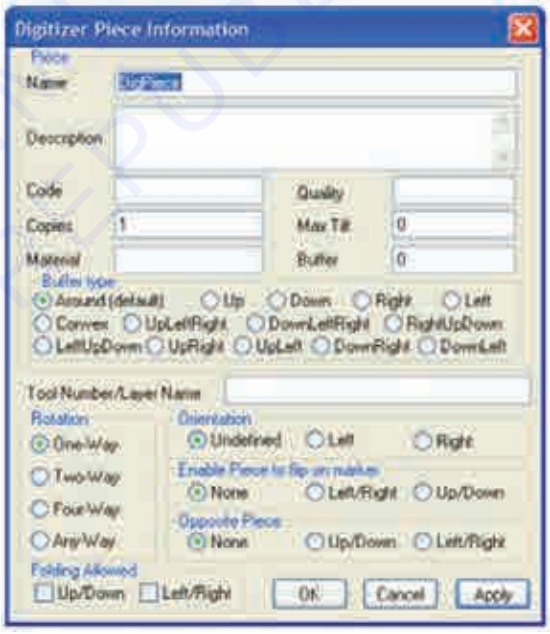


1 Digitizer status Window

2 Internal Commands Window

3 Piece Information Window





Testing Digitizer Calibration

1 Take an 8.5x11" sheet of paper and tape it to your digitizer board.

2 Digitize around the perimeter of the piece using only four grading, non-curve points total(You can use the crosshairs on the digitzer puck to be as accurate as possible while digitizing).

3 Click '"Done"' to send the piece to the workspace.

4 Find the Piece, and bring it to the workspace.

5 Press F8 to see the length of each contour between grading points.

Note: The human hand will never be able to perfectly recreate the exact size and shape of any contour digitized in. Your measurements can be as far as .1 or even .2" off depending on the size of your pattern.

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LESSON 11 : Grading

Objectives

At the end of this lesson, you will be able to:

- explain about the grading and its techniques.

Pattern Grading

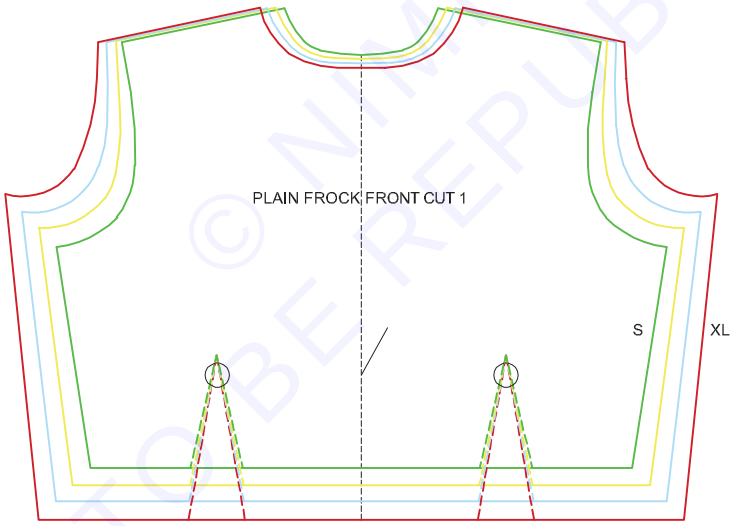
Digitizer Settings

Pattern grading can be defined as the process of increasing or decreasing / enlarge or returning from one size to another proportionally. The main advantages of pattern grading is “Time saving”.

For example in a garment industry, one person is consuming 4 has each for preparing pattern for 4 no of sizes (1 hrs each) and he has to spend 16 Hrs. For the whole process. But, with the help of grading he can complete the entire process with in 8 hrs and he can save 8 hrs. First he can prepare the pattern for one size with in 4 hrs, and then with the help of grading he can prepare the remaining pattern within 4 hours. After preparing a pattern the outlines of the pattern has been enlarged or reduced with the help of “increments” of the measurement chart during the grading process.

This has been illustrated in the following simple figure (Fig 1)

Fig 1



Pattern grading process requires size interval and increments of a measurement chart.

Size Interval

It can be defined as the amount by which a measurement varies from one size to another size.

E.g.:

Size	S	M	L
Chest	80 Cms	84 Cms	88 Cms

Here the size interval of chest measurement

S to M = 84 – 80 = 4cms

M to L =88 – 84 = 4cms

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Increment

It can be defined as the amount by which a variable quantity varies from one size to another size .

Variable quantity

It can be defined as the ratio of measurement used during pattern drafting

Size	S	M	L
Neck	30 Cms	36 Cms	42 Cms

The size interval from S to M = 6cms and

M to L = 6cms

During drafting the neck curve we are using the measurement in the ratio of 1/6. i.e.1/6

Neck (Fig 2)

Here, the 1/6 Neck or 1/6 is defined as the variable quantity.
Because, this will vary according to the drafting method, style
and design features.

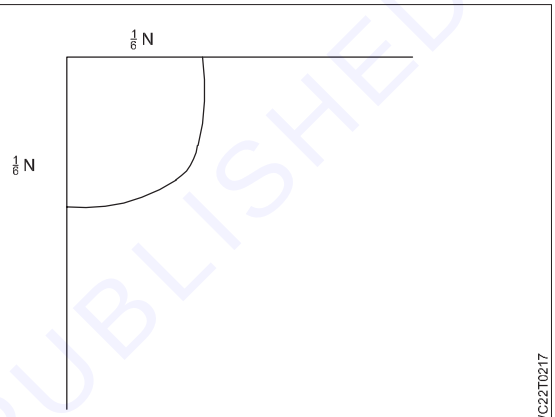
In the above example,

Variable quantity (V.Q) for 'S' size =1/6 Neck = 30/6 =5cms.

V.Q for M size =1/6 Neck =36/6 = 6cms.

Hence, the increment S to M of Neck measurement
=V.Q of M – V.Q of S
=6 -5 =1cm or 10 mm

Fig 2



SWC22T0217

Also, the increment can be calculated directly by using the formula.

Increment = Size interval X Variable Quantity

For the above example, Increment of S to M of Neck Measurement = Size internal of M X VQ

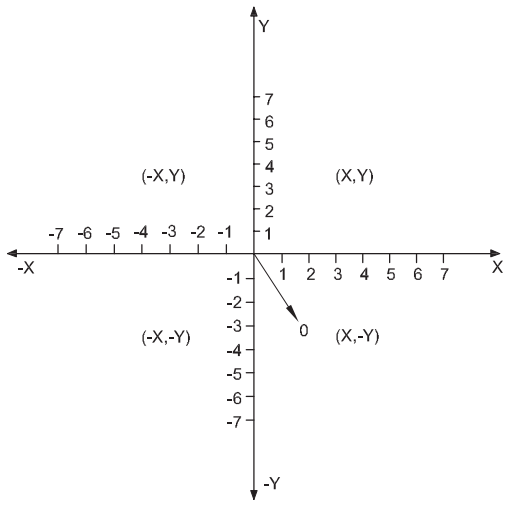
= 6 X 1/6

= 1 cm or 10 mm

Increment applying method

The increment should be calculated and applied both in the 'X' and 'Y' direction. And the '+' and '-'sign should be given for simply indicting the direction.(Fig 3)

Fig 3



SWC22T0218

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To avoid fractional measurement like 0.5cms, 0.8cms the increment are normally referred by using millimeters (mms). Eg:5 mm (0.5cms) 8mm (0.8cms), 12.5 mm (1.25cms)

Grading Methods

There are two types of pattern grading method. They are,

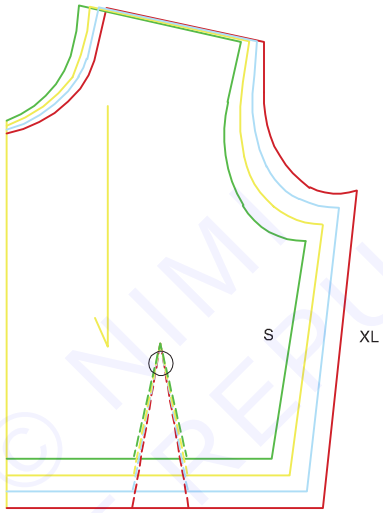
1 Radial Draft method

2 Track Shift method

1 Radial Draft Method

In this method, the pattern is in fixed position, and the grading is done on the peripheries of the pattern like a circular or radial method. The increments are applied on each grading points, and patterns outlines are traced. The lines and curves of the other graded sizes are drafted and traced using tracing wheel if necessary. After finishing, the base size pattern is removed and the undrafted lines and curves are drafted correctly and finished. (Fig 4)

Fig 4



Advantages

1 It is an easy method.

2 It can be completed within less time.

Disadvantages

1 It an approximate method.

2 It is suitable for children's wears only.

2 Track Shift Method

In this method, the pattern is not in fixed position , and the grading is done by moving or shifting the base pattern on the lines or tracks which already drawn on the paper to be cut. The increments are calculated and according to the increments, the lines are tracks with axes are drawn on a paper in which the other patterns to be graded. The axes are drawn on the base pattern and the base pattern is placed on the tracks and grading is done by moving or shifting the pattern on the lines or tracks. The starting and end lines of the points of the graded patterns are only marked. Then, the base size pattern is removed and the lines are finished with the help of the scale and the curves are finished with the help of the base pattern.(Fig 5)

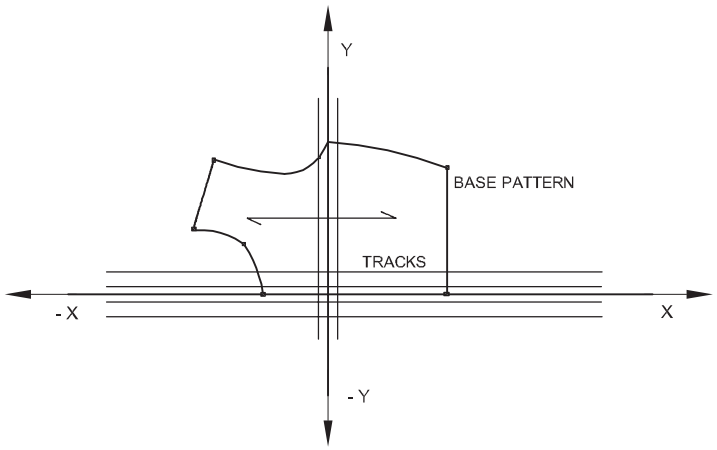
Advantages

1 It is an accurate method.

2 It is suitable for all garments.

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Fig 5



Disadvantages

1 It is complicated method.

2 It consumes more time

Computer – Aided Grading

Computer based grading systems operate in one of three ways.

- The Grading increments are applied directly to the corresponding grading points.
- The Grading increments are fed into the computer in tabular form and the different sizes are generated automatically using appropriate numerical algorithms built into the grading software.
- The pattern for each individual size is calculated separately starting from the data in the size charts.

Some special features of computer pattern grading:

- Any change in one pattern piece can be automatically applied over all sizes.
- A particular size can be altered without affecting the others.
- Grading rules established for one pattern piece can be applied to another.
- Graded sizes can be displayed and edited individually.
- When two pieces have been graded, further pieces can be generated with a single mouse click.
- Sets of grading rules can be laid out in tabular form.
- A set of grading rules can be saved along with the corresponding pattern set.

SIZE TABLE:

Use F4 shortcut key to show/hide all sizes, or check the box next to the size you wish to view on the working area.

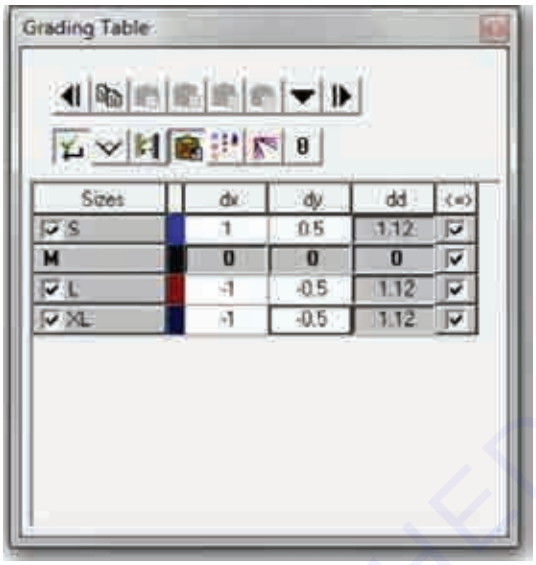
GRADING TABLE:

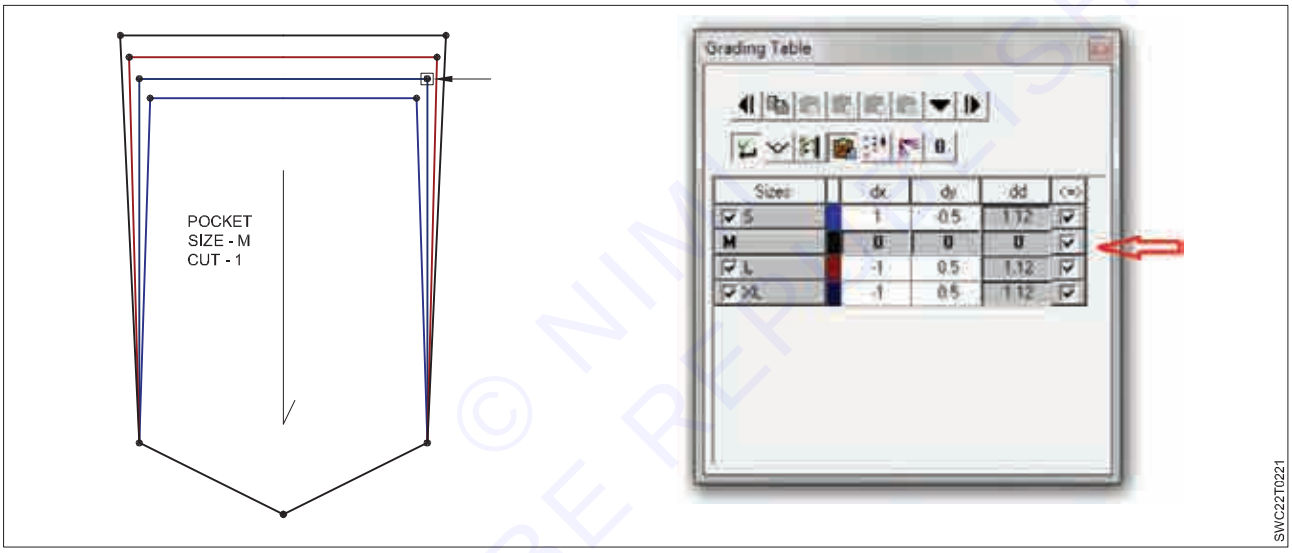
dx & dy

Grading Values are displayed in the Grading Table whenever a point is selected. The grading values are also used to grade internals, like buttons and lines.

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LESSON 12 : Designing in Skirts

Objectives

At the end of this lesson, you will be able to:

- explain about the different types of skirts.

Designing in Skirts

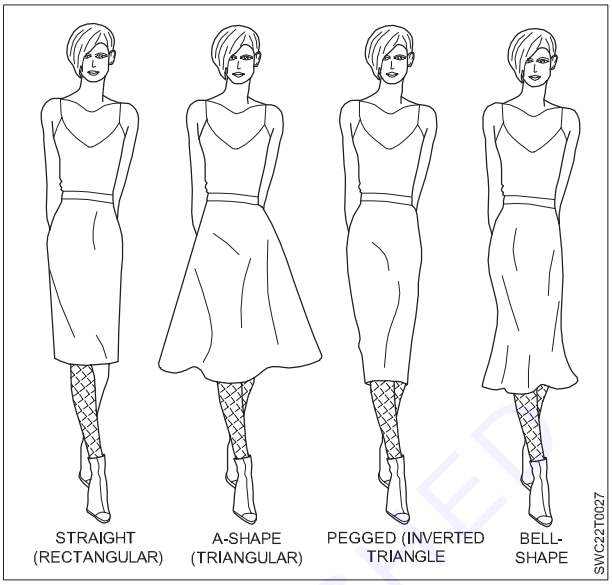
A skirt is the lower part of a dress or a separate outer garment that covers a person from the waist downwards.

At its simplest, a skirt can be a draped garment made out of a single piece of fabric. Most of the skirts are fitted to the body at the waist or hips and fuller below, with the fullness introduced by means of darts, gores, pleats, or panels. Modern skirts are usually made of light to mid-weight fabrics, such as denim, jersey, worsted, or poplin. Skirts of thin or clingy fabrics are often worn with slips to make the material of the skirt drape better and for modesty.



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The hemline of skirts can vary from micro to floor-length and can vary according to cultural conceptions of modesty and aesthetics as well as the wearer's personal taste, this can be influenced by such factors as fashion and social context.



Four Skirt Foundations:

Each of the four skirt foundations has a specific name that identifies its silhouette. It is the amount of deviation from the basic skirt that determines the new silhouette.

Straight, or Rectangular, Shape (Basic Skirt)

The skirt hangs straight from hipline to hemline.

A-Shape, or Triangular

The skirt falls away from the hip, flaring out at the hemline, increasing the hemline sweep. (Circular and flared shapes are included in this category.)

Pegged, or Inverted Triangle

The skirt tapers inward from hip level to hemline. The pegged silhouette may be achieved by increasing waist and hip fullness or by tapering from the hip to the hem.

Bell-Shape

The skirt clings to the figure's curves at, above, or below the hip and breaks into fluid movement along the hemline.

Skirt Characteristics

Skirts are described in terms of the following three areas:

- The sweep: the width of the skirt at hemline.
- Movement: the way a skirt's fullness reacts to the movement of the body.
- The break point: the point at which the skirt breaks away from the body into fluid movement.

Different types of Skirts:

Flared Skirts

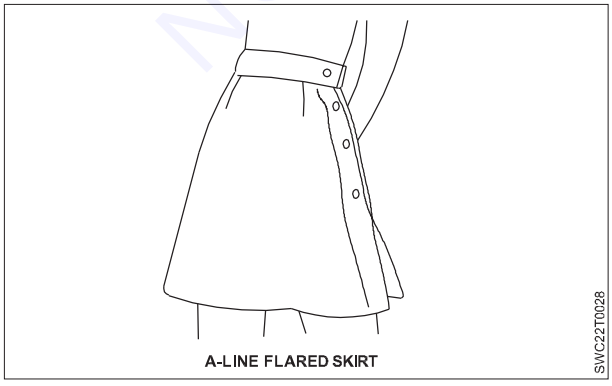
The flared skirt is added Fullness, to increase the sweep of the hemline. Flared skirts have a triangular silhouette.

A-Line Flared Skirt

The A-line silhouette is one in which the hemline measures greater than the hip circumference. It has a more rounded effect along the hemline that provides additional flare for walking.

Basic Flared Skirt

A flared skirt has more sweep along its hemline than does the basic A-line skirt. It is increase the flare to the hemline





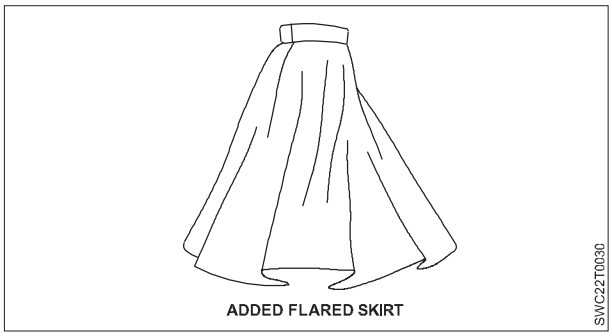
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Added Flare Skirt

The hemline sweep may be increased by adding additional flare within the pattern's frame and to the side seams (for balance). The skirt will have more sweep than the basic flared skirt. Long skirts with great sweeping hemlines are often wider than the fabric. A separate pattern should be made for the section that extends beyond the fabric.

Gathered Dirndl Skirt

Dirndl skirts are rectangular in shape (waist and hemline are of equal measurements). To compute the amount of fullness for gathers, the width of the fabric is considered.



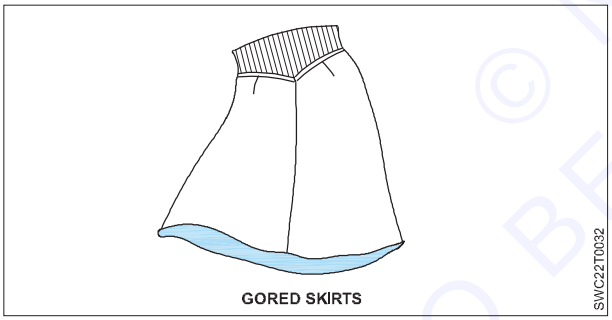


Gored Skirts

A gore is a skirt panel that tapers toward the waistline. A gored skirt contains any number of gores—from 4 to 12 or more—equally spaced or in clusters, depending on the look desired. The gore may hang straight from hip level, may be flared or pleated.

6-Gore

The basic 6-gore skirt has three panels in the front and in the back. The center panels are cut on the fold. The zipper can be stitched at the side seam or in the back gore panel.



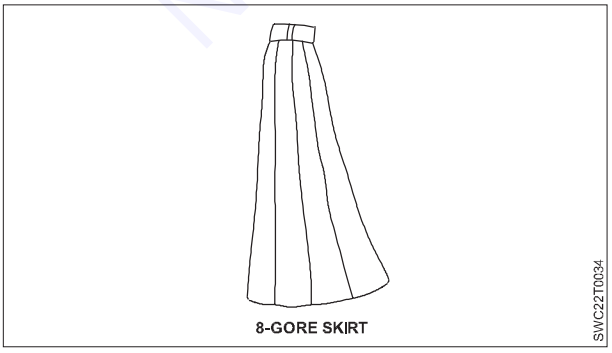


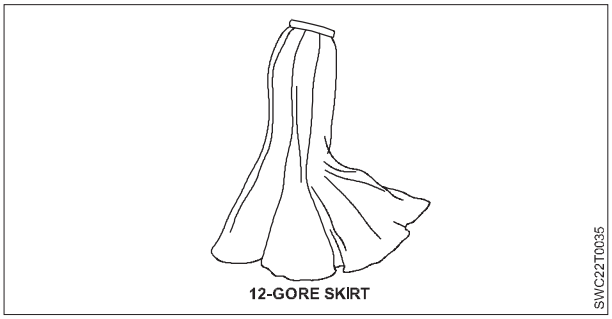
8-Gore Skirt

To create an 8-gore skirt, add seams at the center front and back of the 6-gore skirt patterns.

12-Gore Skirt

Gores having 12 or more panels can be generated through the draft of a gore panel, which is cut as many times as it represents. Flares can be added to the shape of the gore panel in creating the Trumpet, Flip, and Tulip silhouettes. The gore panel is drafted by dividing the waist and hip into the number of gores desired.





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Pegged Skirt

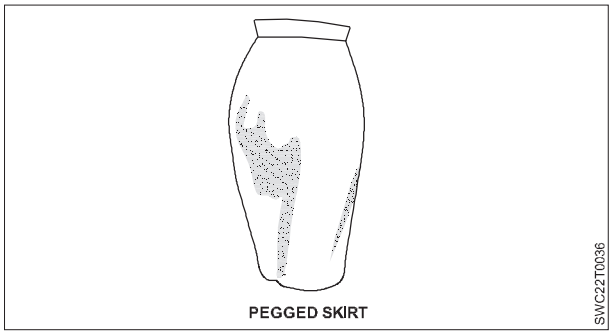
A peg skirt is characterised by fullness at the waist line, which tapers to a narrow hem.

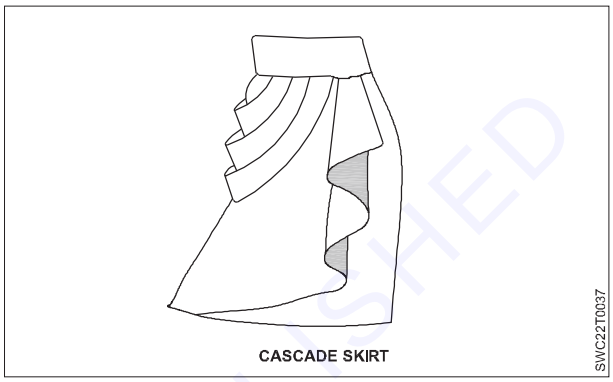
The side seams are tapered to create a basic peg skirt.

Draped Wrap Skirt with a Cascade

Five drapery pleats start from the waistband. The cascade is part of the skirt pattern.

The drapery pleats end near the princess line on the opposite side of the skirt, as shown, or can end at the side seam. To complete the wrap patterns, a full front and back basic pattern are needed.


PEGGED SKIRT
SWC22T0036


CASCADE SKIRT
SWC22T0037

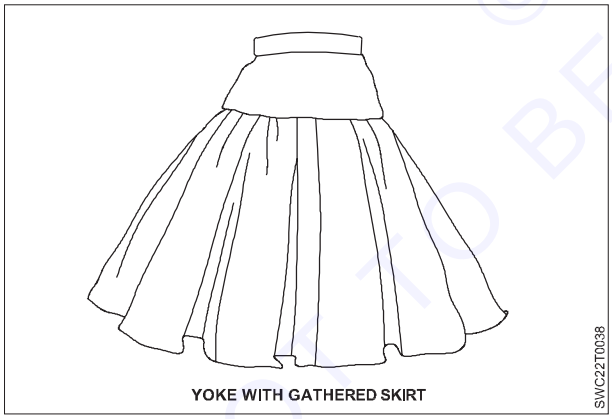
Skirts with Yokes

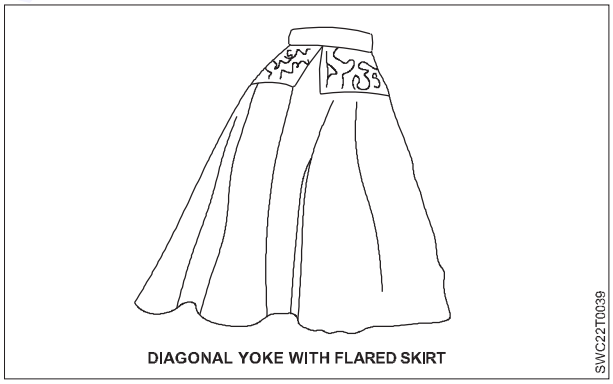
Yoke with Gathered Skirt

The yoke 3 1/2 inches down from the waistline and is attached to a gathered dirndl skirt. The skirt is developed from a basic straight line skirt and is spread for fullness.

Diagonal Yoke with Flared Skirt

The yoke is parallel to the waist, to the point where it ends at a diagonal to the center front waist. The back yoke is parallel with the waistline.


YOKE WITH GATHERED SKIRT
SWC22T0038

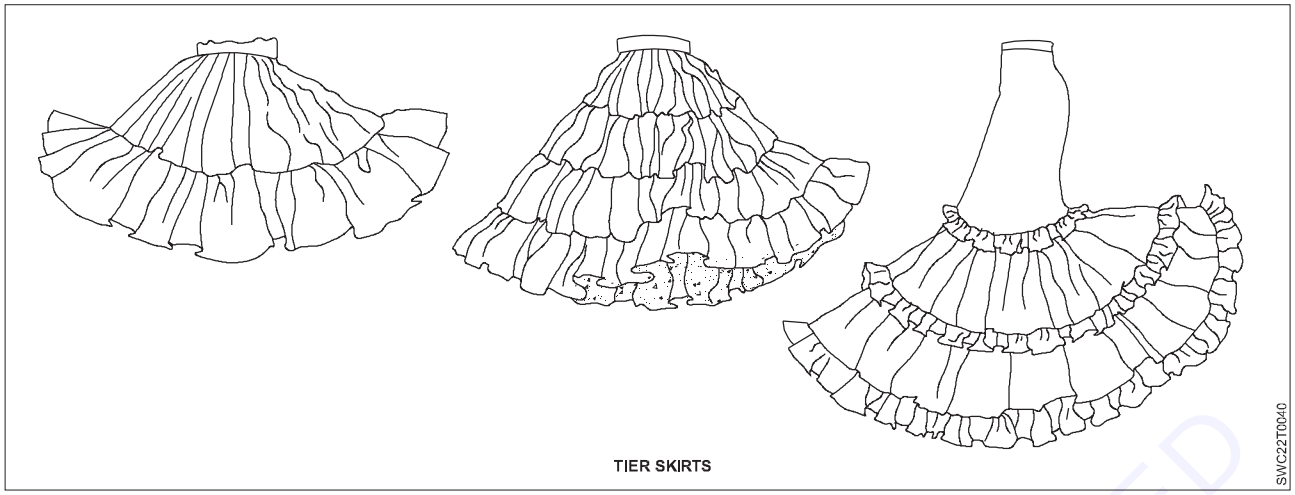

DIAGONAL YOKE WITH FLARED SKIRT
SWC22T0039

Tiers

Tiered designs are those featuring rows or layers of fabric attached to each other or separated and attached to a frame underneath.

Tiers may be of graduated or even lengths. The width of each tier may vary. When planning a tiered design, the first tier, which is attached to the waistline (or yoke), may be from 1 to 1 1/2 times the fabric width. Each subsequent tier may increase in width from 1 1/2 to 2 times the width of the previous tier, depending on the amount of fullness desired.

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TIER SKIRTS

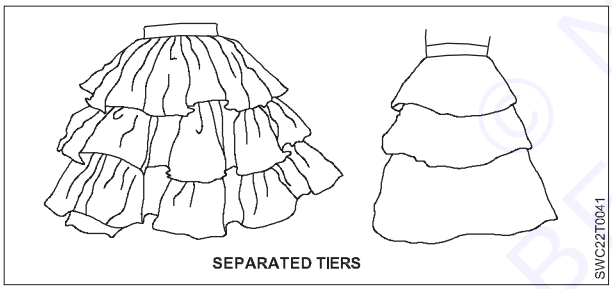
Separated Tiers

Tiers are single layers of gathered or flared panels stitched to a straight or flared underskirt. The tier placements are controlled through the seams of the underskirt, or through punch marks that guide the sewer. Tiers overlay each row to conceal the seams of the preceding rows.

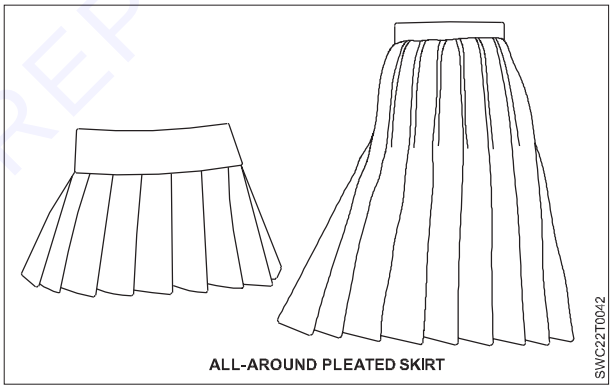
All-Around Pleated Skirt

Pleats are folds in fabrics often as a means of containing a wide piece of fabric to fit another one of narrower proportions.

Pleats contain the fullness of fabric and create new silhouettes for your dresses and elevate the look to a new level.



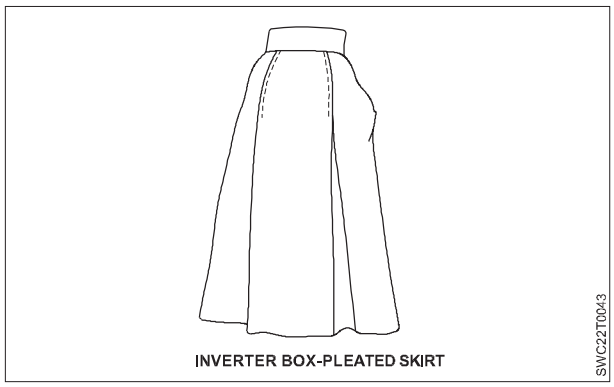
SEPARATED TIERS



ALL-AROUND PLEATED SKIRT

Inverted Box-Pleated Skirt

The skirt features inverted box pleats in front with slight A-line flare at side seams. The back is basic with A-line flare. Pleats can be either stitched (as shown) or unstitched. Moreover, pleats make the perfect embellishments for clothing girls.

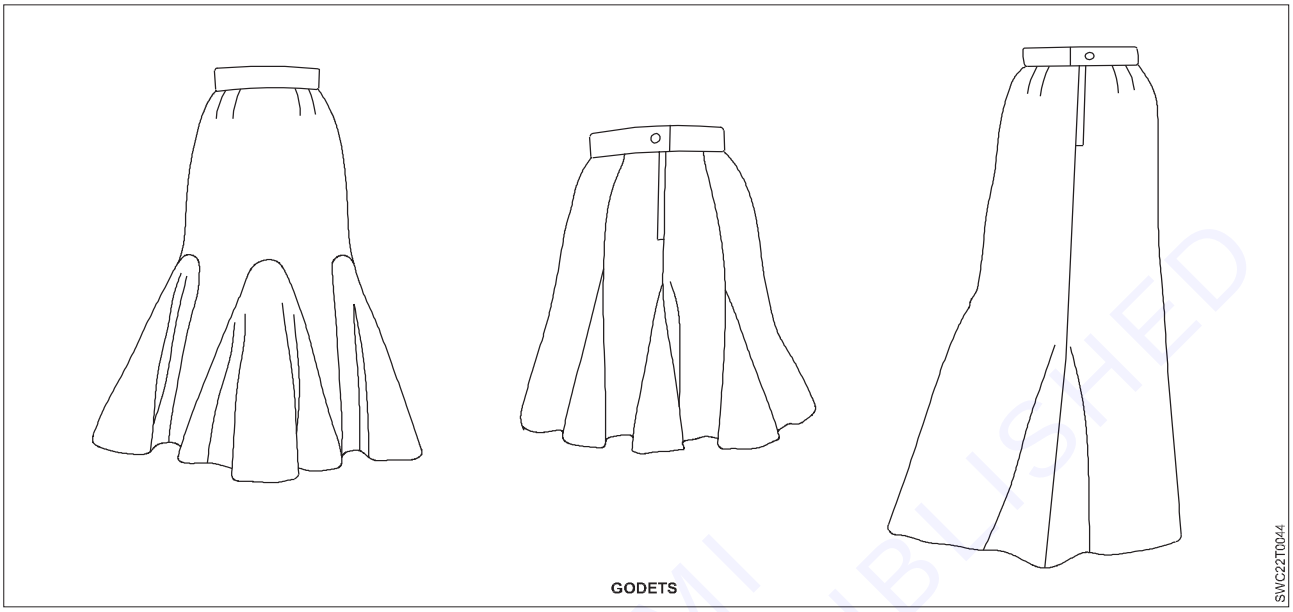


INVERTER BOX-PLEATED SKIRT

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Godets

Godets are generally triangular-shaped wedges of fabric placed between seams or into slits or used as a replacement for cutout sections (of varying shapes). Godets provide additional flare at hemline or may be added as a design feature. They are created singularly or in a series around the skirt. They may extend evenly to the hemline or be graduated in length. Godets may be wearing on a bodice, jacket, blouse, sleeve, and dress.



GODETS

Wrap Skirt

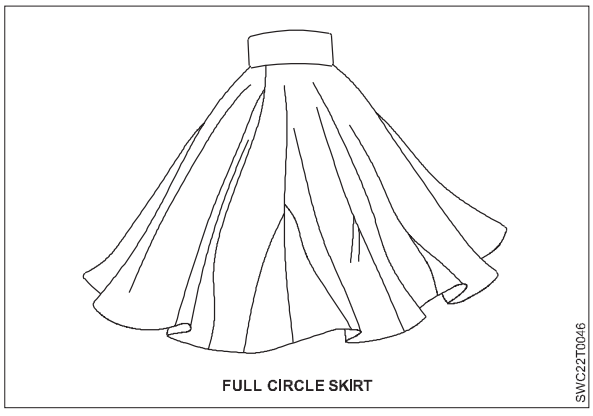
A basic, A-line, flared, or gathered skirt can be developed into a wrap skirt by extending the center front. The hemline may be squared, curved, or of any other variation desired. Wrap skirts may have side seams or may be developed all-in one. Belts may be buttoned or tied. Designs are based on an A-line flare skirt.



WRAP SKIRTS

Full-Circle Skirt

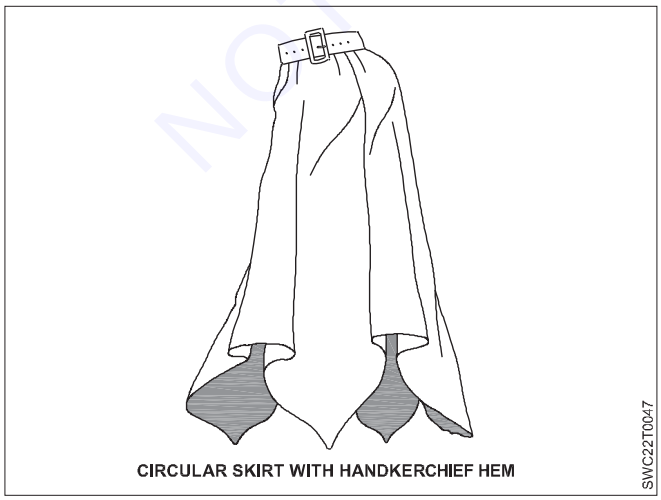
A skirt made from a circle of fabric with an opening in the center for the waist. It has more flare in the sweep.



FULL CIRCLE SKIRT

Circular Skirt with Handkerchief Hem

The design is a circular skirt with a handkerchief hemline (squared or pointed hemline). Waistline is with or without gathers.



CIRCULAR SKIRT WITH HANDKERCHIEF HEM

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LESSON 13 : Apparel Market and Enterprise

Objectives

At the end of this lesson, you will be able to

- explain about the different types of sleeves.

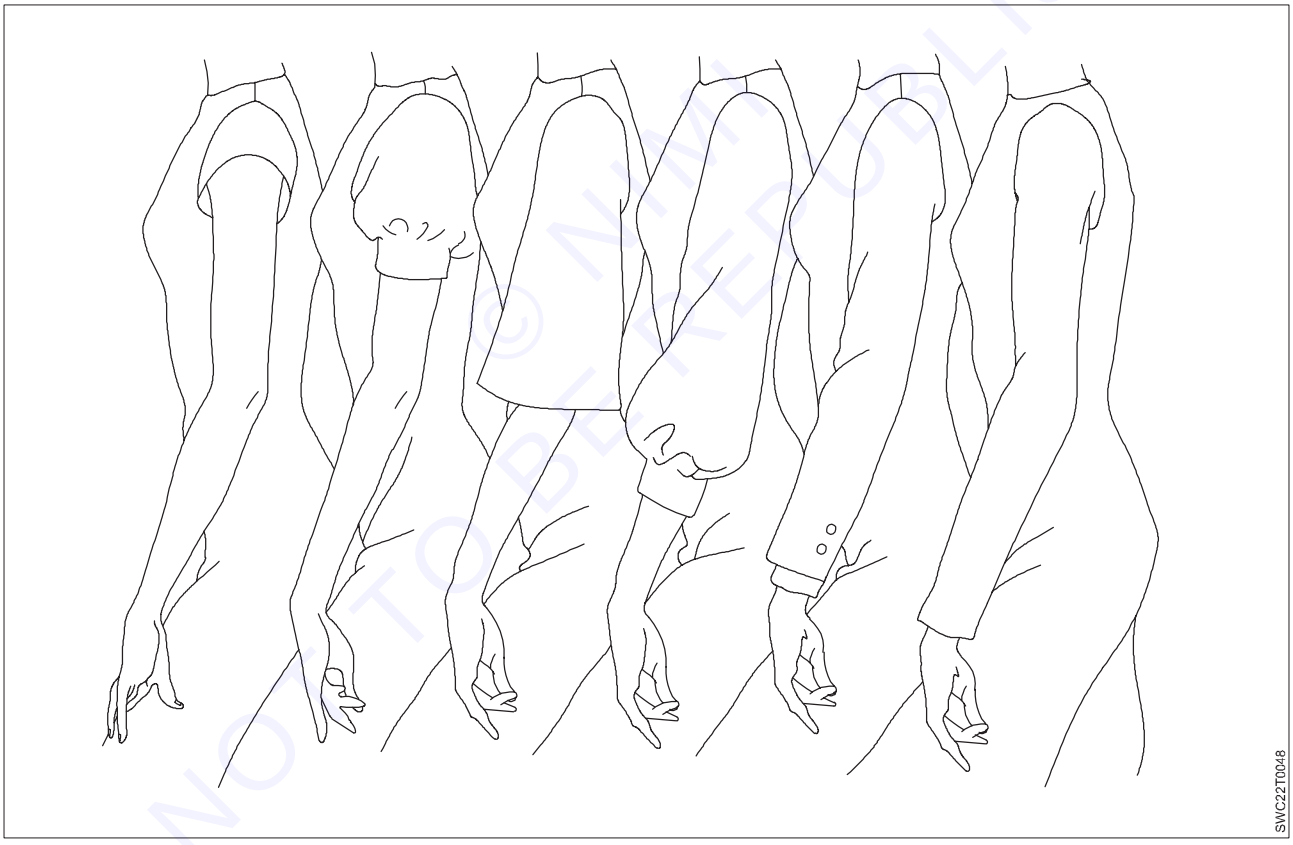
Designing in Sleeves

A sleeve is the part of a clothing item, whether a dress, blouse, jacket, sweater and more, that covers the arm. Sleeves can come in a variety of lengths—short, mid-length, or long.

There are two major classifications of sleeves:

- The set-in sleeve cut separately, Set-in sleeves can be designed to fit the armhole smoothly or with gathers. They can be designed fitted or with exaggerated fullness and can be cut to any length.
- Stitched into the armhole of the bodice and the sleeve combined with part or the entire bodice.

Different types of Sleeves



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Terminology

Sleeve cap – Curved top of the sleeve from front to back.

Cap height – Distance from biceps to cap at center.

Biceps level – Widest part of the sleeve dividing the cap from the lower sleeve.

Sleeve ease – Additional allowance at biceps, elbow, and wrist levels accommodating the circumference of the arm and allowing ease for freedom of movement. Ease ranges from 1 1/2 to 2 or more inches.

Cap ease – Difference between the cap and armhole measurement (ranging from 1 to 1 7/8 inches).

Elbow level – The location of the elbow of the arm.

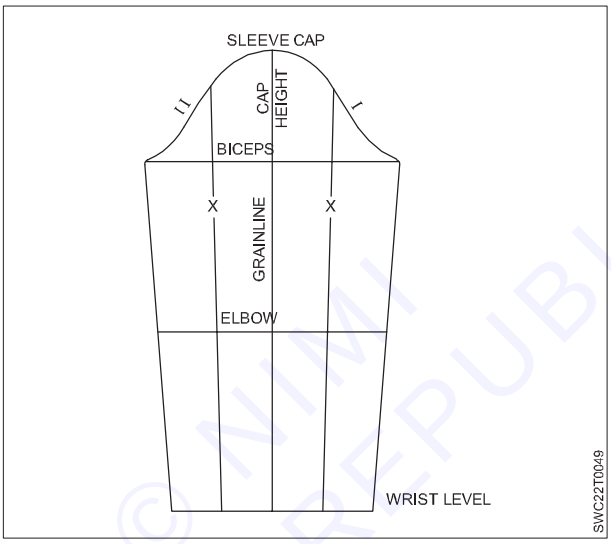
Wrist level – The bottom (hemline) of the long sleeve, level with the wrist.

Grainline – Center of sleeve from top of the cap to wrist level—straight grain of sleeve.

Quartering sleeve – Sleeve divided into four equal parts from cap to wrist. Used as guidelines for spreading the sleeve. Quarter sections are labeled X.

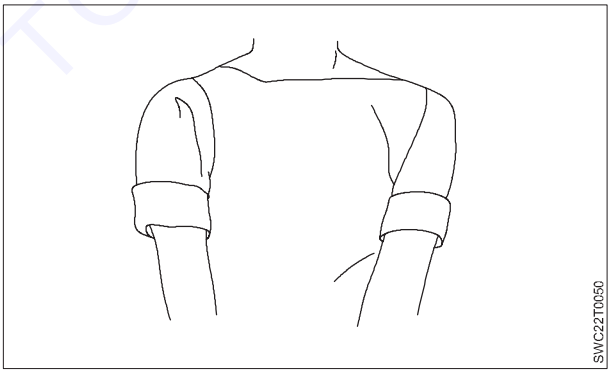
Notches – One notch indicates front sleeve; two notches indicate back sleeve. Cap notch indicates where sleeve and shoulder meet (location can vary from center Grainline).

Notch should be 1/3rd of Armhole measurement from underarm sleeve. Need to measurement front armhole and back armhole separately.



Roll-Up Cuff

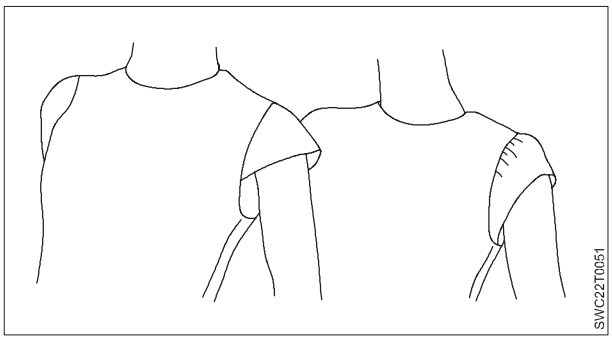
Roll-up cuffs are developed all-in-one with the sleeve or as separate cuffs stitched to the sleeve and turned up. To develop this type of cuff, determine the finished length of the sleeve (between biceps level to hem) and add cuff width. Example: Sleeve length below biceps _ 4 inches; cuff 1 1/2 inches (for roll-up). Use these measurements or personal measurements. Use this process for pants with cuffs.



Cap Sleeves

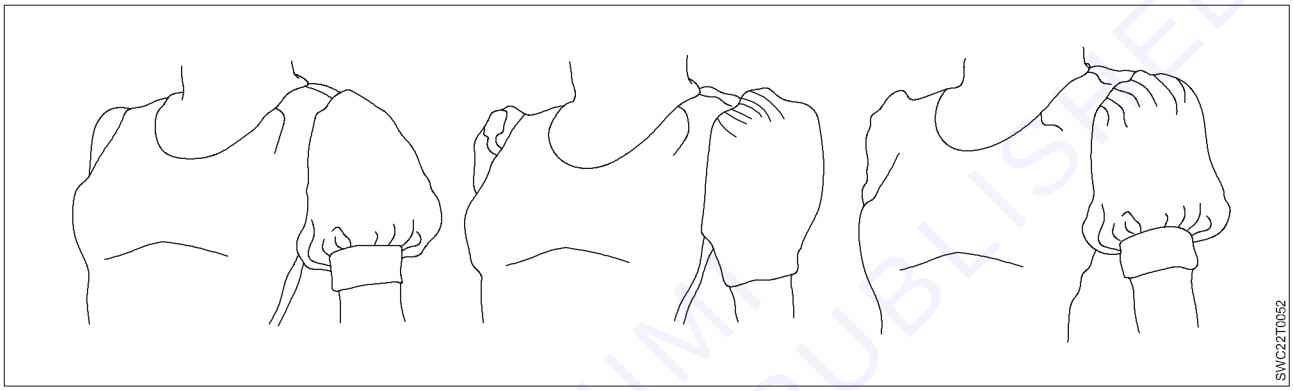
Cap sleeves can just away from the arm or conform to the arm. This type of sleeve can be shaped in a variety of ways and is usually designed for a bodice, dress, or blouse.

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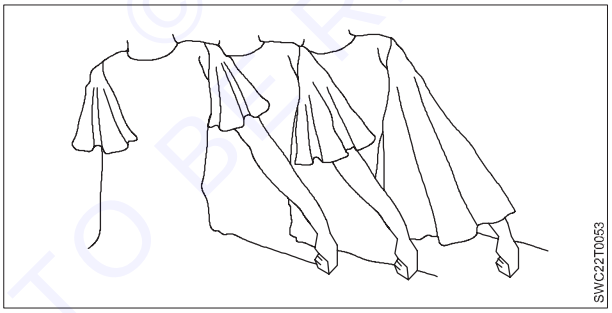
Puff Sleeves

Puff sleeves have fullness added. They are designed with gathers at the hemline, at the capline, or at the capline and hemline. The puff sleeve can be of any length, and fullness can be more or less.



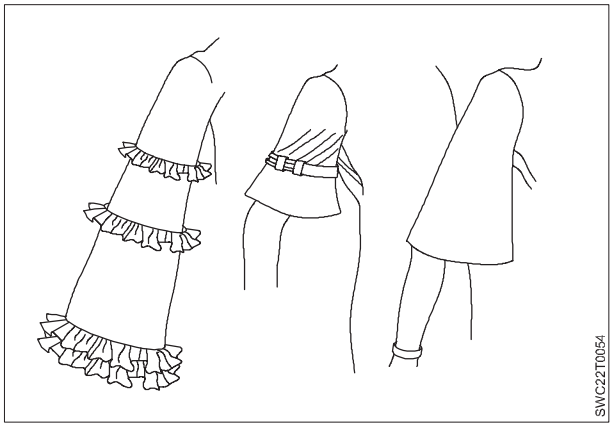
Circular Hemline Sleeves

To increase the sleeve hemline to a half circle. The sleeve can be developed to any desired length. The short sleeve should be used as a guide for longer lengths.



Bell Sleeves

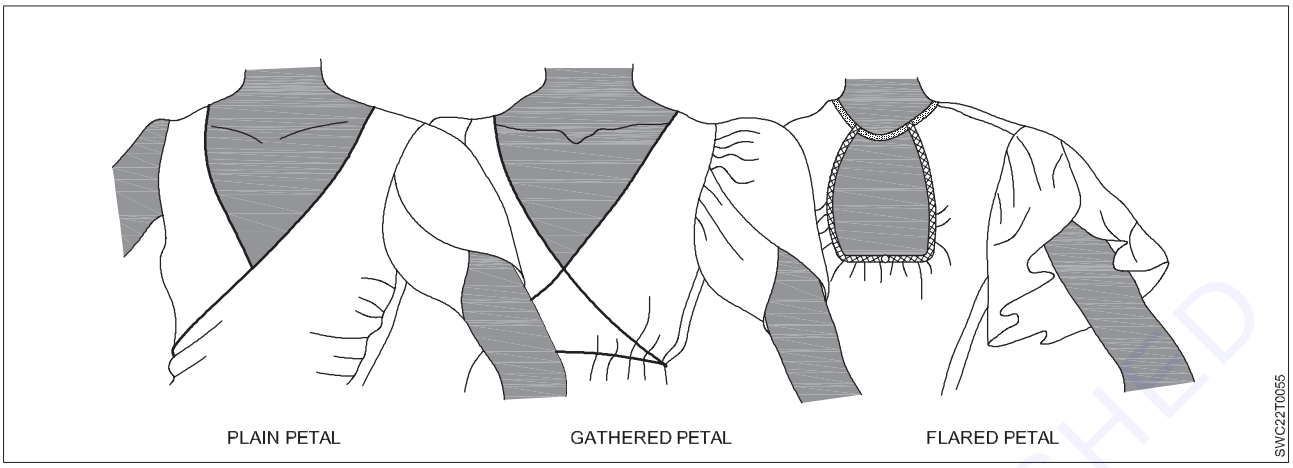
A bell sleeve has a smooth cap and a hemline flaring out in the shape of a bell. The bell sleeve may be developed to any length and flare desired. It can be based on the sleeve block, the bishop sleeve, or the exaggerated bishop sleeve (with the hemline trimmed).



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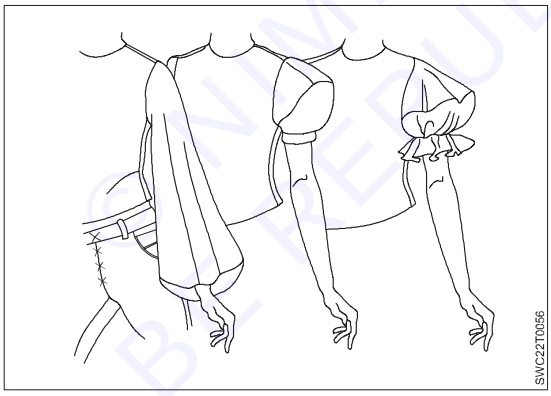
Petal Sleeves

The petal sleeve resembles a petal as the sleeve sections cross over each other at the cap. The sleeves are developed in a number of ways and at varying lengths. The front sleeve underarm curve is trimmed.



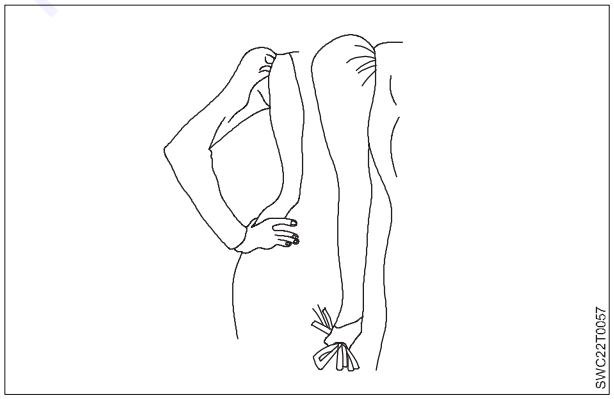
Lantern Sleeves

A lantern sleeve is a two-section sleeve that flares out from the cap (upper section) and hemline to a style line within the sleeve. The sleeve can be developed at varying lengths and fullness. The three designs show the flexibility of the lantern sleeve silhouette.



Leg-O-Mutton Sleeves

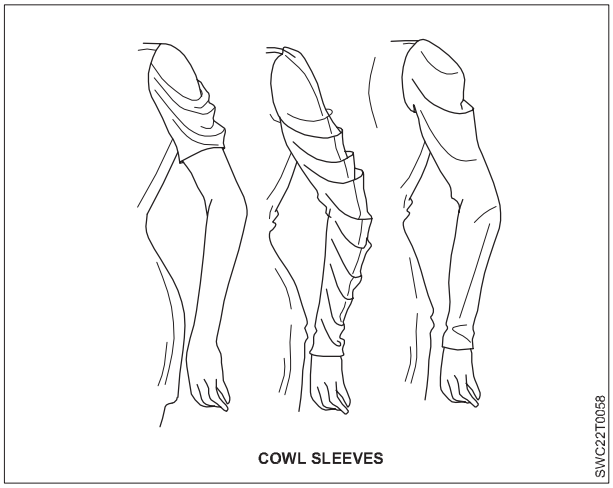
Sleeve is enlarged at the biceps and cap area, tapering the fullness toward the elbow level.



Cowl Sleeves

The cowl sleeve drapes from the center of the sleeve cap to any desired depth (example: 5 inches). It is developed from the basic block sleeve to any sleeve length.

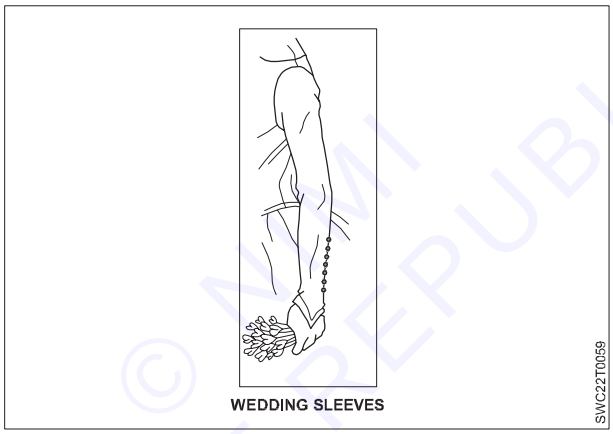
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COWL SLEEVES

Wedding Sleeves

The traditional long, buttoned wedding sleeve is based on the basic sleeve.



WEDDING SLEEVES

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Designing in Collars

Objectives: At the end of this lesson, you will be able to

- explain about the different types of collars.

Collar

A collar encircles the neck and frames the face, offering great opportunities for design variations. Collars may be developed close to or away from the neckline. They may be wide, narrow, flat, or high and with or without an attached stand. The collar edge may be stylized or may follow a basic shape—it may be round, curved, scalloped, square, or pointed (long or short) in any direction.

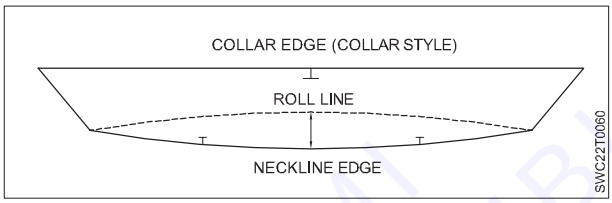
Collar Terms

Neckline edge – The side of the collar that is stitched to the neckline of the garment.

Collar edge – The outer edge or design of the collar.

Collar stand – The height at which the collar rolls over itself.

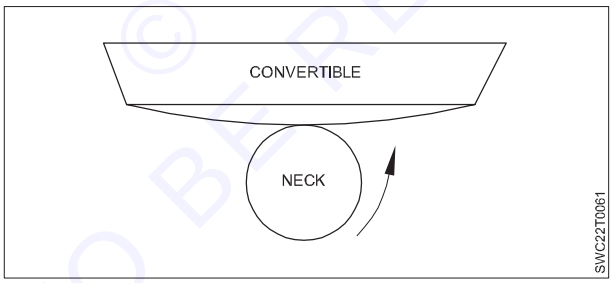
Roll line – The fold-over at the collar stand.



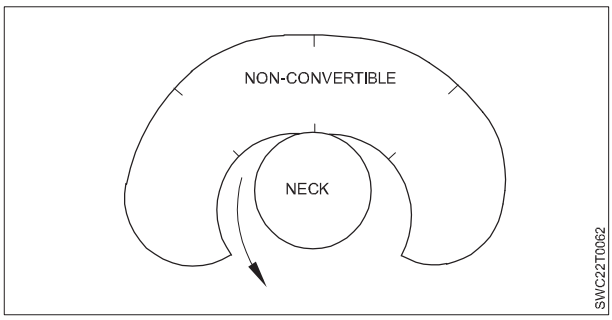
Collar Classifications

Regardless of the collar design, the neckline edge generally has one of two basic shapes:

1 Contrary to the neckline curve of the form or garment. This type of collar will spring open when unbuttoned—convertible (example of basic shirt collar).

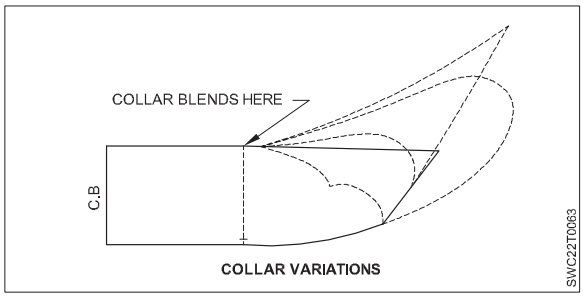


2 Closely follows the curve of the neckline of the form or garment. This type of collar will stay in place when unbuttoned— nonconvertible (example of Peter Pan collar).



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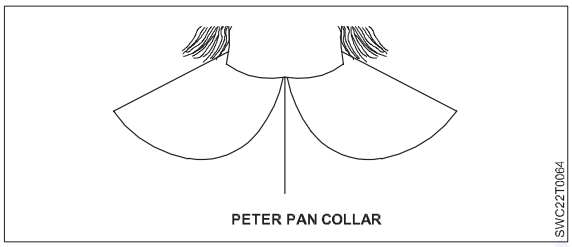
Collar Variations



COLLAR VARIATIONS

Peter Pan collar

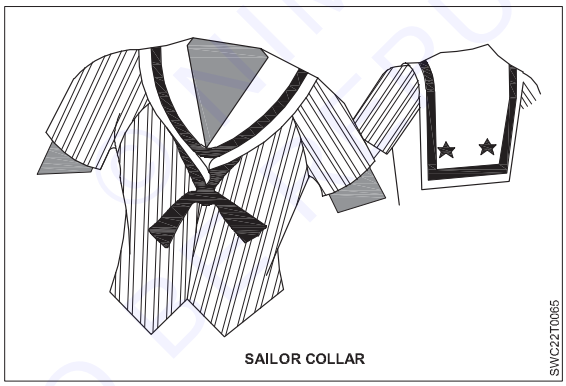
A Peter Pan collar is a style of clothing collar, flat in design with rounded corners.



PETER PAN COLLAR

Sailor Collar

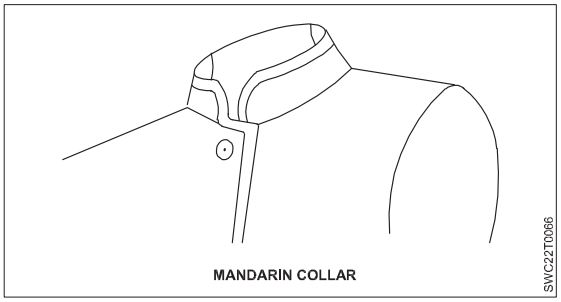
The sailor collar was inspired by the sailor's uniform and is based on instructions of the nonconvertible collar.



SAILOR COLLAR

Mandarin Collar

A Mandarin collar (also called military, Nehru, and Chinese collar) is a loose-fitting, stand-up collar. It separates in front and varies in width from 1 1/4 to 1 1/2 inches on the average. It is the base for other collars, stands, and combination collar-and-stand variations. The collar may meet at center front, be overlapped and buttoned, or be extended to any point along the neckline. The Mandarin can be developed either close to or away from the neck. It can be curved, blunted, pointed, or extended for a partial folded-over collar effect. The neckline measurement is needed to draft this collar.

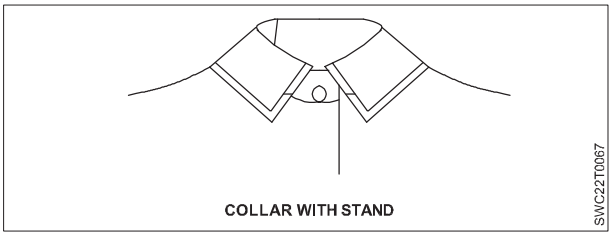


MANDARIN COLLAR

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Collar with Stand

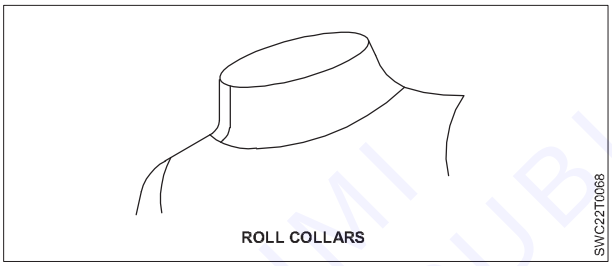
A collar is attached to the top edge of a Mandarin stand that has an extension for the button and buttonhole (like as a shirt collar).



COLLAR WITH STAND

Roll Collars

Bias-fold collar bands can be developed for any neckline (basic or for a wider neckline). The finished length, however, should be slightly shorter than the area covered to compensate for the stretch of the bias fabric. The collar width may be planned for either a folded bias band or a band folded back on itself. Cut the band equal to the front and back neck measurement. Stretch the collar band slightly when stitching to the neck of the garment.



ROLL COLLARS

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LESSON 14 : Specification Sheet

Specification Sheet

Specification sheets provide Important details to ensure the correct execution of the patterns into finished garments. Spec sheets help to produce accurate samples, which improves turnaround time and simplifies communication during all stages of manufacturing and quality control.

Spec sheets Include detailed technical diagrams, construction notes, finished garment measurements, fabric yields and material and trim details. All specs are in Excel spreadsheet format and can be easily transferred through e-mall.

Introduction:

Garments specification sheet is an important document for manufacturing any garments. The main objects of providing garments spec sheet to the manufacturer is to facilitate the whole processes of garments manufacturing.

Definition of Garments Specification Sheet

- Garments specification sheet is a document of a product which contains the sketch of garment design, fabric construction etc.
- It is provided by the buyer to the garment merchandisers at the beginning of a garment export order
- Garment merchandisers normally receive garments specification sheet in soft copy (PDF file) from the buyer.
- By following this document, garment merchandiser can run the others merchandising procedure of that product such as consumption, costing etc.
- It should be noted here that, garments specification sheet can be corrected after developing sample.
- In Ready made grament sector, it is also known as garments spec sheet, specification sheet or garment spec.

Key Points of a Garments Spec Sheet

1 Sketch or design of the product,
2 Measurement chart,
3 Printing instruction,
4 Embroidery instruction,
5 Stitch instruction,
6 Garments washing instruction,
7 Accessories instruction,
8 Different label instruction,
9 Necessary comments related to the product.

1 Sketch or design of the product

Sketch or design means the basic outlook of the required item. It is confirmed by the buyer. He can make it by using computer.

2 Measurement Chart

Measurement chart or measurement sheet contains various size measurement of the required item. By following this sheet pattern has to develop.

3 Printing Instruction

Printing instruction contains various information about the required print for the item. Printing instruction means print size, print location etc.

4 Embroidery Instruction

Embroidery instruction contains different types of information about the required embroidery for the definite item. Embroidery instruction means embroidery size embroidery location etc.

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5 Stich Instruction

Stitch instruction contains various info about the stitch required for the item. Stitch instruction means stitch type, stitch thread types etc.

6 Garments washing instruction

Sometimes garment has needed various wash effects which is instructed here. Garments washing instruction means types of wash, softness, hardness etc..

7 Accessories Instruction

Accessories instruction contains diligent information about the required types of accessories needed for the garment.

8 Different Label Instruction

Label instruction contains various types of label such as main label, care label, size label etc.

9 Necessary comments related to the product

If buyers seemed to deliver some comments related to the required garments manufacturing methods, then he can use this option

Steps in implementation

1 Develop a specification sheet. A specification sheet package may include complex technical sketches, pattem and/or garment measurements, methods of measurements charts, embroidery/screen and label placements. A specification sheet will be developed based on the design of the products and the requirements of the clients or producer itself on the quality, standards, key or all materials and so on.

2 At the top of the specification sheets is the information about the products such as company name and logo, product name and description, style code, and a sample design/picture of the product design.

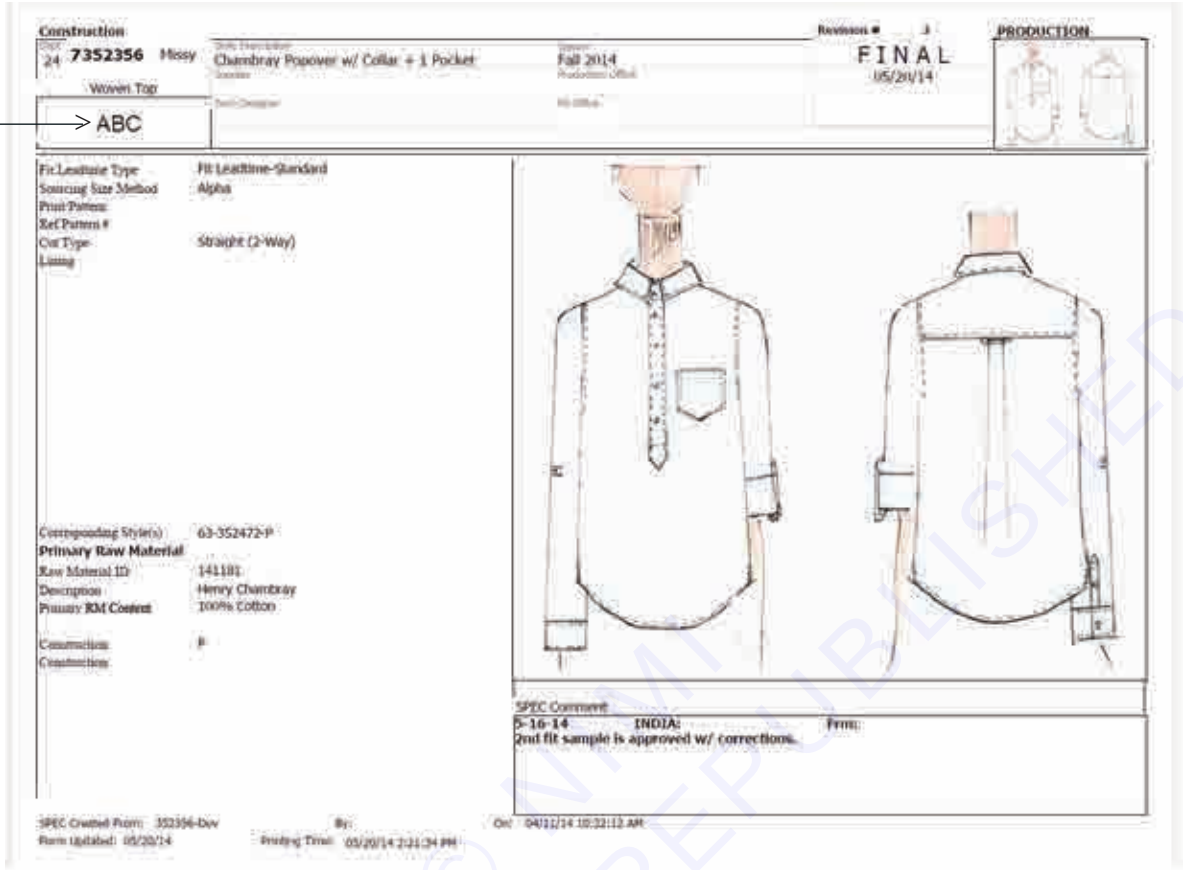
3 The specification sheet must have specific information about the product induding key dimensions such as length, neck round, waist, shoulder as well as other dimensions of the products in different standard sizes such as small, medium, large, or extra large.

4 Information on types and quantity of some important details such as buttons or types of fabric.

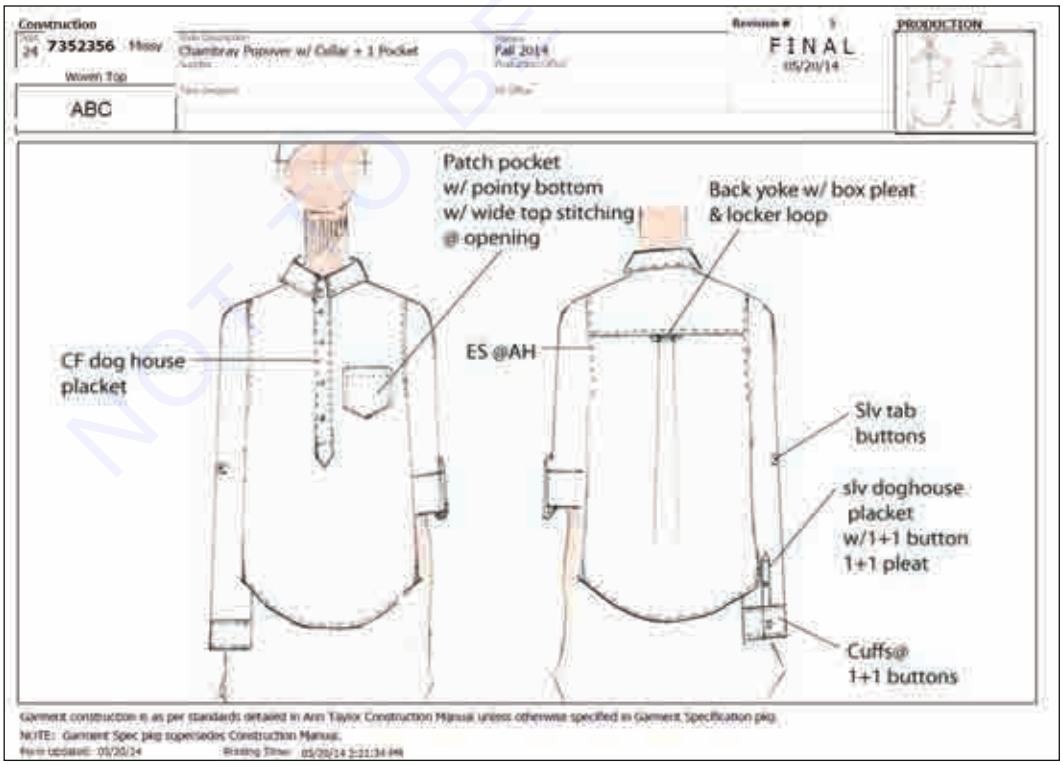
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First Page of Tech Pack – Basic details

Brand Name

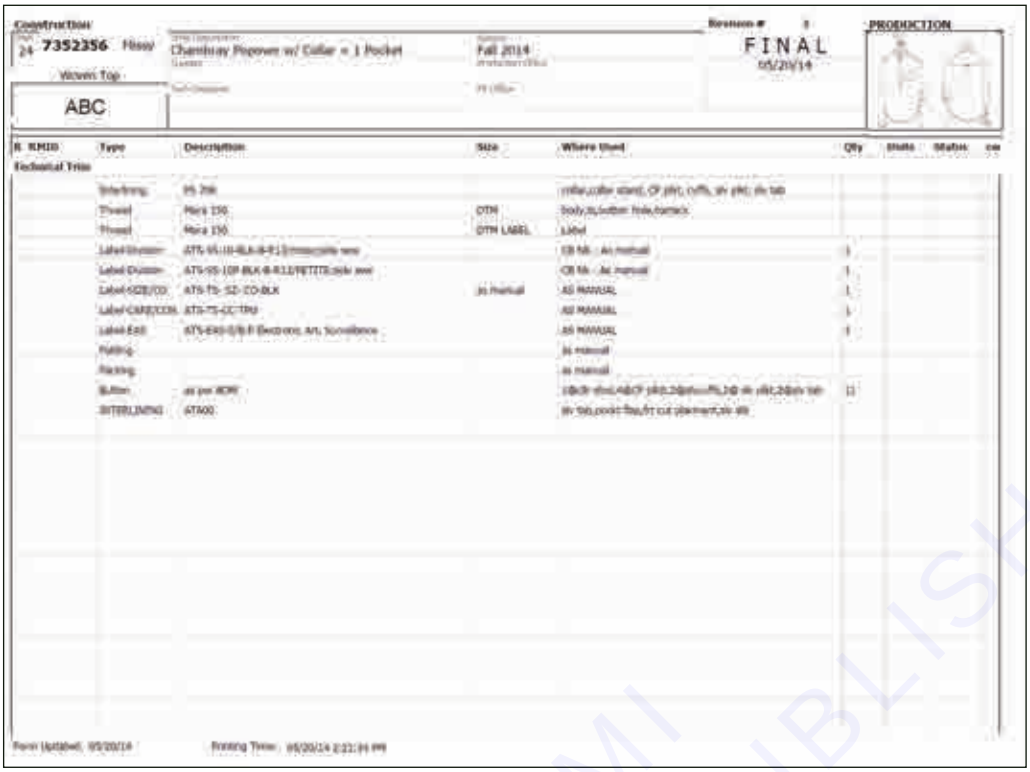


Construction detail Page - Full details of garment construction

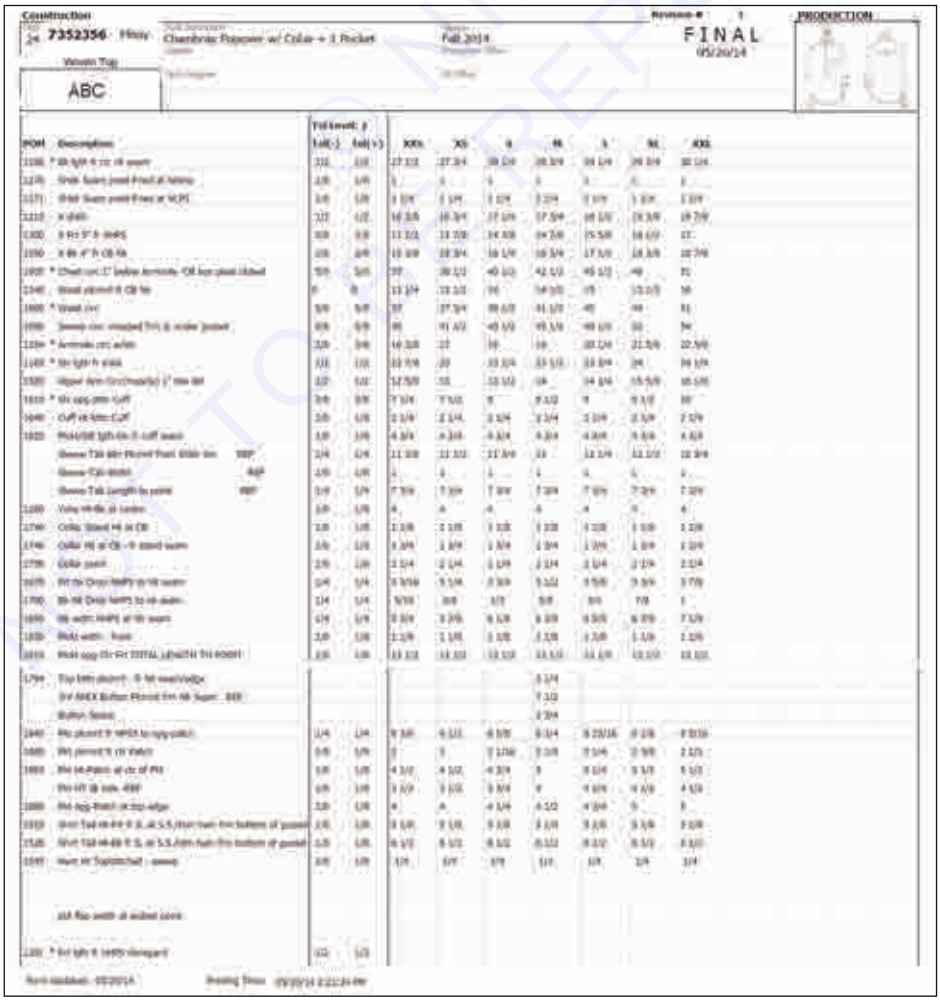


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Bill of material Sheet – It has all Trims details

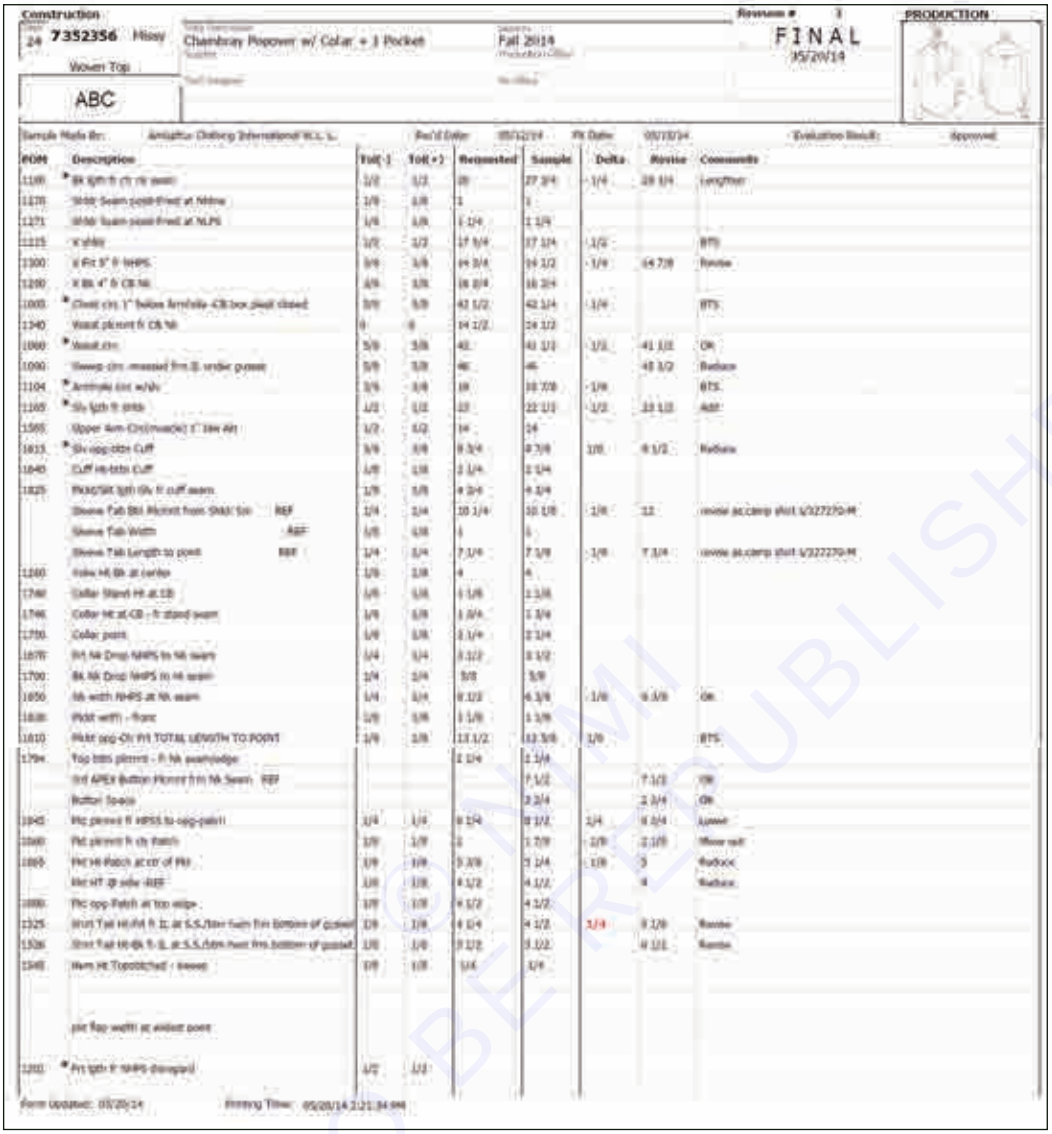


Graded Spec Sheet



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After sending the Fit sample, received measurement of the garment of the buyer's garment, which was wore by the model and checked the fitting.



Construction

24 7352356 Missy Chambray Popover w/ Collar + 1 Pocket Fall 2014

Woven Top

ABC

Revision # 1

FINAL

05/20/14

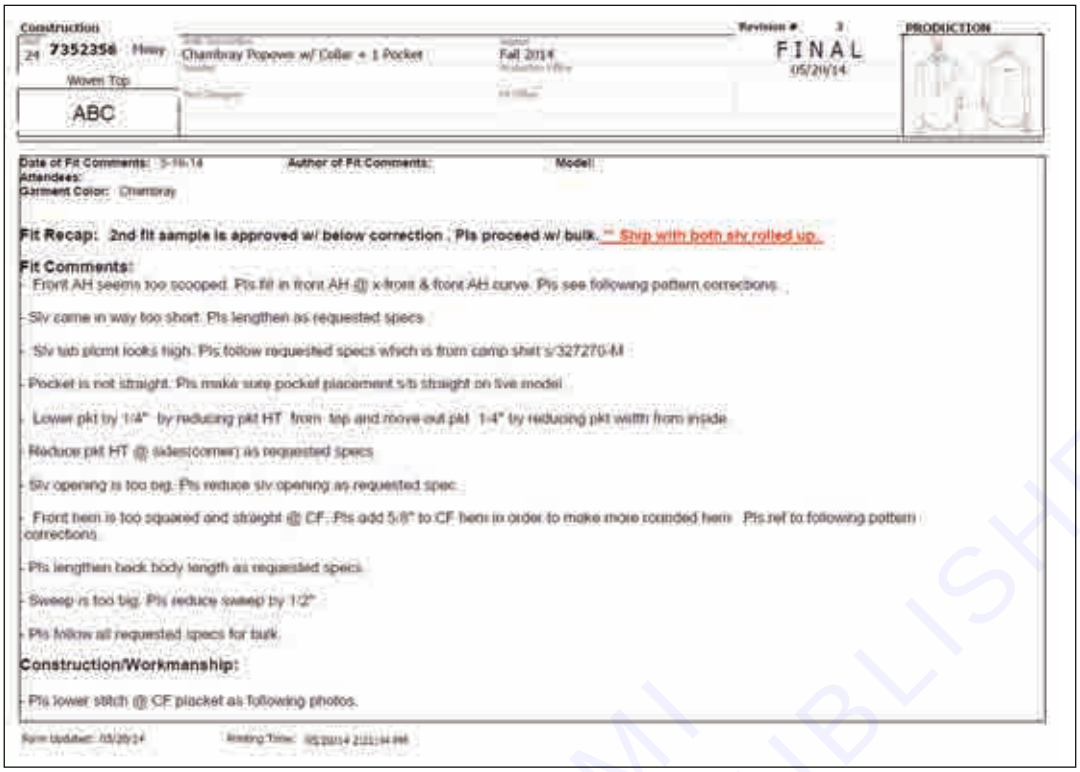
PRODUCTION

POM	Description	Tol(-)	Tol(+)	Requested	Sample	Delta	Revise	Comments
1100	▸Bk lgth fr ch nk seam	1/2	1/2	28	27 3/4	-1/4	28 1/4	Lengthen
1170	Wdth Seam point Fnsd at Nkline	1/8	1/8	1	1			
1171	Wdth Seam point Fnsd at NLPS	1/8	1/8	1 1/4	1 1/8			
1115	▸Bk yoke	1/2	1/2	17 3/4	17 1/4	-1/2		BTS
1300	▸Bk Fit 5" fr NHPS	3/8	3/8	14 3/4	14 1/2	-1/4	14 7/8	Revise
1200	▸Bk 4" fr CB Nk	3/8	3/8	16 3/4	16 3/4			
1005	▸Chest circ 1" below Armhole -CB box pleat closed	3/8	3/8	42 1/2	42 1/4	-1/4		BTS
1140	Waist plcmnt fr CB Nk	0	0	24 1/2	24 1/2			
1060	▸Waist circ	3/8	3/8	42	41 1/2	-1/2	41 1/2	OK
1090	Sweep circ -measd frm @ under gusset	3/8	3/8	46	46		45 1/2	Reduce
1104	▸Armhole circ w/sh	3/8	3/8	19	18 7/8	-1/8		BTS
1165	▸Slv lgth fr shldr	1/2	1/2	23	22 1/2	-1/2	23 1/2	Add
1565	Upper Arm Circ(muscle) 1" btw Arh	1/2	1/2	14	14			
1815	▸Slv opg circ Cuff	3/8	3/8	9 3/4	9 7/8	1/8	9 1/2	Reduce
1840	Cuff Ht btn Cuff	1/8	1/8	2 1/4	2 1/4			
1825	Pkt@Slit lgth Slv fr cuff seam	1/8	1/8	4 3/4	4 3/4			
	Sleeve Tab Btn Plcmnt from Shld Sm REF	1/4	1/4	10 1/4	10 1/8	1/8	12	revise as camp shirt s/327270-M
	Sleeve Tab Width REF	1/8	1/8	1	1			
	Sleeve Tab Length to point REF	1/4	1/4	7 1/4	7 1/8	1/8	7 1/4	revise as camp shirt s/322270-M
1160	Yoke Ht Bk at center	1/8	1/8	4	4			
1740	Collar Stand Ht at CB	1/8	1/8	1 1/8	1 1/8			
1745	Collar Ht at CB - fr stand seam	1/8	1/8	1 3/4	1 3/4			
1755	Collar point	1/8	1/8	1 1/4	1 1/4			
1870	Frt Nk Drop NHPS to Nk seam	1/4	1/4	1 1/2	1 1/2			
1700	Bk Nk Drop NHPS to Nk seam	1/4	1/4	5/8	5/8			
1650	Nk width NHPS at Nk seam	1/4	1/4	6 1/2	6 3/8	-1/8	6 1/8	OK
1630	Pkbt width - front	1/8	1/8	1 1/8	1 1/8			
1610	Pkbt opg Ctr Frt TOTAL LENGTH TO POINT	1/8	1/8	13 1/2	13 3/8	1/8		BTS
1794	Top btn plcmnt - fr Nk seamedge			2 1/4	2 1/4			
	3rd APEX Button Plcmnt frm Nk Seam REF				7 1/2		7 1/2	OK
	Button Space				2 3/4		2 3/4	OK
1945	Pkt plcmnt fr HPSS to opg patch	1/4	1/4	6 1/4	6 1/2	1/4	6 1/4	Lower
1940	Pkt plcmnt fr ctr Patch	1/8	1/8	2	1 7/8	-1/8	2 1/8	Move out
1865	Pkt Ht Patch at ctr of Pkt	1/8	1/8	3 3/8	3 1/4	1/8	3	Reduce
	Pkt HT @ side REF	1/8	1/8	4 1/2	4 1/2		4	Reduce
1880	Pkt opg Patch at top edge	1/8	1/8	4 1/2	4 1/2			
1325	Shirt Tail Ht/Frt fr @ at S.S./btm hem frm bottom of gusset	1/8	1/8	4 1/4	4 1/2	1/4	4 1/8	Revise
1326	Shirt Tail Ht-Bk fr @ at S.S./btm hem frm bottom of gusset	1/8	1/8	3 1/2	3 1/2		4 1/2	Revise
1340	Hem Ht Topstitched - sweep	1/8	1/8	1/4	1/4			
	pkt flap width at widest point							
1201	▸Frt lgth fr NHPS (longest)	1/2	1/2					

Form Updated: 05/20/14 Printing Time: 05/20/14 2:21:34 PM

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Buyer Fit comments given based on the Fit sample sent to the buyer.



Construction

24 7352356 Missy Chambray Popover w/ Collar + 1 Pocket Fall 2014 Revision # 3 FINAL 05/20/14 PRODUCTION

Woven Top

ABC

Date of Fit Comments: 5-16-14 Author of Fit Comments: Model:
Attendees:
Garment Color: Chambray

Fit Recap: 2nd fit sample is approved w/ below correction . Pls proceed w/ bulk. ** Ship with both slv rolled up.

Fit Comments:

- Front AH seems too scooped. Pls fill in front AH @ x-front & front AH curve. Pls see following pattern corrections
- Slv came in way too short. Pls lengthen as requested specs
- Slv tab plcmt looks high. Pls follow requested specs which is from camp shirt s/327270-M
- Pocket is not straight. Pls make sure pocket placement s/b straight on live model
- Lower pkt by 1/4" by reducing pkt HT from top and move out pkt 1/4" by reducing pkt width from inside
- Reduce pkt HT @ sides(corner) as requested specs
- Slv opening is too big. Pls reduce slv opening as requested spec
- Front hem is too squared and straight @ CF. Pls add 5/8" to CF hem in order to make more rounded hem Pls ref to following pattern corrections
- Pls lengthen back body length as requested specs
- Sweep is too big. Pls reduce sweep by 1/2"
- Pls follow all requested specs for bulk

Construction/Workmanship:

- Pls lower stitch @ CF placket as following photos.

Form Updated: 05/20/14 Meeting Time: 05/20/14 2:01:34 PM

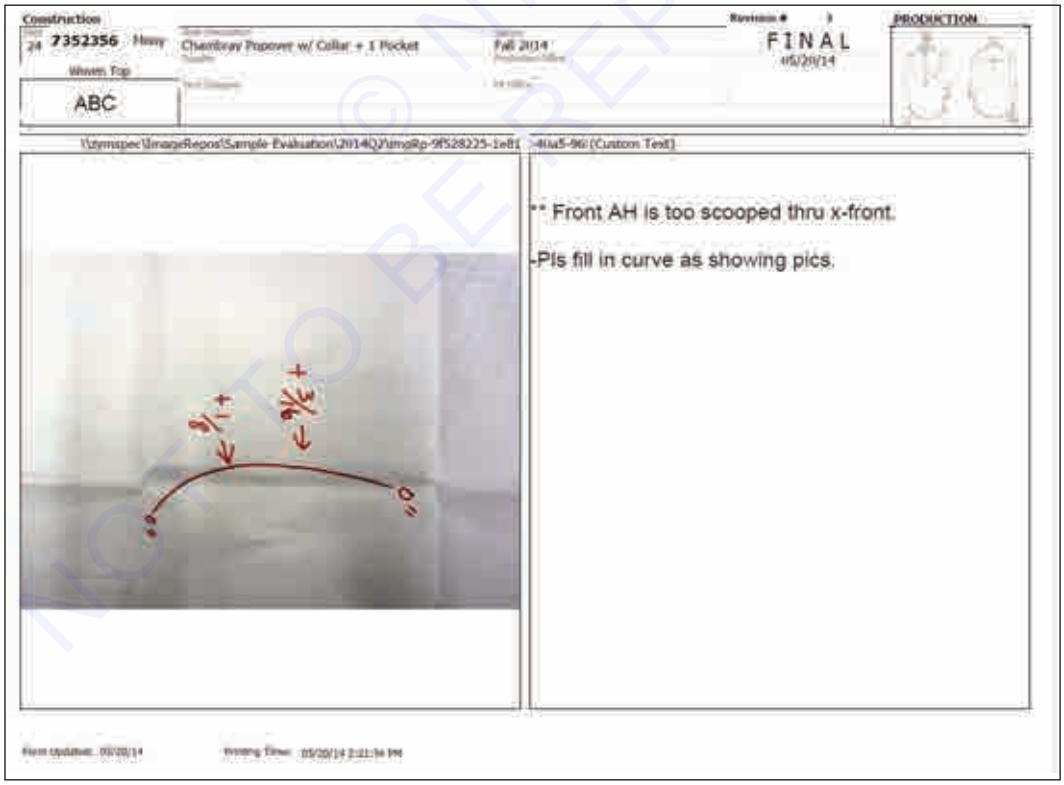
Front, Side and Back view of Model's wored the fit Sample for the fitting reference to the factory.



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The Paper pattern send along with Fit sample to the buyer. Buyer marked the correction in the pattern for factory reference.





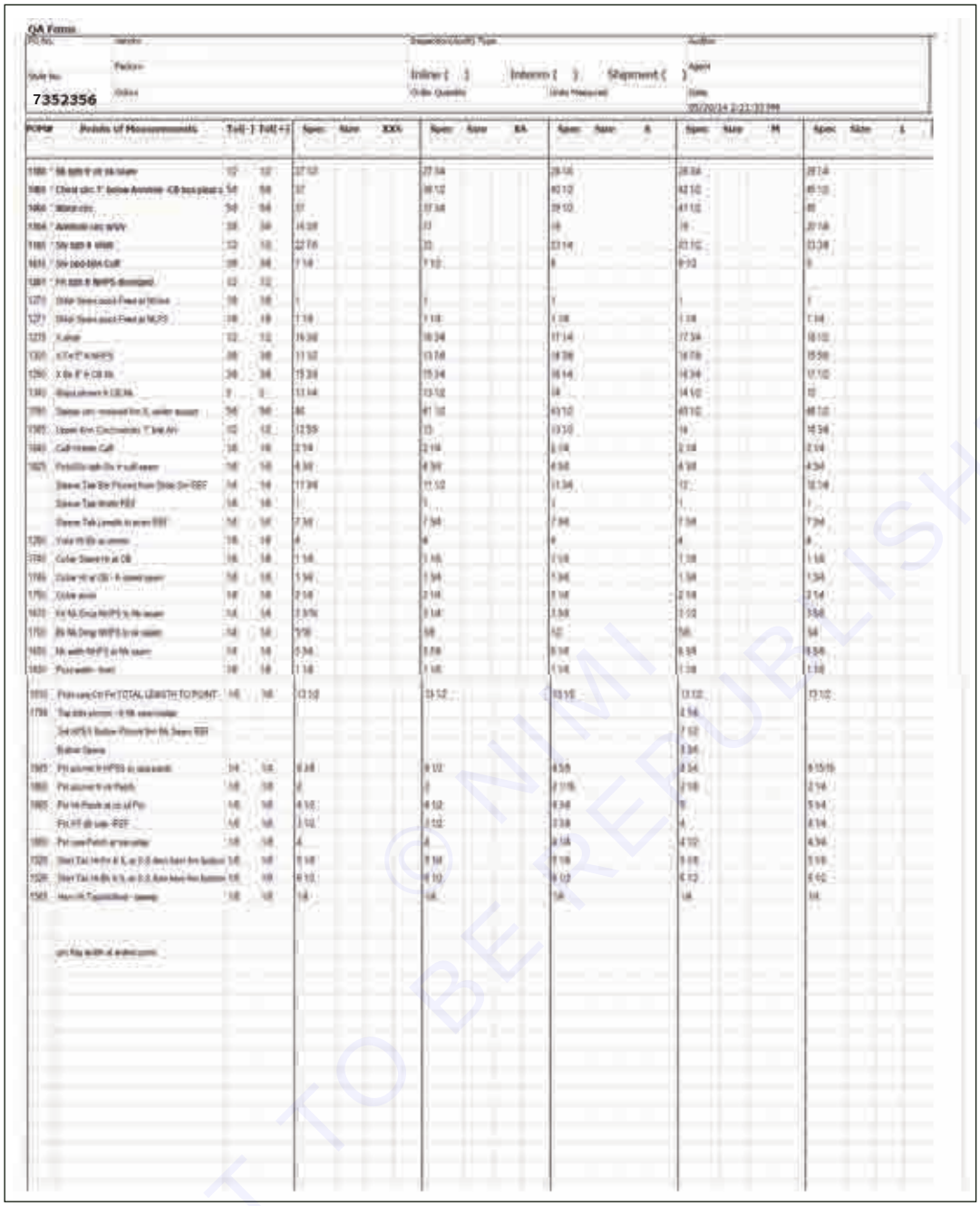
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In the garment, some correction marked for the future correction in the pattern as well as sample.



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QA Measurement sheet for all size



Export & import files printing and plotting commands X & Y axis Refer page 126 to 127 and 137 to 141.

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LESSON 15-21 : Marker

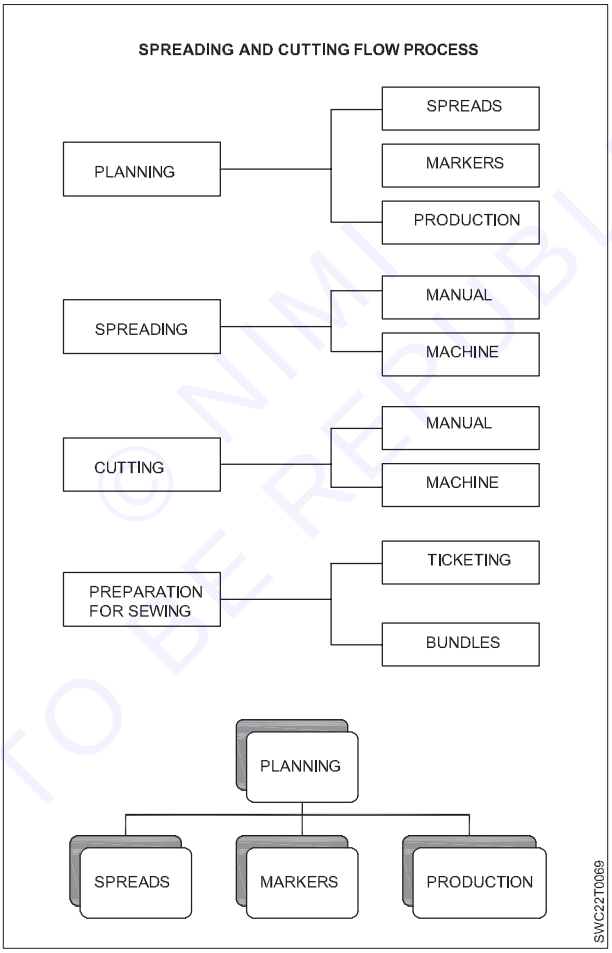
Objectives

At the end of this lesson you shall be able to

- understand and explain about the marker and spreading
- explain about the 3D in PDS.

Marker

Planning is very important part in the garment industry. Before making the Marker, planning will be done as per the below given process flow.



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Cut order planning

It translates customer orders into cutting orders

- Minimize total production costs
- Meet deadlines
- Seek most effective use of labor, equipment, fabric and space.

Responsibities of cut order planning

Examining incoming orders and piece goods width and availability.

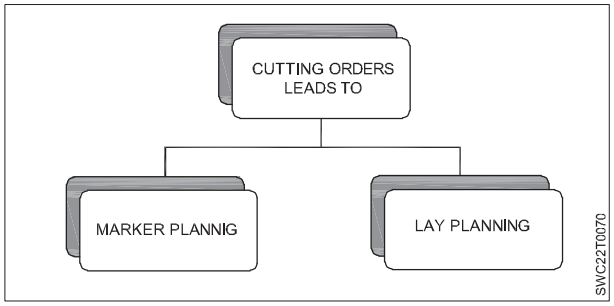
Determining volume, size ratios, and sectioning procedures for marker making .

Determining whether file markers are available or new ones are needed.

Developing Specifications for optimum marker making and fabric utilization.

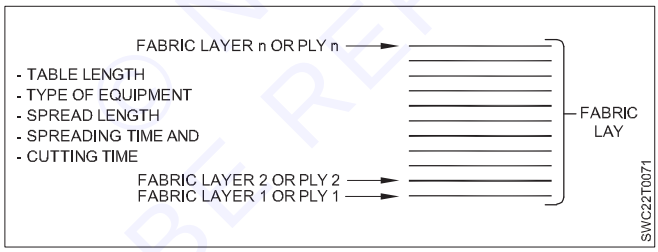
Determine most effective use of spreading and cutting equipment and personnel.

Issuing orders for marker making, spreading and cutting.



Marker planning

- The results of cut order planning are cutting orders that direct marker planning and cut planning.
- The purpose of marker planning is to determine the most efficient combination of sizes and shades for each order and to produce the best fabric yield and equipment utilization.
- One cutting order may require several markers to achieve optimum efficiency.
- A lay is a stack of fabric plies that have been prepared for cutting.
- Lay planning is the basis of managing cutting room labor and table space.
- Spreading and cutting schedules are affected by:



Marker

- Is a diagram of a precise arrangement of pattern pieces for a specific style and the sizes to be cut from a single spread.

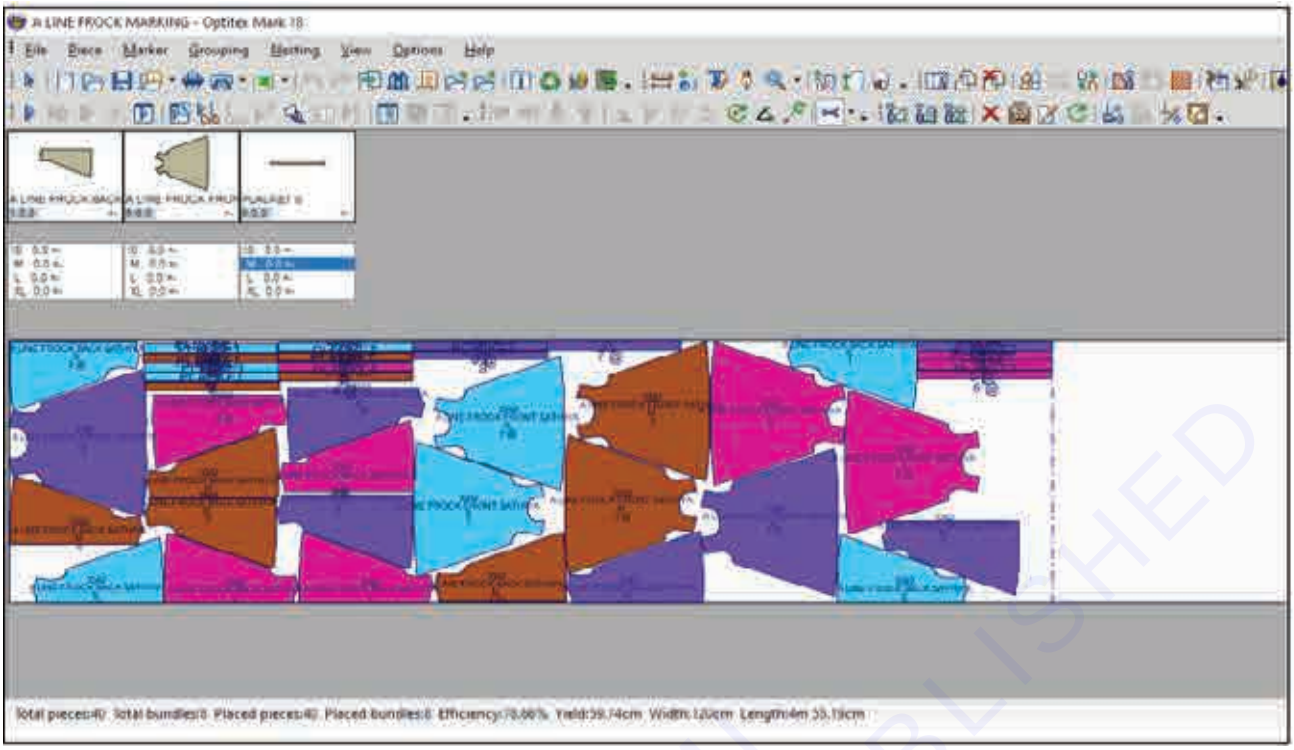
Marker making

- is the process of determining the most efficient layout of pattern pieces for a specified style, fabric, and distribution of sizes (requires time, skill and concentration)

Marker making

- Marker making is a critical step in the manufacturing process.
- By retaining strict control over this critical step, they keep the fabric consumption as low as possible.
- It also ensures that the issues that affect quality will be given proper attention. These include placing patterns on grain, keeping patterns paired, and attending to details such as drill holes and notches.
- Depending on the relative efficiency of each marker produced, the company may save or waste thousands of dollars a year.

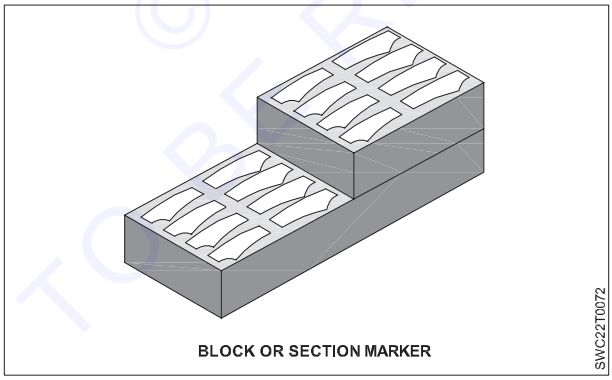
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Marker making

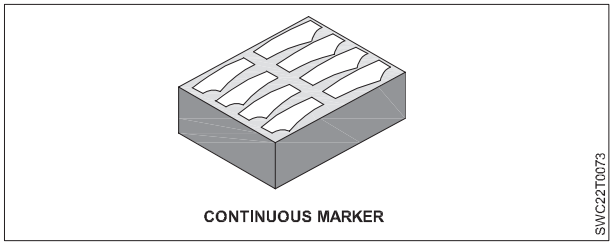
Markers types

- Blocks or Sections
- Blocked or sectioned markers contain all of the pattern pieces for one sty!e in one or two sizes.



Continuous

- Continuous markers contain all the pattern pieces for all sizes Included in a single cutting.

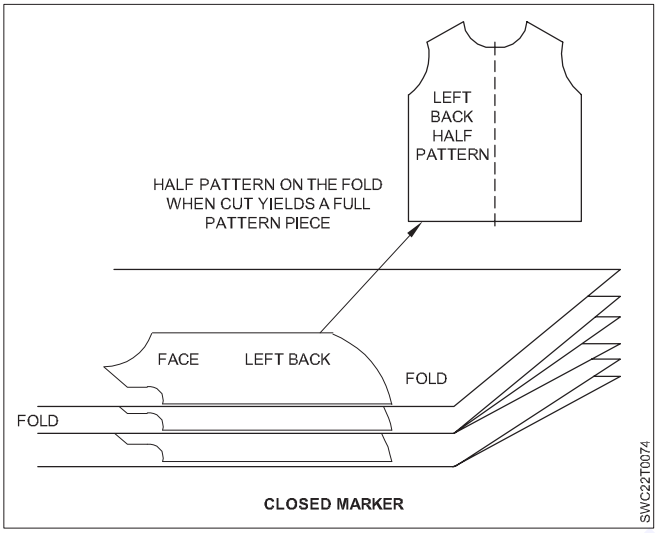


Markers types

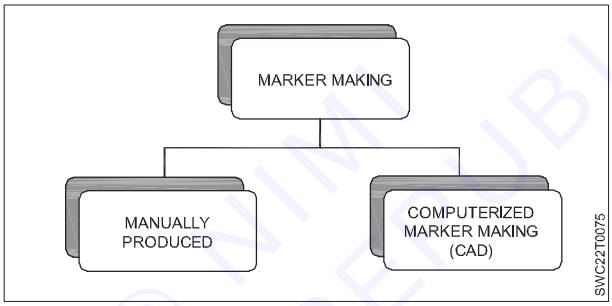
- Open marker
- Marker made with full pattern pieces.

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- Closed marker
- Marker made with half garment parts pieces for laying along the folds of the tube (tubular knit).



CLOSED MARKER



Manual marker

- Created on marker paper or directly on fabric ply
- Tracing by pencil or tailor's chalk.
- Time consuming.
- Subject to errors. (pattern overlap, grain line, poor line definition, omission of pcs.)
- Accuracy depends on individual's skill.

Computerised marker

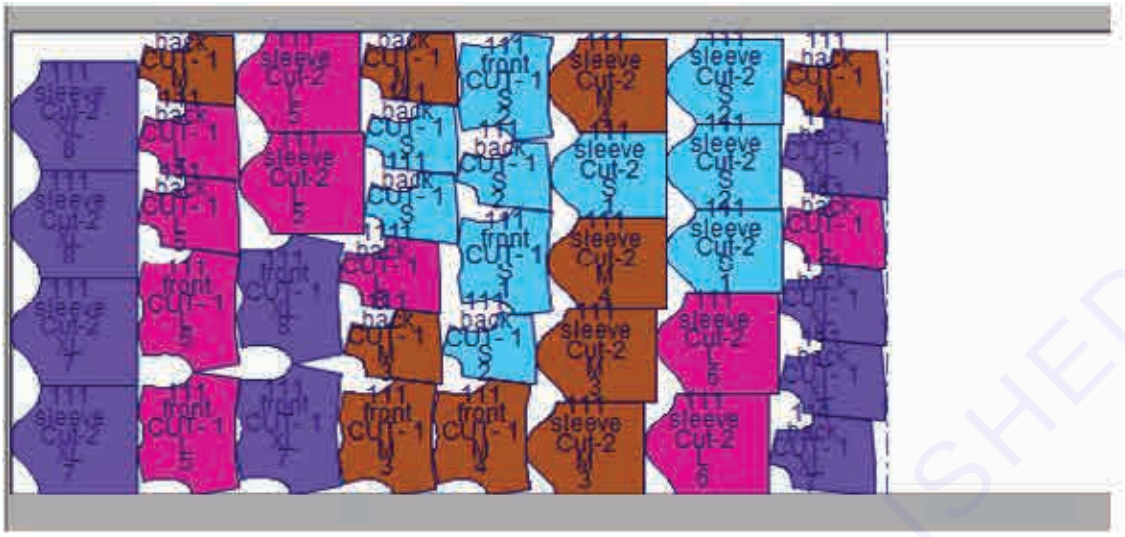
- Accurate
- Shortest response time.
- Direct or digitized.
- Manipulate images to determine best utilization. No overlapping/no omissions
- Parameters (style #,size, etc.) for markers are entered into the computer.
- Can be printed/recalled/modified.
- Criteria can be set by technician. Can be used to determine fabric requirement.

Marker mode

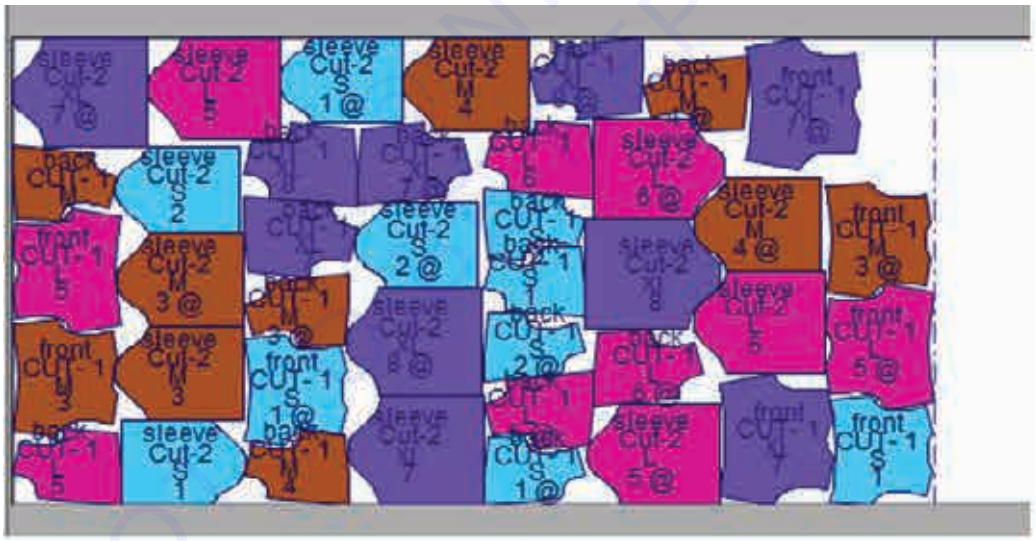
The marker mode is determined by fabric symmetry and the directionality of the fabric. The term nap is used to indicate the fabric is directional it is different from end to end and it is created by its structure (cut and uncut piles, finish, or a directional print). There are three types of marker modes:

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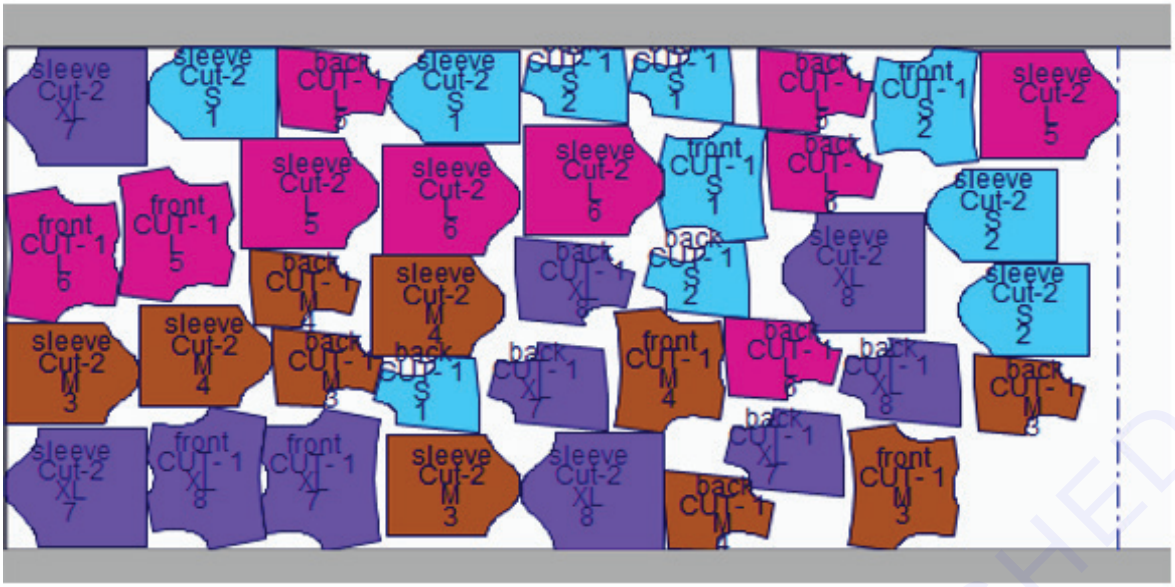
1 **Nap-one-way (N/O/W):** The nap- one-way marker is made for asymmetrical and directional fabrics, the orientation of pattern pieces is extremely important to the consistency and quality of the product. These fabrics require that all pattern pieces be placed on a marker in only one direction. The Nap-one-way marker is the highest quality but least efficient of the three nap directions for a marker.



2 **Nap-either-way (N/E/W):** The nap-either- way marker is made for symmetric and non-directional fabrics, where there is no restriction on which way the patterns are oriented. The patterns may be either oriented "down" or "up", and placed in the marker wherever they fit best, with only consideration for grain line. The N/E/W marker is usually the most efficient mode yielding the highest fabric utilization. This Mode assumes consistent (dye) color in the length and width of the goods.



3 **Nap-up-and-down (N/U/D):** The Nap-up-and-down marker may be made for asymmetrical and directional fabrics, such as corduroy, it may be possible for all the pattern pieces of one size to be placed in one direction and another size placed in the opposite direction. With this type of marker, the nap of corduroy pants may run down for a size 7 and up for a size 9. The critical factor is that the nap must run in the same direction in all the pieces of one garment. Napped fabric such as corduroy will appear shaded if the pieces in one garment have the nap running in different directions. Generally, N/U/D yields a better utilization of fabric than N/O/W.



Marker Efficiency

- Area of patterns in the marker plan X 100%
- Total area of the marker plan
- It is determined for fabric utilization
- Minimum waste

Factors affecting marker efficiency

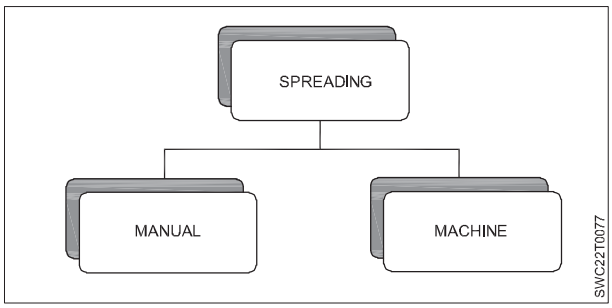
- Fabric characteristics (fabric width, length of design repeat etc.)
- Shape of Pattern pieces (large pieces - less flexibility)
- Grain requirements

Spreading

- Spreading is the processes of superimposing lengths of fabric on a spreading table cutting table or specially designed surface in preparation for the cutting process
- Spread or lay is the total amount of fabric prepared for a single marker

Requirement of spreading

- Shade sorting of cloth pieces
- Correct ply direction and adequate lay stability
- Alignment of plies
- Correct ply tension
- Elimination of fabric faults
- Avoidance of distortion in the spread



Spreading equipment

- Spreading surfaces (table, pin table, vacuum table)
- Spreading machines

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Manual spreading

- In manual spreading, fabric is drawn from its package which, if it is a roll, may be supported by a frame and carried along the table where the end is secured by weights or by clamps.
- The operators work back from the end, aligning the edges and ensuring that there is no tension and that there are no wrinkles.

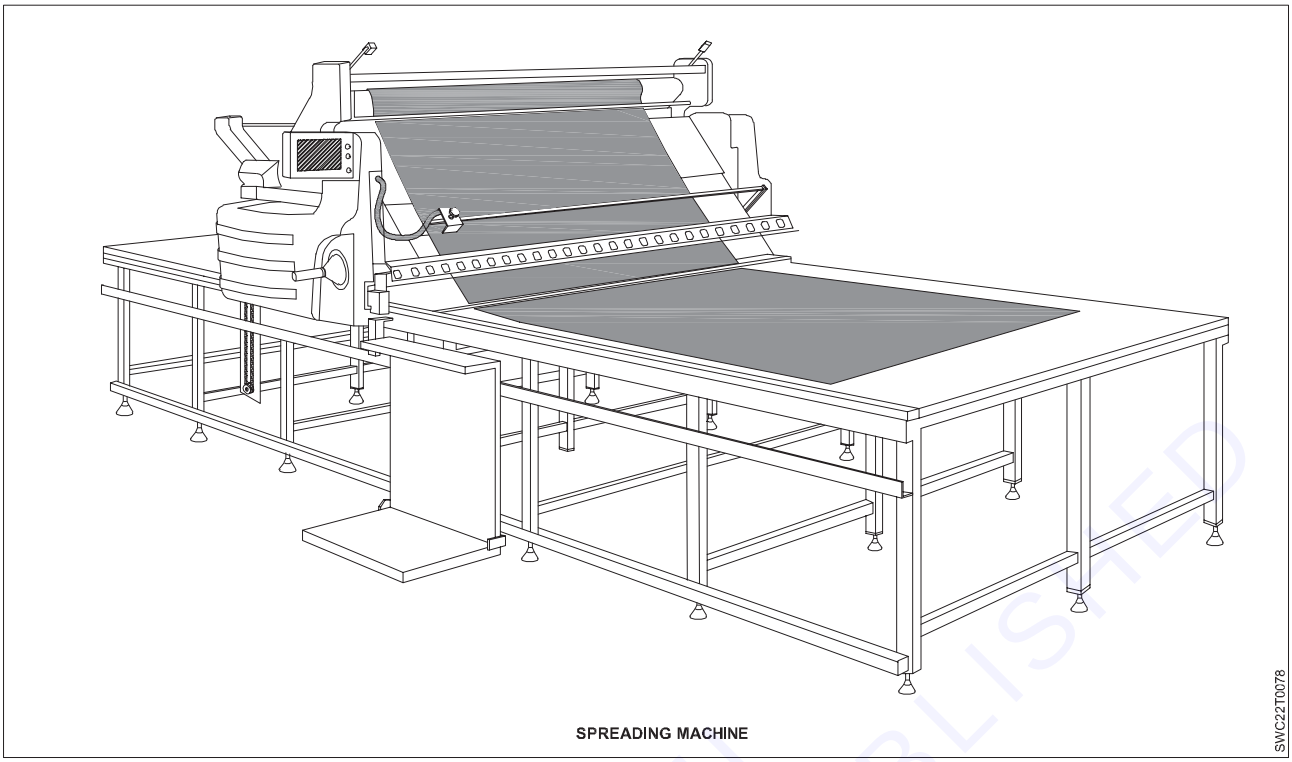




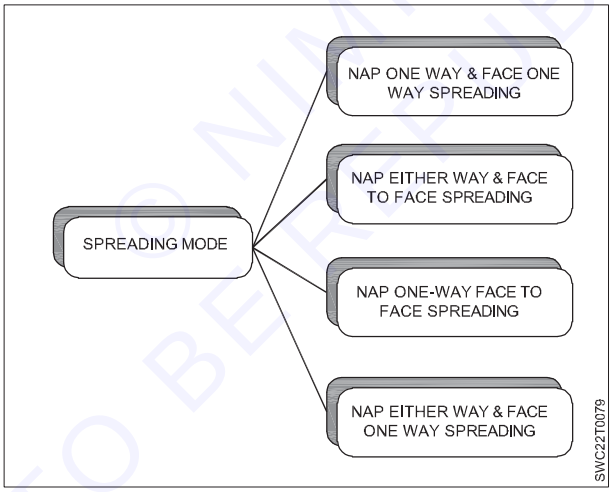
Machine Spreading

- Spreading machines carry the piece of fabric from end to end of the spread, dispensing one ply at a time on the spread.
- Spreading machines may include:
  - A motor to drive
  - A platform on which the operator rides
  - A ply cutting device with automatic catcher to hold the ends of ply in place
  - A ply counter
  - An alignment shifter actuated by photo electric edge guides
  - A turntable
  - A direct drive on the fabric support, synchronized with the speed of travel, to reduce or eliminate tension in the fabric being spread.

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SPREADING MACHINE

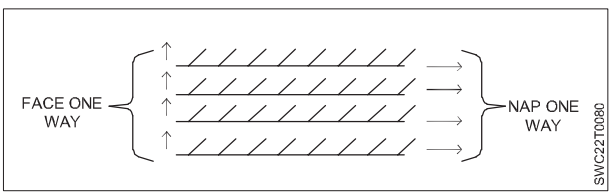


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Spreading

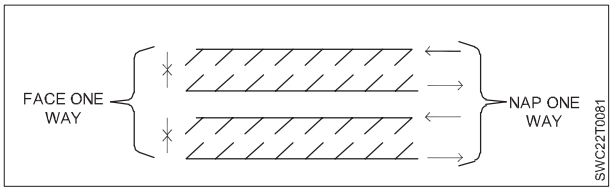
Spreading Mode: Nap one way & face one way spreading

- Most common spreading method that can also be done manually.
- Fabric roll is kept on a roller stand and fabric end is being pulled by two spreading operators (thus unwinding fabric from freely rotating roll) walking along both sides of cutting table.
- While using machine, the lose end of fabric is being held by catcher and machine carries the rolls along table thus unwinding and spreading the fabric in the process.
- Every layer has to start from same end thus spreading machine has to come back to starting position without spreading the fabric. This return movement of spreading machine is called as “dead heading”



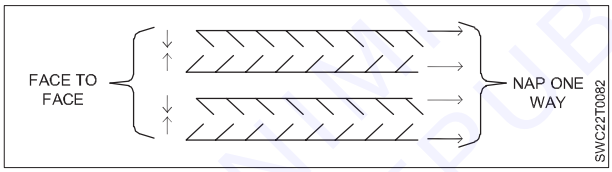
Spreading Mode: Nap either way & face to face spreading

- The quickest spreading method while using spreading machine.
- Difficult to achieve manually.
- The machine carry the fabric roll while the end is being held in place by catcher, at layer end fabric is not cut just folded and held by another catcher while the fabric is being laid by the machine during it's return movement also



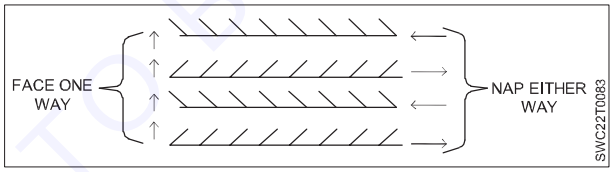
Spreading Mode: Nap one-way face to face spreading

- Most time consuming method of spreading.
- The lose end of fabric is being held by catcher and machine carries the rolls along table thus unwinding and spreading the fabric in the process.
- At layer end the fabric is being cut, turntable rotate the fabric roll by 180 degree and return back to starting position without.
- Now from the starting end the second layer is being laid face to face.



Spreading Mode: Nap either way & face one way spreading

- The lose end of fabric is being held by catcher and machine carries the rolls along table thus unwinding and spreading the fabric in the process.
- At layer end the fabric is being cut, turntable rotate the fabric roll by 180 degree and start spreading the second layer from the opposite end face one way. There is no dead heading by the machine in this spreading mode.



Spreading costs:

- Labour cost
- Fabric waste
- Splicing Loss
- End loss
- Width loss

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LESSON 22-28 : Introduction of 3D and its uses

Objectives

At the end of this lesson you shall be able to

- explain about the 3D in PDS.

Introduction to 3D

Uses of 3D

3D Fashion design and development software

TUKA3D is the fashion industry's most advanced, easy-to-use, 3D apparel design and development software. Customize your virtual fit model, build life-like virtual clothing samples, and create stunning presentations for buyers, retailers, or even customers. Tukatech's 3D apparel design software eliminates the need for trial and error in physical sample creation, ensuring that any design fits right the first time. This video provides a great overview of the capabilities of TUKA3D.

3D Virtual sample making

Turn 2D patterns into visually stunning 3D apparel samples that accurately simulate the weight, stretch, color, and other values of any fabric.

Bypass physical sample making

TUKA3D's accurate virtual fit sessions with animation allow the user to bypass physical sample making, dramatically reducing the time and cost associated with product development.



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Models based on scan data



Scan your fit model using the Styku Body Scanner. Hundreds of measurements can be extracted from a body scan which can then be used to create a 3D avatar that is an exact replica of your fit model.

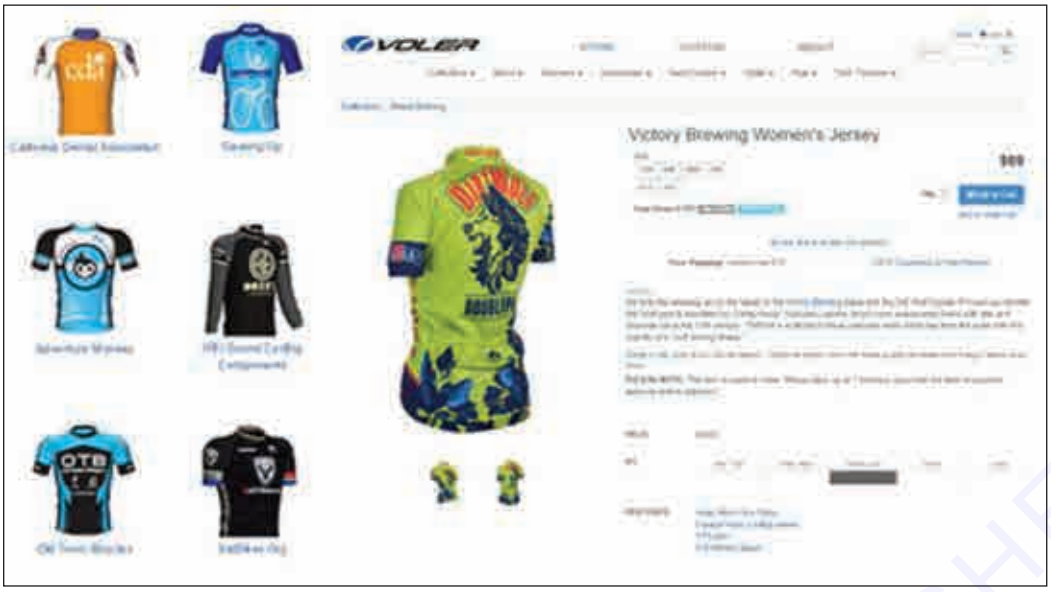
Fabric simulation

An extensive library of fabric presets allows the user to visualize garments with cloth properties that replicate actual fabrics. Build realistic fabric simulations with pleats, textures, transparencies and more.



Full-motion simulation

Animate the virtual fit model to visualize how a garment drapes in motion. Models can be made to run, dance, cycle, pose, walk the runway or anything else you desire.



No physical samples, no photo shoot, no inventory

Create a virtual photo shoot for online sales, emailing to buyers, or for marketing purposes. Showcase a complete collection without manufacturing a single garment. With TUKA3D, the Made-on-Demand business model becomes a reality.

Export multiple file formats

Within TUKA3D, users have the ability to export to multiple file formats. 3D files can be exported as OBJ, FBX, VRML, X3D, or XHTML files. Videos can be rendered and exported as AVI, WMV, MP4 or MOV files. Images can be rendered and exported as JPG, TIF, PNG, BMP, and many others.

Virtual Prototyping

With Optitex 3D Virtual Prototyping, the process of creating accurate samples has truly been revolutionized. Instead of sending real patterns back and forth to suppliers, one can create, view and edit the initial samples in one place, drastically reducing the time spent on developing products, and getting them to the market quickly.

Accurate, custom-made models help maintain fit standards across the entire collection of products and even across manufacturers. Our 3D avatars can be modified to meet the specifications so that an accurate preview can be performed, without having to call together a fit session. These models have over 60 parameters to modify, ensuring that a model that is custom-fit to specific requirements, can be created.

With each version of Optitex, our 3D Virtualization tools continue to evolve to meet a growing number of needs. Our 3D tools allow our users to simulate a large number of design elements:

- Hardware like buttons, zippers, pulls, buckles and rive
- A variety of seam finishes like piping and top-stitching
- Design elements like pleats, shirring, facing, interfacing and interlinings
- Texture placement like engineered repeats, logos, and matched logos

Fit tools like tension and stretch mapping, 3D digitizing and flattening and even true-to-life animations enable our customers to get patterns from sample to production quickly, accurately, and cost-effectively. Sample simulations allow them to fit their garments on a custom-made virtual model without having to cut any fabric, then make changes right on their screen. All this happens within a matter of hours, not days or weeks.

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Navigating the 3D Toolbar

The 3D toolbar allows you to perform all 3D operations including, placing the cloth, simulating, changing avatars, digitizing, stitching, etc. The 3D toolbar is dynamic according to specific actions in 2D, for example, you will only be able to place the cloth if a PDS file is opened.

You can customize the toolbars, for example if you want to move the location of a toolbar.

To customize the toolbars, click here

Note: You can always click Reset Toolbars to return to the default view.

To navigate the 3D Toolbar:

1 Open PDS.

2 Make sure the 3D window is displayed (go to View> 3D Windows> Model).

The 3D toolbars are located at the top of the 3D window:

The toolbars are divided into the following groups to help make your work easier and more organized:

Tools Name	Description
Refresh	Allows you to refresh any changes that were made to your pattern.
Clear Lines	Allows you to remove the cloth from the 3D window.
Clear Lines	Allows you to remove all non-cloth items from the 3D window, i.e. Flattening lines, Tape measurements, Circumference disks, 3D text etc. For more information, see.
Clear 3D Window Tool	Allows you to clear all content from the 3D window.
Place Cloth	Allows you to place the cloth in the 3D window.
Dynamic Updates	Turn on Dynamic Updates. When turned on, the 3D window updates according to changes that are made in 2D.
Update Now	Click on Update Now, if Dynamic Updates is off and you want to update changes in the 3D window that were made in 2D.
Simulate Draping	Allows you to simulate the pattern.
3D Stitch	Allows you to stitch your pieces together using the 3D Stitch Tool.
Select Stitch	Allows you to select the stitches using the Select Stitch tool.
Move Texture	Allows you to move the texture on your pattern in the 3D window.
3D Move Piece	Allows you to select and move pieces in the 3D window.
3D Rotate Piece	Allows you to rotate selected items such as pieces, circumference disks, clt items, modelsand model parts, i.e., shoulder pads in the 3D window.
3D Scale Model	Allows you to scale avatars, rigid parts, models, etc. in the 3D window.
3D Scale Piece	Allows you to stretch or shrink pieces in the 3D window, for initial positioning. Once you simulate, the piece will go back to it's original size.
3D Transform Piece	Allows you to move or rotate objects or pieces in the 3D window, either by relative or absolute values.
3D Digitizer	Allows you to use the 3D digitizer.
Model Properties	Allows you to view the model properties options.
Tape Measure	Allows you to measure between two points on pieces/3D objects in the 3D window.

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Add Circumference Measure	Allows you to measure the circumference of the avatar in the 3D window.
Bounding Box Measure	Allows you to use a bounding box to measure the height, width and depth of 3D objects.
3D Text	Allows you to add a description which points to a certain spot on the 3D model or cloth.
Simulation Properties	Allows you to view the Simulation Properties.
Load Model	Allows you to load models/3D objects that are supported by Optitex.
Save Model	Allows you to save content of the 3D window in a 3D file format that is supported by Optitex.
Save Cloth	Allows you to save a cloth file (CLT) A CLT file contains the cloth, shaders, textures, etc.
Print Model	Allows you to send the content of the 3D Window to a printer.
Full Screen	Click to view the 3D window in full screen mode. To move out of full screen mode, press Shift Ctrl F on your keyboard.

3D Flattening

Tools Name	Description
Draw Path	Allows you to draft lines directly on the 3D object.
3D Notch	Allows you to create a notch on a pin or on a line drafted on the 3D object.
3D Button Tool	Allows you to add a button on a patch area on a 3D object.
Mirror Lines Tool	Allows you to create symmetry of the drafted lines.
3D Baseline	Allows you to set the 3D baseline.
Edit Pins Tool	Allows you to move a flattening pin and to reshape a curve line between two flattening pins.
Build Patch	Allows you to use the build patch tool.
Flatten All	Allows you to transform 3D objects into 2D patterns.
Flatten Whole Mesh	Allows you to transform 3D objects into 2D patterns.
Flattening Tools.	Allows you to view the Flattening Options dialog.

Editing & Selection

Tools Name	Description
Vertex Tool	Allows you to add a vertex.
Bridge Tool	Allows you to build a bridge.
Combine Surfaces	Allows you to combine surfaces.
Weld Selected Object Tool	Allows you to weld.
Flip Normals	Allows you to flip the normals.

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Selection Tools	Allows to you to select a 3D item.
Selection Tools	Allows you to select 3D items using the paint brush.
Selection Tools	Allows you to view the 3D Selection options dialog.
Reference Mode	Allows you to use the View Reference Mode option.

Camera

Tools Name	Description
Home	Allows you to reset the camera in 3D and bring the content of the 3D window back to the default position.
Frame Selected	Allows you to focus on the selected mesh (3D avatar/pieces) and change the center focus of the 3D rotation.
Auto Rotate	Allows you to turn the model around the Y axis continually.
Tilt Camera	Allows you to lock the front facing view rotation.
Camera Buttons	Allows you to view the front view of the content in the 3D window.
Camera Buttons	Allows you to view the rear view of the content in the 3D window.
Camera Buttons	Allows you to view the left view of the content in the 3D window.
Camera Buttons	Allows you to view the right view of the content in the 3D window.
Camera Buttons	Allows you to view the bottom view of the content in the 3D window.
amera Buttons	Allows you to view the upper view of the content in the 3D window.

Display

Tools Name	Description
Show/Hide Model Tool	Allows you to either Show/Hide Model.
X-Ray Display	Allows you to view the pattern and avatar in X-ray display mode.
Wireframe Display	Allows you to view the pattern and avatar in wireframe display mode.
Show Springs	Allows you to view the pattern in springs mode.
Display Unique Colors	Allows you to view each 3D cloth piece in a unique color.
Tension Map	Allows you to inspect simulated cloth objects via a colored map depicting amounts of stretching, tension and distance between the cloth and the model.
2D Back-ground with Shader	Allows you to apply the background of the fabric on the 3D model.
Center Axes	Allows you to display the XYZ axes in the 3D window. Show.
Normals	Allows you to determine which side of a surface is out or in.
Show Selected Piece	Allows you to display only selected pieces in the 3D window.
Display Shadows	Allows you to depict depth in the 3D window by casting and obstructing light.
Show Grid	Allows you to display a grid in the 3D window.

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Cloth Editing

Tools Name	Description
Create Mating Rules	Allows you to create and define mating rules.
Mating Rules Manager	Allows you to view and edit defined mating rules.
Magic Glove	Allows you to use the Magic Glove so you can move pieces on the 3D model during simulation.
Magic Glove + Pin	Allows you to move 3D objects before/during/after simulation and add a pin so you can move the pin to fur-ther alter.
Pin Manipulator Tool	Allows you to use the Pin Manipulator so you can pin your cloth and manipulate your pattern in the 3D win-dow.
Move Pin	Allows you to move the location of a pin that was added using the Magic Glove.
Remove Single Pin	Allows you to select a single pin and remove it.
Clear Pins	Allows you to clear all the pins that were added using the Magic Glove.
Refine Cloth	Allows you to increase the resolution of the cloth in the 3D window.
Simplify Cloth	Allows you to decrease the resolution of the cloth in the 3D window.
Smooth Cloth	Allows you to smooth out your pattern after simulation.

3D Render

Tools Name	Description
HQR Mode	Allows you to view your content in the 3D window in HQR mode (High Quality Rendering).
PR 3D mode	Allows you to view your content in the 3D window in PR3D mode (Photorealistic Rendering). Use to Viewing the Model in PhotoRealistic 3D Mode.
Lighting Editor	Allows you to change the lighting presets. Modifying the Lighting Via Lighting Editor.
Edit Background	Allows you to change the background of the 3D window.
Snapshot	Allows you to create an image/s of your content in the 3D window by creating a snapshot, according to the ac-tive rendering (OpenGL/HQR/PR3D). Saving as a.

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Module 4: Apparel Enterprise & Market Survey

LESSON 29 : Apparel Enterprise & Market Survey

Objectives

At the end of this lesson, you will be able to:

- understand about the overall apparel industry, career, buying house, apparel marketing and retailing.

Apparel Enterprises and Career

The apparel industry makes clothes and clothing related products. Products include men's, women's and kid's garments including outerwear, innerwear, sleepwear, bathing suits. Other divisions produces home high fashion garment, home furnishing etc. Indian apparel industry produces clothes for domestic as well as international markets. The apparel industry consists of small, medium and large size companies. According to the company sizes, a total number of employees in a firm varies.

Small manufacturing companies that sell garments primarily to the local market are scattered in all over India. Medium and large size firms produces bulk quantity for export market as well as domestic market are located only in few zones, like in North India (Delhi, Gurgaon, Noida, Ludhiana), South India (Chennai, Tirupur and Bangalore), East Zone (Kolkata) and west zone (Mumbai and Ahmadabad). In recent years the apparel industry is growing in other parts of India like Rajasthan, Hardwar and Patna etc. In manufacturing maximum number of employees are worker.

Like most industries, apparel industry employs staffs for maintenance, IT, Human resources, warehouse, sales etc. It employs many staffs unique to garment manufacturing, such as fashion designers, merchandisers, pattern makers, fabric cutter, sewing machine operator, quality assurance, washing and pressing garments.

In the apparel industry, one has a variety of options to choose as the career compared to other industries like IT, Automobiles the average pay for the low-level workers is less. But highly paid jobs are also available in the apparel industry. Few profiles those are most attractive and well paid are fashion designing, sourcing and marketing, apparel buyer, apparel production, production planning, Industrial engineer, retailing, merchandising, Testing Lab experts, quality control, apparel technician, academic in fashion institutes, apparel consultants etc.

Apparel Consultant

An Apparel consultant is a professional who provides advice and guidance to individuals and businesses on matters related to clothing and fashion, best suited to their requirements and lifestyle.

They provide guidance to individuals and corporate on:

- New Job opportunities
- Personal branding
- Wardrobe management
- Personal Styling
- Personal Colour
- Shopping
- Latest trends

Some Apparel consultants also work in retail outlets, offering advice to customers as they shop, while others may work in fashion design or styling studios, helping clients put together outfits for special occasions or photo shoots. In short, an Apparel consultant is an expert in the field of fashion and lifestyle who helps clients in making informed and correct decisions about their clothing and style.

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Role of an Apparel Consultant

An apparel consultant is in demand for a variety of reasons. For companies and brands dealing with clothing and fashion products, an apparel consultant can provide valuable insights and expertise on current and emerging trends. This can include, conducting market research and identifying emerging trends, analysing consumer behaviour to determine what styles are likely to dominate the market and make recommendations pertaining to colour, style and fit. The companies can benefit by developing clothing lines that are in line with customer preferences and latest trends. An apparel consultant can also help companies to identify new opportunities and to develop strategies for success in the marketplace.

Overall, an Apparel consultant can provide a range of benefits to both individuals and companies in the fashion industry. They can help clients to make informed decisions about clothing and accessories, and to stay on top of the latest trends in the fashion world.

How to become an Apparel Consultant

To become an Apparel consultant, one needs to have a strong understanding of fashion and clothing trends. This can be obtained through a combination of education and on the job experience in the fashion industry. One way to gain the necessary knowledge and skills is to pursue formal education in fashion or a related field which includes earning a degree in fashion design, fashion merchandising, or a related field from a recognized College or University. Many institutes also offer certificate programs or short term courses in fashion and apparel consulting that help in gaining additional training and expertise in the field.

Apparel Made-ups and Home Furnishing Sector Skill Council (AMHSSC) was established under the aegis of Ministry of Skill Development & entrepreneurship to organize skilling initiatives across the nation. Since its inspection, the Council has successfully trained and certified 18 lakhs candidates till date in the domain of apparel, made-ups and home furnishing sector.

In addition to education, the Council also helps candidates get placement or experience within the industry by means of internships or entry-level positions in fashion design, merchandising, or sales department. Working in these job roles can provide valuable hands-on experience and help candidates develop a deep understanding of the industry.

Having acquired the necessary education and experience, one can start working as an apparel consultant. This may involve working for a consulting firm, starting your own consulting business, or working as a freelance consultant. You may also be able to work as an in-house consultant for a fashion retailer or clothing manufacturer. Becoming a successful apparel consultant requires a combination of education, experience, and expertise in the fashion industry.

Personality behavior for an apparel consultant

There are several personality behavior that can be helpful for an apparel consultant to acquire. These are as follows:

- **Creativity:** An apparel consultant should have a creative and artistic eye, as well as the ability to think outside of the box, when it comes to fashion and clothing. This can help them develop unique and innovative ideas and make valuable recommendations to their clients.
- **Attention to detail:** An apparel consultant should have an eye for detail, as well as the ability to carefully analyze and evaluate clothing and fashion trends. It is a useful skill in making accurate and informed recommendations to clients.
- **Communication skills:** An apparel consultant should have strong communication skills, so that they can clearly and effectively communicate their ideas and recommendations to clients. This may include giving presentations, writing reports, and working with designers and manufacturers to develop new clothing lines. They should also acquire excellent listening skills.
- **Confidence:** An apparel consultant should have confidence in their abilities and in the recommendations they make to their clients. This can help them influence clients to follow their advice and handle challenging situations or difficult clients.
- **Flexibility:** An apparel consultant should be flexible and adaptable, as the fashion industry is constantly changing and evolving, they should be able to adapt to new trends and styles, and be willing to try new things in order to help their clients stay up- to- date.

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- **Networking skills:** An apparel consultant should have strong networking skills, as they will need to build relationships and connections in the fashion industry in order to stay informed about the latest trends and to develop new business opportunities.
- **Business knowledge:** An apparel consultant should have a good understanding of businesses, as they may be involved in developing marketing materials, managing budgets, and working with designers and manufacturers to create new clothing lines. This can help them make informed and strategic decisions for their clients.

Career Progression of an Apparel consultant

The career progression of an apparel consultant will depend on a number of factors, including their education, experience, and skills. However, some possible career paths for an apparel consultant include:

- **Entry-level positions:** An apparel consultant may start their career at an entry-level position, such as an assistant to a fashion designer or a sales associate in a clothing or lifestyle store. In these roles, they can gain experience and build their knowledge of the fashion industry, as well as develop their communication and presentation skills.
- **Freelance consultant:** After gaining some experience, an apparel consultant may decide to become a freelance consultant, working with a variety of clients on a project-by-project basis. This can provide flexibility and autonomy; it will also require the consultant to be responsible for marketing their services, managing their own finances, and building their own network of clients.
- **Senior consultant:** As an apparel consultant gains experience and builds their reputation, they may be able to move into a senior consultant position. In this role, they work with high-profile clients, and are responsible for managing a team of consultants. They can also add value by offering inputs related to development of new clothing lines and marketing strategies for their clients.
- **Fashion industry executive:** With extensive experience and a strong track record, an apparel consultant is able to move into a leadership position in the fashion industry. This could include working as a Creative director for a fashion brand, Vice president, product development for a clothing company or brand, or even starting their own fashion business.

Buying Office

The Buying house is a type of business in the export-oriented garment industry in the manufacturing country. The business we call 100% export-oriented business. Here the word buying house means “buy” means buying and the word “house” is used in the sense of any business establishment. A buying house is a business organization that works as a trading company.

A buying house is a liaison office controlled or operated by the respective apparel buyer (retailer), set near to manufacturing plant to follow up and execute their order sheet. Working there is a job for a retailer; call a retailer (buyer) employee, and the buyer pays them. Garments buyers are giving buying garment clothes and buying houses to ensure goods are manufactured within specification, manufacturing, and delivery on time.

Basically a buying office is a mediator between the overseas buyer and the local manufacturer. The buying office is a sourcing and quality inspection office working for the overseas client/importer/buyer.

Functions of Garments Buying House

The primary function of buying house is to communicate with buyers and negotiate orders. And finally, when the order is confirmed, it is the job of the garments-buying house to execute it through a factory and arrange the shipment of the order. And when the order comes to the factory from the hands of the buying house, the buying house supervises, leads, and takes care of all the work from the beginning to the end of that order till shipment. A foreigner who is a foreigner cannot be in constant contact with or care for him from abroad. Meanwhile, buying houses often acts as representatives or agents of foreign buyers. The primary responsibility of the buying house is to ensure the quality of the product that the buyer wants or the quality of the product that he wants.

How Buying House Works

Buying houses generally works in two ways. Namely:

1 As a trading company.

2 As a buying agent.

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As a trading company

An example will help you understand. Suppose a buying house negotiates an order with a foreign buyer and the order is confirmed at $3.5. The buying house will then shift this order to one of the factories, and while shifting it will aim to execute the order for less than $3.50. The less he can execute, the more his profit. The buying house executes the order at $3 in this case; in that case, it will have a profit of 50 cents on each garment. If a buying house operates in this manner, it will be operating as a trading company.

As a buying agent

The policy or system followed to work as a buying agent is to link the buyer with the manufacturer, i.e. with the garment factory. In that case, a commission is left for the buying house, which may be 5 to 10% or less in some cases. This 5 to 10% commission is collected from the buying house garments once the product is shipped.

The nature of job for a buying office is,

- Coordinating in terms of fitting and patterning problem
- Supporting manufacturers in sample evaluation,
- Providing recommendation of better engineering method related to supplier's technical/equipment capabilities and incorporate aesthetics, product quality and safety requirements for each product.
- Perform various inspections at pre-production, in-process and final stage + lab testing.
- Production tracking.
- Problem shooting – risk analyzing.
- Responsible for Quality System implementation.
- Responsible for coordinating shipments and buyers related compliance in the area of quality product.

The buyer works through a buying office mainly for better sourcing – good factory, good price, good quality product, promptness of delivery with all sincerity. To this end, a buying office should be the buyer's eyes, soul and heart in the work-center where his order is running. The buying office is the buyer's office in short.

Promotion Agencies and Organisation

The Promotion agency, also commonly referred to as an advertising agency, is an entity that handles marketing and advertising for a company or companies. In other view promotional agencies refers to help the industry to update the infra structure, business development, implementation if latest techniques while some companies depend on independent promotion agencies, large companies often have in house operation that handle promotion and advertising.

Incorporated in 1978, AEPC is the official body of apparel exporters in India that provides invaluable assistance to Indian exporters as well as importers/international buyers who choose India as their preferred sourcing destination for garments.

The Apparel Export Promotion Council (AEPC) has been the moving force behind lot of achievements, given below:

- It has Head Office in Gurgaon with Registered Office at Okhla and 10 offices pan India.
- AEPC today is a powerful body for the promotion and facilitation of garment manufacturing and their exports.
- For Indian exporters, AEPC is a one-stop shop for information advice technical guidance workforce and market intelligence. Members have access to updated trade statistics potential markets information on international fairs and assistance in participating at these fairs. It also plays a large role in identifying new markets and leading trade delegations to various countries.
- In recent years AEPC has worked tirelessly in integrating the entire industry - starting at the grass root level of training the workforce and supplying a steady stream of man power to the industry; identifying the best countries to source machinery and other infrastructure and brokering several path breaking deals for its members and finally helping exporters to showcase their best at home fairs as well as be highly visible at international fairs the world over.

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Twice a year, AEPC showcases the best of India's garment export capabilities through the prestigious India International Garment Fair, playing host to over 350 exhibitors displaying the exotic, the haute, the pret, the contemporary and much more.

With AEPC's expertise and all the advantages that India has, it makes for a truly win-win situation - Indian exporters grow stronger each year in their achievements, skills and proficiency, while international buyers get superior solutions for their garment imports.

AEPC Vision

To promote, support and facilitate Indian apparel industry to enhance its competitive advantage and global positioning in a holistic and sustainable way that is beneficial to all stakeholders of the industry.

AEPC Mission

AEPC attains the vision by facilitating industry to achieve national targets on export promotion, employment generation, productivity enhancement and brand creation in a responsible and progressive manner and thereby providing enhanced value to the consumers in specific and society at large.

AEPC's main objectives

1 To promote, advance, increase, develop export of all types of readymade garments, excluding, woollen knitwear and garments of leather, jute and hemp.

2 To undertake all export promotion measures, particularly to undertake market research, provide inputs for budgets and Foreign Trade Policy, Provide inputs for various FTAs, PTAs and Bilateral agreements, to monitor tariff and other restrictive practices of importing countries, to find out the product range and export prices of garments of other countries, to develop new designs and patterns of garments, to undertake marketing in individual foreign markets, to send trade delegations and missions to foreign countries as well as to survey export potential of readymade garments from the country.

3 To publicize and highlight to importers and the public in foreign countries the advantages of trade and commerce with India and to create a liking for the various types of garments markets for the purpose of continuously and regularly reporting to manufacturers, traders and exporters of garments.

4 To assist members, especially, in the small scale sector by giving assistance in the matter of understanding and implementation of the drawback, rules and procedures, import license facilities provided and how to apply for the facilities.

5 To establish design centers, to evolve improved design and patterns and garments suitable for export, to improve the qualities and standards of the fabrics and garments by importing technical knowhow, to encourage export production of quality garments and to undertake necessary research in fashions, designs and techniques and to encourage manufacture of garments for exports.

6 To undertake training of workers and technical personnel, to improve the skill of workers engaged in garment manufacturing in India and to assist in the technological base of the garment industry.

7 To obtain from members of the Council and to prepare for the council as a whole, action plans for promotion of exports, development of export markets, generation of production for exports, setting of export targets generally and in relation to specific countries and commodities on an annual basis and for such medium and longer terms as may be considered desirable and to ensure/ undertake execution of such plans.

8 To co-operate with government and other various organizations in the country and abroad with a view to further promotion of exports of readymade garments.

Trade Association in Apparel Industry

Trade associations play the role of setting laws and providing comprehensive knowledge to companies within the industry. They basically represent the interests of member companies and enable them to develop commercial breakthrough.

The role of a trade association is to represent the industry by voicing out issues affecting the member companies within the industry. They also provide a platform where companies can interact and create more networks with each other since they operate in the same industry.

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Trade associations play important roles for companies in the industries that they operate in. Some of the functions are:

- They educate members by providing necessary information. Trade associations can organize seminars and training programs to educate their members on many aspects that could help enhance efficiency in the industry. An example of the educative information that can be trained is the launch and publishing of white papers. White papers contribute to the decision-making process of an entity by enabling them to understand the way to go in various situations or market conditions.
- They provide necessary market information to their members that could help raise their market share. For example, trade associations can avail information on prevailing market conditions like up-and-coming market opportunities that the members could capitalize on and gather profits.
- Trade associations also ensure the engagement of members in fair and transparent trade practices. For example, they can establish laws that prohibit unfair trade practices and attach penalties to the policies so that defaulters are held accountable and answerable.
- Trade associations also offer advice regarding legal and technical matters to ensure that the members are informed and do not take the wrong direction. For example, they can offer guidance on the operation of antitrust laws so that members are aware of the practices that may provide them subject to questioning when they indulge in such practices.

Given below are the Trade associations in India:

Apparel Export Promotion Council (AEPC)

Incorporated in 1978, AEPC is the official body of apparel exporters in India that provides invaluable assistance to Indian exporters as well as importers/international buyers who choose India as their preferred sourcing destination for garments.

Confederation of Indian Textile Industry (CITI)

Confederation of Indian Textile Industry, a Company under Section 25 of the Companies Act 1956 is the new name of Indian Cotton Mills' Federation (ICMF). ICMF had been established in March 1958 and later incorporated as a company in February 1967. Originally, ICMF represented the organized textile units in spinning and composite sectors comprising mills producing cotton yarn, blended and man-made spun yarn, fabrics and home furnishings. The need for an umbrella organization representing the entire textile chain had been felt by various segments of the industry for quite some time, in order to properly project the potential, problems and requirements of the industry in a holistic and comprehensive way, nationally and internationally. After extensive consultations, ICMF initiated the process of establishing an umbrella organization for the textile industry in August 2000 by broad basing the coverage of its Member Associations to include independent weavers and processors. Later Member Associations were also advised to admit manufacturers of technical textiles and garments. In 2003-04 the Federation also started admitting associations and federations catering to textile segments not covered under ICMF, as Associate Members. Since many of the Associate Members were not connected with cotton or mill industry, it was felt that the name of the organization should also be broad based to represent the entire textile sector. The process reached its logical conclusion with the formation of CITI in May 2005.

Export Promotion Council for Handicrafts (EPCH)

EPCH is the apex body which coordinates handicraft exports from India. It provides Comprehensive information to foreign buyers on the entire range of handicraft of India and liaisons between Indian handicraft exporters and Foreign buyers. Sponsored by Ministry of Textile, Government of India, the council also organises trade-shows, buyer-sellers meets, conference and study tours to keep Indian exporters of the latest trends in markets world-wide.

Indian Exhibition Industry Association (IEIA)

IEIA is the Indian Exhibition Industry Association with members representing trade fair organizers, venue owners and service providers from all over the country. It has been formed with the main aim of facilitating all round growth and development of exhibition industry in India, to provide a platform to industry players and act as interface with various government and non government agencies with a view to help in voicing the concerns of its members and of exhibition industry as a whole.

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India Trade Promotion Organisation (ITPO)

India Trade Promotion Organisation is the nodal agency of the Government of India for promoting the country's external trade. ITPO, during its existence of nearly three decades, in the form of Trade Fair Authority of India and Trade Development Authority, has played a proactive role in catalysing trade, investment and technology transfer processes. Its promotional tools include organizing of fairs and exhibitions in India and abroad, Buyer-Seller Meets, Contact Promotion Programmes, Product Promotion Programmes, Promotion through Overseas Department Stores, Market Surveys and Information Dissemination.

Apparel Market

Apparel Market Definition

The apparel market consists of sales of apparel by entities (organizations, sole traders and partnerships) that manufacture apparel. Apparel refers to clothing or garments in general. Apparel manufacturers cut and sew (i.e, purchase fabric and cut and sew to make a garment) and/or produce garments by first knitting or weaving fabric and then cutting and sewing the fabric into a garment.

The apparel industry includes companies manufacturing full lines of ready-to-wear apparel and custom apparel; apparel contractors, performing cutting or sewing operations on materials owned by others, jobbers, performing entrepreneurial functions involved in apparel manufacturing; tailors, manufacturing custom garments for individual clients; and entities that combine knitting with the production of complete garments, but excluding producers of knitting fabric not combined with the produce of complete garments. Companies in the apparel industry produce garments such as shirts, T-shirts, jackets, socks, uniforms, caps, hats, neckties and belts. Apparel are made of cotton, linen, polyester and other textiles.

Apparel Market Segmentation

The apparel market is segmented by type, by type of fiber, by distribution channel and by geography

By Type-

The apparel market is segmented by type into

a Women's Wear

b Men's Wear

c Kids Wear

The women's wear market was the largest segment of the global apparel market segmented by type, accounting for 51.8% of the total in 2020. Going forward, the men's wear segment is expected to be the fastest growing segment in the global apparel market segmented by type, at a CAGR of 10.0% during 2020-2025

Sub-Segmentation

Women's wear

By Type-

The women's wear market is further segmented by type into

a Dresses & Skirts

b Trousers

c Blouses

d Jerseys, Sweatshirts & Pullovers

e Coats & Jackets

f Suits & Ensembles

g Sports & Swimwear

h Night & Underwear

i Shirts & Singlets

j Blazers

k Others

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The trousers market was the largest segment of the women's wear market segmented by type, accounting for 16.4% of the total in 2020. Going forward, the blazers segment is expected to be the fastest growing segment in the women's wear market segmented by type, at a CAGR of 12.3% during 2020-2025.

Sub-Segmentation

Men's wear

By Type-

The men's wear market is further segmented by type into

a Trousers

b Shirts

c Jerseys, Sweatshirts & Pullovers

d Coats & Jackets

e Blazers

f Suits

g Sports & Swimwear

h Night & Underwear

i T-Shirts & Singlets

j Others

The trousers market was the largest segment of the men's wear market segmented by type, accounting for 22.5% of the total in 2020. Going forward, the blazers segment is expected to be the fastest growing segment in the men's wear market segmented by type, at a CAGR of 14.5% during 2020-2025.

Sub-Segmentation

Kids wear

By Type -

The kids wear market is further segmented by type into

a Infant & Toddler Clothes

b Young Children Clothes

The young children clothes market was the largest segment of the kids wear market segmented by type, accounting for 69.3% of the total in 2020, and is expected to be the fastest growing segment in the kids wear market segmented by type, at a CAGR of 9.9% during 2020-2025

By Type of Fiber-

The apparel market is further segmented by type of fiber into

a Man-Made Fibers

b Cotton Fibers

c Animal Based Fibers

d Vegetable Based Fibers

The man-made fibers market was the largest segment of the global apparel market segmented by fabric type, accounting for 64.0% of the total in 2020. Going forward, the animal based fibers segment is expected to be the fastest growing segment in the global apparel market segmented by fabric type, at a CAGR of 14.2% during 2020-2025.

By Distribution Channel

The apparel market is further segmented by distribution channel into

a Online Sales

b Offline Sales

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The offline sales market was the largest segment of the global apparel market segmented by distribution channel, accounting for 66.5% of the total in 2020. Going forward, the online sales segment is expected to be the fastest growing segment in the global apparel market segmented by distribution channel, at a CAGR of 13.6% during 2020-2025

By Geography

The apparel market is segmented by geography into

i North America

- USA
- Canada
- Mexico

ii Western Europe

- UK
- Germany
- France
- Spain
- Italy
- Denmark
- Switzerland
- Ireland
- Sweden
- Netherlands
- Austria
- Belgium
- Portugal
- Norway
- Finland

iii Asia Pacific

- China
- Japan
- India
- Australia
- Philippines
- Vietnam
- Indonesia
- Malaysia
- New Zealand
- Hong Kong
- Singapore
- South Korea
- Thailand

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iv Eastern Europe

- Poland
- Russia
- Romania
- Czech Republic

v South America

- Peru
- Argentina
- Chile
- Brazil
- Colombia
- Venezuela

vi Middle East

- Saudi Arabia
- UAE
- Turkey
- Israel

vii Africa

- Nigeria
- Egypt
- South Africa

Apparel Sourcing

Apparel sourcing is the procurement practice of any given business related to fashion. A procurement team interacts with a supplier, states their demands, and carries out a profitable trade to acquire various goods and services. This is standard in most sectors, and fashion is no different. Everything, from the fabric to the metallic or decorative accessories needed, comes under goods procured. Since fashion items are required in bulk, buying from an established supplier in the field makes sense. It is here, precisely, where the apparel sourcing process starts.

Increase in the number of customers preferring to shop online on digital platforms, the sector has increased the options presented to the public. Consumers can quickly browse through seemingly endless catalogues to get what they want and factor ethical sourcing into their purchase decisions. Due to several brands and options being available in a few clicks, it is easier for consumers to make well-informed decisions.

Fashion retailers have stepped up their apparel sourcing game to avoid ethical conflicts. They are digitally expanding their various products, making profits on the chosen material. Different factors must be considered before tasking a supplier with an order to complete. They are -

1 Communication - A priority for any business is to communicate their ideas to the suppliers and for the vendor to recognize specific business needs.

2 Market values - The material supplied by the vendor must match the current market trends and deals.

3 Shipping time - On-time delivery of good-quality products is vital for establishing trust between the two parties.

4 Use of advanced technologies - The Company must analyse how effectively a vendor incorporates the changing technology into their product. This, in turn, will prove vital to rating the quality of the product.

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5 Trade regulations - Legal formalities must be completed for a deal between two parties to be successful.

6 Quality of the raw material used - The quality of the products shipped depends on the quality of the raw material used by the vendor. This can be checked by the company before placing an order.

7 Price - Cost-effectiveness plays an essential role in apparel sourcing deals.

8 Location - The business's proximity sometimes plays a role in deciding the fate of an out-sourcing deal.

Changing trends in fashions

Introduction

For the global fashion industry, India has always been a key market. Even though it experiences many challenges of inequality, infrastructure, and market fragmentation; it is forecasted that the sector will show the strong economic growth, scale, and increasing digital disruption. All together these elements will make the Indian market a global place in the times to come. As per report, India's apparel market is expected to be valued at $59.3 billion (2023) in upcoming years and the Indian fashion industry will emerge to be the sixth-largest market in the world. The Indian fashion industry has seen its fair share of struggles with the pandemic situation. However, now as it is reviving with the situation turning better, the industry is all set to inch towards in next year.

Emerging Concepts in India's Fashion D2C (Direct-to-consumer) Space

1 Increase in D2C Fashion Brands

The buying habit of new set of Indian consumers has been changed and now they shops only at D2C fashion brands. Fashion brands can perform very well by using the D2C model since it gives them complete reach to consumer data, superior control over the customer experience, and the opportunity to boost and capitalize on brand loyalty. Because of this, businesses have total freedom to use chatbots to involve with customers, answers to their questions, and connect with them. Due to this, a further application of chatbots, businesses are even using various social media sites like WhatsApp, Facebook, e-mail, and Instagram to offer goods and services to clients directly.

2 The Tendency of Consumers Towards D2C Businesses

In today's era, consumers depends majorly on internet fashion since it is easily accessible, convenient, and provides immediate gratification. As compared to other industries, it is found that fashion has an edge in terms of logistics – shipping to thousands of areas across India, which sometimes not necessarily the case particularly for high-end watches, jewelry, electronics, and furniture. Due to social media evolution, customers are more active regarding their needs and open to discovering new regional brands that runs on direct-to-consumer (D2C) channels. This has made it possible for D2C and fresh start-up brands to compete with established ones in the fashion industry.

3 Extension of Consumer Base

With fashion D2C brands looking for increase their presence and value in Tier II (population 50,000 to 99,999) and Tier III cities (population 20,000 to 49,999) after enlarging with good efficiency in Tier I cities (100,000 and above), smaller towns have promise, and businesses should make use of this to find and expand their consumer base. They are prominently working to follow to new and developing trends in order to be always one step ahead of their rivals, personalization of items is on the rise. In the previous 2 years, D2C brands have undoubtedly been able to boost engagement and bring in more customers, but the next challenge will be to sustain them and keep their loyalty.

Emerging Trends in the Indian Fashion Industry

1 Sustainability

Being concerned about the future of the planet is a clear thing after the COVID-19. In today's era those brands are in demand which is focusing on eco-friendly and sustainable clothing and accessories. It is definitely the most important aspect when it comes to fashion consumers as it is largely impacting their buying behavior.

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2 Size comprehensive fashion

There is an increasing level of awareness when it comes to body shape acceptance and body positivity; hence there has been a shift in clothing sizes available across the world. Currently, they range from plus size to maternity to size-inclusive fashion. Exclusive to the standardized sizing, many designers these days have expanded their collections to plus sizes. Plus-size models can be seen ruling the fashion world from editorial shoots to ramp walks. By this curvy women have quickly become new fashion favorites.

3 Trending at leisure

It is seen that, so many people making lifestyle changes and adapting health driven routines which have inspired brands to manufacture yoga-inspired clothing. Moreover, courtesy the corona pandemic, people are tending to wear comfortable and practical outfits. The brands that are constantly trying to combine fashion and functionality together to create a stylish wearable look are achieving blockbuster growth in the market.

4 Executing in Pantone colors

Pantone color of the year has become a very hot trend from last few years and this trend has been noticed and accepted by people all over the world. Recently, the Pantone Color Institute announced two colors for the year which are Ultimate Gray and Illuminating. These two colors are surely the most vibrant and elegant ones and it will be showcase in fashionistas and celebs donning these two colors in this year.

5 Comfort is the new style:

From the pandemic outbreak, consumers' preferences and tastes have undergone a huge shift. They now give importance to the comfort over fashion and it has emerged to be the new fad. COVID-19 paved the way for many of the innovations and ever since then, at leisure market has made its way in people's lives as well as in wardrobes. Along with nudes and pastels, solar shades are about to get prominence. Hues for example gold, bronze, amber, marigold, etc. will rule the fashion industry by the upcoming year. Amongst prints and patterns, stripes and floral prints will be making their way back into the wardrobes.

Domestic Marketing and International Marketing

Domestic Marketing

Domestic Marketing refers to the marketing activities employed on a national scale. Marketing strategies were undertaken to cater customers of a small area, generally within the local limits of a country. It serves and influences the customers of a specific country only.

Domestic Marketing enjoys a number of privileges like easy to access data, fewer communication barriers, deep knowledge about consumer demand, preferences and taste, knowledge about market trends, less competition, one set of economic, social & political issues, etc. However, due to the limited market size, the growth is also limited.

International Marketing

International Marketing is when the marketing practices are adopted to cater the global market. Normally, the companies start their business in the home country, after achieving the success they proceed their business to another level and become a transnational company, where they seek to enter in the market of several countries. So, the company must be known about the rules and regulations of that country.

International marketing enjoys no boundaries, keeping the focus on the worldwide customers. However, some disadvantages are also associated with it, like the challenges it faces on the path of expansion and globalisation. Some of which are socio-cultural differences, changes in foreign currency, language barriers, differences in buying habits of customers, setting and international price for the product and so on.

Basis For Comparison	Domestic Marketing	International Marketing
Meaning	Domestic marketing refers to marketing within the geographical boundaries of the nation.	International marketing means the activities of production, promotion, distribution, advertisement and selling are extend over the geographical limits of the country.

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Area served	Small	Large
Government interference	Less	Comparatively high
Business operation	In a single country	More than one country
Use of technology	Limited	Sharing and use of latest technology.
Risk factor	Low	Very high
Capital requirement	Less	Huge
Nature of customers	Almost same	Variation in customer tastes and preferences.
Research	Required but not to a very high level.	Deep research of the market is required because of less knowledge about the foreign markets.

Primary Market and Secondary Market

In a primary market, new shares and bonds are offered to the public for the first time via an initial public offering (IPO). The secondary market, on the opposite, refers to exchanges such as BSE or New York Stock Exchange or NASDAQ where stocks are traded.

A company may have different types of capital requirements depending on its present stage of growth. A well-established company may not require long-term capital. In that case, they may opt for equity financing i.e. raising capital via the sale of shares. But another company, which has a proven track record and now wishes to expand operations, may go for an IPO. While equity financing is a secondary market operation, launching an IPO happens in the primary market.

The two financial markets -- primary market and secondary market play a major role in the mobilization of money and help develop the economy. Countries with robust financial markets make it easier for companies to access funds and grow faster.

The features of the primary and secondary markets:

Features of Primary Market

- A company turns to the primary market for its long term capital needs. Fulfilling the need for long term capital is, therefore, a feature of a primary market.
- A fresh issue of securities takes place in the primary market. The buyers are usually institutional investors and retail investors.

Features of Secondary Market

- The secondary market helps companies fulfill short-term liquidity requirements. It facilitates the marketability of existing securities.
- It also ensures true and fair dealing for the protection of the investor's interest.

Difference between Primary Market vs. Secondary Market

Primary Market	Secondary Market
Securities that are issued in a market are referred to as the primary market.	When the company gets listed on an exchange and its stocks are then traded among investors, it is called the secondary market.
The primary market is also known as a 'new issue market'	The secondary market is known as an 'after issue market.'

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Depending upon the demand and supply of the securities traded the prices in the secondary market vary.	The prices in the primary market are fixed.
In the primary market, investors have an option to purchase the shares directly from the company.	In the secondary market, the investors buy and sell the securities among themselves.
Investment bankers do the selling in a primary market.	In the secondary market, the broker acts as an intermediary while the trading is done.
In the primary market, the company stands to gain from the sale of a security.	In the secondary market, investors stand to gain any sort of capital appreciation from the securities.
The securities in the primary market can only be sold once.	In the secondary market sale and purchase is a continuous process.
The amount that is received from the securities becomes capital for a company.	In the case of the secondary market, the same reflects the income for investors.

Retail Business

The business of buying clothes from manufacturers and selling them to customers is known as retail. Retailers make initial purchases for resale three to six months before the customer is able to buy the clothes in-store.

Fashion marketing is the process of managing the flow of merchandise from the initial selection of designs to be produced to the presentation of products to retail customers, with the goal of maximizing a company's sales and profitability. Successful fashion marketing depends on understanding consumer desire and responding with appropriate products. Marketers use sales tracking data, attention to media coverage, focus groups, and other means of ascertaining consumer preferences to provide feedback to designers and manufacturers about the type and quantity of goods to be produced. Marketers are thus responsible for identifying and defining a fashion producer's target customers and for responding to the preferences of those customers.

Marketing operates at both the wholesale and retail levels. Companies that do not sell their own products at retail must place those products at wholesale prices in the hands of retailers, such as boutiques, department stores, and online sales companies. They use fashion shows, catalogs, and a sales force armed with sample products to find a close fit between the manufacturer's products and the retailer's customers. Marketers for companies that do sell their own products at retail are primarily concerned with matching products to their own customer base. At both the wholesale and the retail level, marketing also involves promotional activities such as print and other media advertising aimed at establishing brand recognition and brand reputation for diverse characteristics such as quality, low price, or trendiness.

Apparel retailers include department stores, mass merchandisers, specialty stores, national chains, outlets, online stores, mail-order companies, and discount and off-price stores. Retailers, such as Gap and Victoria's Secret, that sell their own private labels are directly involved in garment design and manufacturing.

Fashion retailing is the section of business that acts as an intermediary between the manufacturers and customers. It can be defined as the process of "buying clothes from the manufacturer and selling them to the customers"

Types of Retailing:

There are three sorts of retailing.

1 The first is the market, a physical location where buyers and sellers meet. Typically this is done around the local area squares, sidewalks or designated streets and may include the construction of temporary structures (market slows down).

2 The second shape is shop or store trading. A few shops utilize counter-service, where goods are far from buyers, and must be acquired from the vender. This sort of retail is normal for little costly things (e.g. gems) and controlled things like pharmaceutical and alcohol. Self-service, where goods might be taken care of and examined preceding buy, has turned out to be more typical since the twentieth century.

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3 A third type of retail is virtual retail, where items are requested by means of mail, phone or online without having been examined physically yet rather in an inventory, on TV or on a site.

In some cases this sort of retailing imitates existing retail sorts, for example, online shops or virtual marketplaces, for example, Amazon.

Retail Management

Retail management involves overseeing the day-to-day operations of retail stores, ensuring smooth functioning, and driving sales growth. It encompasses various aspects such as inventory management, visual merchandising, customer service, marketing, and sales. Retail managers are responsible for creating a pleasant customer shopping experience while achieving business goals.

Retail managers have diverse responsibilities, including:

- Managing store operations and ensuring compliance with company policies and procedures.
- Developing and implementing sales strategies to achieve revenue targets.
- Monitoring inventory levels, analysing sales data, and forecasting demand.
- Recruiting, training, and supervising store staff.
- Creating visually appealing displays to attract customers.
- Resolving customer complaints and ensuring high levels of customer satisfaction.
- Analysing market trends and competitor activities to stay ahead in the market.

A successful career in retail management demands a combination of skills, including:

- Strong leadership and decision-making abilities.
- Excellent communication and interpersonal skills.
- Analytical and problem-solving skills.
- Knowledge of market trends and consumer behaviour.
- Proficiency in retail software and technology.
- Sales and negotiation skills.
- Ability to work in a fast-paced and dynamic environment.
- Adaptability and flexibility.

Fashion Retailing

Fashion retail describes businesses that sell clothes and accessories directly to customers in store. There are four main types of fashion retail businesses including high street chain stores, department stores, luxury brands and independent boutiques.

There are many different job roles within fashion retail, ranging from in store to head office. This includes sales, buying, management, merchandising and visual merchandising.

Retail is at the heart of every fashion business and although consumer shopping behaviors have evolved over the years, many consumers still prefer the experience of shopping in store rather than online.

Retail stores allow brands to create their own unique shopping experience - not only in terms of building relationship with customers but also in sharing the brand's messaging and values. They're also really beneficial for customers and allow them to ask questions and try products before they buy them.

With so many fashion brands fighting for consumers' attention on the high street and online, fashion retail businesses must be really innovative in order to stand out. As such, each and every job role within a retail brand is integral to its success.

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Types of Fashion Retail Jobs

Fashion retail is a huge industry and there are many areas can specialise in. Some of the most common fashion retail career paths include:

- Sales Assistant
- Retail Manager
- Retail Buyer
- Retail Visual Merchandiser
- Retail Merchandiser

Sales Assistant

Sales assistants form the backbone of every fashion retail business. Without them, no customers would be greeted and no sales would be made. It's also a great way to kick start your career in the fashion industry as working as a sales assistant provides you with a lot of transferable skills and there are plenty of opportunities for progression.

Sales assistant's main responsibility is to provide good customer service. This includes, answering questions about products or services, helping customers find what they're looking for, promoting new products and promotions and building understanding with customers. They must also assist with business operations by replenishing stock on the shop floor, styling product displays and making sure that the store is clean and tidy.

What Do Retail Assistants Do?

Retail assistant's main duty is to increase sales and transitions. In order to do this, they must be really friendly and engaging with customers. It can also be quite physically demanding as they will likely be on their feet for long periods and are required to lift and move stock. It's an incredibly fast paced environment and working with lots of different customers can be incredibly rewarding.

The main responsibilities of a retail assistant include:

- Welcoming and greeting customers
- Serving and advising customers
- Unpacking and sorting new stock deliveries
- Displaying and arranging stock
- Rotating and replenishing stock
- Promoting products and offers
- Taking cash and card payments
- Handling returns and refunds
- Meeting sales targets
- Keeping the store clean and tidy

Retail Assistant Skills

- Excellent customer service skills
- The ability to work well as part of a team
- The ability to work under pressure and remain calm
- Strong attention to detail
- Sensitivity and understanding
- Sales and promotion skills
- The ability to use own initiative
- Excellent verbal communication skills
- Computer literacy

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Retail Manager

Retail store managers are responsible for ensuring that the day to day operations of a business run smoothly. This may include managing employee schedules, training new employees, handling payroll, understanding sales trends, setting sales targets and managing in store marketing and promotions.

Having excellent communication and leadership skills is essential for retail managers as they will likely manage a team of sales assistants and they themselves may report to an area manager or business owner. They must lead by example and demonstrate excellent customer service skills as well as help motivate their team to reach sales targets.

What Do Retail Managers Do?

Working in retail is incredibly fast paced and Retail Managers must be able to quickly adapt between the customer service and leadership components of their role. The main responsibilities of a Retail Manager include:

- Manage and motivate a team to reach sales targets
- Manage stock control
- Analyse sales and forecast future trends
- Employee management e.g. conducting interviews and performance appraisals
- Staff training and development
- Respond to customer queries
- Organise marketing materials and promotions
- Customer service and sales
- HR and logistics
- Oversee store visual merchandising

Retail Manager Skills

- Experience leading a team within a retail setting
- Excellent problem-solving, leadership, and communication skills
- Proven ability to set and achieve financial and business objectives
- Experience enforcing and maintaining company policies and procedures
- Firm understanding of sales, promotions, trends, retail markets, and merchandising
- Excellent customer service skills
- Experience creating and maintaining employee scheduling
- The ability to work as part of a team

Retail Buyer

A retail buyers' main responsibility is to source the right products at the right price in order to maximise profits. That being said, their duties can vary day to day, which is what makes it one of the most desirable jobs in the industry. The responsibilities of a retail buyer may also vary depending on their level of experience and the business they work for.

Retail buyer's must take several factors into consideration when making buying decisions. They must have excellent analytical skills and be able to evaluate customer buying patterns, trend forecast, and research market trends, plan product ranges and assess the quality and sustainability of collections. They must also be good communicators as building relationships with suppliers is a huge part of their role.

What Do Retail Buyers Do?

The great thing about being a retail buyer is that their role is incredibly varied. Their duties may also vary depending on their level of experience and the business they work for. The main responsibilities of a Retail Buyer are:

- Trend forecasting and research
- Building and maintaining relationships with suppliers

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- Planning product ranges and pricing
- Working with internal marketing and merchandising departments
- Assessing quality and sustainability of product ranges
- Developing sales strategies and monitoring budgets

Retail Buyer Skills

- Analytical and numerical skills
- Organisational and multitasking skills
- Excellent communication skills
- Creativity
- A passion for retail
- The ability to work in a fast paced environment
- The ability to work as part of a team

Retail Visual Merchandiser

The role of a visual merchandiser is to design and communicate visual ideas and displays to help promote retail brands. They combine their creativity with business skills to create eye-catching displays that pull customers to stores and drive sales.

The responsibilities of a retail visual merchandiser may vary depending on their level of experience and the business they work for. Visual Merchandisers who work from a head office will most likely collaborate with other departments to create annual visual strategies and promotional events. They may also ensure that there is consistency across multiple stores and provide retail staff with training.

Visual Merchandisers who are freelance or work in a store will have much more creative control over a brand's layout and visual concepts. This includes researching trends, planning display themes for different seasons, managing the layout of stores, deciding what product goes where, designing window displays and styling mannequins.

What Do Retail Visual Merchandisers Do?

A Retail Merchandiser's roles and responsibilities can vary from brand to brand and they may work in store or head office. That being said, their main duty is to increase profits for the store by creating a space that attracts customers and makes them want to shop. Here are the main responsibilities of a Retail Visual Merchandiser:

- Design store plans and displays
- Sourcing materials
- Analysing competitors
- Creating visual merchandising packs
- Analysing performance
- Travelling to stores to provide training

Retail Visual Merchandiser Skills

- Creativity and design skills
- IT and CAD skills
- Trend forecasting
- Communication and leadership skills
- Commercial awareness
- Visual and spatial awareness
- The ability to work as part of a team
- Must be able to provide and receive constructive criticism

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Retail Merchandiser

Retail Merchandisers are responsible for ensuring that products appear in the right store, at the right time and in the right quantities. Merchandisers help to shape collections within a brand and they must accurately forecast trends, plan stock levels and monitor performance. It is their responsibility to make sure each collection is profitable.

Merchandisers work closely with buyers and visual merchandisers to ensure that collections come together. Fashion Buyers choose the product lines while Merchandisers decide how much money should be spent, how many lines should be bought, and in what quantities. Once the collection has been finalised by the Merchandising department, they will then work with Visual Merchandisers to ensure that each collection is displayed and promoted appropriately in store.

What Do Retail Merchandisers Do?

Retail merchandising is incredibly varied and fast paced. While most Merchandisers will work in head office, there is the opportunity to travel to stores and meet with suppliers and manufacturers. The main responsibilities of a retail merchandiser include:

- Merchandise planning
- Trend forecasting
- Price planning and budgeting
- Sales forecasting
- Building manufacturer and supplier relationships
- Marketing and promotion
- Manage stock levels
- Analyse product performance

Retail Merchandiser Skills

- Analytical and numerical skills
- Flexible and good under pressure
- Excellent communication skills
- Creativity
- The ability to work well as part of a team
- Computer literacy

Department store

A department store is a large establishment that sells a wide range of products organised into distinct departments in order to satisfy nearly every customers' requirements under one roof. It is divided into several departments, each of which focuses on a specific type of product.

For Example: Within a store, there may be separate departments for toiletries, medicines, furniture, groceries, electronics, clothing, and dress material.

A departmental store is a large retail establishment that offers a wide range of products and services. Department stores offer various products, including clothing, cosmetics, home furnishings, and electronics. Development of department stores was associated with growth during the 19th century of large population centres, transportation, and harnessing of electricity for power and lighting.

Types of Departmental Stores

The main types of departmental stores are as follows:

1 Supermarkets

Supermarkets are the most significant type of departmental store. They are typically huge stores that sell various merchandise, including food, clothes, household items, and electronics. Supermarkets are usually located in busy areas, such as city centres or near transportation hubs.

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2 Discount Stores

Discount stores are a type of department store that sells merchandise at discounted prices. Discount stores typically carry various inventory, including clothes, electronics, and household items. Discount stores retailers purchase products in wide quantities from manufacturers for a massive discount.

3 Department Stores

Department stores not only offer variant goods but also a huge range of designs, colour and style that suit individual demands of consumers. The main concept behind a departmental store is supplying the basic necessities under a roof.

4 Specialty Stores

Specialty stores focus upon particular categories as opposed to retailers who sell a large number of consumer goods categories. It has various characteristics but main defining characteristics are that they sell very particular products.

5 Convenience Stores

Convenience stores usually sell a limited selection of merchandise, such as food, drinks, and cigarettes. These are small retail businesses that stock a range of regular items like coffee, groceries, snack food, ice creams, tobacco products, newspapers and magazines.

6 Drugstores

Drugstores are a type of store that sells medicine and other health-related products. Drugstores include selling prescription drugs, supplements and variant health-related items.

Characteristics and Features of Departmental Stores

1 Benefits

Department stores are large retail establishments that sell a wide range of products. Department stores typically have a wide variety of departments, each selling different products. This allows customers to find everything they need in one place, making department stores a convenient shopping option.

2 Advertising

Department stores typically have extensive advertising and marketing campaigns to attract customers. This can benefit as it increases customer awareness of the store and its products. However, it can also be a disadvantage, as it can increase the store's operating expenses.

3 Services

Department stores typically offer a wide range of services, such as customer service, credit, and returns. This can benefit customers by providing a more convenient shopping experience.

4 Employees

Department stores typically have a significant number of employees, who are often unionised. This can be a benefit, providing customers with a more personalised shopping experience.

5 Locations

Department stores are typically located in central business districts or shopping malls. This can be a benefit, as it increases customer foot traffic.

6 Security

Department stores typically have many storefronts, as it has security issues. This is because many storefronts can make the store more susceptible to crime.

7 Safety

Department stores typically have a high level of customer traffic because a high level of customer traffic can increase the chances of accidents and injuries.

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8 Inventory

Department stores typically have a high level of inventory. A high inventory level can make the store more susceptible to theft.

9 Expenses

Department stores typically have a high level of operating expenses. This is because high operating expenses can eat into the store's profits.

10 Customer Satisfaction:

Department stores typically have a high level of customer satisfaction. This is because department stores usually offer a wide range of products and services that appeal to many customers.

Advantages of Departmental Stores

1 Offer Convenience

Departmental stores offer a wide variety of products under one roof. This is convenient for customers as they can find everything they need in one place. The variety of products also means that there is something for everyone, making department stores a popular shopping destination.

2 Variant Discounts and Sales

Departmental stores offer discounts and sales which attract customers. The deals and sales make the products more affordable, a big draw for customers.

3 Quality Customer Service

Departmental stores provide good customer service, which keeps customers returning. Customer service is important as it makes the shopping experience more enjoyable and makes customers want to return.

4 Great Place to Window Shop

Departmental stores makes a good place for window shopping as it offers a variety of products for the customers to look at.

5 Wide Variety of Products

Departmental stores have all that an individual needs or desires. It is a hub that sells a wide variety of products starting from necessities to luxury.

Limitations and Disadvantages of Departmental Stores

1 Limited Selection

While departmental stores may have a wide range of merchandise, they typically carry a limited selection of each product type. This can lead to customer disappointment if they are looking for a specific item and the store does not have it in stock.

2 High Prices

Departmental stores have high overhead costs, which they must recoup through their prices. This can lead to departmental store prices being higher than prices at other types of retail stores.

3 Challenging to Navigate

Departmental stores can be challenging to navigate, especially for first-time shoppers. The stores are often large and overwhelming, making customers feel lost and frustrated.

4 Long Lines and Crowded

Departmental stores often have long lines and can be crowded, leading to customer frustration. Customers may feel like they are wasting their time waiting in line or claustrophobic in a crowded store.

5 Poor Customer Service

Departmental stores may not have the same level of customer service as smaller retail stores, which can be due to the high volume of customers that departmental stores serve. As a result, customers may feel like they are not being given the attention they deserve.

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Chain stores

Chain stores are defined as a type of retail organisation that is composed of more than one retail store, and it is owned and operated by a single management company. It is an outlet that is characterised by several locations that share a brand with centralised management along with standard business practices. Chain Stores have completely revolutionised the retail market. They have managed to dominate the sector for a long time and continue to do so with their method of making shopping more convenient for the customers.

Characteristics of Chain Stores

Chain Stores have become a go-to place for customers around the world for fulfilling their multiple shopping needs. As such, it becomes essential for us to understand the main aspects of chain stores and why they are so popular among shoppers. The characteristics of the Chain Stores are as follows:

- **Large Scale Retailing** – Chain stores are basically a system that involves large scale retailing. These stores mainly sell articles of all kinds, from the ones which are used every day to the luxury items. It tries to cater to customers who are looking for a one-stop shopping experience to fulfill all their needs. These stores are branded, their turnover is pretty fast, and they maintain a decent standard when it comes to the quality of products as well as the shopping experience.
- **Approaching a Customer** – The success of any chain store revolves around the manner in which they approach the customers and try to address their shopping needs. This approach is very different from the departmental stores who focus more on drawing the customers. Chain stores try to approach more customers at a time by opening a large number of shops within a city or town but at different places. This way they can go nearer to where the customers live and make it more convenient for them to approach the stores. They operate primarily in residential and office spaces, thus completely eliminating the middlemen while also providing great discounts to the customers.
- **Same Line of Products** – Chain stores generally focus on handling a single line of products. They mostly specialise in one or two articles for a product line. The articles are sold by all the similar shops. They concentrate on a limited number of merchandise products that are related to the convenience goods category because they are always in demand among the consumers. These goods ensure a high turnover and are a constant source of revenue for the store.
- **Specialisation** – The chain stores deal with a limited set of merchandise products. It helps them to focus on a specialised line of goods that they can deal with, that are also popular with the customers, thus ensuring high turnover.
- **Uniformity** – These chain stores focus on standardisation and uniformity. They have a uniform logo, colour, product line, layout, colour, counter arrangements, etc., to help customers recognise and associate with these elements easily.
- **Single Ownership** – Under the chain store system, there are a number of shops, but they are all managed by a single manufacturer. Chain stores are owned and operated by a manufacturer or a group of manufacturers. The advantage of single ownership is that there is a proper chain of command for everyone who works in the organisation and ensures a smoother workflow in the company.
- **Centralised Buying and Decentralised Selling** – The central organisation in the chain store buys the products and supplies them to all the branches. The shops under the chain store system are established in various cities and in various areas of the big cities to sell the merchandise. The selling function is decentralised.
- **Uniform Pricing** – One of the central characteristics of chain stores is that their pricing for a particular product or service remains uniform across multiple stores. The pricing is decided by the central office, which they stamp on the article, and then it is sent to the different branches and stores.
- **Dealing with Cash** – Most, if not all, chain stores are operating on the cash and carry model. They do not allow credit sales for anyone. The goods are sold in the retail shops and delivered to the customer. There are no facilities for home delivery that are provided by the store.
- **Central Management** – It is important to note that the chain stores are generally controlled by a centralised management system. The daily managerial activities of these stores are under the supervision of local managers. But the important decisions and the policymaking process is under the purview of the headquarters. The headquarters are responsible for making strategic decisions. They also deal with the operating policies, which are standardised across all the units of chain stores.

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- **Minimum Size** – Technically, the chain starts with two stores, but it is up to the management on how many chain stores they want to operate at a point in time. Many small merchants who open multiple stores in the shopping centres or newly populated areas do not see themselves as chain stores. But it is more meaningful to look at a larger number of stores as the minimum criteria for categorising any retailer as a chain

Some examples of chain stores in India are Reliance Fresh, Lifestyle, Dmart, etc.

Shopping Center

A shopping centre is a collection of independent retail stores, services, and a parking area conceived, constructed, and maintained by a management firm as a unit. Shopping centres may also contain restaurants, banks, theatres, professional offices, service stations, and other establishments.

Aspects considered by planners when a shopping centre is to be built include feasibility of the site in terms of the community's ability to support a centre; adequate vehicular access; and size, access, and topography of the site, as well as availability of utilities, zoning laws, and land use in the immediate area. Economic conditions of the area, the sociology of the region, and local commercial competition and attitudes determine the size of centre that can be supported and the kind of stores acceptable to a given locale.

Shopping centres are generally of neighbourhood, community, or regional scope. The smallest type, the neighbourhood centre, usually has a supermarket as a focus, with daily convenience shops such as a drugstore, shoe repair, laundry, and dry cleaner accompanying it.

The regional shopping centre provides a full range of shopping services comparable to those found in a small central business district. It is built around at least one full-size department store and often several; specialty shops and boutiques are numerous, and there are usually several restaurants and perhaps a motion-picture theatre. Services for the immediate day-to-day needs are minimized. On larger sites motels, medical centres, or office buildings may also be provided.

Car-parking facilities are a major consideration in shopping-centre design. The size and scope of the centre, the type of tenant, and the economics of the area partially determine parking needs.

Examples of Shopping Center in India:

The Forum Mall, Bangalore, VR Mall, Chennai, Phoenix Market City, Mumbai, Sarath City Capital Mall, Hyderabad, DLF Mall of India, Noida

Lulu International Mall, Kochi, World Trade Park Mall, Jaipur, Ambience Mall, Delhi and Elante Mall, Chandigarh

The Shopping Centres Association of India (SCAI), a NPO (non-profit organisation) has been set up with the vision to engage in, and encourage, the development of the shopping centre industry in India, by equipping it with the requisite knowledge base and operational skills, to enable it to assume its rightful place in the society, the economy, and the world. SCAI will aim to play an anchor's role in the evolution of the Indian shopping centre industry and to consolidate the entity of the individual shopping centre, helping it merge into the larger society as an institution of importance. This will be achieved by:

- Developing the distinct function of the shopping centre towards marketing of consumer goods and services
- Building up — and inspiring — a body of focused research into the architecture, aesthetic and design aspects of shopping centres
- Encouraging the development and spread of sophisticated management paradigms and maintenance methods
- Being a knowledge resource centre that collects, analyses and disseminates information on techniques of profitable operation

Delving into macro economic, legislative and marketing factors with a bearing on the shopping centre industry and guiding members to come on their own as credible, responsible and forward-thinking stewards in the arena of shopping centre development and management.

This attempt by SCAI to bridge the gap between the Indian shopping centre industry and the retail industry, and create important linkages between the two will be brought about through:

- Creating a research cell that will support design, centre management, marketing and promotion, and thereby create or redefine the rules of the industry.

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- Developing new managing parameters for creating profitable operations from the experienced institutions, which will support upcoming (individual) centres and the industry.
- Working towards marketing and promotional activities affecting the shopping centre industry and guiding it towards creating new techniques for growth.

Mall Globalisation

Globalization refers to the spread of the flow of financial products, goods, technology, information, and jobs across national borders and cultures. In economic terms, it describes an interdependence of nations around the globe promoted through free trade.

Globalisation aims to establish a borderless world in which a country's needs may be met from all around the world, resulting in a single global economy.

Corporations gain a competitive advantage on multiple fronts through globalization. They can reduce operating costs by manufacturing abroad, buy raw materials more cheaply because of the reduction or removal of tariffs, and most of all, they gain access to millions of new consumers.

Globalization is a social, cultural, political, and legal phenomenon.

- Socially, it leads to greater interaction among various populations.
- Culturally, globalization represents the exchange of ideas, values, and artistic expression among cultures.
- Globalization also represents a trend toward the development of a single world culture.
- Politically, globalization has shifted attention to intergovernmental organizations like the United Nations (UN) and the World Trade Organization (WTO).
- Legally, globalization has altered how international law is created and enforced.

Because of Globalization, it is paving a way for the international brands, people feel that they can get anything that they want in the shopping malls be it electronic goods, apparel and consumer durables.

Major Indian developers for retail malls indicated that rising demand, tight vacancies, investments, and buyer inclination, are among the significant reasons behind the strong growth.

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Module 5 : Quality Control & Inspection

LESSON 30 - 33 : Quality control & inspection

Objectives

At the end of this lesson, you shall be able to:

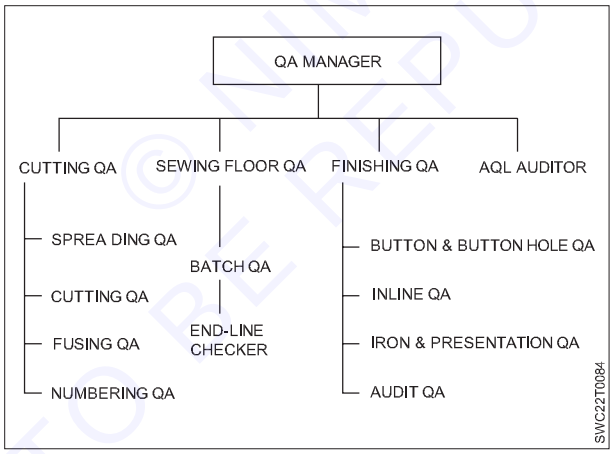
- explain about quality control in detail

Quality control

Quality may define as the level of acceptance of goods or services. It is a relative term. It completely depends on customer satisfaction. Actually product quality is based on product attribute. In textile and apparel industry, quality is calculated in terms of quality and standard of fibers, yarns, fabric construction, color fastness, designs and the final finished garments.

Quality is very important in apparel business. Customers demand and expect is the supreme importance in garment business because of clothing trends become change with short time period. There are various factors on which quality fitness of apparel industry is based such as – performance, reliability, durability, visual and perceived quality of the garment.

Organization chart of Quality Department



Stages of Quality Control in Garment Manufacturing Technology:

In the apparel industry quality control is practiced right from the initial stage of sourcing raw materials to the stage of final finished garment. Quality control in apparel industry is very complex and lengthy task.

There are several stages to control quality in apparel manufacturing industry. They are given below:

1 Pre-production quality control

2 Quality control during production

3 Final inspection

4 Quality control to developing a sampling plan

5 Post-production quality evaluation

1 Pre-production quality control

In pre-production quality control, each component of a garment is tested prior to assembling. Closures, interlinings, sewing threads, and other design elements are tested for their quality and durability. Fabric with too many defects or closures that do not work properly can be detected prior to construction, which saves time and money in the

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long run. Fabric, accessories, closures, interlinings, sewing threads, and other design elements are all tested prior to the garment manufacturing in the pre-production quality control phase.

All testing should done by the authorized textile testing centre, recommended by the buyer.

- **Fabric quality:**

Fabric quality is of utmost importance to the overall quality of apparel and textile products. Regardless of how well a product is designed or constructed, if the fabric is of poor quality, the product will most likely to fail with the consumer. Most fabric is comprised of fibers that are spun into yarns and then woven or knitted into fabric. Support materials like interlinings usually go from the fiber to the fabric stage. Since fibers are the building blocks of all apparel and textile products, it is important to start with quality fibers regardless if they are natural, manufactured, regenerated, or synthetic. Fabric should keep the following properties.

a **Comfort:** Comfort is very important fabric property. It Comfort is studied by looking at fabric in terms of elongation and elasticity, heat retention and conduction, moisture absorbency, water repellency, waterproofing, hand and skin contact, drape, and air permeability.

b **Colorfastness:** Colorfastness relates to appearance retention and can be described as "how consumers use textile products and include factors that may cause colorants to change color or migrate from one material to another". Colorfastness is studied by exposing the fabric to different conditions including acids and alkalis, crocking, environmental conditions, frosting, heat, light, perspiration, or water.

c **Durability:** Durability evaluates "how various materials used in a product perform when subjected to different conditions". Durability of a fabric is tested until it fails, and both warp and weft yarns are tested. There are many ways to assess fabric durability, including strength (tensile, tear, and bursting), abrasion, pilling, snagging, and dimensional stability.

Fabric Inspection Systems

There are various fabric inspection systems:

- 10-Point System.
- Graniteville "78" system.
- Dallas system.
- 4- Point system.

Ten Point System

- It was developed in the 1950's. This system assigns penalty points to each defect, depending on the length of the defect.
- Under the Ten-Point System, a piece is graded a "first" if the total penalty points do not exceed the total yardage of the piece. A piece is graded a "second" if the total penalty points exceed the total yardage of the piece.
- This system is bit complicated because points per length are different for warp and weft defects. It is difficult in practical use.

Warp defects	Penalty points
10 - 36 inches	10 points
5-10 inches	5 points
1-5 inches	3 points
Upto 1 inch	1 point

Filling defects	Penalty points
Full Width	10 points
5 inches to half the width of fabric	5 Points
1-5 inches	inches
Upto i inch	1 point

Graniteville "78" system

- This system was introduced in 1975 for the field of fabric grading.
- The system divides defects into major and minor types.
- The major defect is one, which is very obvious and leads the goods to second quality.

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- The minor defect is one, which may or may not have caused garment to second, depending on its location in the end use item.

Defect length	Penalty points
9 inches	1
9 - 18 inches	2
18 - 27 inches	3
27 - 36 inches	4

The following points are noteworthy in this system:

- The principle was established in garment cutting piece, in which, the short length defects (less than 9") will normally be removed.
- The system tries to balance the importance of longer defects (over 9") and put less weight on 1-10" defects such as slubs.
- The system also suggests the viewing distance of 9 foot instead of normal 3-foot viewing distance.
- The system tends to eliminate very small defects from the total penalty score.
- This is mostly recommended for use, where larger garments are to be cut with fabrics of wider widths.

Dallas System

- This system was developed in 1970s specifically for knits. It was approved by Dallas Manufacturers Association.
- According to this system, if any defect was found on a finished garment, the garment would then be termed as a "second".
- For fabrics, this system defines a second as "more than one defect per ten linear yards (One linear yard is 36" long), calculated to the nearest ten yards".
- For example, one piece 60 yards long would be allowed to have six defects.

4-Point System

- The 4-Point System, also called the American Apparel Manufacturers Association (AAMA) point-grading system for determining fabric quality, is widely used by producers of apparel fabrics and is endorsed by the AAMA as well as the ASQC (American Society or Quality Control).
- The 4-Point System assigns 1, 2, 3 and 4 penalty points according to the size and significance of the defect.
- No more than 4 penalty points can be assigned for any single defect.
- Defect can be in either length or width direction, the system remains the same.
- Only major defects are considered. No penalty points are assigned to minor defects.
- In this system, one should inspect at least 10 per cent of the total rolls in the shipment and make sure to select at least one roll of each color way.

Defect length	Penalty points
Upto 3 inches	1 Points
3 - 6 inches	2 Points
6 - 9 inches	3 Points
Over 9 inches	4 Points
Holes and Openings (1 inch or less)	5 Points
Holes and Openings (over 1 inch)	6 Points

Eg (Calculation)

Knitted Fabric length is 58 yards, width 60inch for inspection. Following defects and points can be found (4-Point Method).

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Size of Defects	Defects	Total Points
Upto 3 inch	2	2x1=2
3 – 6 inch	3	3x2=6
6 – 9 inch	2	2x3=6
More than 9 inch	1	1x4=4
Total Points Earned		18 Points

$$\text{Point per 100 Sq. yards} = \frac{\text{Total Linear Points x 3600}}{\text{Length in yards x Fabric width in inches}}$$

$$\text{Points/100 Sq. yds} = \frac{18 \times 3600}{58 \times 60}$$

As per the standard less than 40 Points/100 Sq.yds is considered First Class

As per the standard more than 40 points/100 Sq yds is considered Second Class

Quality inspection of other Trims:

Garment Trims are inspected in the same manner as other textile and apparel products. Trims are checked during pre production, production, and post production with a final inspection. Various Trims include closures, interlinings, sewing threads, elastic waistband, and other design elements. These Trims should be able to withstand the care and maintenance procedures devised for the clothing.

Inspection procedure for the Trims is described below:

a **Closures:** Closure strength and durability is extremely important to garment construction and consumer satisfaction. Closures for apparel and textiles products include zippers, buttons, hooks, snap fasteners, drawstrings, hook-and-loop fasteners, and others.

b **Interlinings:** Interlinings, also called interfacing, are generally nonwoven fabrics that add more structure and body to garment components like collars, button plackets, waistbands, and cuffs. Interlinings may be fusible or sew-on. Interlining durability is important for garment construction.

c **Sewing threads:** Sewing thread is the yarn used to combine two or more fabric pieces together in garments, accessories, and other textile products. Thread encompasses the majority of the stress and strain from movement and needs to be strong and durable. It must resist breaking and be compatible with the rest of the garment in terms of color, care instructions, and construction. Sewing thread should be free from imperfections such as knots, slubs, thick and thin places.

d **Elastic waistband:** Elastic waistbands are tested for fit (as per size) and durability (loss of elasticity). The fit is measured by the force needed to stretch the waistband about 200 more than the hip size (as per the size label) and bringing back to the waist size. The durability can be measured by stretching the waistband by 50% and measuring the force needed to stretch it. The loss of force in the two cases should be less than 10% for the waistband to be acceptable.

Raw material inspection:

- Yarn defects such as thick and thin,
- Knitting defects,
- Fabric construction,
- Fabric **GSM (Grams per square meter),**
- Fabrics shade matching,
- Fabric holes,
- Fabric defects,
- Sewing thread,

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- Zipper,
- Fabric softness,
- Fabric width,
- Vertical stripes,
- Horizontal stripes,
- Fabric shrinkage,
- Defective printing,
- Defective embroidery,
- Defective buttons,
- Dirt and stains in the fabric.

Other design elements include beads, sequins, braids, and fringes. They are tested for quality in similar ways as closures. Beads are similar to buttons and are tested for their impact resistance against creaking, chipping, or breaking during sudden external force. Sequins are assessed for their strength and resistance to breaking or tearing. Braids and fringes are checked for their quality in terms of durability from fraying, unraveling, tearing, and ripping.

A quality inspector should check various matters according to the buyer's instruction in Raw material inspection stage of garments.

2 Quality control during production

Each step in the garment production process is vital to the overall quality of apparel products. The production of apparel products includes cutting, assembling, pressing and other finishing procedures, and final inspection. Pattern pieces need to be cut with precision and on grain. Cut pattern pieces should be assembled with accuracy and care. Assembled garments are finished and pressed. Poor attention to detail, or carelessness when sewing, could have the domino effect on other components or future assembling. For example, skewed fabric pieces will not fit together easily and sewing is difficult. Poorly sewn garments have popped stitches and loose seams. Poorly pressed garments will not lie on the body correctly and could have permanent wrinkles. The following section describes the quality control of apparels during various production processes.

a Spreading and cutting defects

Proper care should be taken to avoid any mistakes during spreading, otherwise, it will result in improperly cut components. The major parameters such as ply alignment, ply tension, bowing, and splicing should be done with a great care. Not enough plies to cover the quantity of garment components required should also be taken care. Misaligned plies will result in garment parts getting cut with bits missing in some plies at the edge of the spread.

Narrow fabric causes garment parts at the edge of the lay getting cut with bits missing. Incorrect tension of plies, i.e., fabric spread too tight or too loose, will result in parts not fitting in sewing, and finished garments not meeting size tolerances.

Not all plies facing in correct direction (whether "one way" as with nap, or "either way" as with some check designs), may create in pattern misalignment or mismatch. This happens when the fabric is not spread face down, face up, or face to face as required. The patterns should be aligned with respect to the fabric grain, or else may not fit or drape properly. Spread may be distorted by the attraction or repulsion of plies caused by excessive static electricity.

Cutting is an important stage of the garment production process. Precision is needed to cut accurate pieces that will fit together during the assembly process. Cutting defects include frayed edges; fuzzy, ragged, or serrated edges; ply-to-ply fusion; single-edge fusion; pattern imprecision; inappropriate notches; and inappropriate drilling.

Garment defects are occurred by careless use of knife, perhaps overrunning cutting previous piece. Garment parts have bits missing at edge of lay. If too tight or too loose then garment parts are distorted. Slits opened inaccurately or omitted.

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b Defects in assembling

After the pattern pieces have been cut, they are assembled. Many issues and defects can arise during the sewing process. Defects in assembling include defects with both stitches and seams. Possible stitching defects include needle damage, feed damage, skipped stitches, broken stitches, wrong or uneven stitch density, balloon stitches, broken threads, clogged stitches, hangnail, and improperly formed stitches.

Seam defects include seam grin, seam pucker, incorrect or uneven width, irregular or incorrect shape, insecure back-stitching, twisted seam, mismatched seam, extra material caught in seam, reversed garment part, wrong seam type used, slipping seam, and wrong thread used.

c Defects during pressing and finishing

After garments are constructed, final preparations are completed. These final preparations include pressing garments to help set seams and finish garment shaping. Defects during pressing and finishing include burned garments, water spots, change in original color, flattened surface or nap, creases not correctly formed, fabric of finished garment not smooth, edges stretched or rippled, pockets not smooth, garment not correctly shaped, and shrinkage from moisture and heat.

3 Final inspection

After materials have been tested for quality and the products have been manufactured, products are tested for their performance requirements, overall appearance, and sizing and fit. Proper sizing and fit can be measured as per the size of the garment or they can be tested by putting the garments in manikins or even live models. They are also checked visually for any faults during the production process. Hence, the quality of stitching, joining of garment components and accessories are inspected.

Although each component of a garment is tested individually, in pre production quality control, products are tested for a final time to assess the compatibility of materials used together and any noticeable fault. Garments are inspected for off-grain fabric, poor or uneven stitching, mismatched plaids or stripes along seams, puckered or extra material caught in seams, and uneven seams along hems, among many other problems that can occur in the apparel industry.

During inspection, some parts of a product are more important than others in terms of allowable defects. Every garment manufacturer defines its own product zones and includes these in their specifications as there is no industry standard. They will also define what they deem as critical, major, and minor defects. A critical defect results in a flaw that produces an unsafe or hazardous situation like a hole in a latex glove that would compromise the safety of the wearer. A major defect is a flaw that often contributes to product failure or lack of usability for a product. Examples of a major defect could be a broken zipper, broken stitches, or tears in the fabric. A minor defect is a flaw that does not reduce the usability of a product, but still deviates from standards and specifications. Examples of minor defects could be an unclipped thread, untrimmed seam allowance, or slubbed yarns in the fabric.

4 Quality control to developing a sampling plan

Although quality has been incorporated into each product up to this point, products are selected for audits and sorted into acceptable or unacceptable categories prior to shipment to their final destination. There are many types of samples including random, representative, convenience, stratified, constant percentage, and systematic samples. A random sample is where every item has an equal chance of being selected.

A representative sample includes a planned variation of items in a ratio that is appropriate. A convenience sample is made up of items that are easier to inspect over others and not random. A stratified sample is selecting a sample when a large lot of similar items exist. A constant percentage sample is sampling with a known constant percentage regardless of lot size to determine the sampling size. A systematic sample consists of items from equal intervals of time or the same location.

Types of sampling plans include lot-by-lot sampling, lot-by-lot sampling by attribute, skip-lot sampling, continuous production sampling, and arbitrary sampling.

5 Post-production quality evaluation

Post-production quality evaluation in the apparel industry includes wear testing for realistic reactions to everyday scenarios and testing with a simulation study when a consumer's reliability is in question. In wear testing, which is sometimes called product testing, companies provide a small group of consumers with products. Consumers are contracted to wear garments under certain stated guidelines and requirements in order to determine whether

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they meet the company's intended performance criteria. Consumers report back to the company and identify issues with the product before an entire production lot of garments are produced. Testing with a simulation study is similar to wear testing, but a consumer's safety might be in question. Companies would test items like helmets with a simulation prior to producing an entire production lot, or would test the effectiveness of nonskid shoes on wet surfaces. Appearance retention and care are other aspects of post-production quality evaluation.

Types of defects in garment industry

A **Critical defect:** A defect that is likely to result in a hazardous or unsafe condition for the user or that is in contradiction to mandatory Regulations.

B **Major defect:** A defect that is likely to result in failure, reducing usability of the product for its intended purpose and obviously appearance defects affecting the sell ability of the product.

C **Minor defect:** A defect that does not reduce the usability of the product for its intended purpose, but it is nevertheless a workmanship defect beyond the defined quality standard.

D **Unacceptable remarks:** A fault which does not neither render a product hazardous nor unusable nor hinders the sale nor affect the overall quality of the finished product and its intended use, it is not fully in accordance with the customer specific requirements or it is not defined in the clients requirements.

E **Pending remarks:** A fault which results from a non compliance with the applicable standard or major deviation which are common to the entire production or lot. Example: Documents, marking or components which are not complying with the safety standard or with the established requirements or sampling not among the required quantity of finished products.

Cost of Quality Control System

Cost of Quality in Apparel Industry

The term Cost of Quality (COQ), refers to the costs associated with providing poor quality product or service. Quality is one of the least understood subjects in the apparel industry. The problem is that most of the apparel manufacturers, barring exceptions, do not realize the real cost they pay for ignoring quality.

The amount of money going down the drain could be as high as 20 to 25% of the total manufacturing costs. This cost incurred due to poor quality is called Cost of Quality. A greater understanding of cost of quality can surely help reduce these costs and improve profitability of the operations.

Cost of Quality (COQ) in the apparel industry is still a widely understood misconception. The term often gets associated incorrectly with the price of creating quality merchandise. Actually, it is the other way round i.e. the amount of money incurred because the product was not manufactured right at the first time. Thus, the concept of quality costs in the garment industry is a means to quantify the total cost involved in quality-related efforts and deficiencies pertains to a manufactured apparel product.

Although it is not very easy to calculate COQ for any industry, research shows that the costs of poor quality can range from 15%-40% of business costs (e.g. rework, returns or complaints, reduced service levels, lost revenue).

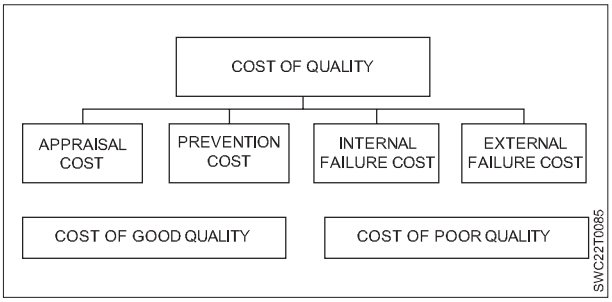
Most of the apparel units do not know what their quality costs are because they do not keep records on a daily basis. A large portion of resources is consumed in finding and correcting mistakes in the merchandise or related processes. Typically, the cost to eliminate a failure in the customer phase is five times greater than it is at the merchandise development or manufacturing phase.

Every time work is redone, the cost of quality increases. The obvious examples in the apparel industry include

- The reworking of a garment
- The retesting of performance of apparel
- The rebuilding of a garment machine
- The correction of an apparel size specification sheet or change of care label
- The reprocessing of garment to improve dimensional stability after wash or the replacement of a trim to fulfill the requirement of a customer or to meet safety issues.

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In general, the cost of quality has two main components: the cost of good quality (or the cost of conformance) and the cost of poor quality.



The cost of poor quality affects internal and external costs resulting from failing to meet the requirements specified for an apparel product by the garment industry.

On the other hand, the cost of good quality affects the cost for investing in the prevention of non conformance to requirements and the costs for appraising the apparel product for conformance to requirements.

1 Appraisal Cost (AC)

These costs are associated with the suppliers' and customers' evaluation of purchased materials, processes, products, and services to ensure that they conform to specifications.

- Audit Cost- It is related to the working of the quality system and its audit.
- Verification Cost- It is related with verification of incoming material, the system set up verification
- Calibration Cost
- Testing Cost

2 Prevention Cost (PC)

These costs incurred during preventing defects. These are planned and proactive approaches and are done before the actual failure of products or services.

- Quality Planning- Planning for a specific order, planning for quality checkpoints
- Quality Assurance- Creation of Quality System
- Quality Training- Training for a new style of system
- Quality Systems- Investment in Quality related software or information system

3 Internal Failure Cost (IFC)

This is the cost that incurs before the product is dispatched to the buyer.

- Rework Cost
- Scrap/Reject Cost
- Re-Inspection Cost
- Wastages (storage/ movement/ over processing etc.)
- Failure Analysis Cost (FMEA/RCA)

4 External Failure Cost (EFC)

This is the cost that incurs when defects are discovered by customers or buyers. This indicates the failure of the quality system of the factory. Various heads under this are:

- Repair Cost
- Claims from Buyer
- Returns
- Loss of Reputations

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Identification of Critical Factor

Total quality management (TQM) is a philosophy and approach that aims to achieve customer satisfaction, continuous improvement, and employee involvement in all aspects of an organization's operations. TQM can help organizations improve their performance, efficiency, and competitiveness, but it also requires a commitment and a strategy to implement it successfully.

1 Leadership and vision

One of the first and most critical success factors for implementing TQM is having a clear and shared vision of what TQM means and how it can benefit the organization. The top management and leaders of the organization need to communicate this vision to all employees, and demonstrate their commitment and support for TQM through their actions and decisions. They also need to empower and motivate employees to participate in TQM activities, and provide them with the necessary resources, training, and feedback.

2 Culture and values

Another key success factor for implementing TQM is creating and sustaining a culture and a set of values that support TQM principles and practices. A culture of TQM is one that fosters customer focus, teamwork, collaboration, learning, innovation, and quality awareness. A set of values of TQM is one that emphasizes trust, respect, honesty, integrity, and responsibility. The organization needs to align its policies, procedures, rewards, and recognition systems with its culture and values, and encourage employees to adopt and uphold them.

3 Processes and tools

A third essential success factor for implementing TQM is designing and improving the processes and tools that deliver value to customers and stakeholders. The organization needs to identify and map its core and supporting processes, and measure their performance in terms of quality, cost, time, and customer satisfaction. The organization also needs to use appropriate tools and techniques, such as quality planning, quality control, quality improvement, and quality assurance, to analyze, monitor, and enhance its processes. The organization should also seek to eliminate waste, variation, and defects, and optimize its resources and capabilities.

4 Customers and stakeholders

A fourth vital success factor for implementing TQM is understanding and meeting the needs and expectations of customers and stakeholders. The organization needs to identify who its customers and stakeholders are, and what they value and require from its products and services. The organization also needs to collect and analyze data and feedback from customers and stakeholders, and use it to improve its quality standards, specifications, and outcomes. The organization should also strive to exceed customer and stakeholder satisfaction, and build long-term relationships with them.

5 Employees and teams

A fifth important success factor for implementing TQM is engaging and developing the employees and teams that contribute to the organization's quality. The organization needs to involve and empower employees and teams in TQM initiatives, and provide them with opportunities to learn, share, and improve their skills and knowledge. The organization also needs to foster a climate of trust, cooperation, and problem-solving among employees and teams, and recognize and reward their achievements and contributions. The organization should also promote a sense of ownership, pride, and accountability among employees and teams for their quality performance.

6 Continuous improvement and innovation

A sixth and final success factor for implementing TQM is pursuing and sustaining continuous improvement and innovation in the organization's quality. The organization needs to establish and follow a systematic and structured approach to continuous improvement and innovation, such as the Plan-Do-Check-Act cycle, or the Define-Measure-Analyze-Improve-Control methodology. The organization also needs to encourage and support creativity, experimentation, and risk-taking among employees and teams, and leverage their ideas and suggestions for quality improvement and innovation. The organization should also monitor and evaluate its quality results and impacts, and seek to learn from its successes and failures.

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Objective

At the end of this lesson you shall be able to

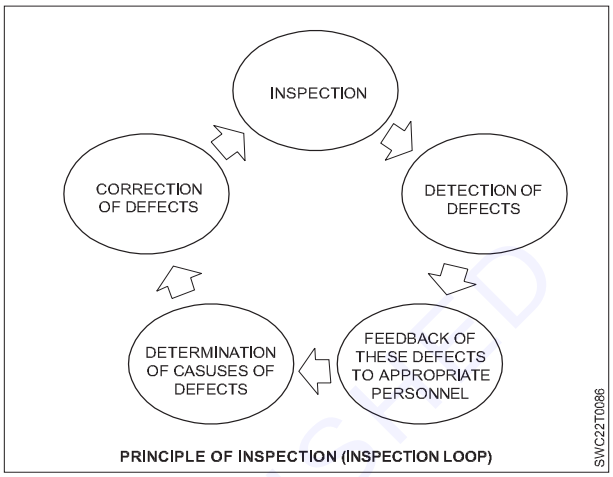
- explain about the inspection and its types.

Inspection

Principle of Inspection (Inspection Loop)

Garments inspection is an important term in the readymade garments sector. Quality inspector is the main in apparel inspection, who certifies the garments export order, whether it is perfect for shipping or not. The quality inspector has to ensure perfect quality according to the buyer's instruction in various stages of garments inspection.

In garment industry, company has Quality Assurance department, they inspect from fabric to finished product. From Buyer side also Quality Assurance Manager inspect overall quality standard of the production till shipment.



PRINCIPLE OF INSPECTION (INSPECTION LOOP)

Type of Inspection

Types of Inspection

The following are the available sampling-methods that are widely used for ensuring the desired quality of garments manufactured by using various types of fabric:

1 No inspection

2 100% Inspection

3 Spot checking

4 Arbitrary sampling

5 Acceptance sampling

No inspection:

In this method, the garments can be bought or sold without any inspection. But it can't get any idea about the defects of garments. The use of this method is rare in garments industries.

100% Inspection:

A hundred percent (100%) inspection means every unit must be inspected. In this system, it is decided about every unit would be granted or rejected instead of a lot of garments to be granted or rejected. It can have an idea about the quality of garments by this system. It is also informed that all the defects are identified by 100% inspection. Also informed that, if 100% of inspections are done then needs more time and cost.

Spot checking:

This is the middle position of 100% inspections and no inspection methods. The goods which are made for **shipment** are inspected randomly. In this method, the result is found minimum.

Arbitrary sampling:

This type of system is the most popular and widely used in the apparel manufacturing sector. Whatever the lot size is, a 10% sample of the lot is collected and inspected and will decide the lot of garments to be granted or rejected. Both the advantages and disadvantages are found by applying this method.

Acceptance sampling:

In this system, samples are collected and inspected statistically from the lot size and will decide the lot of garments to be granted or rejected. This system is used for inspection of raw materials before garments production, in the production period, and for finished garments after production. This method is widely used and internationally recognized and accepted. There are a lot of advantages and disadvantages are found in this system. The most

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useful advantage of this system is controllable and minimum risk of accepting the wrong decision. This system for inspection is more practical and economical.

AQL – Acceptable quality level

AQL (Acceptable Quality Limit) Sampling is a method widely used to define a production order sample to determine if the entire product order has met the client's specifications. Based on the sampling data, AQL standard can help the customer can make an informed decision to accept or reject the lot.

AQL (Acceptable Quality Limit)

Sample size code letters	
Lot or Batch Size	Sample size code letter
2 to 8	A
9 to 15	B
16 to 25	c
26 to 50	D
51 to 90	E
91 to 150	F
151 to 280	G
281 to 500	H
501 to 1200	J
1201 to 3200	K
3201 to 10000	L
10001 to 35000	M

AQL (Acceptable Quality Limit)

Sampling Plans									
Sample Size Code Letter	Sample Size	Acce ptable Quality Level							
		2.5		4		6.5		10	
		Ac	Re	Ac	Re	Ac	Re	Ac	Re
A	2	0	1	0	1	0	1	1	2
B	3	0	1	0	1	0	1	1	2
c	s	0	1	0	1	0	1	1	2
0	8	0	1	1	2	1	2	2	3
E	13	1	2	1	2	2	3	3	4
F	20	1	2	2	3	3	4	s	6
G	32	2	3	3	4	s	6	7	8
H	so	3	4	s	6	7	8	10	11
J	80	s	6	7	8	10	11	14	15
K	125	7	8	10	11	14	15	21	22
L	200	10	11	14	15	21	22	21	22
M	315	14	15	21	22	21	22	21	22

For example, assume 'lot size' is 5000 pcs, need take the lot size between 3,201 pcs to 10,000 pcs and the code letter is "L".

The code letter is "L", and then can sample size to draw 200 pcs randomly from the total lot size.

AQL standard differ from buyer to another buyer and company to another company based on the brand standard.

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For example, AQL level is 2.5, if 10 are defects found then lot is accepted if more than 10 defects are found then the lot is getting rejected.

AQL (Acceptable Quality Limit)

Sample size code letters	
Lot or Batch Size	Sample size code letter
2 to 8	A
9 to 15	B
16 to 25	c
26 to 50	D
51 to 90	E
91 to 150	F
151 to 280	G
281 to 500	H
501 to 1200	J
1201 to 3200	K
3201 to 10000	L
10001 to 35000	M

AQL (Acceptable Quality Limit)

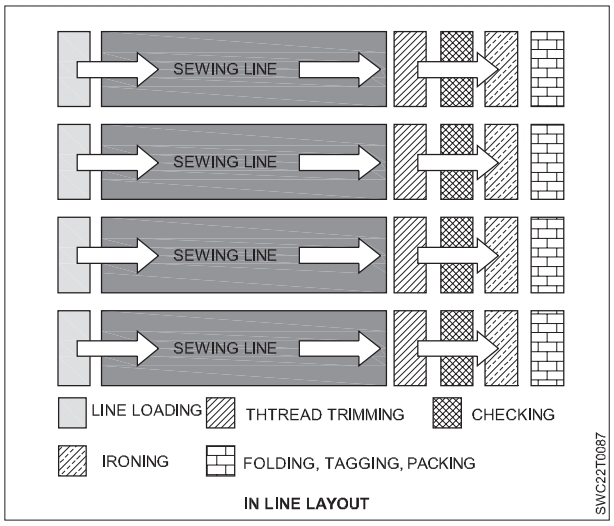
Sampling Plans									
Sample Size Code Letter	Sample Size	Acce ptable Quality Level							
		2.5		4		6.5		10	
		Ac	Re	Ac	Re	Ac	Re	Ac	Re
A	2	0	1	0	1	0	1	1	2
B	3	0	1	0	1	0	1	1	2
c	s	0	1	0	1	0	1	1	2
0	8	0	1	1	2	1	2	2	3
E	13	1	2	1	2	2	3	3	4
F	20	1	2	2	3	3	4	s	6
G	32	2	3	3	4	s	6	7	8
H	so	3	4	s	6	7	8	10	11
J	80	s	6	7	8	10	11	14	15
K	125	7	8	10	11	14	15	21	22
L	200	10	11	14	15	21	22	21	22
M	315	14	15	21	22	21	22	21	22

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Stage of Apparel Inspection

To maintain and control the quality, the quality control department in apparel industry divides the work into different stages of manufacturing.

During production inspection or Inline Production



- Collars & Cuffs matching,
- Sewing threads matching,
- Cutting patterns,
- Stitching,
- Absence of stitching,
- Needle holes & marks,
- Unbalanced sleeve edge,
- Unbalanced placket,
- Open seam,
- Puckering,
- Garment length,
- Shoulder length,
- Body width,
- Shoulder length,
- Placket width,
- Placket length,
- Armhole,
- Arm Opening,
- Sleeve length,
- Rib or Collar width,
- Hemming width,
- Neck width,
- Neck opening,
- Incorrect side shape,
- Broken & Missing stitch,

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- Bottom hem bowing,
- Uneven neck shape,
- Cutting shapes,
- Stitching defects,
- Measurements,
- Buttons,
- Trims & Accessories,
- Labels.

Finishing inspection:

- Finished products checked for measurement, fabric defects, construction and appearance and fit and drape on a live model or mannequin.
- Garment Zones- Areas which according to their visibility levels to the customer are accorded a status and the acceptance or rejection of the defect is prioritized according to the area or zone in which it occurs.
- Based on the kind of defects occurring in specific zones, decisions are taken to accept or reject the product.

Zone 1or A- areas with high visibility that is likely to be viewed at close distance at time of purchase. Shirts fronts till waist, back till a/h, bottoms- front; flared skirt- till low hip

Zone 2 or B – areas which are not visibly dominant but are visible in normal use. Front waist area, back from A/h to 10 cm above hem, bottoms- back.

Zone 3 or C- areas normally hidden in everyday use but could be visible on occasions. Shirt side seams, hem area, bottoms- hem of a long skirt full trouser- between knee and hem area, inseam area.

- Poor Ironing,
- Dirt's& Stains,
- Back Board,
- Collar Stay,
- Butterfly,
- Neck Board,
- Carton,
- Draw cord,
- Size strip,
- Pocket flasher,
- Hangtag,
- Photo-in-lay,
- Price ticket,
- Polybag,
- Tissue paper.

Final inspection:

Types of final inspection.

- No inspection
- 100%inspection
- Spot checking
- Arbitrary sampling

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- Statistical sampling – AQL
- Shade variation from one part to another part of garments,
- Garments measurement with the allowance from buyers provided measurement chart,
- Collar and sleeves balanced,
- Pockets correct,
- Absence of fabric faults and stains,
- Appearance correct,
- Patterns matching,
- Absence of miss stitching,
- Seams finished correctly,
- Accessories correctly applied and working,
- Correct labeling.

Role of Inspector

QC inspectors should take care during their garment inspection procedure in five fundamental steps:

1 Measuring Garment Dimensions

Ensuring that the dimensions of garments observe with their specified sizes is especially important when a part or the entire garment manufacturing process is done by hand, which can result in large margins of error compared to the accuracy of machined cutting and sewing.

Nevertheless, no matter how exact the manufacturing process, there will always be discrepancies in dimensions. If these are not spotted before the garments leave the factory, risk of customer complaints or entire batches being recalled, and ultimately failure in brand loyalty.

Specifying tolerances for garment dimensions

Quality Control (QC) inspectors and the supplier should be well informed of acceptable tolerances for garment dimensions, which determine an acceptable margin of error for any defects or discrepancies found to 'pass' or 'fail' garments.

Tolerances for acceptable margins of error can vary for different parts of the garment, depending on their significance to the entire garment. For example, a sleeve being too long or short by 1/8 inch may be an acceptable margin of error and still pass, but 1/2 inch difference would be marked as a fail.

The acceptable tolerances for margins of error should be clearly specified on the QC inspectors' checklist.

2 Physical tests of buttons, zippers and other accessories

A zip that comes off after little use could indicate that the manufacturer is using inferior accessories, or a button coming loose could identify weak stitching.

These are defects which QC inspectors should look for with physical testing methods such as 'pull tests' and 'fatigue tests' on garment accessories such as zippers, snaps, ribbons and elastic. The tests are performed on a designated number of garments in each batch.

Pull test

Predominantly used to test zippers, a QC inspector uses a gauge to pull the accessory with a predetermined amount of force for 10 seconds.

Fatigue test

This test determines whether the accessory will last as long as intended under normal use by the consumer. A typical test on a snaps or buttons would be to repeatedly button and unbutton the accessory 50 times and check for any damage to the garment after testing.

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Stretch test

Testing elastic bands and straps for proper elasticity and to check whether the elastic or stitching stands up to being pulled or stretched. Stretch tests only need to be carried out on a small selection of finished garments.

3 Fabric Density & Composition Tests

Testing the density or thickness of fabrics used in garment production determines whether the fabric meets the correct quality standards. A fabric that's too thin or not dense enough could mean the manufacturer isn't using fabric of the quality have specified to ensure the garment has a significant lifetime under normal wearing and washing.

There are three fabric density and composition tests which QC inspectors can carry out on site:

Fabric GSM check

QC inspectors use an electronic balance to measure the grams per square meter (GSM) of a sample of the fabric and compare that measurement with the customer's specifications.

Stitches per inch (SPI) check

QC inspectors simply count the number of stitches in a square inch of sample garments. The higher the SPI, the more durable the fabric and the less likely it will stretch or fall apart during normal wear and washing.

Material composition check

Verifying the composition of fabrics used in garment production is important due to the legal requirements of correctly labeling garments, as well as ensuring that the manufacturer is not using inferior materials. If for example a garment label states that the garment is 100% wool or leather, this must be verified by qualified QC inspectors. If subsequent inspections by authorities reveal that the fabric is not as labeled, then they will do fine and penalty.

An experienced QC inspector can judge the composition of fabrics from a hands-on inspection carried out at the factory. However, most garment importers demand third-party lab tests with proper equipment and controls to ensure transparency.

4 Label Verification

As mentioned above, correct labeling is essential for complying with garment labeling requirements for destination markets in Europe and the US. Incorrect or missing labeling could mean fines for the importer as well as having the product rejected by Customs.

The US Textile Fiber Products Identification Act stipulates that garment labels must include the following information:

- Fiber content of the garment
- Country of origin
- Identity of manufacturer / importer / distributor
- Care instructions for washing and ironing

There are specific labeling requirements for wool, leather and fur garments, as well as for footwear, for which the materials used in each part of the footwear item must be specified.

5 Packaging inspection

One of the final on-site inspections for garments before shipping from the factory is to ensure the packaging is suitable for the garments so they'll reach their destination in good condition.

Inadequate storage and packaging can lead to damage from moisture and soiling. One way manufacturers may attempt to mitigate moisture damage is to include a desiccant sachets but there are strict regulations governing the chemicals used in these moisture-absorbing packets.

Testing for DMF is a chemical test which should be carried out in a lab. Silica gels are a safe desiccant sachet ingredient. However, some manufacturers may use Dimethyl Fumarate (DMF) instead, which is banned in most developed destination markets due to its high toxicity and the allergic reactions consumers can suffer from contaminated garments.

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Packaging must also comply with destination market regulations such as clear labeling informing the consumer what the product is, what it's made from and where it came from, among other requirements which may be stipulated by consumer protection laws in different countries.

Benefits of Quality Control in Garment Industry

Quality control helps keep costs down by reducing rejections at every stage of production. Rejections mean wasted materials. For example, wasted materials could mean extra costs down the line when rework has to be done by hand instead of being machine-sewn automatically like it should have been originally.

- Ensures that the garment is manufactured according to the specifications laid out in the tech pack.
- Makes sure that the garment in the right size, color, shape, and quality.
- Helps reduce wastage and rejections due to incorrect measurements or materials used. This decreases costs significantly to avoid producing more products than necessary.
- Helps get collections out on time by avoiding production delays due to errors.
- Allow to deliver orders to customers well within the stipulated deadline.
- Empowers to build stronger work relationships with buyers, leading to more business in the future.

Quality Assurance System

Quality assurance is a process management activity that focuses on ensuring that the processes used to create a product produce as few defects as possible. QA activities are conducted with the goal of ensuring that processes are consistent and effective at producing their desired outcome.

The quality assurance is defined as follows "All the planned or systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality".

Basically quality assurance is a trouble shooter it arrests and rectifies the problem in the beginning only. In case of quality control the problem may be allowed to happen and then it is corrected, where as with quality assurance is enough. Precautions are taken that the problem is arrested in the beginning only and care is taken to see that the very root cause of the problem is rectified in the beginning only.

Thus the quality assurance in force there will not be any production of seconds or inferior quality goods where as with quality control in force there are chances that some seconds or inferior quality products may be produced.

1 Quality assurance vs quality control

Quality Assurance is defined as any action directed toward providing consumers with products of appropriate quality, thus QA identifies appropriate quality characteristics of the final product.

Quality Control consists of inspecting, and/or measuring quality characteristics, comparing them to a standard, and providing feedback for corrective action.

Any control system has 3 components:

- Standard or goal
- A means of measuring accomplishment
- Comparison of actual results with the standard, along with feedback to form the basis for corrective

2 The role of inspection in quality assurance

- To help make decisions on whether to accept or reject products based on specified quality characteristics
- To ensure that the product meets the specified quality characteristics

3 Quality control practices

- Design and develop with a view to avoiding potential manufacturing issues
- Establish tolerances and standards for reference

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- Understanding manufacturer capabilities
- Understanding material supplier capabilities
- Clear and detailed communication on requirements
- Respect design copyrights to avoid legal issues
- Develop policies for seconds or production overruns
- Be aware of international quality standards and legal requirements when going beyond domestic sales

Statistical quality control (SQC) is a scientific technique of controlling quality by means of statistical techniques.

Statistical Quality Control

Basic Terminologies

1 **Statistics:** Statistics means data, a good amount of data. Or simply, the collaborative study of accumulation, analysis, interpretation and presentation of massive volumes of data.

"Statistics are valuable representations of data that assist in the analysis and decision making process"

2 **Statistical tools:** Applications of statistical methods in order to visualize, interpret and anticipate outcomes over collected data.

3 **Quality** "a characteristic of fitness for purpose at lowest cost", or "degree of perfection that suffices the customer requirements". Quality can be defined as "the entirety of features and characteristics for products and services satisfying implicit and explicit demands of customers.

4 **Control:** An approach of measuring and inspecting a certain phenomenon for a product or a service, control suggests when to inspect, and how much to inspect. The system includes feedback to understand the causes for poor quality and necessary corrective steps. The control system basically determines the quality characteristics of an item, correlates the same with predefined quality standards and distinguishes between defective items from non-defectives ones.

5 **Quality control:** Quality control is one of the most important tools deployed to check the definite level of quality of products, or services. In today's highly competitive business environment, quality control has evolved as a prominent tool and a critical factor via any successful industry to ensure standard quality. In 1982, Peters and Waterman recognized quality as a crucial element in the virtue of excellence.

Therefore, quality control is the employment of appropriate techniques and activities in order to accomplish, sustain and upgrade the quality of products and services and to satisfy customer's needs in terms of price, safety, availability, reliability, usability, etc.

The method employs statistical techniques based on probability theory to establish standards of quality and uphold it in the most economical manner.

Making use of statistical tools and techniques in order to monitor and manage product quality across various industries including food, pharmaceutical and manufacturing units, and the process is named as Statistical Quality Control. The method can be conducted as

- A part of production process,
- A part of last-minute quality control check
- A part of eventual check by quality control department

The main advantages of SQC are as follows

i It gives an early warning of defects. It provides a means of detecting errors at beginning.

ii Rework and scrap are minimized. Statistical Quality Control avoids the need for and costs of cent per cent inspection by pointing out trouble spots.

iii SQC helps to maintain customer relations by ensuring uniformly high quality.

iv It helps to avoid unnecessary machine adjustments so long as the process is in a state of control.

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v Provides a basis for attainable specifications.

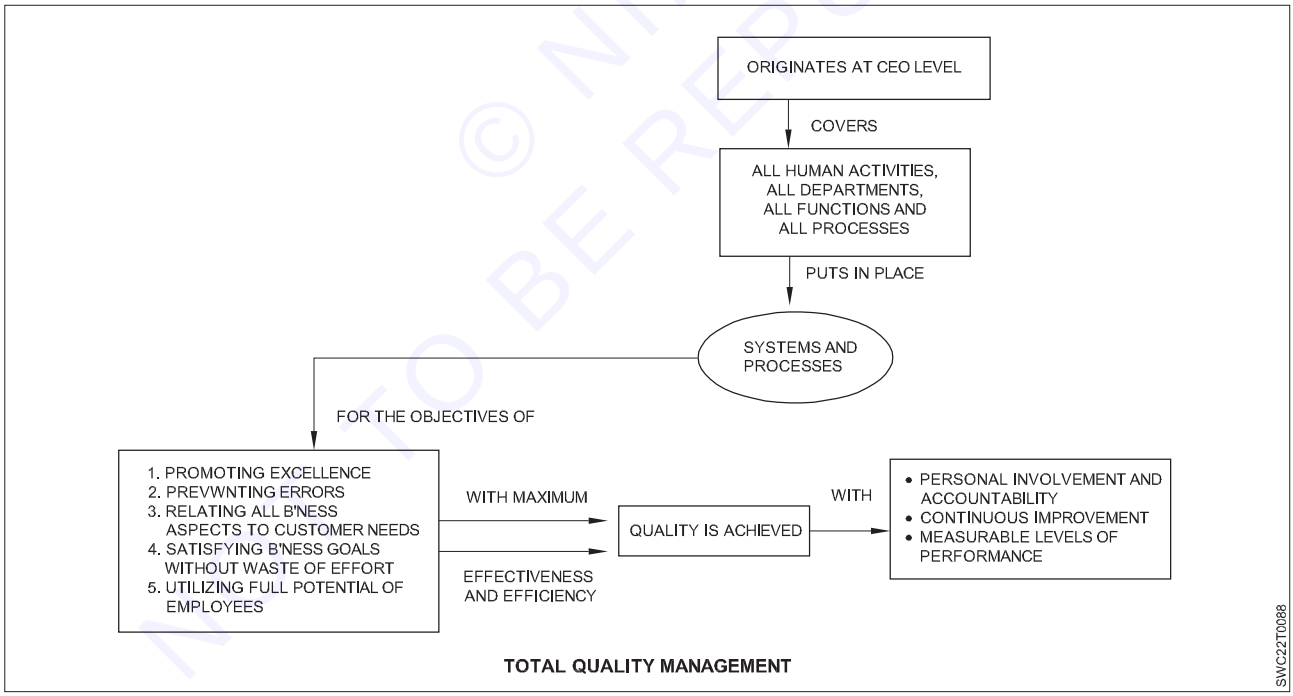
vi It serves as a means of determining, the capability of the manufacturing process to turn out products with prescribed specifications. Thus Statistical Quality Control tends to prevent production or purchase of bad items and therefore, it is superior to inspection.

Total Quality Management

TQM is a philosophy or approach to management that can be characterized by its principles, practices, and techniques. Its three principles are customer focus, continuous improvement, and teamwork. Each principle is implemented through a set of practices, which are simply activities such as collecting customer information or analyzing processes. The practices are, in turn, supported by a wide array of techniques. Successful implementation of TQM requires commitment from top management. No Quality management system can bring overnight improvements. It is sustained effort towards excellence at each level. Top management should lead by example. This can be demonstrated by top management through active participation in TQM related activates.

TQM is a Journey not destination. TQM aim's at zero defects in each functional areas viz. operations, quality, marketing, utility, service, etc.

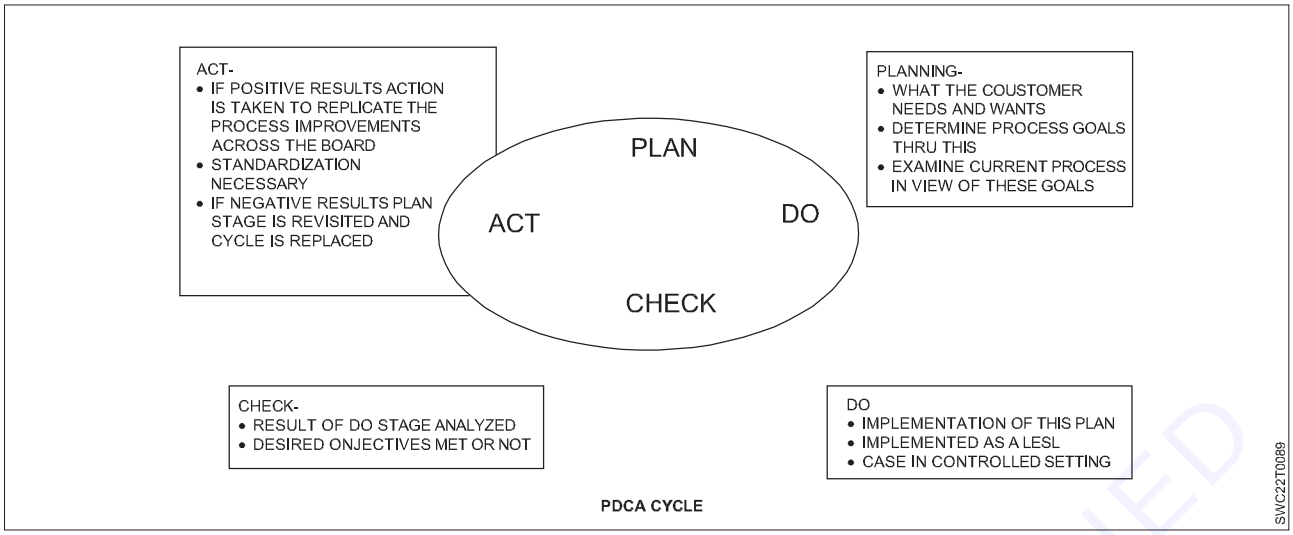
- A set of principles, tools and procedures that provide guidance in the practical aspects of customer focus, quality, continuous improvement and involvement of all personnel.
- It is a corporate business management philosophy embodying customer needs with the business philosophy.
- Aim of TQM is contented customers, empowered employees, increased revenue and reduced expenses.
- TQM strategies like SPC, reduce internal competition, foster teamwork, improve decision making processes and reduce costs.



TOTAL QUALITY MANAGEMENT

- Deming approach-systematic improvement of quality by the application of Deming cycle or the PDCA cycle.
- One of the earliest proponents of continual improvements and customer satisfaction which laid the foundation of TQM by giving Deming`s 14 rules/principles.
- As per De. Deming- Customer is the most important part of the production line. Customers need to be not only satisfied but delighted with your products and services
- So company policy should be to develop products and services ahead of customer demands and not wait till the customer needs them.

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PDCA CYCLE

Strategy Is To Build Quality In To The System

Techniques that can be used-

- Six Sigma tools,
- Poka–Yoke Device,
- Preventive Maintenance Techniques (TPM)
- Benchmarking,
- use of Quality circles,
- Kaizen improvement methods etc.

Six Sigma

- 5-S-(Sort, set in order, Shine, Standardize, Sustain)
  - Foundation Phase
  - Sustenance Phase
  - Maximize plant up time
  - Instrument & system Calibration
  - Break through Improvement
- Started in 1979 at Motorola.
- It is a business process that allows companies to drastically improve their bottom line by designing and monitoring their everyday business activities in ways that minimize waste and resources while increasing customer satisfaction.
- a new definition of quality focusing on achieving 'VALUE ENTITLEMENT' .i.e
- For the company – can have a rightful expectation to produce quality products at the highest possible profits.
- For the customer –they have a rightful level of expectation to buy high quality products at the lowest possible costs.
- Higher sigma values indicate better product and lower values represent less desirable products regardless of what the product is.
- Higher the sigma level, fewer the no. of defects per unit of product.
- Products produced at SIX SIGMA level of quality operate virtually defect free.
- Sigma means the delivering of goods/services within six standard deviations of a desired result.
- Statistically –a defect rate of less than 3.4 defects per million opportunities or 99.9997% perfection.

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Poka–Yoke Device

- These are simple devices/controls which permit the detection of abnormalities as they occur in the process and shut down the operation if necessary. e.g, a limit switch that will not allow the machine to start if a work piece is loaded incorrectly.
- key is to determine when and where defect causing conditions arise

Preventive Maintenance Techniques (TPM):

TPM (Total Productive Maintenance) is a holistic approach to equipment maintenance that strives to achieve perfect production:

- No Breakdowns
- No Small Stops or Slow Running
- No Defects

In addition it values a safe working environment:

- No Accidents

TPM emphasizes proactive and preventative maintenance to maximize the operational efficiency of equipment. It blurs the distinction between the roles of production and maintenance by placing a strong emphasis on empowering operators to help maintain their equipment.

The implementation of a TPM program creates a shared responsibility for equipment that encourages greater involvement by plant floor workers. In the right environment this can be very effective in improving productivity (increasing up time, reducing cycle times, and eliminating defects).

Benchmarking:

Benchmarking is a powerful tool for improving your performance in Total Quality Management (TQM). It involves comparing your processes, products, and outcomes with those of the best performers in your industry or sector. By learning from the best practices of others, you can identify gaps, set goals, and implement changes to enhance your quality and efficiency.

Types of benchmarking:

1 **Process benchmarking**

The initiating firm focuses its observation and investigation of business processes with a goal of identifying and observing the best practices from one or more benchmark firms. Activity analysis will be required where the objective is to benchmark cost and efficiency; increasingly applied to back-office processes where outsourcing may be a consideration.

2 **Financial benchmarking**

Performing a financial analysis and comparing the results in an effort to assess your overall competitiveness.

3 **Performance benchmarking**

Allows the initiator firm to assess their competitive position by comparing products and services with those of target firms.

4 **Product benchmarking**

The process of designing new products or upgrades to current ones. This process can sometimes involve reverse engineering which is taking apart competitors products to find strengths and weaknesses.

5 **Strategic benchmarking**

Involves observing how others compete. This type is usually not industry specific meaning it is best to look at other industries.

6 **Functional benchmarking**

A company will focus its benchmarking on a single function in order to improve the operation of that particular function. Complex functions such as Human Resources, Finance and Accounting and Information and Communication Technology are unlikely to be directly comparable in cost and efficiency terms and may need to be disaggregated into processes to make valid comparison.

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Use of Quality circles

A group of workers who do the same or similar work, meeting regularly to identify, analyze and solve work-related problems. Participation is voluntary, takes place during work hours, and the group consists of three to twelve members. The circle team members present their improvement solutions to management. Ideally workers then implement the solutions themselves. This furthers employee motivation and satisfaction.

Advantages of Quality Circles helped fuel their growth.

- Promotion of teamwork
- Develops employee positive attitudes
- Positive working environment
- Increased quality and productivity

Disadvantages if not addressed:

- Employees not sure of the purpose
- Not enough relevant training
- Participation not voluntary
- Little or no management support
- Quality Circles are not empowered to make decisions

The Quality Circle movement took off in India. As of 2008, the Quality Circle Forum of India (QCFI) reported the existence of 6450 circles. For a discussion of the Global spread of Quality Circles around the same time frame.

Quality Circles were introduced into the healthcare arena. Now, in Europe there is widespread use in healthcare in over twenty countries.

Kaizen improvement methods

Kaizen is a compound of two Japanese words that together translate as “good change” or “improvement.” However, Kaizen has come to mean “continuous improvement” through its association with lean methodology and principles.

Kaizen is an approach to creating continuous improvement based on the idea that small, ongoing positive changes can reap significant improvements. Typically, it is based on cooperation and commitment and stands in contrast to approaches that use radical or top-down changes to achieve transformation. Kaizen is core to lean manufacturing and the Toyota Way. It was developed in the manufacturing sector to lower defects, eliminate waste, boost productivity, encourage worker purpose and accountability and promote innovation.

10 principles of Kaizen

Because executing Kaizen requires enabling the right mindset throughout a company, 10 principles that address the Kaizen mindset are commonly referenced as core to the philosophy. They are:

1 Let go of assumptions.

2 Be proactive about solving problems.

3 Don’t accept the status quo.

4 Let go of perfectionism and take an attitude of iterative, adaptive change.

5 Look for solutions as you find mistakes.

6 Create an environment in which everyone feels empowered to contribute.

7 Don’t accept the obvious issue; instead, ask “why” five times to get to the root cause.

8 Cull information and opinions from multiple people.

9 Use creativity to find low-cost, small improvements.

10 Never stop improving.

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To be successful implementing TQM, an organization must concentrate on the eight key elements:

1 Ethics

2 Integrity

3 Trust

4 Training

5 Teamwork

6 Leadership

7 Recognition

8 Communication

Key Elements

TQM has been coined to describe a philosophy that makes quality the driving force behind leadership, design, planning, and improvement initiatives. For this, TQM requires the help of those eight key elements. These elements can be divided into four groups according to their function. The groups are:

I Foundation – It includes: Ethics, Integrity and Trust.

II Building Bricks – It includes: Training, Teamwork and Leadership.

III Binding Mortar – It includes: Communication.

IV Roof – It includes: Recognition



I Foundation

TQM is built on a foundation of ethics, integrity and trust. It fosters openness, fairness and sincerity and allows involvement by everyone. This is the key to unlocking the ultimate potential of TQM. These three elements move together, however, each element offers something different to the TQM concept.

1 Ethics – Ethics is the discipline concerned with good and bad in any situation. It is a two-faceted subject represented by organizational and individual ethics. Organizational ethics establish a business code of ethics that outlines guidelines that all employees are to adhere to in the performance of their work. Individual ethics include personal rights or wrongs.

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2 Integrity – Integrity implies honesty, morals, values, fairness, and adherence to the facts and sincerity. The characteristic is what customers (internal or external) expect and deserve to receive. People see the opposite of integrity as duplicity. TQM will not work in an atmosphere of duplicity.

3 Trust – Trust is a by-product of integrity and ethical conduct. Without trust, the framework of TQM cannot be built. Trust fosters full participation of all members. It allows empowerment that encourages pride ownership and it encourages commitment. It allows decision making at appropriate levels in the organization, fosters individual risk-taking for continuous improvement and helps to ensure that measurements focus on improvement of process and are not used to contend people. Trust is essential to ensure customer satisfaction. So, trust builds the cooperative environment essential for TQM.

II Bricks

Basing on the strong foundation of trust, ethics and integrity, bricks are placed to reach the roof of recognition. It includes:

4 Training – Training is very important for employees to be highly productive. Supervisors are solely responsible for implementing TQM within their departments, and teaching their employees the philosophies of TQM. Training that employees require are interpersonal skills, the ability to function within teams, problem solving, decision making, job management performance analysis and improvement, business economics and technical skills. During the creation and formation of TQM, employees are trained so that they can become effective employees for the company.

5 Teamwork – To become successful in business, teamwork is also a key element of TQM. With the use of teams, the business will receive quicker and better solutions to problems. Teams also provide more permanent improvements in processes and operations. In teams, people feel more comfortable bringing up problems that may occur, and can get help from other workers to find a solution and put into place. There are mainly three types of teams that TQM organizations adopt:

A Quality improvement teams or excellence teams (QITs) – These are temporary teams with the purpose of dealing with specific problems that often recur. These teams are set up for period of three to twelve months.

B Problem solving teams (PSTs) – These are temporary teams to solve certain problems and also to identify and overcome causes of problems. They generally last from one week to three months.

C Natural work teams (NWTs) – These teams consist of small groups of skilled workers who share tasks and responsibilities. These teams use concepts such as employee involvement teams, self-managing teams and quality circles. These teams generally work for one to two hours a week.

6 Leadership – It is possibly the most important element in TQM. It appears everywhere in organization. Leadership in TQM requires the manager to provide an inspiring vision, make strategic directions that are understood by all and to instill values that guide subordinates. For TQM to be successful in the business, the supervisor must be committed in leading his employees. A supervisor must understand TQM, believe in it and then demonstrate their belief and commitment through their daily practices of TQM. The supervisor makes sure that strategies, philosophies, values and goals are transmitted down through out the organization to provide focus, clarity and direction. A key point is that TQM has to be introduced and led by top management. Commitment and personal involvement is required from top management in creating and deploying clear quality values and goals consistent with the objectives of the company and in creating and deploying well defined systems, methods and performance measures for achieving those goals.

III Binding Mortar

7 Communication – It binds everything together. Starting from foundation to roof of the TQM house, everything is bound by strong mortar of communication. It acts as a vital link between all elements of TQM. Communication means a common understanding of ideas between the sender and the receiver. The success of TQM demands communication with and among all the organization members, suppliers and customers. Supervisors must keep open airways where employees can send and receive information about the TQM process. Communication coupled with the sharing of correct information is vital. For communication to be credible the message must be clear and receiver must interpret in the way the sender intended.

There are different ways of communication such as:

A Downward communication – This is the dominant form of communication in an organization. Presentations and discussions basically do it. By this the supervisors are able to make the employees clear about TQM.

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B Upward communication – By this the lower level of employees are able to provide suggestions to upper management of the affects of TQM. As employees provide insight and constructive criticism, supervisors must listen effectively to correct the situation that comes about through the use of TQM. This forms a level of trust between supervisors and employees. This is also similar to empowering communication, where supervisors keep open ears and listen to others.

C Sideways communication – This type of communication is important because it breaks down barriers between departments. It also allows dealing with customers and suppliers in a more professional manner.

IV Roof

8 Recognition – Recognition is the last and final element in the entire system. It should be provided for both suggestions and achievements for teams as well as individuals. Employees strive to receive recognition for themselves and their teams. Detecting and recognizing contributors is the most important job of a supervisor. As people are recognized, there can be huge changes in self-esteem, productivity, quality and the amount of effort exhorted to the task at hand. Recognition comes in its best form when it is immediately following an action that an employee has performed. Recognition comes in different ways, places and time such as,

- Ways – It can be by way of personal letter from top management. Also by award banquets, plaques, trophies etc.
- Places – Good performers can be recognized in front of departments, on performance boards and also in front of top management.
- Time – Recognition can give at any time like in staff meeting, annual award banquets, etc.

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Module 6 : Special Sewing Machine & their Working Principle

LESSON 34 - 36 : Introduction & scope of apparel industry

Objectives

At the end of this lesson you shall be able to

- explain about the sewing machine, it parts and function
- state the technical terms
- describe about the fusing Interesting & it types, sewing components, sewing needles, sewing threads, stitches, seams and types of motors and belt.

With a glorious history, the textile industry in India is one of the country's oldest industries. The garment industry, which makes up a significant portion of India's exports, is labour-intensive and is divided into two main categories. The unorganized sector, which includes handlooms, handicrafts, and sericulture, is the first. These industries are run on a modest scale and with traditional equipment. The second is the organized sector, which consists of spinning clothing and other items. This industry uses contemporary equipment and methods, which create economies of scale.

Everything we wear belongs to the apparel industry, which is one of the most unique sectors. Given that it is a labour-demanding and blooming business, it must best display innovation and individuality. Students studying apparel production receive training in a variety of areas related to this industry, including designing, patternmaking, scheduling, manufacturing, and many more. The area of apparel production has a broad reach and numerous effective methods. When it comes to selecting a career after graduation, it becomes the best choice for creative personalities.

Apparel manufacturing

Producing clothes is another name for manufacturing apparel. It is the process of making clothing out of fabric. The term "apparel manufacturing" is used when clothing is actively produced at a factory in large numbers. It involves supervising all processes involved in producing ready-to-wear clothing, including managing all connected activities.

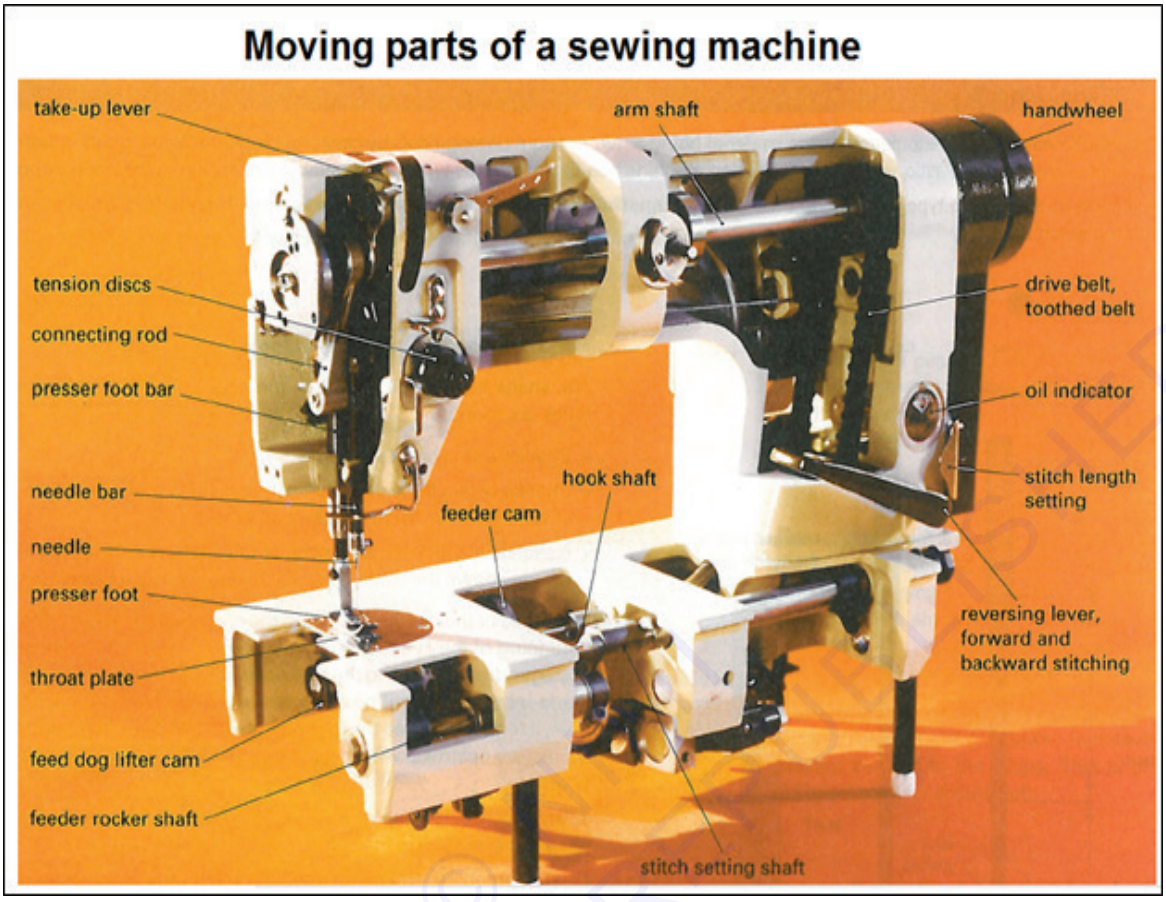
Scope: The second-largest employer in India after agriculture, the garment industry employs an estimated 32 million people and produces everything from fibre to clothing. Millions of households depend on the apparel industry for their livelihood, but it also serves as a storehouse for traditional skills and cultural history and a conduit for heritage and custom. One of the oldest businesses in the Indian economy is clothing. With over 11% of all exports, the manufacturing industry is one of India's major export contributors. Apparel manufacturing requires a lot of labor.

The growth and overall development of this industry directly affect India's growth in the economy.

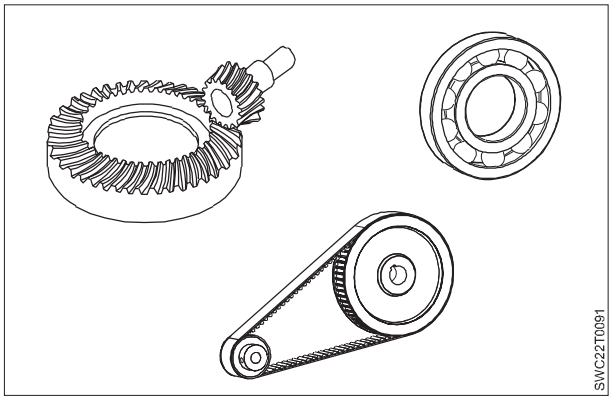
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Sewing machines, their models, parts and their functions

Moving parts of a sewing machine



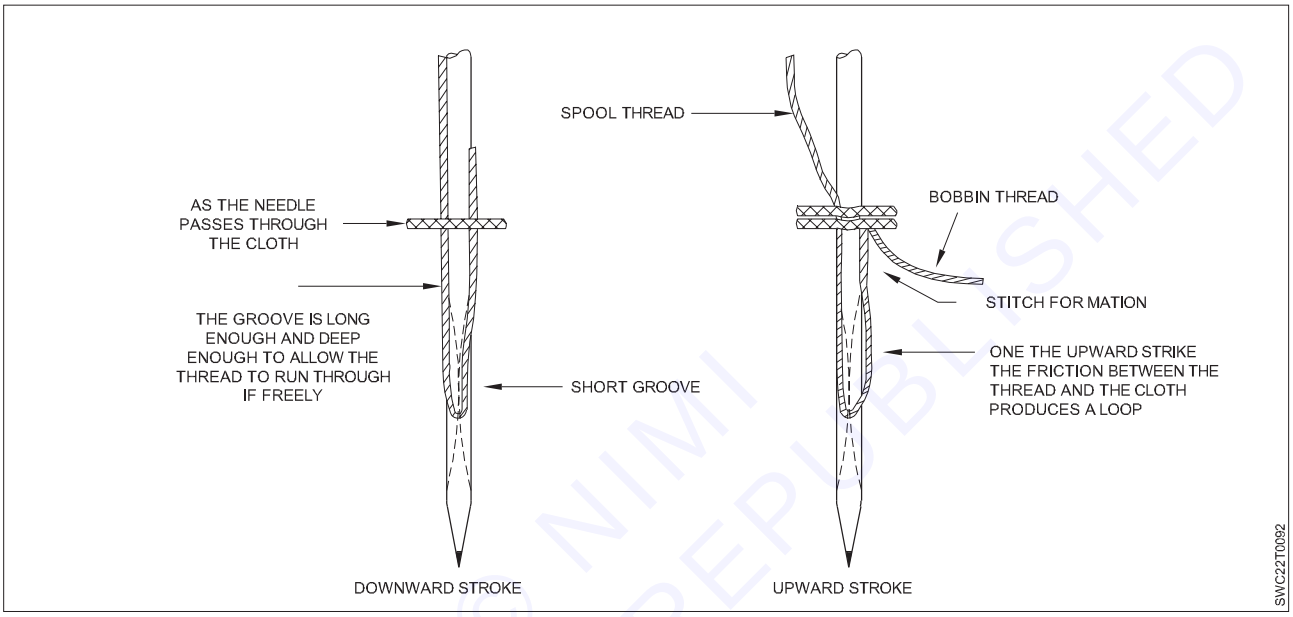
- Main mechanical element of the Integral Sewing Unit (ISU).
- The horizontal component of the casting (horizontal arm) houses the top shaft this is often the main drive shaft.
- The top shaft is usually driven by a V-belt connected to the drive motor pulley wheel and the balance or hand wheel of the top shaft.
- The top shaft is supported at both ends of the horizontal arm on bearings, which are lubricated by gravity or a splash feed oil system. On standard machines and by a pressure-fed system on high-speed seamers.
- The top shaft imparts movement upon all other driven mechanisms within the sewing head by way of a toothed (timing) belt or rigid drive shaft and gears to the bottom shaft which drives all the mechanisms below the bed including feed and stitch forming elements.
- The top shaft generates the needle bar movement and the action of the needle thread take-up mechanism.



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- The rotary motion of the top shaft is transformed into a reciprocating vertical movement by means of loose pin connections to a balanced cam on the end of the top shaft; this constitutes the needle bar drive assembly.
- As with the standard machine, the needle thread take-up is driven by an eccentric cam and pivot coupling on the top shaft. It is the bottom shaft that drives the fabric feed mechanism via ancillary shafts often referred to as rocker bars. These impart the forward and backward motion onto the feed dog along with the rise and fall of the device.
- It is the bottom shaft that drives the stitch-forming mechanisms, which operate below and/or around the fabric plies.

Needle & loop formation



Motions in a sewing machine

The following applies to the lockstitch machine illustrated above.

The top shaft is driven from the motor via the drive belt. The bottom shaft is driven from the top shaft via the toothed belt and gear wheels.

The rotary hook is driven by the hook shaft.

The feed dog is raised by the feed dog lifter cam and driven forward by the feeder rocker shaft. Co-ordination of feeder bar and needle bar is controlled by the feeder cam.

The incremental feed length is determined by the stitch length setting, the stitch setting shaft and the feeder rocker shaft.

The top shaft is provided with a crank and connecting rod, which convert the shaft's rotation into the vertical movement of the needle bar.

Stitch formation parts

Name	Function	Name	Function
Needle	Guides the needle thread through the material being sewn and forms a loop.	Tension discs	Ensures the correct tension for proper stitch formation
Rotary hook	Catches the thread loop and lays it around the under-thread spool.	Presser foot	Presses the material being sewn against the feed dog and the throat plate. Facili tates stitch formation and feeding.

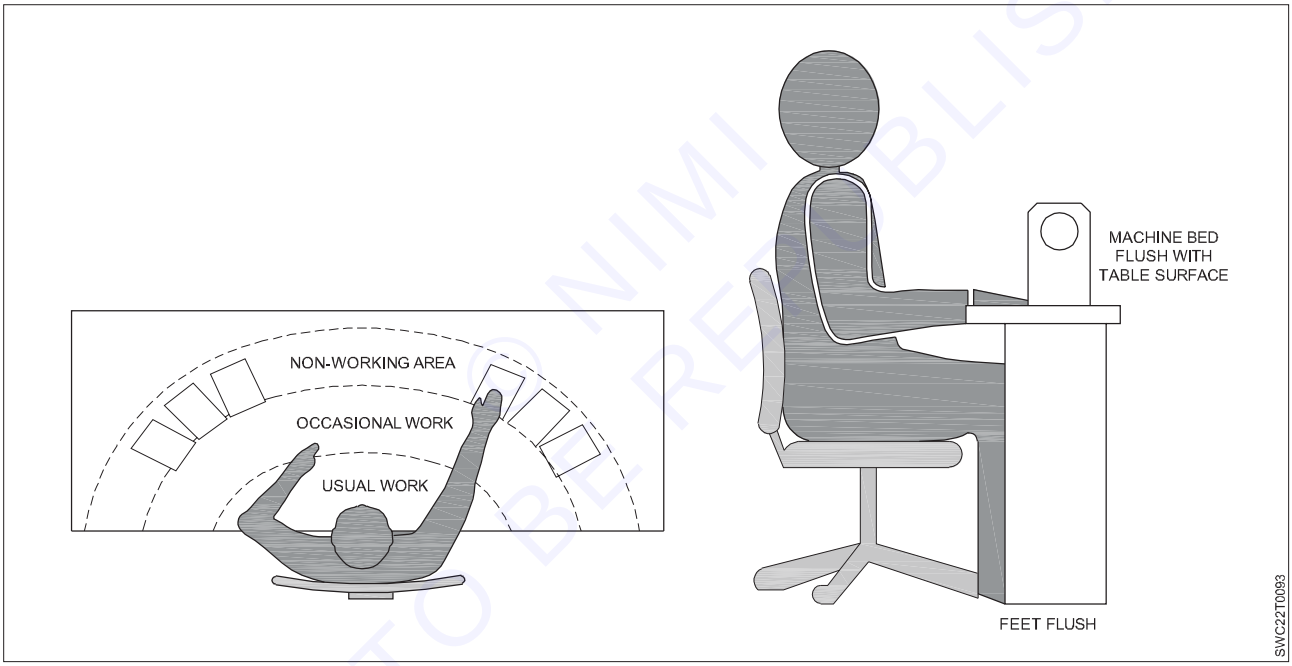
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Take-up lever	Draws the needle thread from the bobbin. Releases the required length of thread for stitch formation. Tightens the stitch.	Throat plate Feed dog	Provides openings for the needle and the feed dog. Moves the material forward, by one stitch length, after each stitch has been drawn.

Ergonomics for effective work

Ergonomics is the study of the relationship between a person and their work environment. The objective is to adapt to the workplace for the worker in order to decrease the risk of injury and improve the link between the worker and their environment.

Ergonomics aims to make sure that tasks, equipment, information and the environment suit each worker. It is indeed a highly interdisciplinary field which helps the worker to attain higher productivity due to less fatigue, safer working environment (fewer accidents), lesser absenteeism and reduced labour turnover.



Ergonomics is an important consideration in the design of workplace in the apparel industry. Here are some examples of how ergonomic principles can be applied in the design of apparel industry workplaces:

1 Workstations and equipment should be designed to accommodate a range of body sizes and shapes, to reduce the risk of musculoskeletal disorders (MSDs) and other injuries.

2 The height of workstations and equipment should be adjustable, to accommodate workers of different heights and to allow for changes in posture throughout the day.

3 The layout of the workspace should be designed to minimize the need for workers to reach or twist, which can increase the risk of MSDs.

4 Lighting should be sufficient and appropriately placed to reduce eye strain and other visual discomfort.

5 Chairs should be adjustable and provide adequate support for the lower back, to reduce the risk of back pain and other MSDs.

6 Footrests should be provided for workers who spend long periods of time standing, to reduce the risk of leg and foot pain.

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7 Noise levels should be minimized where possible, to reduce the risk of hearing damage.

8 Equipment and tools should be designed to reduce the amount of force required to operate them, to reduce the risk of MSDs.

9 Floors should be slip-resistant and free from trip hazards, to reduce the risk of falls.

10 Adequate ventilation should be provided to reduce the risk of exposure to harmful substances.

By incorporating ergonomic principles into the design of the workplace, apparel industry employers can help to improve worker safety, comfort, and productivity, and reduce the risk of workplace injuries and illnesses.

Ergonomics is the study of designing and arranging work environments and systems to improve human performance and safety. In the apparel industry, incorporating ergonomics can bring several advantages, including:

1 **Improved comfort and safety for workers:** Apparel manufacturing involves a lot of repetitive motions, such as cutting, sewing, and pressing. Ergonomic designs of workstations and equipment can reduce physical strain on workers and help prevent musculoskeletal disorders (MSDs) such as back pain, neck pain, and carpal tunnel syndrome.

2 **Increased productivity:** Ergonomics can also help increase productivity by reducing the time and effort required to perform tasks. By designing workstations and tools that are comfortable and easy to use, workers can complete tasks more efficiently and with fewer errors.

3 **Better quality of products:** Ergonomic designs can help improve the quality of the finished product. For example, ergonomic cutting tables can ensure accurate and consistent cutting of fabric, while ergonomic sewing machines can help prevent fabric distortion and improve seam quality.

4 **Cost savings:** Incorporating ergonomics in the design of apparel workstations and equipment can also lead to cost savings. By reducing the risk of worker injury and MSDs, employers can save on medical costs and workers' compensation claims.

Overall, incorporating ergonomic design principles in the apparel industry can result in a safer, more efficient, and higher quality work environment, which benefits both workers and employers.

The designing of the workplace in the garment industry should always apply the five principles of ergonomics:

1 Ergonomic principles in designing a workplace.

2 Ergonomic principles in designing working processes.

3 Ergonomic principles in determining working time.

4 Ergonomic principles in handling material and tools.

5 Ergonomic principles in designing an environment.

1 Ergonomic principles in designing a workplace

- The designing of the workplace should be such that the work performed should be either in sitting or standing posture.
- Workplace height should be such that a standing work can be replaced by a sitting one upon requirement.
- There should be enough space for the operator to stretch his legs comfortably in his workplace.
- Everyone is of different height, so to perform the operation at the most suitable posture either sitting or standing the height of the table or chair should be adjustable.
- There should of armrest for the operator if the work he is performing requires so.

2 Ergonomic principles in designing working processes

- While performing the operation the posture should be such that the operator has to apply a minimum amount of energy to complete the operation.
- The work should be organized for easy and natural repetitions.
- Only when there is a requirement of higher force by hand or movements standing posture is to use. Examples of such can be cutting, pressing, etc.

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- Work should be such that there is a use of both hands simultaneously whenever possible.
- The operators should be able to free his/her hands from the work whenever possible and while serving the tools or machines operated by feet.
- Workplaces should be designed such that the operator has a clean line of sight for the work that he is operating. E.g.- For a sewing workplace, the table should be placed such that it allows for a favorable sitting posture which includes the slightly bent upper part of the back, easy rotation of the body upon requirement, minimum of eye rotation (~10°) while sewing. This achieves higher visual accuracy and accurate management of the operation.
- The workstation around the operator should be calibrated in such a way that along with visual acuity the operator should have the ability to perform a simultaneous movement of hands, legs, and torso.

3 Ergonomic principles in determining working time

- Production time should be only determined for the operator who is skilled enough for the job and has average experience. This way productivity of the operator can be estimated with greater accuracy.
- While calculating the average time taken for operation considerations should be taken for pause for handling loads, improper body posture in work and monotony as they seriously affect the average time due to fatigue.
- Additional time which includes a lunch break, break for physiological needs, etc. should also be taken into consideration.

4 Ergonomic principles in handling material and tools

- Garment components should be placed in such a way that there is a minimum of movement by the operator in retrieving the pieces. By doing this much of the valuable time can be saved.
- The operator should be free from transport procedures as much as possible.
- All the material pieces, tools, etc required in the operation should be positioned close to the operator to avoid bending the body on retrieval.
- There is a certain recommended limit of forces that should be followed while performing lifting operations under favorable conditions. For permanent lifting operations, the allowed load should be of 176N for men &98N for women. Similarly, for occasional lifting, it is 490N for men and 294N for women. This becomes important while textile transport especially while taking textile to the cutting table.

5 Ergonomic principles in designing an environment

- Whether using daylight or artificial illumination the intensity, distribution, and type of illumination should prevent any strain on eyes.
- Appropriate intensity, type of illumination, distribution should be there for different operations. Such as checking operations require a much higher intensity of light.
- Individual sources of light should be provided for sewing dark material and intricate topstitch.

Interiors/Activities	Lux Value
Workstations and external areas	200
Washing, ironing	300
Design, pattern drawing	750
Printing	750
Automatic fabric printing	500
Cleaning, sewing,	600-1000
Quality Control	1000
Dyeing	500

- Workroom temperature should be adjusted such that it does not cause fatigue to the employees and also higher temperature differences will result in discomfort ultimately resulting in lower productivity.

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- The minimum work area per person should be $4m^2$.
- Noise and vibrations should also be taken care of as prolonged exposure to such can cause unrest among the worker and can result in fatigue, insomnia, ear damage, increased blood pressure and many other problems. For standard value, noise should not exceed 50dB for intellectual work, 70dB from office and similar work, 90dB for other types of work.
- Color of the workplace also plays an important role as it gives the feeling of warmth or coldness to the workers. There have been various studies that proved that brighter colors have a pleasant effect on the workers increasing their concentration, mood, and speed of work whereas cold and dark colors create a feeling of apathy, bad mood, and sleepiness of workers.
- There should be proper hygienic conditions around the workplace provided with an adequate number of washrooms.
- Workplace should be kept clean all the time.
- Various studies have shown that music removes fatigue among workers, reduces monotony and anxiety at work. Thus, music can be played at intervals to boost up the workers.

Technical terms & their use in the trade

1 **Centimeter:** For measurement of a piece-length, numbers are given in inch-tape and meter.

2 **Inch tape:** It is an old term, being used for measuring by the tailor these days for their convenience. This has become very popular in tailoring.

3 **Paper pattern :** When full draft according to measurement is prepared on a paper and cut, it is called paper pattern.

4 **Layout :** When a complete pattern is spread on a cloth to see that which part is adjustable on which place then it is called layout.

5 **Inlays and turning:** After the layout some space for stitching is left (which is help full in cases when an extension of the garment is required), then the same is called inlay and turnings. Whose signs may be seen on the layout.

6 **Arm hole:** The round shape of arm hole, which is made for fixing the sleeves is called arm hole.

7 **Skirt in :** In order to provide expansion in a garment, some excess of cloth is taken to make it pleats or gathered and narrowed at the waist which the expansion remains in the lower side-this is called skirt.

8 **Bottom :** Bottom is the last end of the length of garment worn on the upper part as well as on the lower part of the body. As bottom of skirt, bottom of pant. In tailor terms it is called bottom.

9 **Hem:** Finishing of any bottom by hand stitch is called hem.

10 **Hem line:** That line of a garment where its bottom is turned is called hem line.

11 **Trims :** The things which are used for decorating a garment is known as trims (material) piping ribbon etc.

12 **Lining and interlining:** Lining is that piece of cloth that touches the body and is placed under the original cloth. Interlining is a layer of tatron that is placed between original cloth and lining in order to make it stiff. It is called interlining because it is placed between two clothes. As in the case of collar, cuff or front portion of coat, there is stiffness because of this interlining.

13 **Finishing:** Finishing of a garment includes the works like cutting the extra strings bulging at places, cutting the threads of seams, lining etc. By pinking scissors, to make the work complete.

14 **Tight fitting:** The garments, which cleave the body, are called tight fitting garments. As blouse, hip tight pant, old ladies shirt.

15 **Loose fitting:** The garment which is loosely fitted on the body is known as loose fitting garment, as modern ladies, shirt, night suits etc.

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16 **Leg length:** In the lower body garment, below the body-rise inner part of the leg is known as leg length. Inner part of the sleeve is also known as leg length.

17 **Opening:** In order to put the garment on a body, in tight places of it, some type of opening is kept, as front of shirt, sleeve etc.

18 **Placket:** The place cut for opening is provided with one or two bands to finish. It is called placket.

19 **Bias band:** Take a squares piece of cloth and cut a band for piping or false- hem from it in the diagonal shape this is called bias band. It has a greater elasticity. If it is cut at 45 diagonally, then it is better.

20 **Semi-bias band:** When the cloth taken is rectangular in place of squarish, and a diagonal band is made out of it for false-hem or piping there that shall be less biased. That is called semi-bias band.

21 **Slit:** When the opening is not overlapped, it will be called slit. As side opening for ladies, shirt, made or bur shirt.

22 **Vent:** When the opening is overlapped, then it is called vent. As opening for coat or safari.

23 **Pitch point:** Pitch point is given for joining sleeves with a tight fitting garment. For giving a pitch point, arm hole of the garment is caught at shoulders, seams and stretched up to side seams, and the place where there happens to be the half of the arm hole, a small cut is given by scissors. This small cut is known as pitch point. Side seam of the sleeve is joined with this pitch point and basted. This small cut is kept always at the front part of the garment.

24 **Facing:** The band which is given in any upper body garment, for folding (forward or backward) is called facing. It is kept ranging from 4cm to chest/12+1.5 cm in different types of garments. In addition to this any part of the garment which is used for giving finishing to any type of opening of neck or arm hole or otherwise just like bias or simple band is also called facing.

25 **Overlapping:** After giving facing a line of 1.5 cm is kept while drafting. Its purpose is that even when the open garment is overlapped, it does not seem to open, and by providing neck or its collar do not appear to be slant.

26 **Velt:** A pocket band is given on the chest line on the left side of jacket and coat, is called Velt its band is ¾; or 2 cm in length.

27 **Turning:** Bottom fold is called turning.

28 **Turning up:** It is usually given in pants and gents half sleeve garments. After turning one more fold is given. Sometime full fold is given and sometime the fold is clipped. This has because an old fashion now.

29 **Alteration:** When there is a fault in any stitched garment. The same is rectified. It is called alteration. As rectifying looseness on the shoulder etc.

30 **Fork:** In the lower body garments, the circle which is made from seat line to top line is known as circle of fork. In addition, if hip in a pyjama is to be extended, a piece is provided, that is also called fork piece or gusset.

31 **Seat:** Hip of gents is known as seat.

32 **Jetting:** A band of the original cloth is fixed at the mouth of pocket, in order that the cloth (lining) inside the pocket is not visible. It is called jetting.

33 **Fly:** Fly is used for finishing the gents garment having opening. Three flies are used in the left side. That is the to say in order to cover button or zip, fly, in used.

34 **Button take:** It is used on the right side of a pant or a short button or zip is fixed on button take. It is in the shape of fly but for fixed button, it is called button take.

35 **Press seam:** It is normally used on the biased portion. After giving plain seam, the same is clipped. Then of its flap is caught to provide it whit another seam at a distance of one point inside the formal seam. This seam is give to strengthen the biased seam in a garment.

36 **Width of cloth:** Width wise yarn used in cloth, are called width of cloth.

37 **Grain line :** Grain line is the direction of yarns in a fabric which are length wise in length and width wise in width.

38 **Selvedge :** Border line of the cloth. Finishing is given on the standard size piece-length so the strings do not bulge. The cloth has no flexibility in length while this flexibility is in its width.

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39 Lob mark : Stitching of gents wear is known as lob mark. It is a Urdu term which means edge in this sense. So the gents' wears don't have in leys.

40 Band: Band is used to make a garment with closed neck. It is used with or without or collar.

41 Buckram or tetran : These are used for beautifying a garment. Buckram is of simple quality while tetran is of specific quality.

42 Dapota: The band which given from outside, is provided with a pleat like band at its fold, it is called Dapota. It is also given on such a band at a small space which turns on a bigger space.

43 Flap: Flap is a piece of stitched cloth which is fixed to cover the pocket.

44 Gimp: The thick thread, which is inserted into the button hole through diagonal baste.

45 Diagonal bast : Diagonal baste is to use to fix the gimp all around button hole.

46 Tape: The band which is fixed on the mouth of pocket etc. So that edges do not stretch.

Typical Terms in Tailoring

47 Tailoring: Work of a tailor.

48 Cutting: Cutting of a cloth or to cut a cloth into pieces.

49 Stitching: Sewing.

50 Seams: Stitching or to join the two pieces.

51 Tucker: In order to decorate a garment, fine to coarse cloth is folder and stitched on it.

52 Darts: In order for bringing fitting and fullness in a garment. These are of two kinds-single edged and double edged. It used on ladies shirts.

53 Pleats: In order to decrease an extra cloth, it is taken from one place and put on another-this is called pleat.

54 Fish: Single edged dart is called fish.

55 Bridle: In order to contain the diagonal shape on the folding at level, a tape is given, it is called bridle. It is kept 4 cm wide so that half of it may remain inside while the other half may remain outside.

56 Balanced marks: Balance marks are basis of the fitting of a garment, as it is necessary to adjust front portion of a pant with the marks on the back portion, otherwise crease will be disturbed. This is also marked as.

57 Balance notches: The small cuts given on the edge of balance marks are called balance notches.

58 Chirak : If while stitching legs. Balance marks are not adjusted, then crease of the pant shall be disturbed. This is called Chirak.

59 Bagging : The looseness around the lower portion of the back of a pant is called bagging.

60 Closing : Seal of any placket is called closing.

61 Cut on double : In tailoring except in case of pile fabric only, double layers are cut. This art is known as cut on double.

62 Fall of collar : The outer portion of the collar that extends to the band is called fall of collar.

63 Stand of collar : The place where collar turns is called stand of collar.

64 Flair: The extension of skirt is called flair, as skirt of frock, petticoat or skirt etc.

65 Button hole : Holes for putting in buttons is button hole.

66 Button hole stand : In delicate garment to contain the strings for making button holes, diagonal baste is done. It is called button stand.

67 Yoke: Width of shoulder is called yoke. The band which is used for extending the length of the cloth or decorating designs etc. Is also known as yoke.

68 Button hole bar: Button hole seal is known as button hole bar.

69 Button and button hole stay : For giving perfection to button or button hole, a small piece of cloth is put under them, that is called button and button hole stay.

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70 **Bound button hole:** In coarse clothes especially in ladies, coats, a piece of cloth is kept and stitched after folding for making a button hole, it is called bound button hole, it is called bound button hole. Method of making it is given in the picture.

71 **Pocket stay:** The band which is used for strengthening pocket on the back of a pant is called pocket stay.

72 **Pocket hang:** In order to contain the pocket from hanging, a band is fixed, it is called pocket hang.

73 **Laying:** Before making layout, the layers of the cloth are spread on the table. It is called laying. It is usually done in factories.

74 **Layout:** Spreading of the pattern and making marks on a laying cloth is called lay-out

75 **Lay marks :** Before lay out the marks which we put for drafting are called lay 75. Gathering : Two large stitching are given to mark plates. It is called gathering.

76 **Shearing:** After giving more than two stitches or drawing pursues by hand like zigzag is called shearing running stitches like zigzag is also known as shell gather age.

77 **Scye up and lower :** Usually used in coat sleeve. For making the balance of sleeve, where are holes are joined with the leg length in the up and down parts, are called scye. Back point is known as scye up and the forward point is known as scye down.

78 **Gorge :** Circle of the neck is known as gorge.

79 **Button neck :** Below the button and above the band a thread is rolled around the button, it is called button neck.

80 **Sleeve crown :** upper portion of the sleeve of coat is known as sleeve crown.

81 **Try on :** Try on is to take try of a garment s fitting.

82 **Padding :** In order to rise any portion of a garment, cotton or from pad is called padding.

83 **Teak :** The garment such as shirt, jackets, baskets, etc. In which back neck is raised 1 ½ to 2 cm as compared to the front side, is called teak. In such a necks, a band is always used.

84 **Margin:** The space left for inlay and turning is called margin.

85 **Fore pitch:** The cut which is given on arm hole for joining the sleeve of a coat, is called fore pitch.

86 **Back pitch:** The cut which is given on the are hole for joining the sleeve of a coat on the back is called back pitch.

87 **Iron speaking:** Press highly warm is known as iron speaking.

88 **Darning :** On wearing or tearing of tearing of a garment, darning is done according to its size for its repair.

89 **Patching :** Repairing a torn garment by a self piece is known as patching.

90 **Scallop :** The different type of cuts which are provided in garments for decoration are called scallop.

91 **Seam allowance:** The space left for stitching garments as margins are also known as seam allowance.

92 **Hump or hunch back:** Hunch backed person who has a hump on his back bone.

93 **Notches:** Special marks are made as teeth by small cuts. It known as notches.

94 **Press button:** It is also known as stitch button. It is of two parts. One part is known as male part and another is known as female part. Look at the picture.

95 **Hooks and eyelets:** It is helpful in closing the openings, is made of iron or brass. Look at the picture. Used in ladies or children garments.

96 **Style features :** The style of the garment as demanded by the customer, as written on the measuring booklet, large neck or small neck, sleeve cut etc.

97 **Dummy:** A figure similar to a human body stricture, on which fitting of a garment is made whit out head. Tailors use it for try purposes.

98 **Pattern:** When full measurement is drawn on a paper and ct accordingly. It is called paper pattern .

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99 **Scissors :** Main equipment for cutting a cloth. Without this cutting and embroidery work cannot be done. It is available in 3'' size to 10'' size.

100 **Shears:** Big scissor with 12'' and 14'' size is called shears. It is usually used for gents, garments and for cutting 2 or more layers in factories.

101 **Slant :** Slant is diagonal shape. Usually the pants side pocket which are made slant, are called slant pockets.

102 **Canvas:** Buckram this is stiff cloth which is fixed on the chest of coats, so that coat may appear beautiful on wearing in a canvas thread and hairs are woven to mark it stiff.

103. **Gusset :** Gusset is panel or panel for arm pit. Nowadays it has because a fashion for ladies garments to use it as long panel from waist line up to the bottom line.

104 **Tracing wheel :** This equipment is used for imitating marks of chalk from one layer of cloth to another exactly in the same design. It has small wheel teeth. Measuring 4'or 5'of a rod with its help marks are imitated on cotton, silk clothes. It does not imitate marks on woollen or polyester fabrics.

105 **Texture :** The surface of a fabric that may be soft, round, fine or smooth.

106 **Pile:** Upright end of the fabric as in fur, corduroy, towel.

107 **Face:** The right side or upper side of the cloth.

108 **Grain:** The length and width of the fabric.

109 **Warp:** Thread running in length of cloth.

110 **Weft:** Thread running across the cloth.

111 **Girth:** Circumference of edge of the garment in front and back as in shirt.

112 **Jetting:** A piece of fabric or piping of cloth for pocket.

113 **Fraying:** Turning of cut thread or slippage of thread.

114 **Drafting:** Drawing sketch of a garment by actual size or scale.

115 **Damp cloth:** A thin fabric used for pressing a garment to avoid spot rush, stain or scorching.

116 **Making up:** The conversion of fabric into garment.

117 **Mesh:** Opening or spacing between the thread.

118 **Melton:** A heavy milled woven cloth made with cotton warp and woollen weft used for drafting on table.

119 **Stay:** Small strips of linen canvas for strengthening the garment pocket and button stay.

120 **Preshrinking:** Treatment of texture before finishing to prevent shrinkage.

121 **Synthetic:** Artificially made fabric.

122 **Soaking:** Treatment applied for shrinkage.

123 **Fastenings:** It is a device to hold together separate parts of a garment (button, zip, etc).

124 **Mercerised:** The cotton material after going through a chemical process because more lustrous.

125 **Sizing:** A finishing process made on yarns and cloth to give strength stiffness and smoothness

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Safety during work

The garments industry is a place of thousands peoples work together. The safety risk is a big threat. Industry standards play a pivotal role in maintaining health and safety. Compliance with regulations, such as fire safety protocols and building codes, ensures that factories are equipped with appropriate emergency exits, fire suppression systems, and adequate escape routes. Regular inspections by regulatory bodies help identify and address any non-compliance issues. This proactive approach minimizes risks and encourages continuous improvement in safety practices.

Workplace Layout and Design

Creating a safe and comfortable working environment starts with an effective workplace layout and design. It is essential to ensure that the workspace is adequately sized to prevent overcrowding and allow for safe movement. Sufficient lighting and ventilation must be provided to minimize the risk of accidents and promote overall well-being. Hazardous areas or processes should be appropriately segregated to minimize exposure and potential harm to workers.

Machinery and Equipment Safety

Garment production often involves the use of various machinery and equipment. Regular inspection, maintenance, and servicing of these machines are vital to prevent accidents and injuries. Safety guards, emergency stop buttons, and other relevant safety features should be in place to protect workers from hazardous machine components. Furthermore, comprehensive training programs must be conducted to ensure that workers are proficient in operating machinery safely.

Handling Hazardous Substances

The use of chemicals and other hazardous substances is prevalent in the garments industry. It is imperative to establish proper storage, handling, and labeling procedures for these substances. Adequate personal protective equipment (PPE) must be provided to workers exposed to hazardous materials. Material Safety Data Sheets (MSDS) should be made available, ensuring that workers have access to crucial information about the chemicals they handle.

Fire Safety

The risk of fire is a significant concern in any manufacturing setting, including the garments industry. Employers must prioritize fire safety by installing and maintaining fire alarms, extinguishers, and emergency lighting. Clear evacuation routes, prominently displayed emergency exit signs, and regular fire drills are essential to ensure that workers can quickly and safely exit the premises in the event of a fire. Additionally, all employees should receive thorough training on fire safety protocols.

Ergonomics for Worker Well-being

The garments industry involves repetitive tasks and prolonged periods of standing or sitting. Proper ergonomics is vital to prevent musculoskeletal disorders and enhance worker well-being. Employers should provide ergonomic workstations and equipment that minimize strain and promote correct posture. Regular breaks, task rotation, and training on proper lifting techniques are essential to prevent work-related injuries.

Electrical Safety

Electrical safety is a critical aspect of maintaining a safe working environment. Compliance with electrical codes and regulations is essential to prevent electrical hazards. Regular inspection and maintenance of electrical systems and equipment should be conducted to identify and rectify any potential risks. Proper grounding, insulation, and protection measures must be implemented to safeguard workers from electrical accidents.

First Aid and Medical Facilities

Prompt access to first aid and medical facilities is crucial for the well-being of workers. Adequately stocked first aid kits should be readily available, and designated personnel should be trained to provide immediate medical assistance when needed. Additionally, arrangements should be made for workers to access medical facilities in case of emergencies or when medical attention is required.

Training and education

Comprehensive health and safety training is a cornerstone of ensuring a safe work environment in the garments industry. Regular training programs should be provided to all employees, including new hires and contractors. These programs should cover topics such as proper use of personal protective equipment (PPE), emergency procedures, hazard identification, and reporting mechanisms.

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First Aid

First aid refers to medical attention that is usually administered immediately after the injury occurs and at the location where it occurred. It often consists of a one-time, short-term treatment and requires little technology or training to administer. First aid can include cleaning minor cuts, scrapes, or scratches; treating a minor burn; applying bandages and dressings; the use of non-prescription medicine; draining blisters; removing debris from the eyes; massage; and drinking fluids to relieve heat stress. OSHA's revised recordkeeping rule, which went into effect January 1, 2002, does not require first aid cases to be documented. For example: A worker goes to the first-aid room and has a dressing applied to a minor cut by a registered nurse. Although the registered nurse is a health care professional, the employer does not have to report the accident because the worker simply received first aid.

Accidents and emergencies can occur at any time, leaving us in a tight spot. However, having a basic understanding of first aid safety rules can make a significant difference in saving lives and preventing further harm until professional help arrives. The golden rules of first aid that everyone should know to respond effectively in critical situations.

1 **Personal safety comes first:** The first and foremost rule of first aid is to ensure your own safety first. Assess the situation carefully before rushing to help. If there are ongoing dangers like fire, electrical hazards, or toxic fumes, it is crucial to remove yourself and others from harm's way before administering first aid. You cannot help someone if you become a victim yourself.

2 **Assess the situation and victim:** Once you've established a safe environment, assess the victim to determine the severity of their condition. Check for responsiveness by tapping the person gently and shouting to see if they react. If they don't respond, check for normal breathing. If the person is not breathing or only gasping for air, initiate CPR (Cardiopulmonary Resuscitation) immediately.

3 **Call for help:** One of the most important rules of first aid ever hesitate to call for professional medical help, such as emergency services or 112, even if you're not entirely sure of the severity of the situation. It is better to seek assistance early and let the professionals handle the situation if needed.

4 **Control bleeding:** If there is any bleeding involved, stopping the flow should be your immediate next step. Uncontrolled bleeding can be life-threatening, so it's essential to stop the bleeding as quickly as possible. Apply direct pressure on the wound using a clean cloth or bandage. Elevate the injured area if possible, and continue applying pressure until medical help arrives.

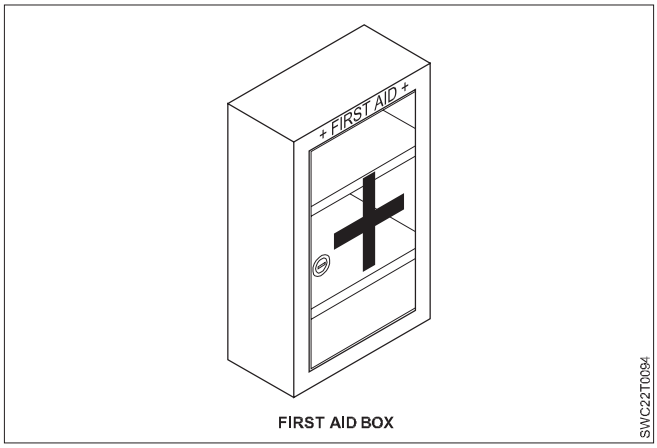
5 **Treat for shock:** Shock is a severe condition that can follow significant injuries. It occurs when there is inadequate blood flow to the organs and tissues. To treat for shock, lay the person down and elevate their legs if there are no spinal injuries. Keep them warm with blankets or clothing, and reassure them to help reduce anxiety.

6 **Be mindful of head and spinal injuries:** When dealing with a person who has sustained a head or spinal injury, avoid moving their head or neck unless necessary to maintain their airway. Stabilise the head and neck in the position found, and wait for medical professionals to take over.

7 **Attend to burns:** Burns can be painful and prone to infection. Immediately run cool (not cold) water over the burn for at least 10 minutes to help reduce pain and prevent further damage. Cover the burn with a sterile, non-stick bandage to protect it from infection.

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First Aid Box



FIRST AID BOX

Must-have things in your first aid box: First aid, as the name suggests is the initial help extended to an injured person until full medical care is available. First aid can make all the difference, if done in the right manner. It can ensure speedy recovery with the least damage and if gone wrong, can prove to be life-threatening. Keeping a well-equipped first-aid box at home is important for everyone as this is only what will help until you drive to the hospital or wait for the ambulance to come.

Antiseptic creams: Putting the adhesive bandage is the second thing to do when you get a cut or a wound. Cleaning the wound and putting the antiseptic lotion on it is the first step. Using antiseptic also avoids the formation of pus in your wound.

Adhesive bandages: Leaving a cut open is never a good idea as it makes you prone to infection later. Adhesive tapes come in many shapes and sizes so stock both small and big ones. You can also keep the ones that come for animals if you have a pet at home.

Tweezers: Tweezers are important to remove foreign objects lodged in the skin. They can also be used to remove ticks in dogs. Obviously, you keep two in that case. Never forget to sterilize the tweezers before keeping them back in the box after use. However, practice caution while using it.

Tape and sterile gauze: For profuse bleeding, you would need both these objects in order to create a larger tape. Put antiseptic cream and create a padding with the gauze to cover such wounds. This is good for kids and pets as they won't be able to remove it easily.

Muscle pain spray or tube: After headaches, muscle sprain and backache are the two most common problems people face. Spray when coupled with the heating pad is the best solution to such problems. Though one should use them in moderation as these sprays get absorbed in your bloodstream directly.

Pain relievers: Stocking basic painkillers is one of the most important things. Not only in your first aid box but carry these in your everyday bag too. Pop one until you meet the doctor.

Thermometer and medicine for fever: Your first aid box is for sure incomplete without a thermometer. In order to avoid taking unnecessary medicine, measure the fever before you pop a pill for the same.

Allergy medicine: Many people are allergic to some foods. Having these foods can cause them tremendous discomfort. So, if you or anybody in your family is allergic to any foods or anything else, keep the medicines for the same handy with you.

Don't just stock the essentials in the first-aid box and forget about it. Remember to clean and re-stock the medicines every month, because nothing can be worse than having expired medicines in the first-aid box at the time of emergency.

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Fusing Technology

The fusible interlining consists of a base cloth, which may be similar to that used for a sew-in interlining, and which carries on its surface a thermoplastic adhesive resin, usually in the form of small dots, which will melt when heated to a specific temperature.

Advantages of using fusible interlinings

- In most cases the use of fusible interlinings shortens manufacturing time with a consequent reduction in direct labour cost.
- There is a reduction in the skill required in many operations involving fusing compared with the sewing in of interlinings and this leads to a reduction in training time.
- It is easier to achieve consistent quality in the lamination process than it is with many of the operations of sewing in of interlinings, especially on modern lightweight fabrics.
- Fusible interlinings provide opportunities for alternative methods of garment construction; in some cases the interlining might be considered as a 'work aid'.

Requirements of fusing

The process of fusing interlinings to garments must fulfill certain requirements and avoid certain problems if the garment is to have a satisfactory appearance and performance throughout its life.

1 The laminate produced by fusing should show the aesthetic qualities required by the designer in the finished garment. This relates in particular to the stiffness or draping qualities of the garment. It is a matter of trial and error before manufacturing begins. The factors over which the garment manufacturer can exercise choice are the drape of the fusible's base cloth, and the type and quantity of the fusible resin forming the bond. Other fabric properties that could be affected adversely by the fusing on of interlinings are crease recovery and air permeability.

2 The strength of bond of the laminate must be sufficient to withstand handling during subsequent operations in the garment manufacturing process as well as the flexing that takes place in wear. The bond must resist either the temperature and degree of agitation of a washing and drying cycle, with perhaps subsequent ironing, or the solvents, temperature and agitation of a dry-cleaning process, and in some cases both. If there is not a complete and even bond over the whole surface of the laminate when first fused, or if delamination takes place at some stage in the garment's life, it will appear as a 'bubbling' in the outer fabric of the garment. Certain fabrics are particularly difficult to fuse to, notably shower proof rainwear fabrics. Both the shower proof finish on the fabric and its typically smooth, hard surface make a good bond difficult to achieve.

3 Fusing must take place without either strike-through or strike-back occurring. When the softened adhesive resin is pressed into the garment fabric, it is important that it does not go right through to the face side of that fabric, and that it does not go back to the outside of the interlining base cloth. These problems are known as 'strikethrough' and 'strike-back' respectively. If strike-through occurs it may show on the right side of the garment as a pattern of dots of resin; if it occurs on a garment subject to high temperature ironing such as a shirt collar, it may be picked up on the iron and lead to marking of the garment. If strike-back occurs, it can contaminate parts of the equipment used in the fusing process, and may also adhere to the garment lining during pressing.

4 The fusing process must not cause thermal shrinkage in the outer fabric. Fusing commonly takes place at around 150 °C and at this temperature any fabrics may be subject to thermal shrinkage. If this occurs, it can cause garments to fit together badly during manufacture and be incorrect in size after manufacture. To minimise shrinkage, some fusing presses have a preheat zone, set at a lower temperature.

5 A further possible effect of the heat of the fusing process is that of dye sublimation. Fabrics may change colour to a level that is unacceptable, causing a mismatch between the fused and unfused parts of the garment. This phenomenon can sometimes be pronounced. In one company, a polyester fabric was so affected by the fusing process that it was decided to send all the garment pieces through the press, whether or not they required the attachment of a fusible interlining. Only in this way could they avoid shading in the garments.

6 Since the fusing process involves pressure, there is a risk that pile fabrics may be subject to crushing during fusing. Fused and unfused parts of the garment, when sewn together, may have a different appearance.

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7 Where showerproof fabrics are fused, there is a possibility that the presence of a fused interlining in the garment may wick water through the fabric in the fused areas while the unfused areas remain satisfactorily Shower proofed. Water-resistant interlinings have been developed for these situations.

The fusing process

The means of fusing are temperature and pressure, applied over a period of time, usually in some kind of specialised fusing press.

In addition to the outer fabric of the garment, three factors determine the properties of the fused laminate:

- base fabric of the interlining
- type of fusible resin
- pattern of application of the resin to the base cloth

Base fabric of the interlining

Base fabrics are available in the woven and non-woven constructions described for sew-in interlinings and also as warp knits. The warp knits are either a lock-knit or weft insert construction. The most usual fiber is nylon, which gives very soft handle and draping.

Type of fusible resin

- Just as there is a range of stitch and seam types to achieve a range of assembly objectives and finishes, so there is a range of resin types to cover a range of laminating requirements. The choice of resin is restricted by limits imposed by the outer fabric, the fusing equipment to be used, the end use requirements, and the precise behaviour of the resins in response to heat.
- The particular requirements of resins are as follows:
- The fusing temperature needed must not be so high that it will damage the outer fabric or its colour. The usual maximum is 175 °C, with 150 °C most common.
- The fusing temperature needed must not be so low that the bond is inadequate to withstand garment making. The lower limit is generally 110 °C, although leather may require even lower temperatures.
- The resin must provide a bond that is suitably resistant to washing and/or dry-cleaning. The thermoplastic nature of the resin must be such that adjustment of temperature is sufficient to permit it to penetrate the outer fabric to give a bond, without fl owing excessively to give strike-through or strike-back. The resin must contribute to the achievement of the desired handle of the laminate.
- In the majority of end uses, the resin must be white or transparent. It must also have low dye retention properties.
- The resin must be harmless in processing and in end use.

Means of fusing

Fusing equipment must control three factors:

- temperature
- pressure
- time

Temperature

This must be high enough to achieve the necessary temperature at the glue line which will change the dry thermoplastic resin into a partially molten state in order that it will flow. For each resin there is a limited range within which the correct level of flow is achieved. Too low a temperature gives poor flow and poor subsequent adhesion. Too high a temperature gives too much flow, resulting in strike-back and strike-through and a reduction of performance in most respects.

Pressure

The equipment must provide enough consistent pressure to ensure intimate contact between interlining and outer cloth over the whole surface of the interlining. This ensures correct transfer of heat to the glue line and

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correct penetration of resin among the fibers of the outer fabric. Too low a pressure reduces penetration with consequent low adhesion. Too high a pressure provides excessive penetration of resin resulting in strike-back and strike-through.

Time

The equipment must give enough time to allow the temperature and pressure to induce melting of the resin and penetration of the outer fabric in order to produce a satisfactory bond; too much time may result in strike back and strike-through. It will be appreciated that if a thick fabric and an interlining are put into a heated press in a cool state, it may be several seconds before the resin reaches the required temperature.

Fusing equipment

The equipment used for fusing can be divided into:

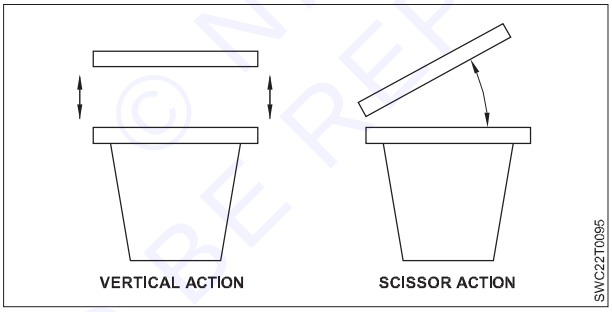
- specialised fusing presses
- hand irons
- steam presses

Specialised fusing presses

Flat bed fusing press

It consists of two horizontal metal platens between which the fabric and interlining laminate are sandwiched. The top platen is unpadded but the bottom platen has a resilient cover, typically silicone rubber, though it may be a felt pad. Both platens have an outer cover of PTFE, which can be cleaned easily to prevent straining and build-up of resin that would cause garment parts to adhere to the platen.

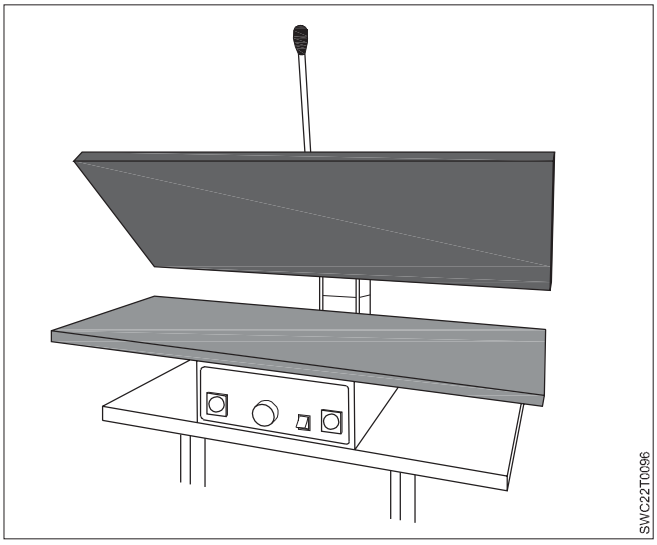
Heat is provided by electric elements, usually in the top platen only, but sometimes in the bottom as well. The elements provide a uniform temperature over the whole surface.



Flat bed fusing presses. (i) Vertical action. (ii) Scissor action.

The press manufacturer aims for a standard of control allowing a variation of 5 °C either way from the required temperature over the whole surface area. Pressure is applied by closing the platens together mechanically, hydraulically or pneumatically. The pressure system must be robust, provide accurate closing over a large area, and be free from distortion through heat, wear or mechanical faults. The resilient bottom cover should be changed regularly to avoid pressure problems. Vertical action closure gives more accurate pressure than the scissors action. Fusing time is normally controlled by an automatic timer, whose cycle can be varied to suit different requirements. It is typically of the order of 8–12 seconds.

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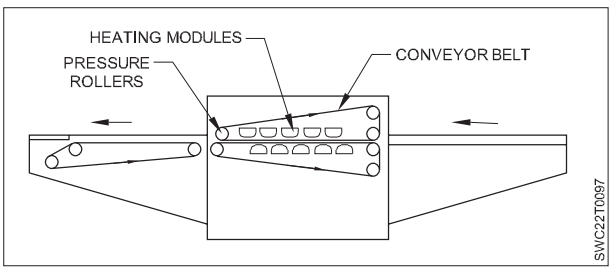
- These presses do not cover a very large area, often no more than one meter by half a meter, and the number of garment parts that can be fused at one time will depend on their size. Where small parts are being fused, output may be increased by laying them on a sheet of card which is then placed in the press.
- Accuracy of positioning of the interlining on the garment part is important, not just for the garment, but for the cleanliness of the press.
- Where the whole area of a garment part is being fused, the interlining pattern is normally slightly smaller than the garment pattern so that there is no possibility of the interlining extending over the edge of the garment part.
- Variations in the design of these presses can improve productivity, in particular by having a twin-tray system that slides in and out from under the top platen, or a three-station carousel which has two operators at separate loading and unloading stations.

One of the advantages of this type of fusing press is that in the simplest version, their small size and relatively low cost allow their use by the smaller clothing manufacturer. They also tend to reduce fabric shrinkage since the fabric is held under pressure throughout the fusing cycle. A disadvantage is the tendency to crush pile fabrics such as velvet because of the length of time that they are held under pressure.

Continuous fusing systems

These systems operate by passing the garment part, with its interlining placed on it, past a heat source, and either simultaneously or subsequently applying pressure. Heat is provided in one of three ways:

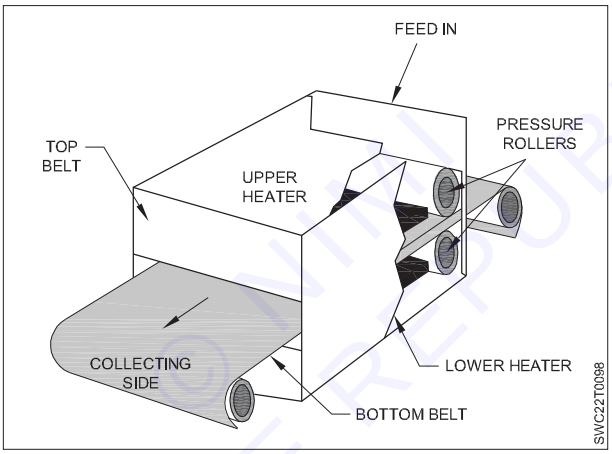
- With direct heating, the conveyor belt carries the components to be fused into direct contact with a heated surface, either a drum or curved plates.
- With indirect heating, the components to be fused are carried through a heated chamber.
- With low temperature, gradient heating, the components are carried through a pre-heating zone. Heating is either direct or indirect. With this approach the temperature reached at the glue line is only just above that required to make the resin a viscous fluid and in some cases fusing takes place satisfactorily with a glue line temperature of only 120 °C. This reduces the possibility of heat shrinkage in the outer fabric and is a feature of some of the most recent fusing presses.



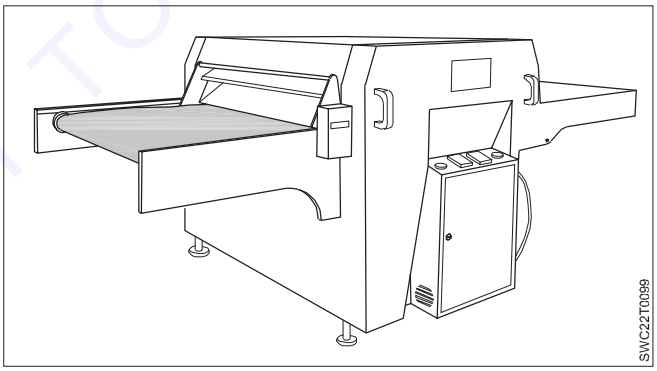
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The maintenance of the required temperature is less of a problem inside a fully enclosed, continuously operating press than with a flat bed press, especially with modern electronic temperature controls. On drum presses, the tension of the conveyor belt presses the components continuously against the heated drum during the complete fusing process. Where conveyor belts carry the components past heating plates (direct) or through a heating chamber (indirect), nip rollers apply pressure to the assembly after heating.

- The pressure time is very small compared to that in flat bed presses and has to be controlled more precisely.
- The loading on the rollers is applied by springs or pneumatically at their ends. Rollers must be maintained parallel, unbowed and free of wear to give even pressure. The rubber covering of the rollers is available in a range of hardnesses. Usually shirt top collar fusing requires the hardest rollers and outerwear fabrics require softer rollers.
- Fusing times depend on the speed of the conveyor belt, which can be adjusted to give various dwell times in the heated zone.
- Companies engaged in high-volume garment production generally fusing systems, both for the quality of the fusing they give and for the productivity gains.
- Unloading may be by operator at the far end, or by automatic catcher, or the press may divert the fused parts back to the loading station.



Continuous fusing presses generally reduce any problems associated with fusing pile fabrics such as velvet because the duration of pressure on the fabric is short. For the same reason, though, fabrics prone to heat shrinkage are likely to shrink more when fused in a continuous press than when held firmly in a flat bed press.



Hand iron

Only those interlinings that can be fused at relatively low temperatures, low pressures and in relatively short times are suitable for fusing by hand iron.

There are a number of difficulties:

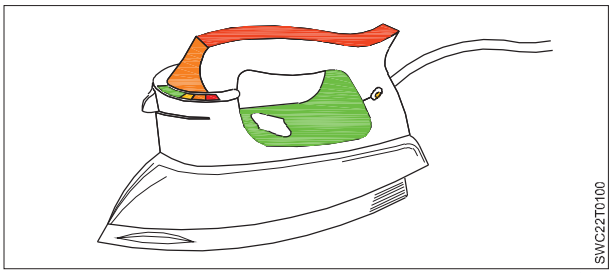
- The operator cannot know the temperature at the glue line and cannot apply pressure uniformly.
- The operator estimates the time subjectively.

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- Only small parts can be fused with any degree of success, and then only by pressing the iron for a fixed time on to the fusible, covering the area step by step and using steam to help the heat transfer.

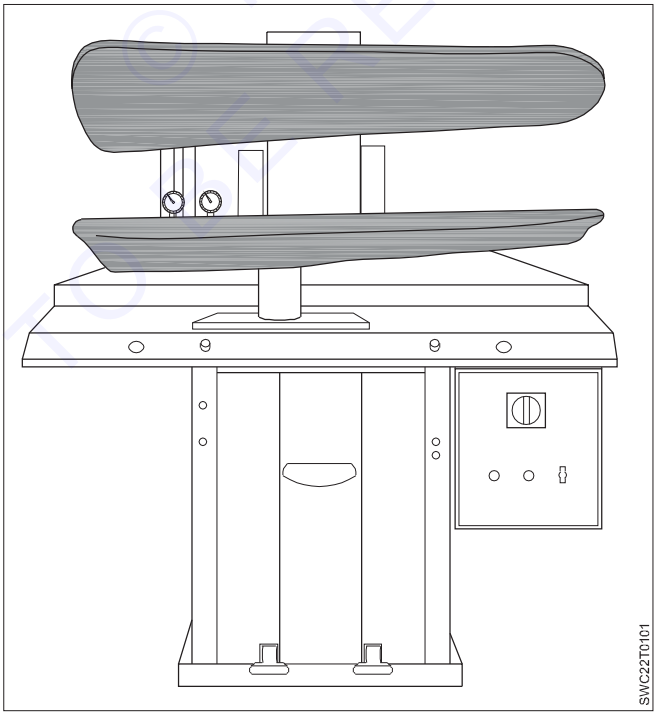
In this situation, garment parts may appear to be satisfactorily fused initially but deficiencies will show up as delamination during wearing or cleaning of the garment.

When the iron is used merely to position an interlining part or tape temporarily, to be followed by pressing on a steam press, fusing conditions are more satisfactory. This is common in menswear where additional, reinforcing, fusible tapes are often added during the construction of a jacket, in positions such as pockets, vents and hems. The garment is placed on a shaped press (described in the next chapter), the interlining sections are positioned using the hand iron, and the press is closed to effect complete fusing. On jacket hems, a slotted interlining tape is often used; once this is fused on, the iron can be further used to press up the hem along the line of slots before further sewing.



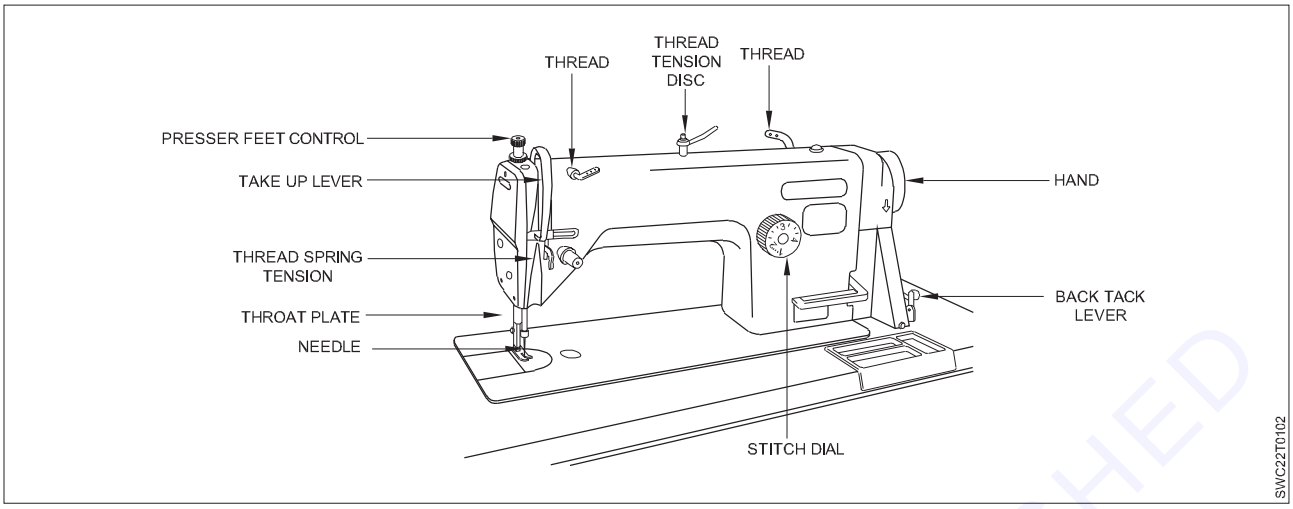
Steam press

In this case fusing takes place on presses of the type used for intermediate and final pressing of made up garments. Temperature at the glue line is achieved by steam from the head of the press. The resins that fuse most successfully on a steam press are polyvinyl acetate and the lower melting range of polyamides, but fusing is not as effective as when using a dedicated press. A specialised use of a steam press for fusing is in the positioning and initial attaching of fusible shoulder pads in men's jackets.



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Components of sewing machine



- The industrial sewing machine is a more advanced and heavy duty version of the standard home sewing machine.
- Industrial sewing machines are generally used for bulk production in garment and textile industries. A typical pocket industrial machine can sew 2,000 pockets in an eight-hour production cycle.
- An industrial sewing machine is designed to sew several layers of tough material, such as leather, canvas, and vinyl, at one time.
- The internal parts and motors in a standard commercial sewing machine are too delicate for the heavy loads.
- An industrial machine comes equipped with a clutch and large servo motor for mass production avowing major wear and tear in its internal parts. An industrial sewing machine is specifically built to resist long term wear and tear, and is therefore built with superior strength, parts and motors. Traditional sewing machines on the other hand might include nylon or plastic gears.
- Single Needle Lock Stitch Machine (SNLS) The Single Needle Lock Stitch Machine is the most popular and versatile sewing machine in the industry. The Lockstitch sewing machine forms precise and secured straight stitches on the top and the underside of the fabric.
- The sewing machine feeding systems are used for handling fabrics in a controlled manner during stitching for continuous sewing.
- The feeding mechanism comprises three components, namely, presser foot, throat plate and feed dog.

Elements of feeding mechanism

1 Presser Foot

2 Feed Dog

3 Throat Plate

Upper component of the feeding system that grips the fabric during the feeding action and stitch formation.

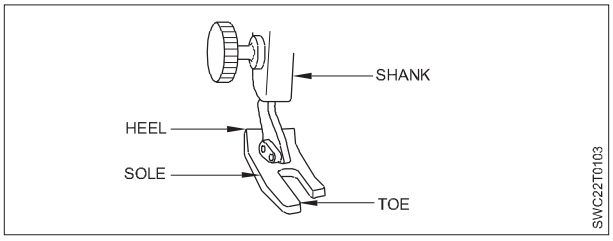
Fitted on to the presser bar, controls the quantity of pressure applied on the fabric.

Higher sewing speeds may require more pressure to control the movement of the fabric.

Variations in the basic presser foot take place in the shoe component, which involves the sole, heel and toe.

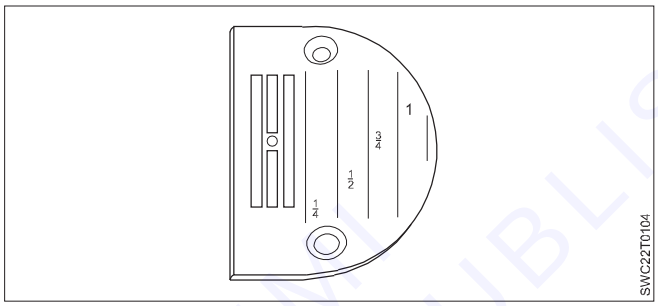
- The sole - the flat area that has direct contact with the fabric, which could be made smooth, toothed.
- The toe - the front portion of the shoe that is accountable for guiding, holding and positioning the unsewn fabric.
- The heel - the back part of the shoe that is mainly responsible for holding fabric and retaining its established position for the feeding and stitching action to take place.

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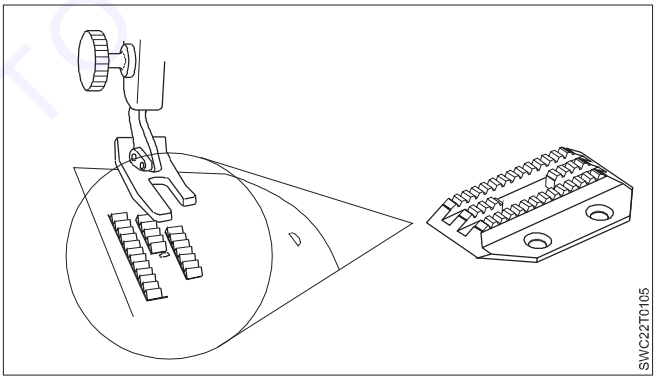
Throat plates

- Throat plates are removable metal plates secured to an adapter plate directly under the needle.
- Throat plates keep the fabric panel as the needle penetrates to form the stitch.
- Throat plates have openings for needlesto pass through and for the feed dog to come up.
- The needle hole should be only about 30 percent larger than the size of the needle.



Feed dog

- The main element in a feeding system is the feed dog
- It is transports the fabric.
- A set of feed dogs, which look like short, thin metal bars, are crosscut with grooves, move to and fro in the throat plate slot which is marginally bigger than the feed dog.
- The typical four motions performed by the feed dogs such as forward, then downward, then backward and then upward aid to transport the fabric for continuous stitching.



Types of feed mechanism

The feed mechanism on a sewing machine could be categorised based on its application and end-use as

- Manual feed
- Drop feed
- Differential feed

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- Needle feed
- Compound feed
- Unison feed
- Puller, roller feed
- Cup feed
- Fixed feed

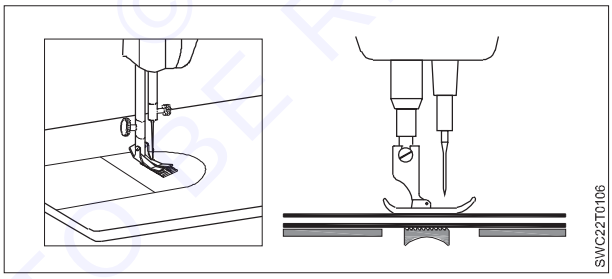
Manual feed

- It is also known as free motion or darning feed.
- This feeding system is commonly utilised for darning, embroidery, freehand quilting, etc.



Drop feed

- The Three sewing machine parts, which together constitute the drop feed mechanism, are the presser foot, the Throat plate or needle plate and the feed dog.

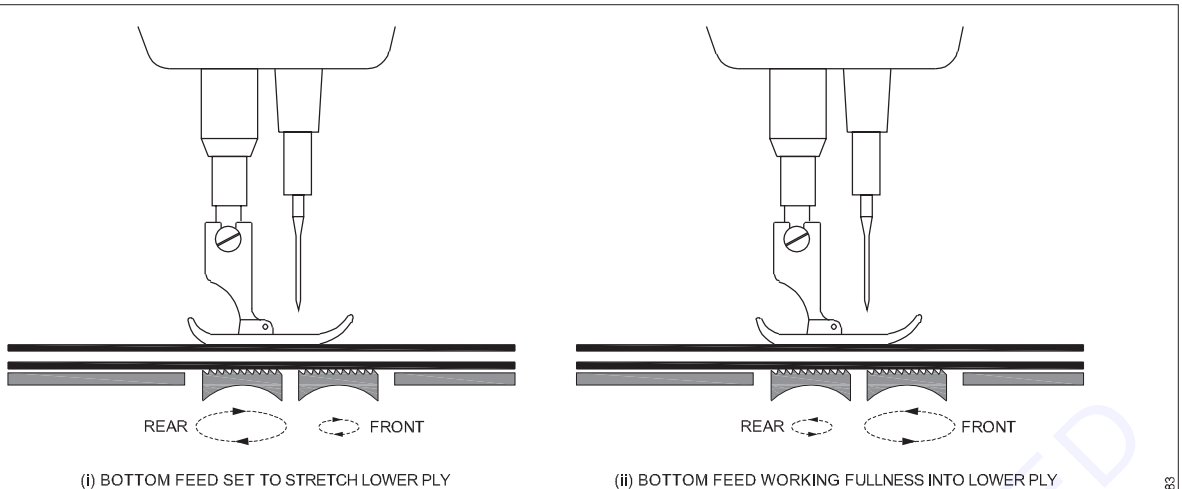


Differential feed

- Differential feed utilises a two-piece feed dog located beneath the throat plate.
- The front and rear feed dog could be fixed to move at the same or different speed/distances.
- The Rear feed dog is moving at a faster rate compared to the front, the fabric will be stretched.
- The front feed dog is moving faster than the rear feed dog, the fabric is gathered (shirring)

  Eg: Over lock machine

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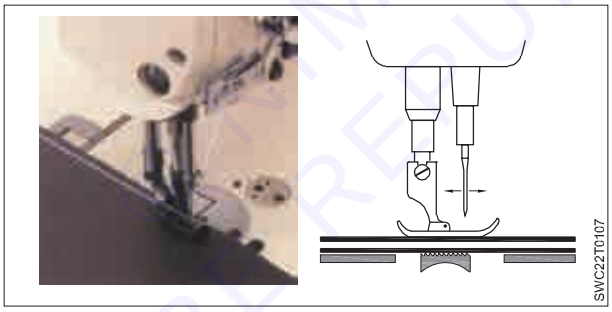
(i) BOTTOM FEED SET TO STRETCH LOWER PLY

(ii) BOTTOM FEED WORKING FULLNESS INTO LOWER PLY

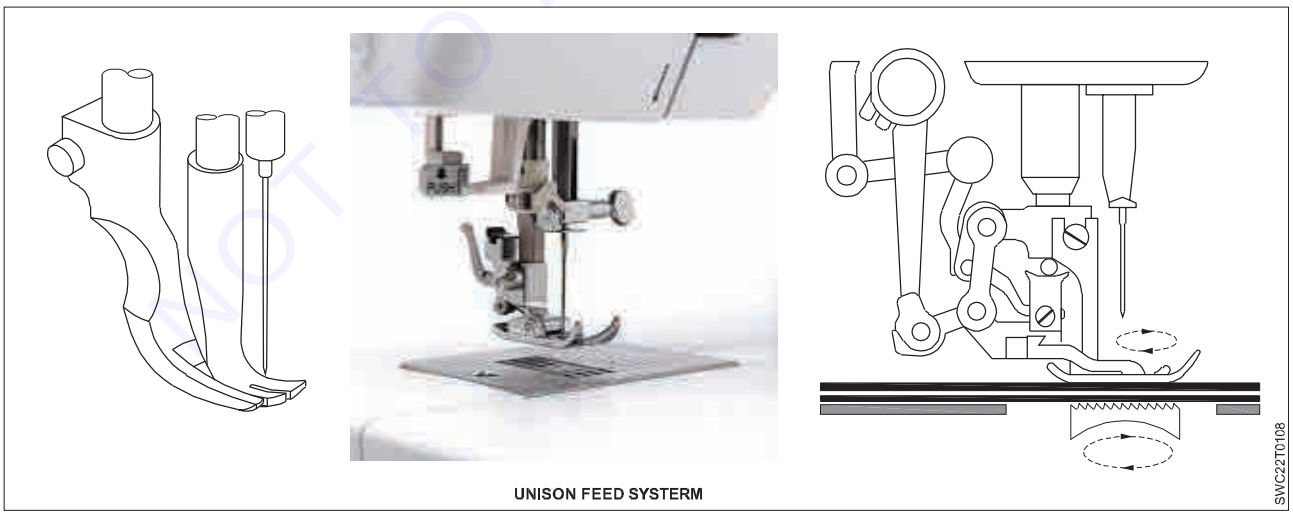
DIFFERENTIAL FEED SYSTEMS

Needle feed/compound feed

- Needle feed is the name given to the feed system in which the needle itself moves forwards and backwards.
- It is useful in bulky sewing, quilting and wadding.
- Exact synchronisation of the movement of the needle and drop feed is needed.

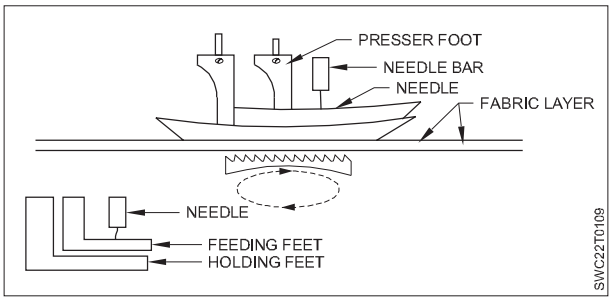


Unison feed



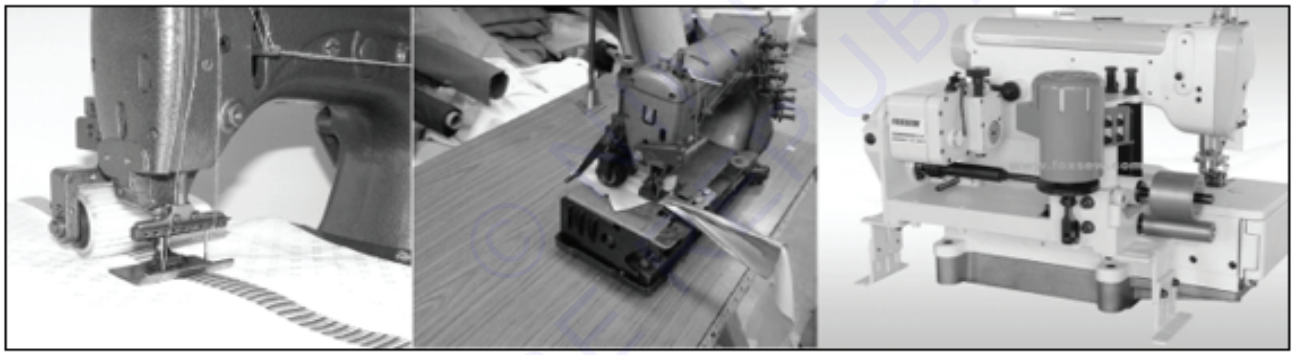
UNISON FEED SYSTERM

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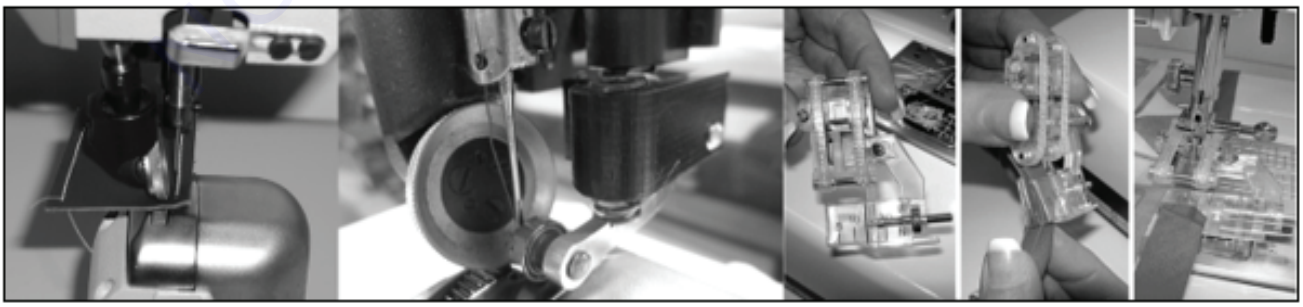
- Unison feed is the combination of feeding mechanisms which provides needle feed in addition to positive top and bottom feeding.
- Two part presser foot, holding feet and feeding feet.
- In this system one presser foot is inside the other presser foot & gives movement at different times.
- The inside presser foot & needle are driven at the same time toward the same direction
- No possibility of ply shifting.
- Suitable for sewing stitch fabric and for bulk seam in heavy weight materials.
- Normally not so used unless special case.

Puller feed



- The fabric passes between an upper roller and a sewing bed, or a lower roller and a presser foot.
- These feed rollers provide a dragging motion on the fabric behind the foot. The top roller is normally driven by the machine and the lower roller moves due to the pressure of the top roller.
- The surface speed of the puller roller is slightly higher than the speed of the feed dog to presser ply shifting roping.
- It is useful in multi-needle machines particularly for attaching the waist band.

Wheel feed



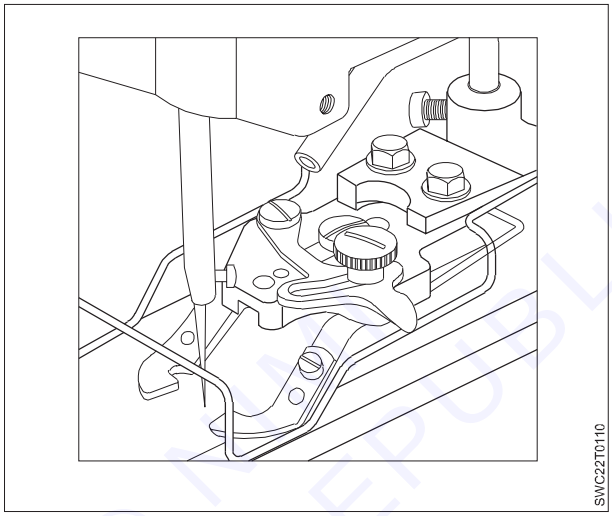
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- The wheel feed mechanism uses a roller that moves the fabric one stitch at a time, in a ratcheting motion.
- In this kind of feeding, the foot has small rollers to enable easy movement of fabric. The material is fed b/w the wheels.
- Continuous motion wheel feed must work in unison with a needle feed.
- Applicable to all types of sports shoes, shoes, children shoes, boots and other foot wear and handbags sewing.

Fixed feed

This is the feed mechanism to feed materials in a fixed state by holding materials between lower plate and upper plate.

(Example: cycle machine and automatic machine)



Sewing machine needles

The manner in which fabric is pierced by the needle during stitching has a direct impact on the strength of the seam as well as garment appearance (Organ Needles 2015). The purposes of the sewing needles are to

- Make a hole in the fabric so that the sewing thread could pass through it to form a stitch without causing any damage to the fabric while doing so.
- To carry the needle thread through the fabric to form a loop. This is then taken up by the hook in a lockstitch machine or by means of the looper in chain stitch machines.
- Pass the needle thread through the loop created by the looper mechanism on a chain stitch machine.

Parts of a needle

The different parts of a sewing needle.

Shank: It is the top portion of the needle, which positions inside the needle bar. It could be designed as cylindrical or have a flat side, based on the method of holding it on to the needle bar. It is the principal support of the entire needle and is larger in diameter than the remaining part of the needle to give the strength.

Shoulder: It is the part in-between the shank and the blade, with the blade forming the longest portion of the needle up to the needle eye.

Blade: It undergoes an enormous amount of friction from the fabric through which the needle passes. In case of needles specifically designed for high-speed sewing, the shoulder is normally extended into the upper part of the blade to give a thicker cross section. This arrangement of reinforced blade strengthens the needle and produces the enlarged hole in the fabric while the needle is at its lowest point, thus minimising the friction between it and the material. On the other hand, the blade could be designed as a tapered one, reducing its diameter gradually from shank to tip to minimise the friction.

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Long groove: It gives a shielding channel for the sewing thread while it is carried down into the fabric for stitch formation thus reducing the abrasion and friction with the fabric.

Short groove: It is located on the reverse side of the long groove, that is, towards the hook or looper; it extends slightly above and below the needle eye. It assists in the formation of the needle thread loop.

Eye: It is the hole or opening in the sewing needle, lengthened through the blade along the long and short grooves on the needle. The profile of inside part of the eye at the top is vital in reducing sewing thread damage and in producing a good loop formation.

Scarf: The scarf otherwise known as clearance cut is a nook across the whole face of the needle immediately above the needle eye. Its objective is to facilitate closer setting of the bobbin hook or looper to the needle so that the needle thread loop could be entered more easily by the point of the hook or looper.

Point: It is tapering portion of the needle created to give a better penetration of the needle on various kinds of fabric. It should be properly selected to prevent damage of the fabric to be sewn.

Tip: It is the ultimate end of the point, which combines with the point in defining the penetration performance of the needle.

Identification of sewing needle

Three parameters are generally used for the identification of sewing needles such as system, point and size.

System

It describes the elements of a needle to suit the sewing machine type. Based on the type of sewing machine and type of stitch, the needle is designed with variants in blade length, shank thickness, type of needle eye, etc. It is worthwhile to ensure with the sewing machine manufacturer for appropriateness of needle system to machine.

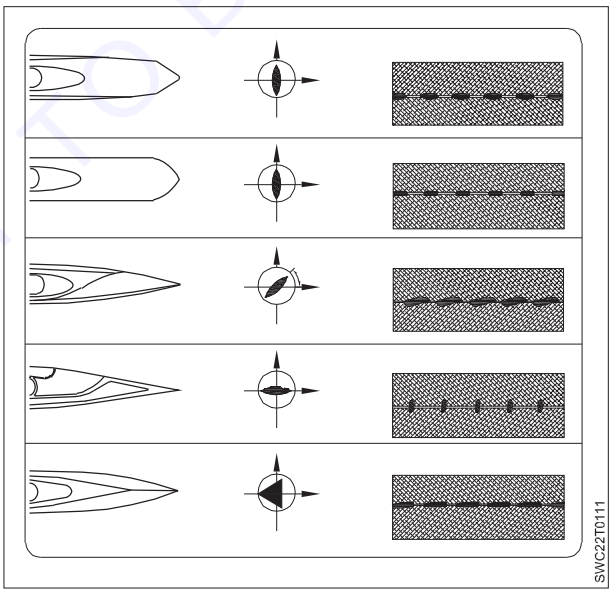
Point

A needle point is broadly categorised into two types:

1 Cutting or leather point needle

2 Round point needle – set or cloth points

Cutting point needles – Cutting point sewing needles have spiky tips like blades and a wide range of cross-sectional profiles such as rounded, triangular, square and lens exist. They are normally used to sew highly dense and non-fabric based materials. Five universal kinds of cutting point sewing needles along with their profile of incision produced when used in a machine with the commonest threading direction.



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The narrow wedge point needle: It cuts the material at right angles (90°) to the seam direction and permits to go for a high stitch density (SPI) while leaving adequate material between the needle holes to retain seam strength of material. On soft leather material, stitch densities as high as 12 per centimeter are achievable. It is the most frequently utilised cutting point needle for stitching uppers in the shoe industry.

The narrow reverse point needle: It produces cut that lies 45° to the seam direction, and produces a seam where the thread is turned to the left on the surface of the material.

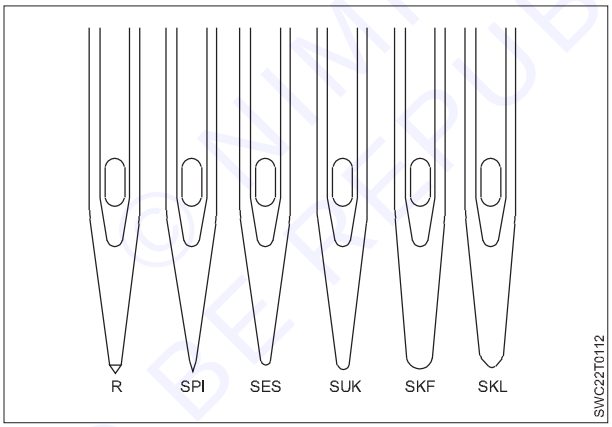
The narrow cross point needle: It makes a cut along the line of the seam and necessitates a longer stitch length. Heavy decorative seams could be made where thicker sewing threads are used at lower stitch densities, that is, longer stitch length.

Numerous kinds of other point types exist for the variety of leathers, seams, sewing machines and strength and appearance requirements that arise. This involves triangular cross sections for multi-directional sewing.

Cloth point needles

These kinds of needles are used for sewing textile materials instead of the leather/sheet materials as in the case of cutting point needles. The points have a round cross section contrasting to the various cutting profiles of the cutting point needles and the tip at the end of the point can vary in profile to suit the particular material being sewn.

- The contour of the tip of the needle point which attains the deflection rather than penetration is a fine ball shape and the needle is called a light ball point needle which is utilised primarily for sewing knitted fabrics.
- The tip of the needle point which attains the penetration has the shape of a cone and is known as a set point needle which is utilised for sewing woven fabrics. Both ball and set point needles are available in a number of types.



Types of cloth point needles R: set cloth point, SPI: slim set point, SES: light ball point, SUK: medium ball point, SKF: heavy ball point, SKL: special ball point.

Slim set point (SPI): It is generally used for sewing denser woven fabrics and aids in achieving a straighter stitch which could minimise seam pucker. Generally used for heavy woven fabrics, coated fabrics and topstitching of collars and cuffs.

Medium set point needle: It is the general purpose needle in no problem sewing situations. It is commonly used for sewing a range of woven fabrics and in many circumstances could be used for knitted fabrics also.

Set cloth point (R): It is generally utilised for sewing standard fabrics with regular seams.

Acute set point: This kind of needle is used while sewing very dense fabrics like shirting fabric and interlining in collars and cuffs, where a straight line of stitching is required.

Heavy set point: These needles are used for sewing buttons as the button can be deflected to some extent into the correct position; thus, the needle can pass through the holes.

Light ball point (SES): It can be used for sewing lightweight knitted fabric and densely woven material.

Medium ball point (SUK): It is utilised for sewing denim fabrics of medium to coarser weight and knits.

Heavy ball point (SKF): It is utilised for sewing heavier woven elastic materials as well as coarser knits.

Special ball point (SKL): It could be utilised for sewing heavy knits and coarse elastics.

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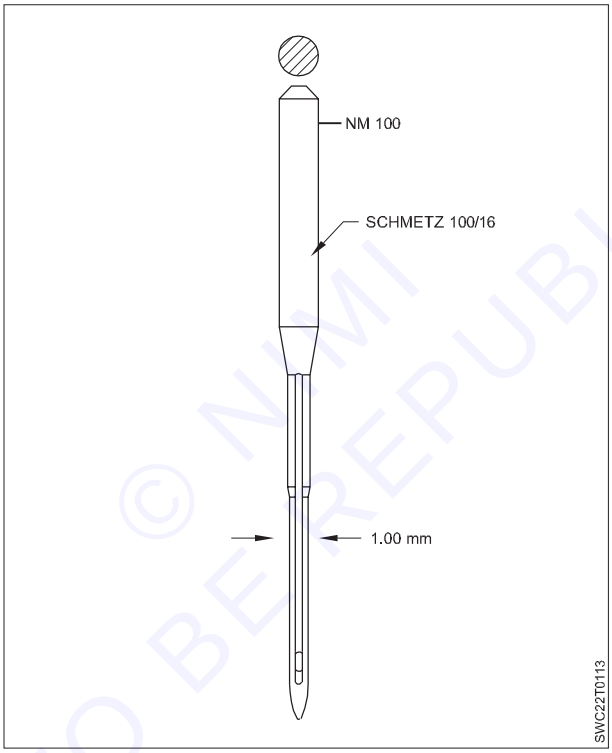
Needle Size

The needle size is normally expressed in two ways. One of the basic methods of representation is by a metric number (Nm). This system represents the diameter of the needle blade in hundredths of a millimeter measured just above the scarf area. For example,

A needle size of Nm 100 is 1.0 millimeter in diameter.

Another standard needle sizing method is the Singer system, otherwise called the American system, which uses a number that represents a size. Needles are offered in a wide range of sizes and the selection of needle size is based on the combination of fabric and sewing thread which is to be sewn. If the selected sewing needle is too small for the sewing thread size, the thread will not fit well into the long groove of the needle and will suffer from extreme abrasion. The use of too fine a needle while sewing heavy plies of fabric could lead to the deflection of the needle, which could influence the stitch loop pick up and cause slipped stitches or even needle breakage. Use of a larger sewing needle for the particular sewing thread resulted in poor

Control of the loop formation which could lead to slipped stitches.



General purpose needles

Application of general purpose needles

Needle	Description	Fabric	Sizes
Ball-point	It has a medium tip, rounded compared to universal needle	Knits	70/10-100/16
Sharp Universal	It has a slim shaft and sharper needle point Needle point is marginally rounded; however, it is sharp enough to pierce woven fabrics	Fine woven fabrics Woven and knitted fabrics	60/8-90/14 60/8-120/19

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Specialty needles

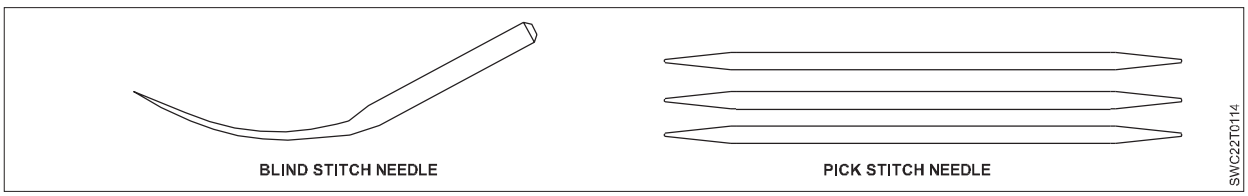
Application of specialty needles

Needle	Description	Fabric	Sizes
Denim	It has a thicker and stronger shaft and a sharp needle point	Denim and heavy woven fabrics	70/10-110/18
Leather	It has a wedge-shaped needle point	Leather and nonwoven fabrics	80/12-110/18
Machine embroidery	It has a larger eye and a special scarf to protect the sewing thread	For embroidery	70/10-90/14
Metallic	It has a larger eye than the embroidery needle, and a sharp point to avoid thread breakage	For metallic threads	80/12
Quilting	It has a tapered as well as sharp needle point	Machine quilting	75/11 and 90/14
Spring needle	It has a shaft surrounded by the wire coil, which acts as a presser foot	Quilting	-
Stretch needle	It has a deep scarf to avoid skipped stitches	Light weight knitted fabrics	75/11 and 90/14
Topstitch needle	It has an extra-large eye and a large groove	Topstitching	80/12,90/14 and 100/16
Twin needle	It is constructed with two needles attached to a single shaft	Double topstitching	1.6/70-4.0/100
Triple needle	It is constructed with three needles attached to a single shaft	Triple topstitching	2.5/80 and 3.0/80
Hemstitch needle	It has a widened shaft and produces a decorative hole in tightly woven fabrics	Decorative stitching	100/16 and 120/19

General purpose needles

Specialty needles

Several over-edge and safety stitch sewing machines utilise curved needles instead of straight needles. These needles are costly though the life of the needle is lesser compared to straight needles. However, the sewing machines utilising curved needles could achieve higher speeds than by using straight needles. Blind stitching machines also utilise needles that are curved, but the purpose here is to avoid penetration right through the fabric. Sewing machines (pick stitching machine) that imitate hand stitch (class 209) utilise a double-pointed sewing needle with an eye in the middle, through which is threaded the short length of thread with which this machine sews



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Sewing Thread

- Even a small sewing thread failure leads to losses on investments in material, equipment, garment engineering and labour.
- Sewing performance and seam quality could be influenced by sewing thread parameters, selection of proper thread and utilisation of thread.
- The fundamental task of a sewing
- thread is to produce aesthetic and performance in stitches and seams

Factors influencing the aesthetic characteristics of sewing thread

Fineness, colour and lustre must be taken into account when selecting a sewing thread for decorative purposes. Other considerations influencing the aesthetics of sewing thread are

- Hue and shade
- Colour fastness
- Stitch selection
- Even stitch formation

Factors affecting performance of sewing thread

Sewing thread used in garments should be durable to withstand the abrasion during wear and needle heat that occurs while sewing, finishing of garments and during wear. Sewing Thread performance could be assessed from its

- Seam strength
- Abrasion resistance
- Elasticity
- Chemical resistance
- Flammability
- Colour fastness

Basic requirement of sewing thread

- Sewability
- Thread Performance in Seam

Sewability

Sewability is a capability of sewing thread to produce a seam with a Minimum number of sewing thread breakages and the slightest damage to the thread and the fabric during the stitching process. The parameters that determine sewability of thread are:

- No thread breakages in high-speed sewing
- Consistent stitch formation
- No skipped stitches
- Evenness of yarn
- Higher abrasion resistance
- Adequate smoothness of thread surface

Thread performance in seam

It is the capacity of a thread to produce the desired functional serviceability in a desired seam.

$$\text{Seam Efficiency Index (SEI)} = \frac{\text{Seam Tensile Strength} \times 100}{\text{Fabric Tensile Strength}}$$

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Proper choice of thread needs consideration of its performance during sewing as well as under conditions of wear and cleaning. As like other Textile materials, sewing threads are composed of a fibre type, yarn Construction and a finish, which all have an influence on Appearance and the performance of the thread.

Extensive ranges of thread sizes are available; the selection of the proper size depends on the fabric to be sewn as well as the needle size used in the machine.

Properties of sewing thread

- **Good tensile strength** to grip the seam firmly during wash and wear.
- **Higher initial modulus** of thread guarantees the least thread deformation during shock loading in sewing and moderately stiff to form the loops.
- S**mooth surface and negligible faults** in thread provides minimum friction b/w the needle and sewing thread at high speed. It should be adequately lubricated to improve the abrasion resistance and its sewability.
- **Uniform thickness** provides smooth passage of thread through the needle and the fabric.
- **Good elasticity** facilitates the thread to recover its original length instantly after the tension has been released. The elastic property of thread influences the strength and quality of a stitched seam.
- **Lower shrinkage -** Cotton threads usually undergo washing shrinkage puckering while synthetic threads suffer from the thermal shrinkage during ironing.
- **Better chemical resistance** is an enviable characteristic for sewing thread in garments that could undergo washing, bleaching or dry cleaning during wear.
- **Higher abrasion resistance** provides a good sewing performance and makes the thread more durable.
- **Good colour fastness** could maintain the original colour of sewing thread without any fading while it is exposed to washing and sunlight.
- **Minimum metamerism** could be attained by the measurement of thread colour with colour matching cabinets. Metamerism is an intrinsic characteristic of a thread when the same thread colour appears to be dissimilar under diverse lighting conditions.

Sewing thread could be classified in numerous ways. Some common classifications are those based on:

- Substrate
- Construction
- Finish

Classification based on substrate

Natural: The utilisation of sewing thread produced from natural fibres is very rare in industrial applications and cotton is the Most frequently used natural sewing thread.

Synthetic: The synthetic fibres have several advantageous characteristics compared to natural fibres such as high tenacity, better resistance to chemicals and higher abrasion resistance. Further, they are also not considerably influenced by rot, mildew, insects, bacteria and moisture

Classification based on thread construction

- Spun threads
- Core spun threads
- Continuous filament threads
- Monofilament threads
- Multifilament threads
- Textured threads
- Embroidery threads
- Technical threads

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Spun threads

It is produced by natural as well as synthetic fibres. Spun polyester is the most frequently used sewing threads in garments. It have a hairy yarn surface, it provides better lubrication properties, softer hand, Exceptional sewing performance, however, it is lesser than the strength of continuous filaments.

1 **Cotton threads**

- a **Soft cotton threads**
- b **Glazed cotton thread:** The glazed process gives the thread a hard finish that Shields the thread from abrasion and improves ply security
- c **Gassed thread:** Gassing process otherwise known as singeing process is used to remove the protruding hairs and produce a lustrous thread. It is produced by moving the cotton sewing thread over a flame at a higher speed to reduce the hairy fibres on the surface of thread.
- d **Mercerised cotton thread:** The cotton yarns are treated with caustic soda with 16%–18% concentration to improve the strength and Lustre.

2 Linen thread

3 Silk thread

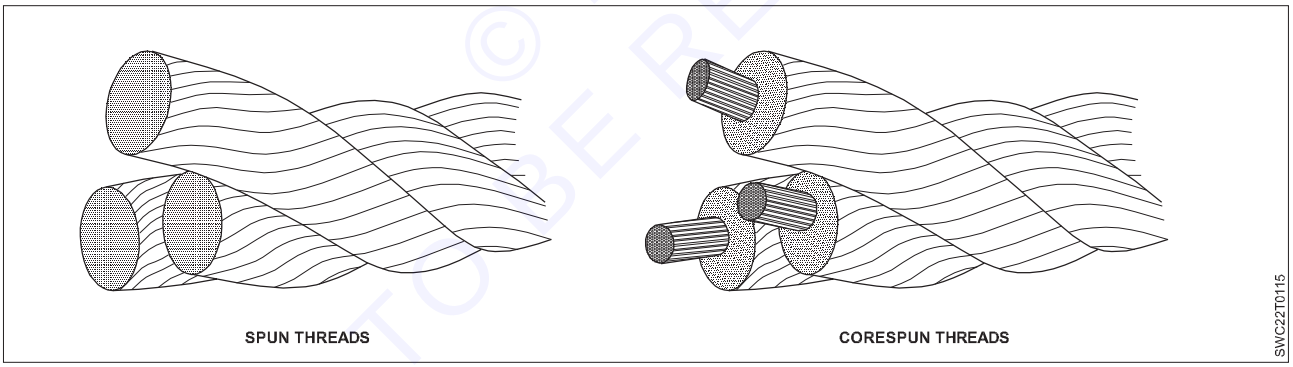
4 Spun synthetic – fibre threads

5 Spun blended sewing threads

Core spun threads

Core spun thread is a mixture of staple fibres and filaments. The most commonly used core spun sewing thread has a multiple-ply structure, with each ply comprising a core polyester filament wrapped by the cotton or polyester staple fibres. The strength of thread is provided by the filament and sewability by means of cotton or polyester fibre wrap.

Continuous filament threads

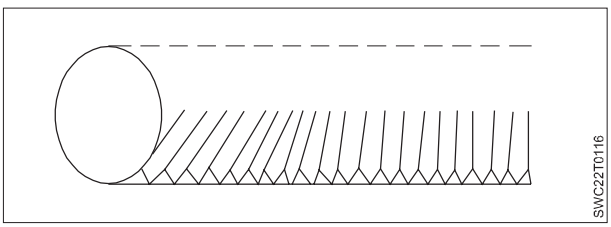


- It is produced by extruding the filaments from the synthetic polymer and is given a twist to improve the strength. The strength of these threads is stronger than spun threads for the same thread size.

Monofilament threads

Monofilament sewing thread is produced from a single continuous fibre with a specific fineness. Although the monofilament sewing threads are stronger, more uniform and

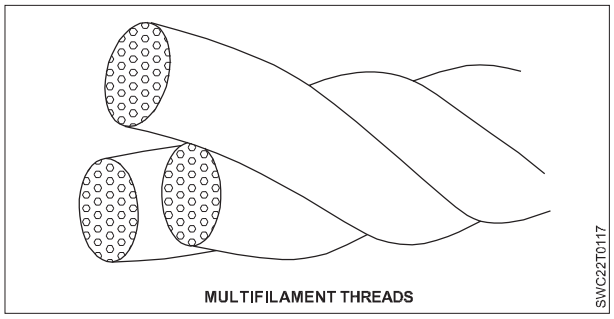
Cheaper, they lack flexibility and are rough in feel. Because of this limitation, it is limited to sewing of hems, draperies and upholstered furniture.



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Multifilament threads

Multifilament sewing thread is generally produced from nylon or polyester and is utilised where high strength is a principal requirement. It comprises two or more continuous filaments twisted together to give more strength. It is frequently used to Sew leather garments, shoes and industrial products. Three kinds of multifilament sewing threads are lubricated, bonded and braided threads.



MULTIFILAMENT THREADS

Textured threads

The texturisation enhances texture to the continuous filament yarns by providing softness and bulk. They are then slightly twisted and heat set to make it permanent.

The texturised sewing threads give exceptional seam coverage. Although these threads provide more cover and high extensibility, they are more subject to snagging.

The types of textured sewing threads are

i false twist textured filament threads,

ii air textured filament threads and

iii air-jet intermingled filament threads

Embroidery threads

- Mainly required for decorative purposes.
- Colour and lustre are two main requirements for embroidery threads.
- Mostly made from mercerised cotton, silk, viscose rayon and polyester fibre/filament Yarns.

Technical threads

- Specifically developed for technical/industrial uses. • Perform satisfactorily in adverse climatic, industrial conditions and heavy duty applications
- Generally made from aramids, glass, ceramics, etc.

Classification based on thread finish

Normally special finishes are provided to the sewing thread for two purposes:

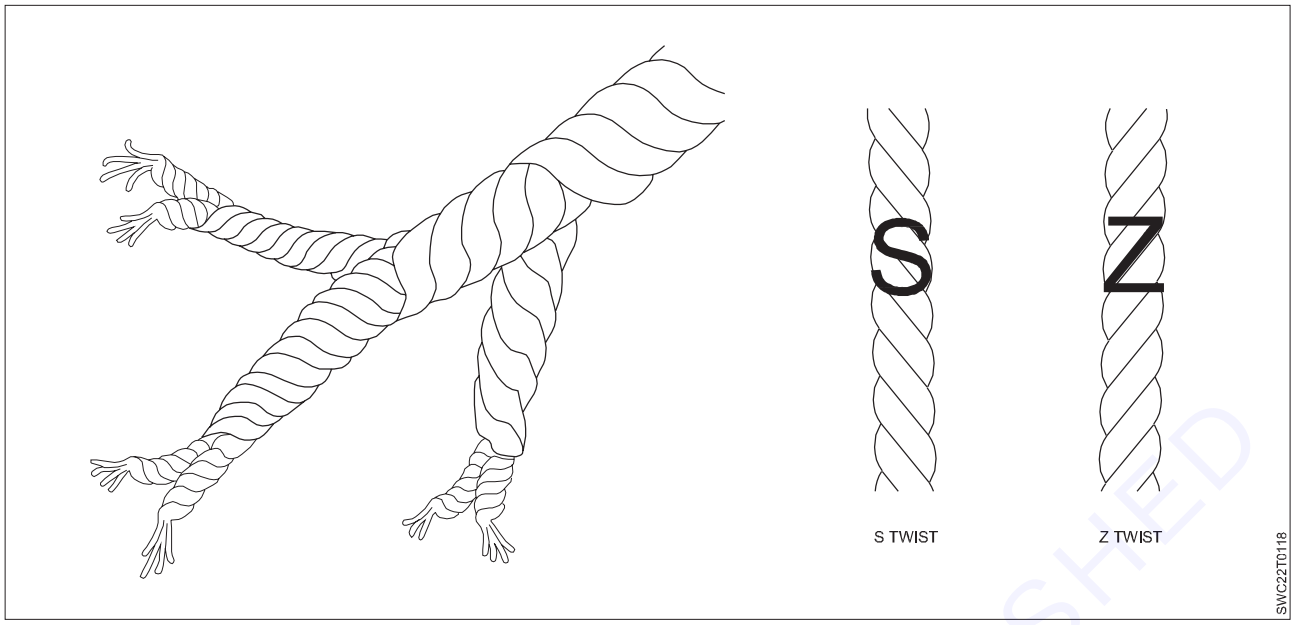
1 To enhance the sewability of the thread – Certain finishes improve the thread strength, lubrication property and abrasion resistance.

2 To accomplish a specific functional requirement – Several types of finishes impart the special finishes such as fire retardant, water repellent, anti-fungal and anti-static finishes.

Twist of the sewing thread

'S' for left twist or 'Z' for right twist

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Yarn count

Count is a numerical value, which express the coarseness or fineness (diameter) of the yarn and also indicate the relationship between length and weight (the mass per unit length or the length per unit mass) of that yarn. Therefore, the concept of yarn count has been introduced which specifies a certain ratio of length to weight.

The fineness of the yarn is usually expressed in terms of its linear density or count. There are a number of systems and units for expressing yarn fineness. But they are classified as follows.

Types of yarn count system:

1 Direct Count System

2 Indirect Count System

Direct count system

The common features of Direct count systems are the length of the yarn is fixed and the weight of yarn varies to its fineness.

Definition of the above Systems is as follows

1 Tex system .....NO. of grams per 1000 meters

2 Denier .....No. of Grams per 9000 meters

3 Deci Tex .....No. of grams per 10,000 metres

4 Millitex .....No. of milligrams per 1000 metres

5 Kilotex..... .No. of kilograms per 1000 metres.

6 Jute count.....No. of lb per 14,400 yds

Indirect count system

The common features of Indirect count systems are the weight of yarn is fixed and the length of yarn varies according to its fineness.

Definition of the above systems is as follows

1 Ne .....No. of 840 yards in One pound

2 Nm .....No. of 1000 metres (Kilometre) in One Kilogram

According to the yarn count definition given in British Standards by using following formula you can convert yarn count from one unit to another.

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	From – To	Formula
1	Ne to Denier	5315 / Ne
2	Denier to Ne	5315 / Denier
3	Ne to Nm	Ne X 1.69
4	Nm to Ne	Nm / 1.69
5	Denier to Nm	9000 / Denier
6	Nm to Denier	9000 / Nm
7	Ne to Tex	590.5 / Ne
8	Tex to Ne	590.5 / Tex
9	Tex to Nm	1000 / Tex
10	Nm to Tex	1000 / Nm
11	Tex to Denier	Tex x 9
12	Denier to Tex	Denier / 9
13	Denier to Decitex	Denier / 0.9
14	Nm to Decitex	10,000 / Nm
15	Ne to Decitex	5905 / Ne

Sewing thread size

Sewing thread sizes could be expressed in direct or indirect numbering systems.

For direct counting system in fixed length systems:

Resultant size = Individual yarn count x Number of plies

For indirect counting system or fixed weight system:

Resultant size = Individual yarn count / Number of plies.

- Metric count (Nm) is used to express synthetic, spun and core spun thread size.
- English count (Ne) is used to express the size of cotton thread.
- Filament sewing threads are generally expressed in denier or decitex.

For direct counting system in fixed length systems

Denier = Weight in grams of 9,000 metres

Tex = Weight in grams of 1,000 metres

Decitex = Weight in grams of 10,000 metres

Eg:

Tex 40 – A length of 1,000 metres gives 40 Grams of weight

Tex 100 – A length of 1,000 metres gives 100 Grams of weight

In fixed length systems, the yarn becomes coarser / heavier as the count number increases.

Tex 120 – Thick Thread

For indirect counting system or fixed weight system

English Count (Ne) = Number of hanks of 840 yards/lb

Metric Count (Nm) = Number of hanks of 1000 metres/kg

Eg: Ne 1 – In one pound of yarn weight, there are 840 yards of yarn length

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Ne 5 – In one pound of yarn weight, there are 4200 (840x5) yards of yarn length

Tkt. = (1000/Tex No.) X 3

Tkt. = Nm X 3

For example, a thread of Tex 40 is Tkt. 75 and Nm 80/2 is Tkt. 120

Higher the ticket number, finer the thread.

Lower the ticket number, thicker the thread.

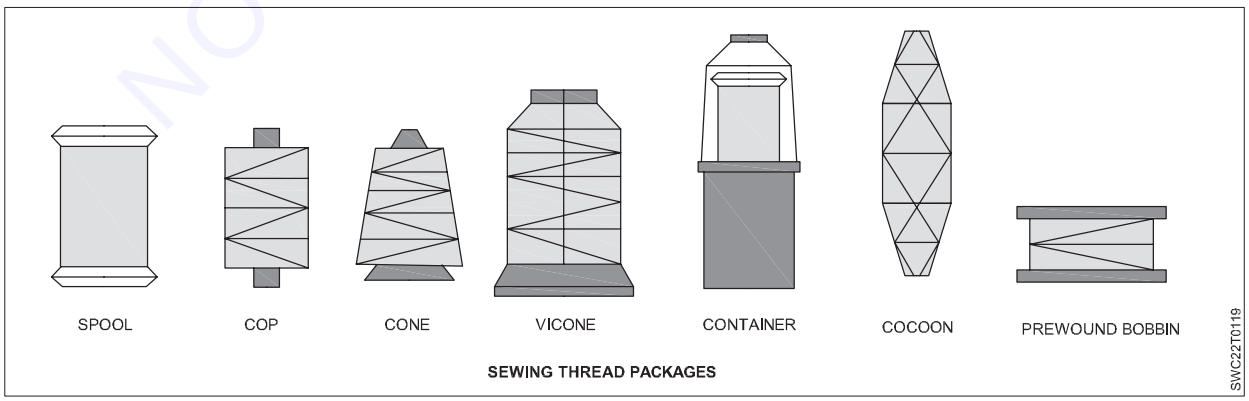
A thread of Tkt. 60 is twice as coarse as Tkt. 120

Fine	Tex	dTexx Ply (When 2-ply)	dTexx ply (When 3-ply)	Total Decitex (dTex)	Ticket No.	Calculation for Ticket No.
	Tex 40	200 x 2	133 x 3	dTex 400	75	(1000/40) x 3
	Tex 60	300 x 2	200 x 3	dTex 600	50	(1000/60) x 3
	Tex 80	400 x 2	267 x 3	dTex 800	38	(1000/80) x 3
Less Fine	Tex 100	500 x 2	333 x 3	dTex 1.000	30	(1000/100) x 3

Fabric Weight / Typical Thread Sizes / Needle Sizes

Fabric	Oz./Sq.Yd.	GSM Grams/Sq Mtr.	Thread Tex Sizes	Needle Sizes
Ex-Light	2 - 4 oz.	68 - 136gr.	Tex 16, 18, 21, 24	60,65
Light	4 - 6 oz.	136-204gr.	Tex 24, 27, 30	70,75
Medium	6-8 oz	204 - 272gr.	Tex 30, 35, 40	80, 90, 100
Med. Heavy	8-10 oz.	272-339gr.	Tex 40, 45, 50, 60	100, 110
Heavy	10 - 12 oz	339-407gr.	Tex 60, 80, 90, 105	120, 140
Ex-Heavy	12-14oz	407 - 475gr.	Tex 105, 120, 135 +	140, 160

Sewing thread packages



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Stitches

A series of repetitive stitches of one pattern is termed a stitch.

The stitch could be formed in any of the three methods given below:

- **Interlooping:** It is created by passing the loop of one thread through the loop of another sewing thread.
- **Intralooping:** It is created by passing the loop of one thread through the loop of the same thread.
- **Interlacing:** One thread passes over another thread.

The six stitch classes included in the British Standard are as follows:

1 Class 100: Chain stitch

2 Class 200: Hand stitch

3 Class 300: Lock stitch

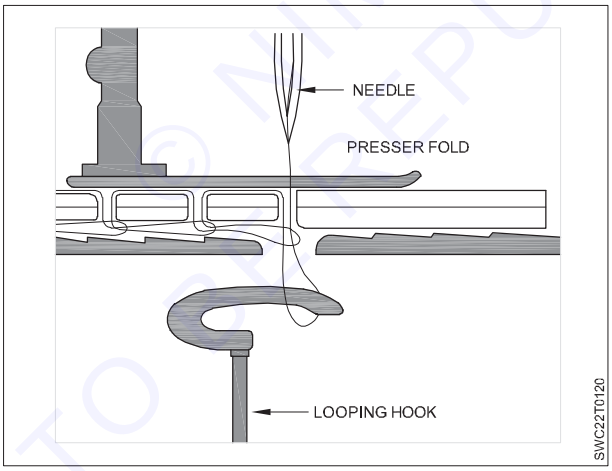
4 Class 400: Multi-thread chain stitch

5 Class 500: Over-edge chain stitch

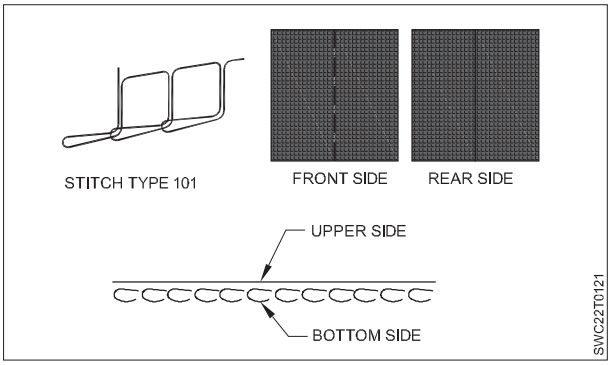
6 Class 600: Covering chain stitch

Class 100: Chain Stitches

These kinds of stitches are formed from one or several needle threads, and are described by intra looping. One or several loops of needle thread are passed through the fabric and secured by intra looping with a subsequent loop after they are passed through the fabric. As each loop is reliant on the subsequent one, these kinds of stitches are very insecure and unravel very easily. The front and rear side of the class 100 stitches in the fabric.



The class 101 stitch is the simplest one in this class produced from a single sewing thread. Since this stitch is insecure, it could be easily removed, and it is used for 'basting' operation in tailor-made garments. This kind of seam is normally not preferred for seaming operation as it is highly insecure but is widely used in multi-needle machines.

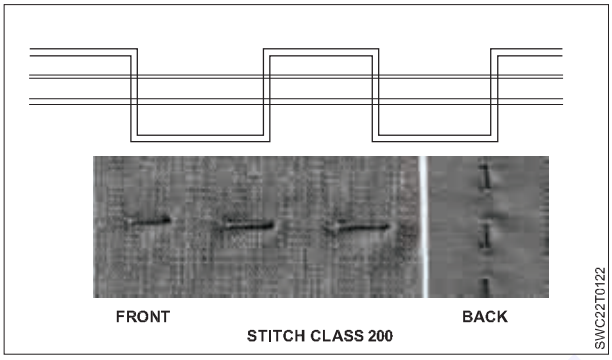


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Class 200: Hand Stitches

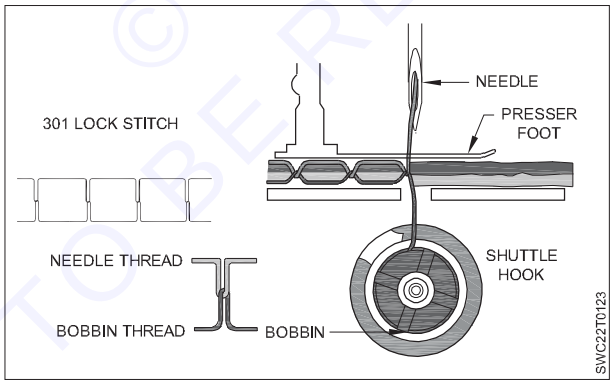
The class 200 stitch types are categorized as hand stitches. These stitches are described by a single sewing thread and the stitch is held by a single line of thread passing through in and out of the fabric. Hand stitching is used at the high-priced garment production as the customer expects it at that price, and it may be the only way to a perfect finish. The front and rear side of the hand-stitched fabric.

The sewing machines have been developed to replicate hand stitching (stitch type 209), which is used around the outer edges of tailored jackets. The machine is called a pick stitching machine. A double-pointed, centre eyed needle sews short lengths of thread in a simulation of hand-sewing. The pick stitching machine could be set to sew a longer stitch on the top than at the bottom or vice versa.



Class 300: Lock Stitches

The Class 300 stitches are formed using two or more sets of sewing threads, and are characterized by interlacing of the two or more threads. Loops formed by one group of threads are passed through the fabric and are held by the second group of thread. The top thread is called the needle thread and the bottom thread is known as the bobbin thread. The interlacing of thread in this class makes them secure and difficult to unravel. Straight lock stitch, 301, with a single needle thread and a bobbin thread, is still the most common stitch used in the apparel industry.



Lock stitch has adequate strength for most purposes, provided appropriate sewing thread is used, with sufficient stretch, when it is correctly balanced. It has a similar appearance on both sides of the fabric. The front and rear side of the lock stitched fabric.

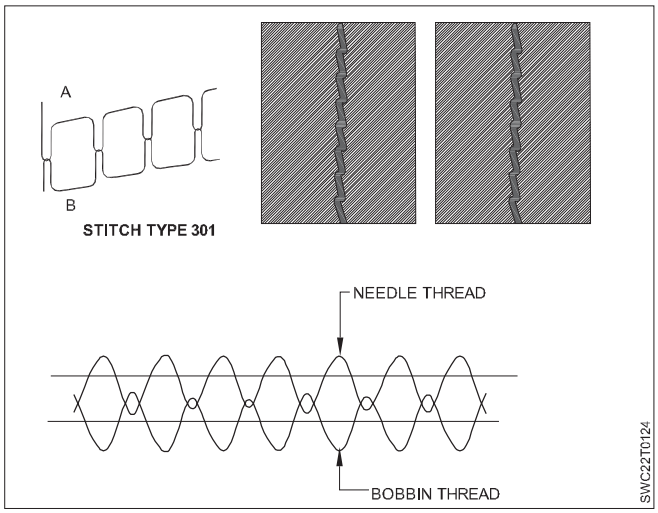
The zigzag version of stitch (Class 304) is generally utilised for joining trimmings like lace and elastic where a wider row of stitching is required. The main disadvantage of the lock stitch is that it uses a small bobbin comprising only a limited length to give the lower thread. Hence, it will exhaust quickly and changing of bobbins is time consuming in production.

The two main disadvantages of lock stitch machines are

1 Multi-needle stitching with many closely spaced needles is not viable due to space required for the bobbin. So the maximum number of needles generally used on lock stitch machines is two.

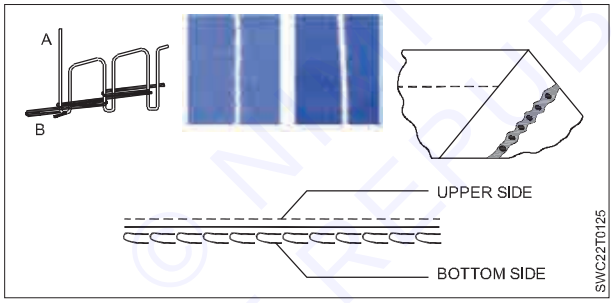
2 The limited stretch of lock stitch because of interlacing of threads which is unsuitable for edge neatening.

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Class 400: Multi-Thread Chain Stitches

The class 400 stitches are created using two or more sets of sewing threads, and are characterised by interlooping of two sets of threads known as needle thread and looper thread. Loops formed in one set of sewing threads are passed through the fabric and are held by interlooping and interlacing with loops formed by another set of threads. The simplest version of this class of stitch, 401.



The chain stitch has the appearance of lock stitch in the front side of the fabric but has a double chain effect created by a looper thread in the backside of the fabric. A two thread chain stitch is stronger than a similar lock stitch and since no threads are interlocked with each other within the fabric, there is less probability to cause the type of seam pucker that occurs when tightly woven fabrics are distorted by the sewing thread. The great advantage of this class of stitch is that both the needle and looper threads are run from large packages (cone) on top of the machine; therefore, there are no issues with running out of bobbins like with a lock stitch machine. It is often used on long seams in garments like trousers. The maximum sewing speed in lock stitch machine would be around 6,000 rpm while in chain stitch machine 8,000 rpm could be achieved.

Class 500: Over-Edge Chain Stitches

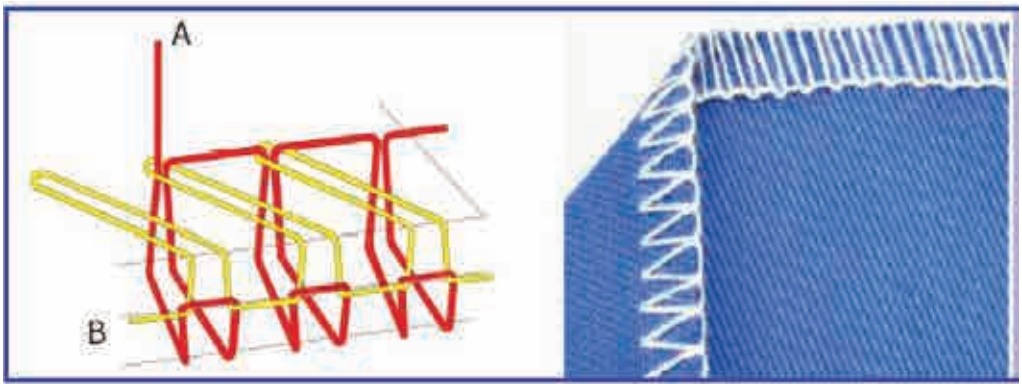
These types of stitches are created using one or more sets of sewing threads, and have characteristic features that loops formed by at least one set of threads goes around the raw fabric edge. These stitches are generally called ‘overlocking stitches’. The most regularly used stitch types in this class has one or two needle threads and one or two looper threads and they form a narrow group of stitching line along the fabric edge with threads intersecting at the edge and preventing the fabric from fraying.

All classes of stitches in this category have high elasticity, they do not unravel easily, and a trimming knife on the machine makes sure there are neat edges prior to sewing.

Stitch class 503 is formed with one needle and one looper thread, and is less versatile, mainly used for edge neatening.

Stitch class 504 is created from one needle thread and two looper threads and is utilised for edge neatening and, in the case of knitted fabrics, for joining seams.

A combination of 401 and 503 stitch class is sewn simultaneously on one machine, where a joined and neatened seam is required that does not need to be pressed open and is generally called a safety stitch (5 Thread Overlock).



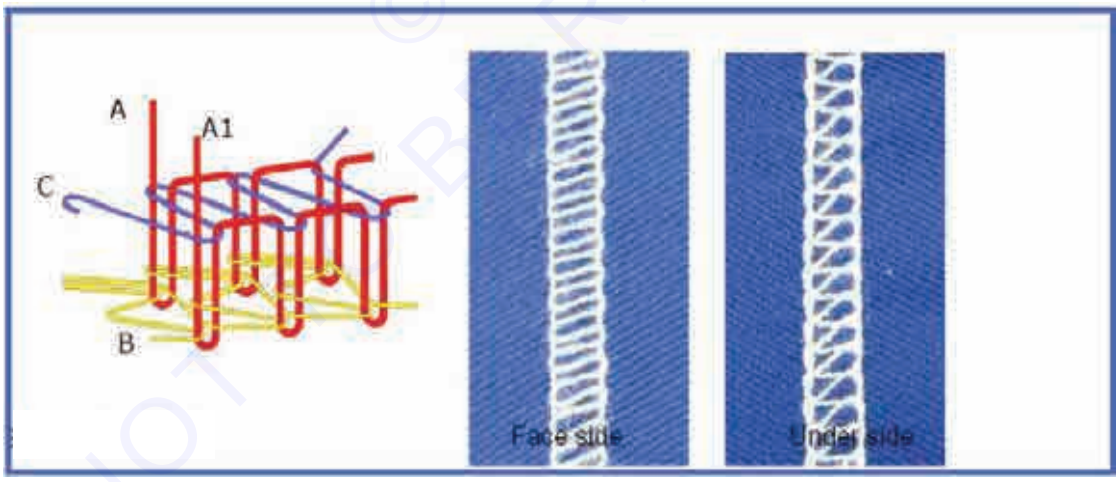
Overlock stitches are categorised by a number of ways and the most common way of classification is based on the number of sewing threads used in a stitch such as 1, 2, 3, 4 or 5 threads overlock stitches.

Each of these stitch classes has a distinctive application and benefits as given below.

- 1-thread overlock stitches are used for 'butt-seaming'.
- 2- and 3-thread overlock stitches known as 'merrowing' are utilised for seaming and edge neatening on woven and knitted garments.
- 4-thread formations known as 'mock safety stitches' provide extra strength while retaining flexibility.
- 5-thread formations, which employ two needle threads known as safety stitches, create stronger seams which are used for apparel manufacturing.

Class 600: Covering Chain Stitches

The stitches in this class are made by utilising three sets of sewing threads, namely, needle (A), looper (B) and spreader (C) thread. The loops formed by the needle threads are passed through the loops of the spreader threads, which are already case on the fabric surface and then passed through the fabric where they are outer looped with loops formed by looper threads on the rear side of the fabric.



Stitches in this class are the most complicated of all types and could have up to a total of nine threads including four needle threads creating a broad, flat joining of elastic, braid of binding to the edges of garments like briefs with the possibility for a decorative top cover as well as the functional bottom cover over the raw edge of the garment fabric.

The complicated type of stitch in this class is known as a flat lock (606), which can be utilised to join fabrics that are butted together. Two trimming knives in the machine ensure that neat fabric edges butt together and four needles and nine threads provide a smooth join with good extensibility. It is commonly used on knitted underwear fabrics to provide a seam with low bulk that can be worn comfortably against the skin.

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Seams

In garment assembling process, two or more plies of fabric or other materials are detained by rows of stitches known as a seam. Seams finishing can be carried out with a range of methods to prevent unraveling of fabric raw edges as well as to neaten seam edges on the inside of garments. The type of seam and sewing thread used will vary with each application.

Classification of seam

Seams are classified based on the type/number of fabric components used. Eight classes of seams are defined by ISO 4916:1991.

Class 1: Superimposed seam

Class 2: Lapped seam

Class 3: Bound seam

Class 4: Flat seam

Class 5: Decorative/ornamental stitching

Class 6: Edge finishing/neatening

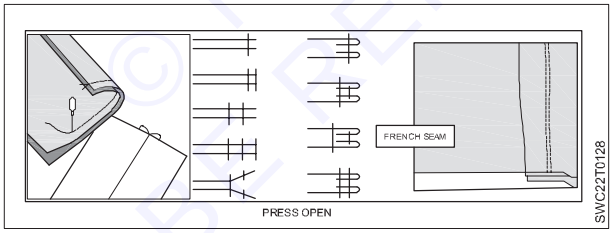
Class 7: Attaching of separate items

Class 8: Single ply construction

Class 1: Superimposed Seam (SS)

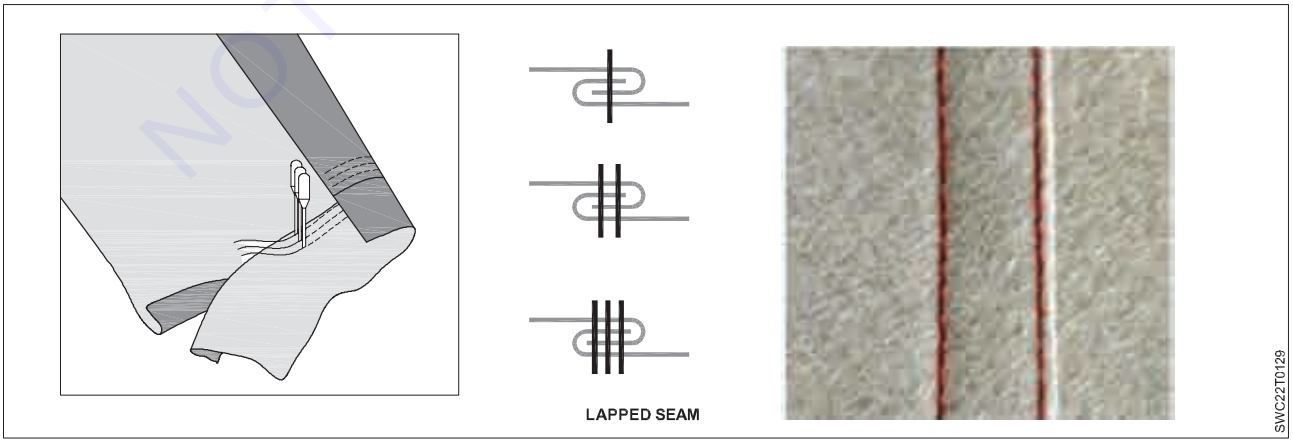
In this kind of seam, normally two or more fabric panels are superimposed over one another and seaming was done near an edge, with one or several rows of stitches.

A simple SS can be produced using 301 or 401 class of stitches and can also be sewn with other classes of stitches. It is used in seams of jeans, in side seams of skirts, dress slacks, finishing belt ends, ends of waist bands on jeans, collars or cuffs and attaching elastic to waistline.



Class 2: Lapped Seam (LS)

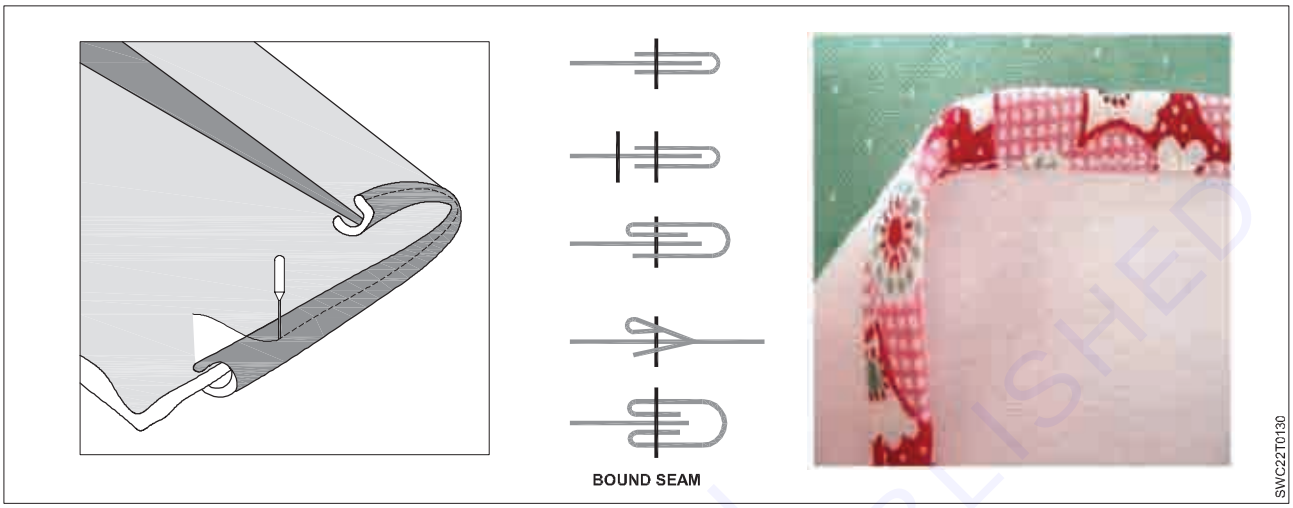
In this type of seam, two or more fabric plies are lapped with the raw edges, flat or folded and attached with one or several rows of stitches. It is a strong seam with fabric edges, generally used to safeguard jeans fabric from fraying. The 401 chain stitch class is commonly used for lap felled seams in jeans because of its strong construction. It is commonly used for rain wear, and edge stitching front facings on jackets and dresses.



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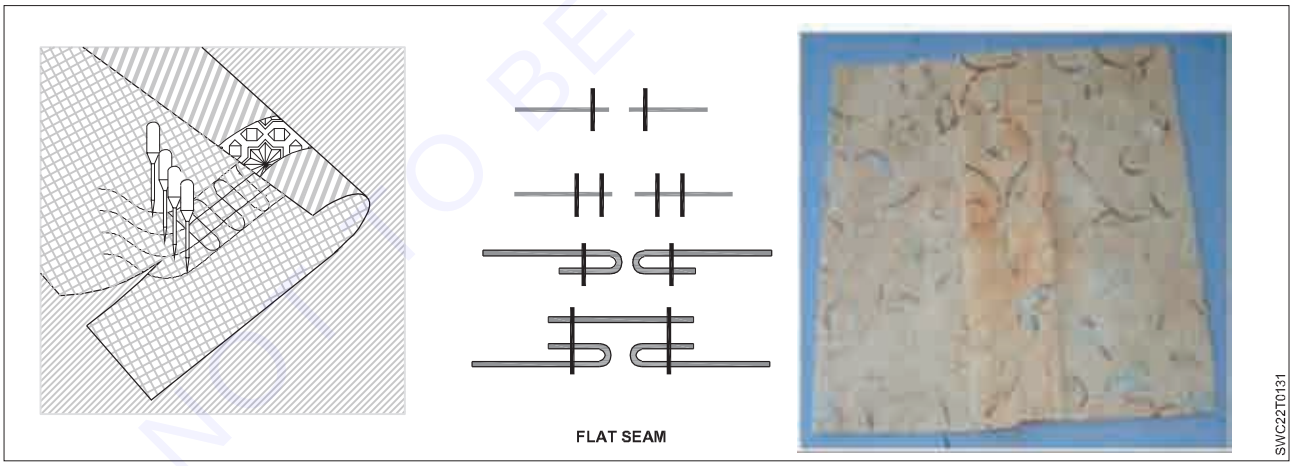
Class 3: Bound Seam (BS)

In this kind of seam, the binding strip is folded on the edge of the base fabric plies and is stitched at the edges along with the fabric plies with one or several rows of stitches. This makes a neat fabric edge on a seam exposed to view. A 401 chain stitch or 301 lock stitch class of stitches is normally used for seaming bound seams and it is utilised for finishing sleeve hems, necklines, finishing seams on unlined jackets and coats, finishing raw edges, continuing the motif design of lace, etc.



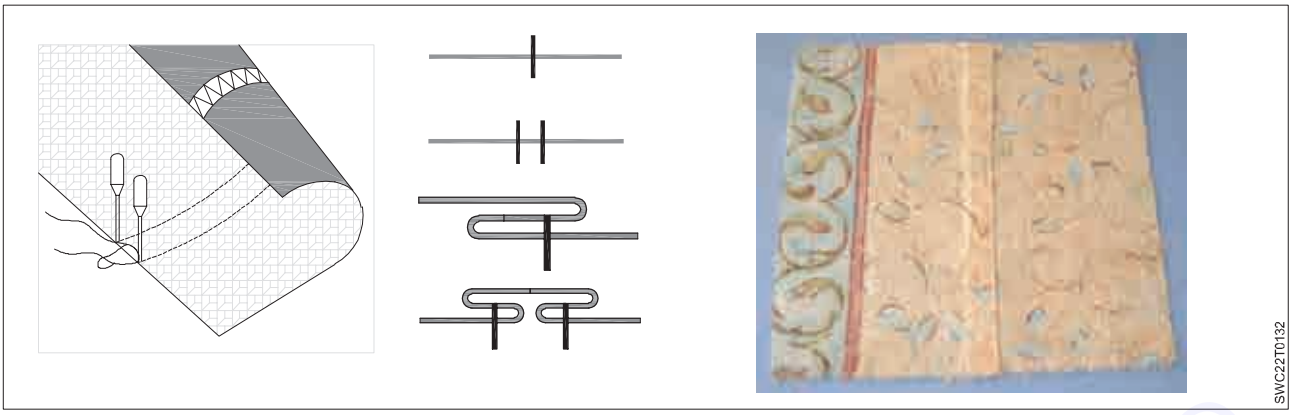
Class 4: Flat Seam (FS)

This seam is also called a butt seam as the edges of the fabrics do not overlay one another, they will be butted together. In this seam type, two fabric edges in flat or folded conditions are brought together and oversewn with stitches. The main purpose of this seam is to provide a joint without any extra thickness of fabric at the seam, as needed in underwear or foundation garments. The bottom threads (looper thread) should be softer as well as stronger and the cover thread should be decorative as well as stronger. The flat seam is normally sewn with a zigzag lock stitch, chain stitch or covering stitch. This kind of seam will comprise two components and could be seen on knitted garments where seams are required to be free from bulk.



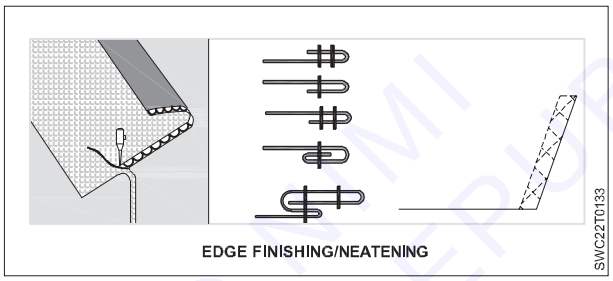
Class 5: Decorative/Ornamental Stitching

The decorative or ornamental stitch is a series of stitches down a straight or curved line or following an ornamental design on a single fabric ply. A more intricate kind of stitch involves various systems of piping, producing an elevated line along the fabric surface. The stitching in a single fabric ply resulted in decorative effects on the fabric surface like pin tucks.



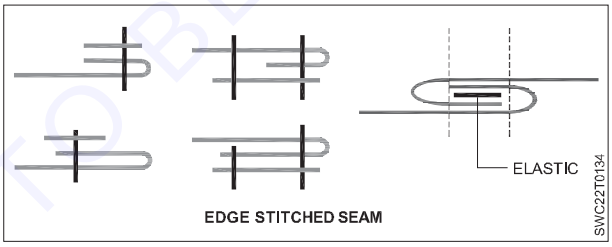
Class 6: Edge Finishing/Neatening

Edge neatening stitch could be seen where the edge of a single fabric ply is folded or covered with a stitch. The simplest of this process is known as 'Serging' where the raw edge of the fabric is secured by overedge stitching to prevent fraying of edges as well as edge neatening. This seam class involves seams whereby the edges are neatened by means of stitches and could be utilised in circumstances where the raw edge of fabric needs finishing. Eg: Overlock.



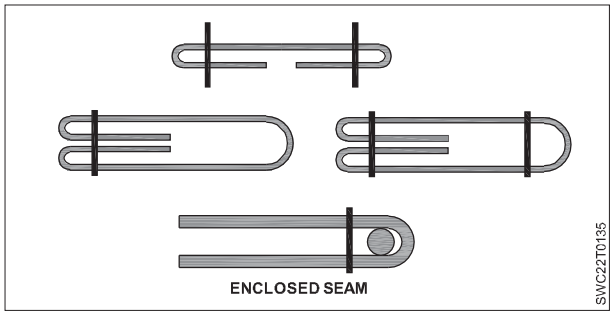
Class 7: Edge Stitched Seam

This kind of seam involves seams that need the inclusion of another component at the edge of a fabric ply, for example, elastic braid inserted onto the edge of ladies briefs. This kind of seam requires two components.



Class 8: Enclosed Seam

In this kind of seam class, only one piece of strip of fabric is turned on both edges. The general application of enclosed seams could be found in belt loops or belts for which a folder attachment can be done on the machine.



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Numerical expressions of seams

Each seam is recognized by a numerical description consisting of five digits.

- The first digit of seam expression represents the seam class (1–8).
- The second and third digits represent the counting numbers (0–99) to specify the differences in the position of the needle penetrations.
- For better communication of seam type, the description of the type of stitch has to be mentioned after the designation of the stitched seam.

Seam quality

Though the type of stitches selected for a seam depends on the functional as well as aesthetic requirements, the following factors have to be taken into account for seam quality.

- Seam size: Expressed by seam length, seam width and depth.
- Seam slippage strength: It is the force required to draw out a 0.25″of the opposing sets of yarns which are perpendicular to the seam line.
- Seam strength: It is the force required to break the seam either by breaking the sewing thread or by breaking the sewn material.

Types of motors and belt

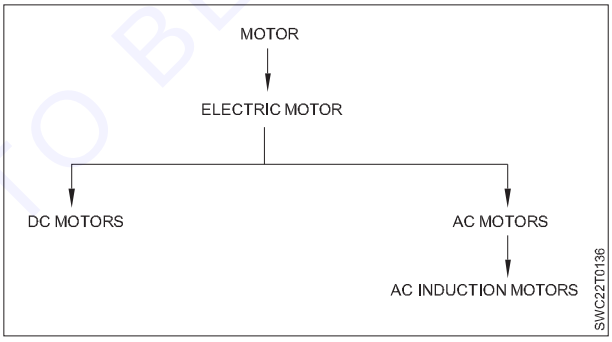
A motor is a machine designed to convert energy into useful mechanical motion. Various types of motors are available in the market, but Sewing industry mostly uses the electric motor. An electric motor uses electrical energy to produce mechanical energy, usually through the interaction of magnetic fields and current-carrying conductors.

Electric Motors can be classified into two categories

1 AC Motors

2 DC Motors

AC motors are mostly used for the industrial Machinery.AC motors are also available in various categories. AC induction motor is the most common technology used in the Garment industry.



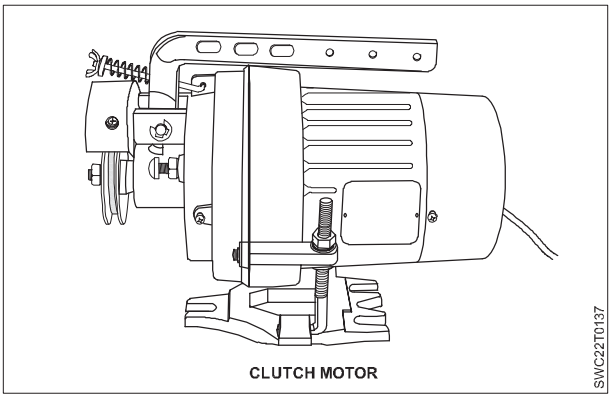
And AC MOTOR is used with the following drives to operate the sewing machine

- Clutch (For clutch Motor)
- SERVO (For Servo Motor)
- Direct Drive

1 Clutch Motor

A clutch is a mechanical device which provides for the transmission of power from one component (the driving member) to another (the driven member). Clutches are useful in devices that have two rotating shafts. In these devices, one of the shafts is typically driven by a motor or pulley, and the other shaft drives another device. The clutch connects the two shafts so that they can be locked together and spins at the same speed. Same Principle is used in the industrial sewing machine also.

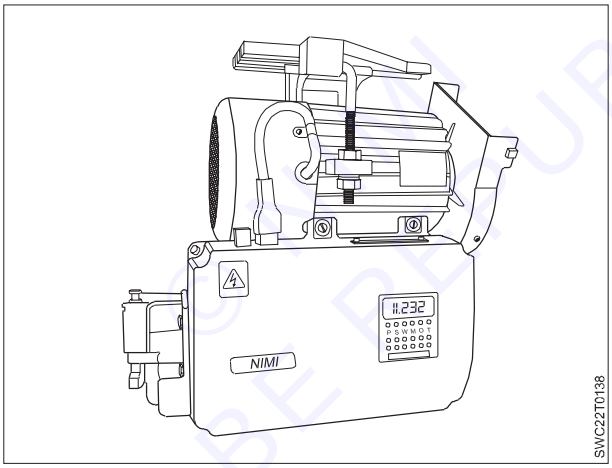
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CLUTCH MOTOR

2 Servo motor

Servo is an automatic device that uses error sensing negative feedback to correct the performance of a mechanism. The term correctly applies only to systems where the feedback or error-correction signals help control mechanical position or other parameters. Servo motor control system will replace the traditional electronic sewing machine motor control and drive system to become a mainstream technology. More and more extensive use of servo motor control system by garment processing enterprises leads to cost saving, maintenance-free, low noise, and replaces the traditional electronic motor control system. It becomes a sewing machine drive system of the mainstream.



Main features of servo motor

- Low noise, low vibration and low power consumption.
- Linkable to PC.
- Multi- Positioning mode.
- Switching power supply system (160V ~ 280V.AC).
- Powerful parameter system, easy adjustment and upgradeable.

Servo motor advantages

1 Energy saving & environmental protection

2 Saving more than 80%

3 Saving manpower by 20%

4 Small size, simple operation, easy maintenance, beautiful appearance

5 Long life

6 Starts, braking action smooth, little vibration

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Comparison of servo and clutch motor

No.	More features	Energy-saving servo motor	Clutch Motor
1	Exterior	Excellent, full of Mechatronics design concepts	Decentralized structure, large pet
2	Labor intensity	Low. Operation simple and convenient, intelligent, operator fatigue is not easy	High
3	Efficiency	High. Output increase, the corresponding reduction product processing fees	Low
4	Vibration	Low. Longer machine life, improve the quality of work improving the environment	Large
5	Noise	Low. Longer machine life, improve the working Environment	Large
6	Service	Low. Brushless servo motor, maintenance-free	Clutch replacement
7	Energy	Once every province, electricity (98% of non-running Power, running power 26%)	Full operation
8	Network configuration	Small. Start current, low total power consumption	Large
9	Saving	Saving can be recovered within a year, consolidated return on investment for 6 months	High cost

3 Direct drive

A Direct drive mechanism is one that takes the power from a motor without any reductions (such as a gearbox, chain and belt).

Advantages:

1 Increased efficiency: The power is not wasted in friction (from the belt, chain, etc, and especially, gearboxes).

2 Reduced noise: Being a simpler device, a direct-drive mechanism has fewer parts which could vibrate, and the overall noise emission of the system is usually lower.

3 Longer lifetime: Having fewer moving parts also means having fewer parts prone to failure. Failures in other systems are usually produced by aging of the component (such as a stretched belt), or stress.

4 No maintenance required for lubrication.

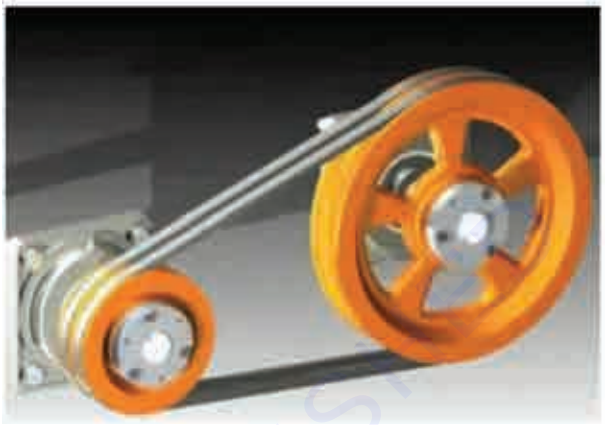
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Machine belts

A belt drive is one of the most popular types of power transmission methods besides gears, chain drives, shaft couplings and lead screws. The use of these highly efficient mechanical drives is increasing with every passing year.

Belt Drives

Belt drive is a mechanism that transmits rotational motion from one pulley mounted on a shaft to another by means of a belt.



- It is used to transfer the power from one system to another system.
- The belt drive is used for continuous power transmission.
- The belt transmits torque from the driving pulley to the driven pulley by means of the forces of friction that arise between the belt and the pulleys.
- The belt is a flexible element of a mechanical system.

Types of belt drives

1 Open belt drive

2 Closed or crossed belt drive

3 Stepped cone pulley

4 Fast and Loose pulley Drive

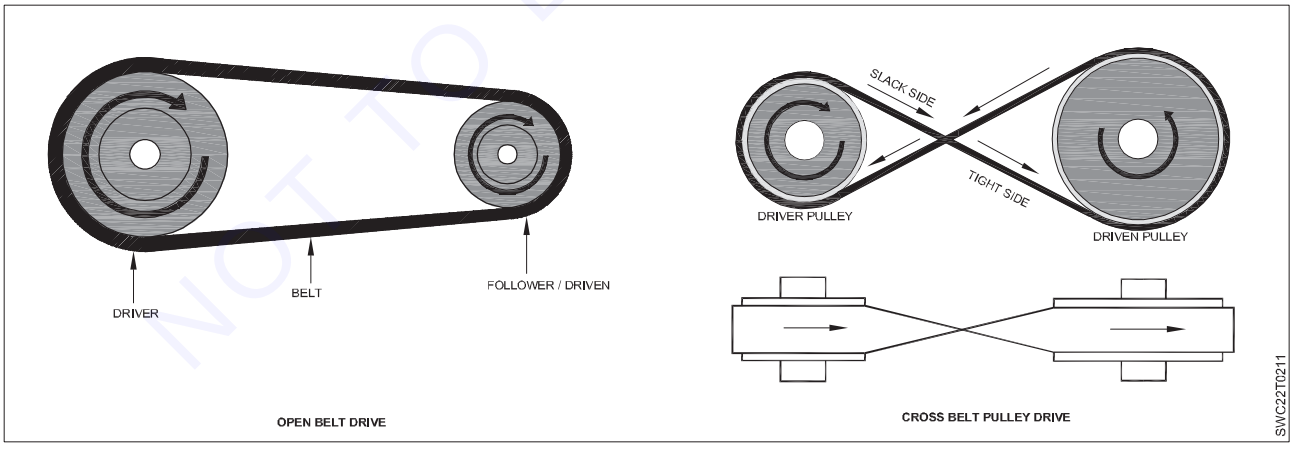
5 Jockey pulley drive

Open Belt Drive

In open belt drive, belt proceeds from top of one pulley to the top of other pulley without crossing.

Cross Belt Drive

In crossed belt drive, belt proceeds from top of one pulley to the bottom of another pulley and thus crosses itself.



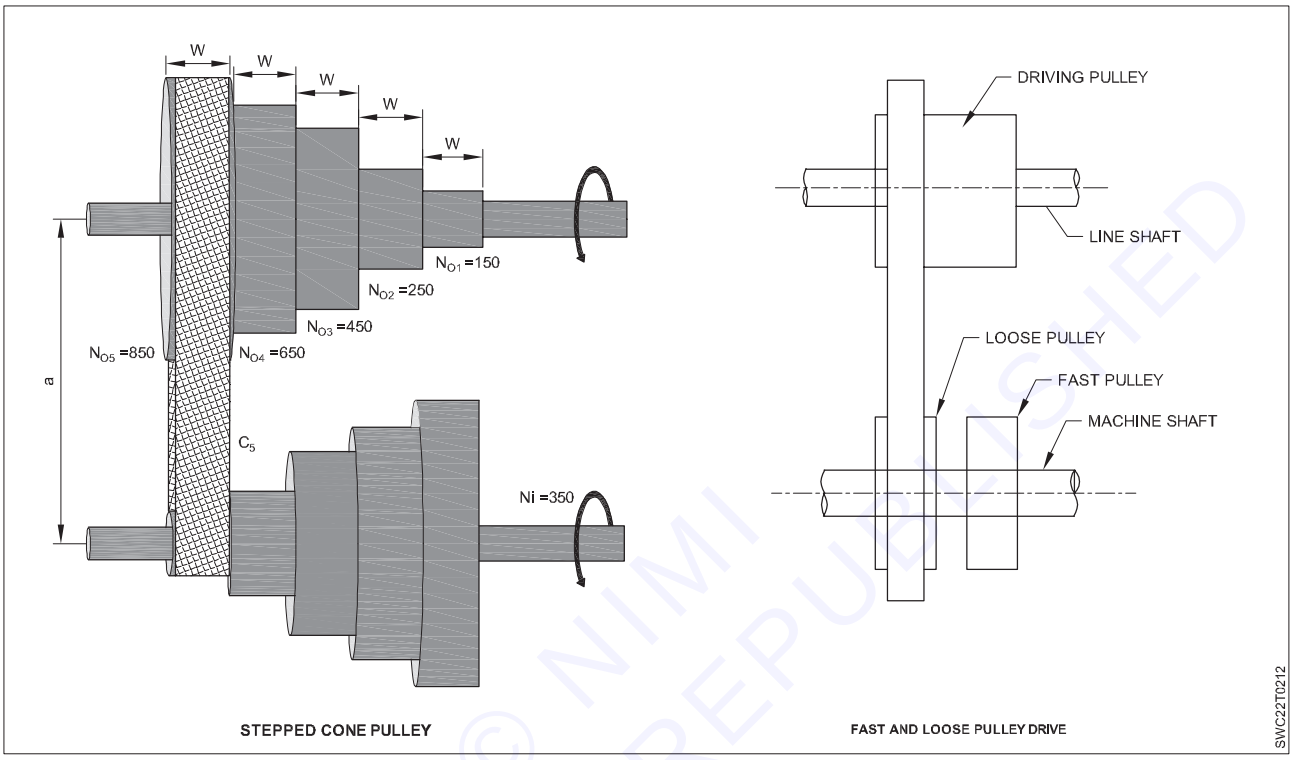
Stepped Cone Pulley

A pair of pulleys, each with a set of steps of increasing diameter, mounted on parallel shafts such that the smallest and largest diameters of one are aligned with the largest and smallest diameters of the other, thereby allowing a wide range of speed ratios to be achieved by shifting a belt from one end of the pair to the other.

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Fast and Loose Pulley Drive

This type of belt drive is used when the driven or machine shaft is to be started or stopped whenever desired without interfering with the driving shaft. A pulley which is keyed to the machine shaft is called a fast pulley and run at the same speed as that of the machine shaft. A loose pulley runs freely over the machine shaft and is incapable of transmitting any power. When the driven shaft is required to be stopped, the belt is pushed on to the loose pulley by means of a sliding bar having belt forks.

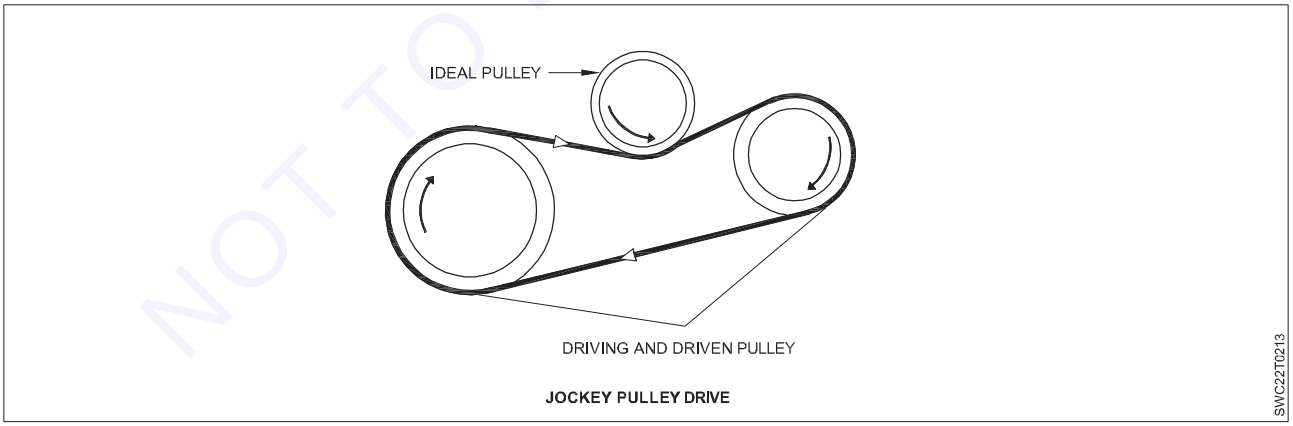


STEPPED CONE PULLEY

FAST AND LOOSE PULLEY DRIVE

Jockey Pulley Drive

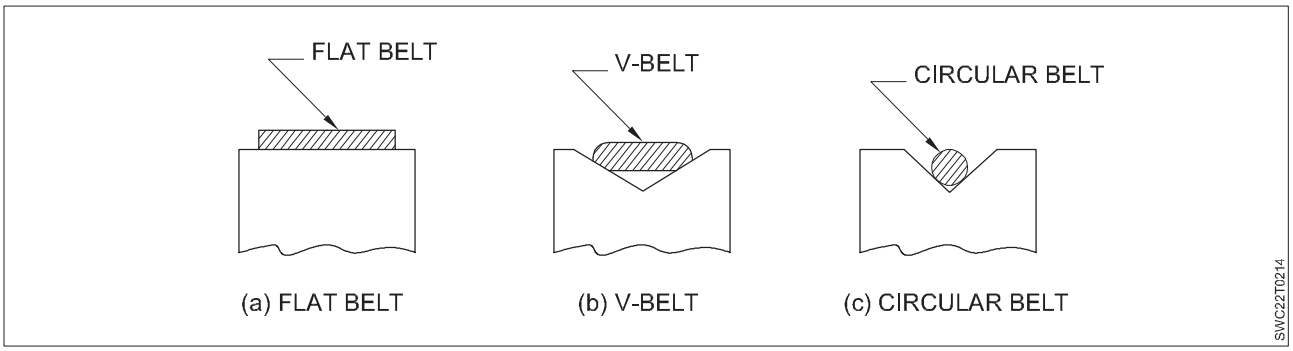
The term jockey wheel predominantly refers to a wheel-based mechanical system used for steering or guidance. It is a guide wheel — usually operating as a pair — which is used to move, retain, locate and (usually) add tension to a belt.



JOCKEY PULLEY DRIVE

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Types of Belt



Types Of belts (on basis of cross section)

Flat Belt



This is a kind of rectangular cross-section. It is used where low power is required and speed is more. Generally, the shaft distance is between 5 to 10 meters. Flat belt transmits power by using friction produce between the belt and the pulley. The pulley rotation in the flat belt is in the same direction. The flat belt has an efficiency of around 98 percent. Very little noise comes in this belt.

Flat belt are best-suited for applications with smaller pulleys and large central distances. This type of belt is used in many power transmission applications.

V- Belt

V belts are in the trapezoidal cross-section. V belts are used where shaft distance is less than 2 meters and used for moderate speed and high power. In belt the multiple drives are possible.

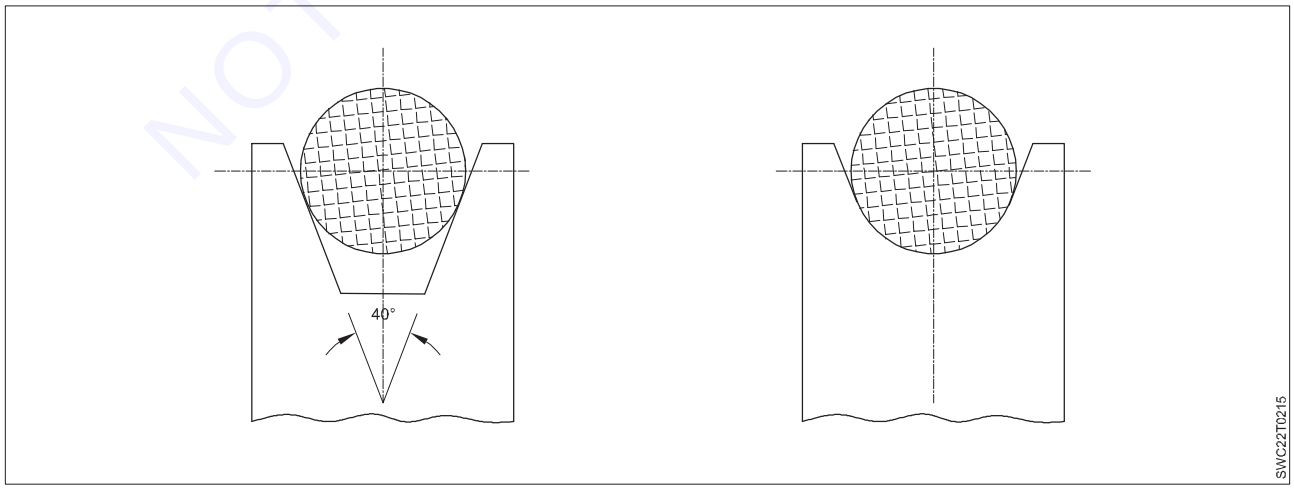
V- belts are used in variable-speed drives. They offer the best combinations of traction, speed, bearing load and service life. At the same level of tension, they transmit higher power than flat belts. These are generally used for centre distances ranging from 1m ~ 2m as they are not suitable for large distances.

Circular Belt

It is a circular cross-section. Circular belts are used where more than a 5-meter shaft distance. It is used for high power transmission. Circular belts are also used where smaller initial tension is required and absences of vibration and noise are there.



There are two types of grooves for the pulley — trapezoidal with an angle of 40° between the sides and half round with a radius equal to that of the belt.



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Timing (toothed) Belt

Timing Belt can be best described as Belt with integrally moulded teeth on its inside which makes positive engagement with axially grooved pulley. Timing Belt is also known as synchronous Belt or positive-drive Belt. It is a precise and reliable type of belt. Timing belts are mainly used inside (internal combustion type) the system to transmit power. Timing Belts exhibit important properties such as fixed speed ratio, no re-tensioning after installation, low maintenance with wide variety of power transmission capacities and drive speeds. Timing belts use teeth that mesh with grooves in a pulley to synchronously drive the system. Its unique feature enables it to use in positive drive resulting in precise movement of drive components.



Timing belt are used to drive camshafts or for the secondary transmission of some motorcycles. They are also used on many industrial or agricultural machines. These are used in applications where positive drive is required and slipping can't be tolerated.

It's quite important to choose the correct belt material so that one does not have to change the belt regularly because of damage.

Factors considered while choosing a material for belt

1 More flexibility.

2 Reliability and Durability.

3 Material should be able to withstand high tensile stresses.

4 It should resist high temperatures.

5 Should have low weight per unit length.

6 The material should have a high friction coefficient.

7 It should have excellent resistance to wear and fatigue.

Belt Materials

Plastic belt

- These types of belt materials are made up of plastic sheets and rubber layers.
- The main advantages of a plastic belt are that it can design almost any size.



Balata belt

- Balata belts are like rubber type belts, but they are stronger than rubber belt.
- This is used for food packaging conveyor.
- This is not used for high temperatures because balata becomes sticky gum at a higher temperature.



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Leather Belt

The leather is the most significant material for flat belts. Leather belts are made from steer leather (cut from either side of the backbone of a steer). It ensures the greater tensile stress on the outer side of the belt is on the flesh side of the belt.



Rubber Belt

They are made by impregnating fabric or canvas with rubber and have a thin layer of rubber on the surface of the belt. They are suitable where the belt exposed to moist, e.g. sawmills, paper mills.



Cotton or Fabric Belt

The fabric belts are commonly used for temporary application. The advantage of this type includes they are suitable for a warm climate, in damp and exposed positions. Normally used in farm machinery and belt conveyor since they need a little attention.



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Module 7 : Pattern Marking & Construction of Various garments

LESSON 37 : Estimation of cloth for Different width, Size and Fabric Pattern

Objectives

At the end of this lesson, you will be able to:

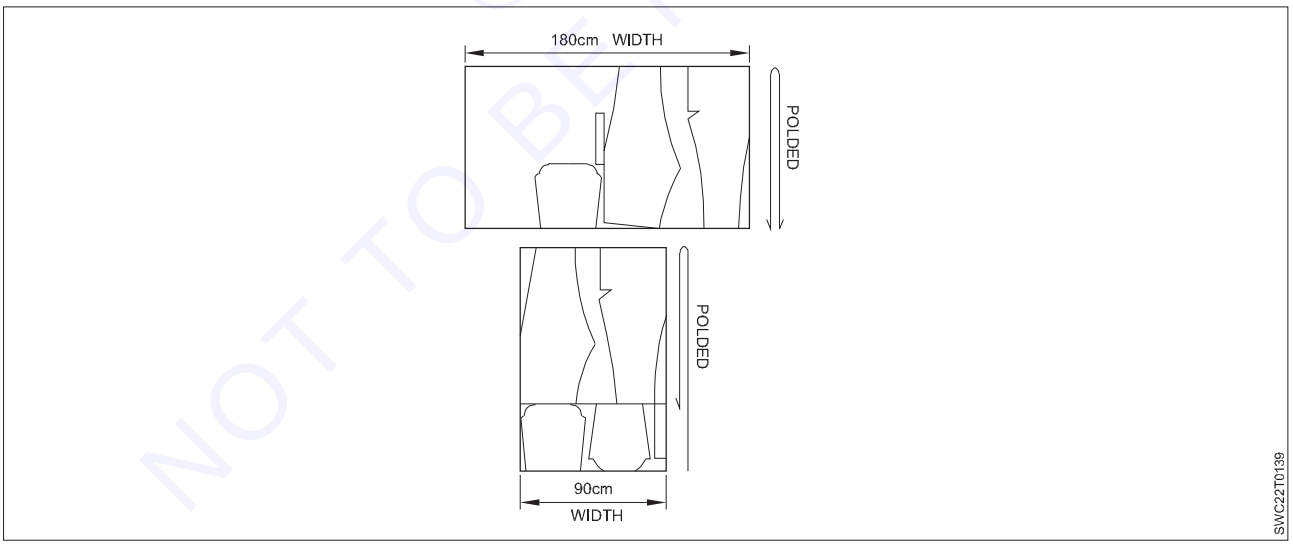
- explain about the estimation of cloth for different width of fabric, size of fabric and identify the fabric pattern.
- explain about the cutting technology
- explain about the ladies blouse and it types.

Estimation of cloth for Different width, Size and Fabric Pattern

The question of how much material is required for a particular garment depends on various factors like

- Width of cloth
- Fabric design
- Dress design (pattern)
- Body measurement.

Width of cloth: Fabric widths vary sometimes according to the type of fabric, like linen, velvet, corduroy, cotton etc., e.g. cottons are often of 90 cm width, silk of 84 cm, light weight woven synthetics of 115 cm. But often one and the same fabric is woven in different width. These different widths are categorised into two groups. The fabrics that are 90 cm and below are named as “single width”, fabrics of 90 cm and above are named as “double width”. While estimat- ing the material required for stitching it is important to check the width of the fabric, hence the layout will be different in both cases, i.e. less material is required for double width.



The layouts show that there is wastage if the double width is used in the particular dress. Therefore single width is preferred for average size and simple dress designs with less compo- nents. Only if one is particular about a certain material which comes only in double width we have to fore go the wastage.

Design of fabric: There is a big variety of fabrics in print (checks, stripes etc. of different sizes) and weave (one way texture or design). In such cases the fabric consumption will be more than in a plain fabric because of one-way layout (all components are to be laid in one direction).

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Dress design: The fabric length also depends on the design features of the garment. An umbrella-cut skirt requires more material than a simple flared one, and smocked parts of a dress will require also 2-3 times more material than plain ones.

Body measurement: Individual measurements require more or less material for a dress to be stitched - a tall and prominent body needs more material than a small and thin one.

The most reliable way to find out about the length of material required is the trial layout on milton cloth.

After preparing the pattern for a particular dress first the fabric (width of cloth/design) has to be chosen. The components are laid on milton cloth in an economical way and then the required length is measured.

The following chart which is based on experience will help to estimate the material for the dresses stitched in practi- cal exercises (medium size figure and plain fabrics). The required length of material in this chart includes all allow- ances.

In ready made pattern the quantity of material is indicated that no calculation or trial layout is required.

	Single width 90cm	**Double width 150cm**
petticoat	2 length+ 10 cm	1 length + 25 cm
pieated skirt	2 length+ 10 cm	1length+ 10 cm
Divided skirt	4 length + 25 cm	2 length+ 15 cm
Baby chemise	2 length	1 length + 5 cm
Children's top	2 length + 5 cm	1 length + 1 sleeve + 10 cm
Aligar pyjama	2length	DW(120cm) 1 length+ 15 cm DW(120 cm)
Pyjama churldar	2 length + 25 cm	1& 1/2 length+ 25 cm
Pant cut pyjama	2 length + Pocket length	DW(120cm) 1& 1/2 length + Pocket length
Baby set	3 length+ 10 cm	DW(120cm) 2 length+ 10 cm OW(120 cm)-
Plain frock	2 length+ 10 cm	1 length + 20 cm
Design frock	3 length	2 length
Umbrella frock	3 length	2 length+ 10 cm

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	Single width 90cm	Double width 150cm
Boy's night suit		
For Pyjama	2 length + 20 cm	1 length+ 15 cm
Full sleeve shirt	3 length+ 10 cm	1 length + 1 sleeve length
Combination suit	2 length + 5 cm	1 length+ 15 cm
Boy's shorts	2 length + 20 cm	1 length+ 10 cm
Nehru kurtha	2 length + 1 sleeve + 5 cm	1 length + 1 sleeve length + 10 cm
. Kalldhar kurtha	4 length+ 15 cm	2 length + 5 cm
Salwar belted	2 length+ 10 cm	1 length + 25 cm
Ladies's shirt	2 length + 1 sleeve + 10 cm	2 length + 5 cm length
Ladies's blouse plain	2 length + 1 sleeve length	1 length + 1 sl. length
Ladies's blouse choli cut	2 length + 1 sleeve length	1 length + 1 sl. length
Slacks	2 length + 20 cm	1 length+ 15 cm
The required length of material Includes all allowances		
Jeans	2 length + 20 cm	1 length+ 15 cm
Boy's shirt	2 length + 1.5 sl. length	2length
Gent's shirt	2 length + 1.5 sl. length	2 length
Housecoat	2 length + sl. length	1.5 length + 20 cm
Nighty	2 length + 1 sl. length	

Different Fabric Pattern

Fabric patterns are in two different directions:

- One way direction - All garments pattern can place in one direction
- Two way direction - Garments pattern can place up and down per our wish

Different types of fabric patterns are:

- Solid
- Prints
- Stripes
- Checks/Plaid

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Solid Fabric

Solid fabric is a collection of colorful fabrics that have a plain or solid pattern. Plain fabric is without design or motifs. Then pattern can place for cutting in two way direction.



Prints – One Way

A fabric has a directional print, it shows all print goes up or down to the pattern on the fabric.Then pattern should place in one way direction.

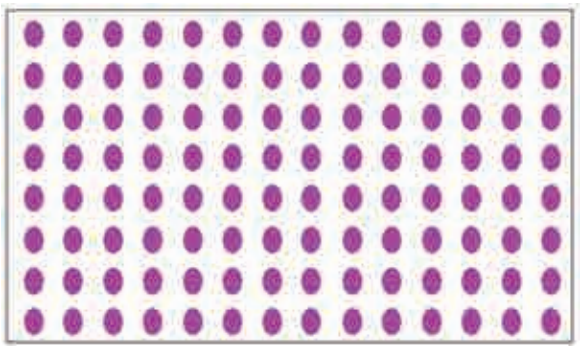


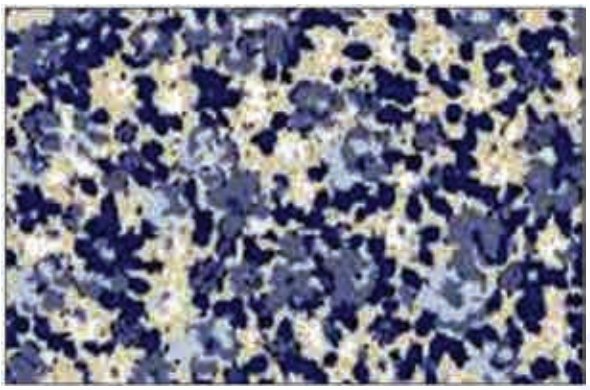


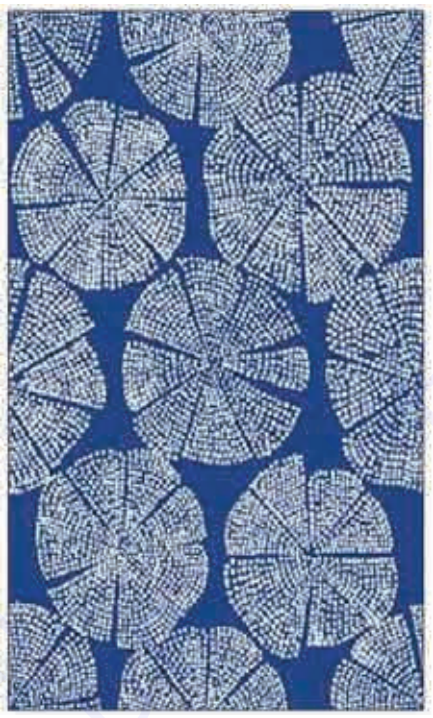



Print – Two Way

Two way prints look the same on the up and down side to the pattern on the fabric.Then pattern can place in two direction.

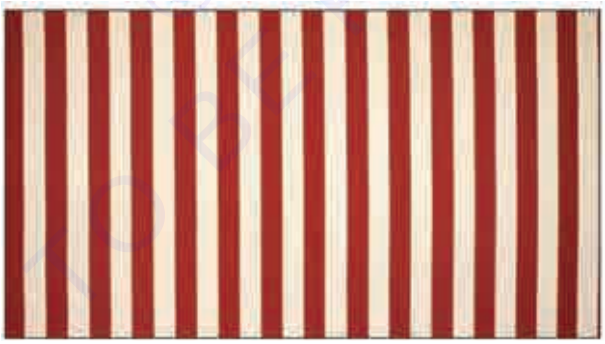






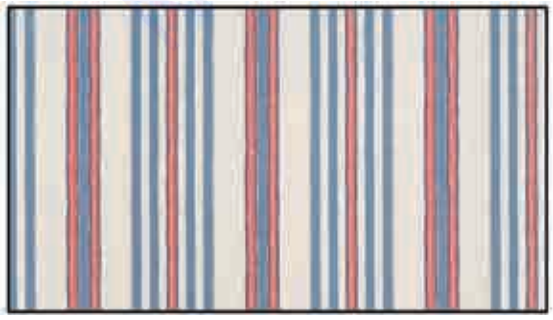
Stripes – Two Way

A balanced stripe repeats the pattern as the most dominant stripe from left to right of the center bar.Then no difference in stripe,then pattern can place in two way direction.



Stripes – One Way

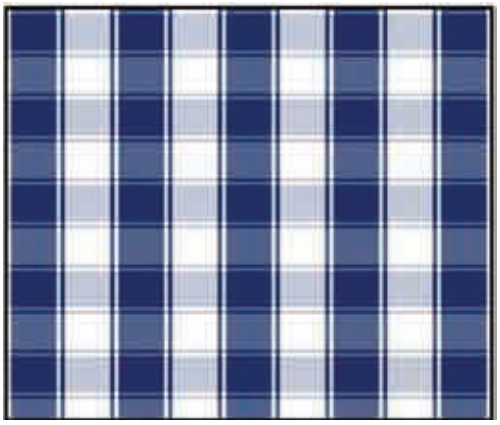
An unbalanced stripe varies in spacing or color from left to right and/or above and below of the center bar. Stripes may be vertical or horizontal.Then pattern can place in one direction.





Checks/Plaid – Two Way

An even (balanced) plaid has the same lines, spaces, and colors on the left and right and the same lines, spaces, and colors above and below a center or dominant line. Even plaids will match in both the lengthwise and crosswise directions.



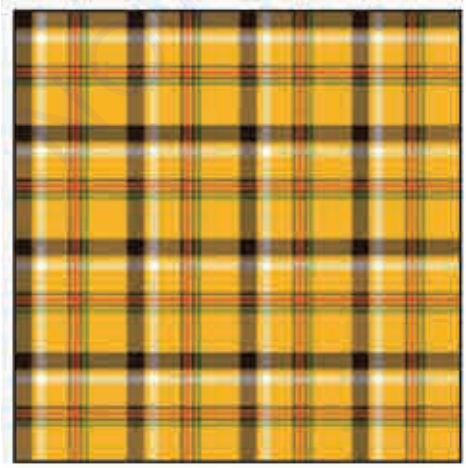
Checks/Plaid – One Way

An uneven (unbalanced) plaid can be one of four types:

- Different from left to right of a dominant line.
- Different above and below a dominant line.
- Different from left to right and above and below a dominant line.
- Different from crosswise to lengthwise whereby the plaid is even right to left and/or up and down.









Cutting Technology

Cutting Machine

Cutting Machine is used for cutting out parts of articles from layers of cloth card webs or knitted fabric. The technically possible depth of cutting of the layer depends on the design of the cutting machine and on the thickness and properties of the fabrics. Cutting machines may be movable or stationary. The machine is shifted manually relative to the layer along lines drawn on the top card web. The development of apparel sector has led to the invention of various fabric cutting machines. Industrial cutters and cutting machines have led to better efficiency and precision in our work. The invention of these gadgets has reduced considerable efforts in the cutting process of different types of fabrics. Although there are different types of cutting machines used to cut fabrics and the most common type of cutting machines are given below:

Different Types of Fabric Cutting Machine

According to the operating process, the Cutting Machine can be classified into three types. Such as-

1 Manual

2 Semi- Automatic

3 Automatic / Computerized

1 Manual Cutting Machine

- Bent Handle Shears
- Scissors
- Pinking Shears
- Buttonhole scissors

2 Semi-Automatic Cutting Machine

- Electric scissor
- Straight knife of Cutting Machine.
- Round Knife Cutting Machine.
- Band Knife Cutting Machine.
- Die Cutting Machine.
- Notcher Machine.
- Drill Machine.

3 Computerized Cutting Machine

- Knife Cutting Machine.
- Laser Cutting Machine.
- Water Jet Cutting Machine.
- Plasma Torch cutting Machine/Airjet Cutting Machine.
- Ultrasonic Cutting Machine.

1 Manual cutting

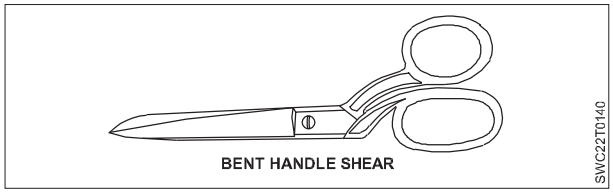
Method's and further developement's in Cutting Technology

Hand shears can be used to cut from single or double ply up to a maximum of 10 plies. The lower blade of the shears passes under the plies but the subsequent distortion of fabric is only temporary and accuracy can be achieved with practice. Left-handed shears are also available for left-handed persons. The disadvantage of this method lies in the time it consumes and the consequent high labour cost but it is appropriate for made-to-measure garments.

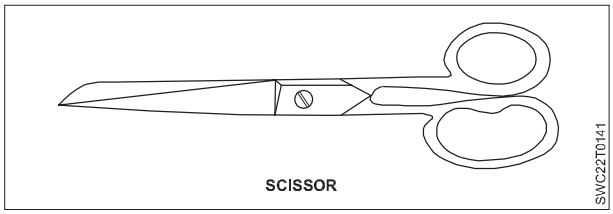
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Types of Hand Shears are as follows

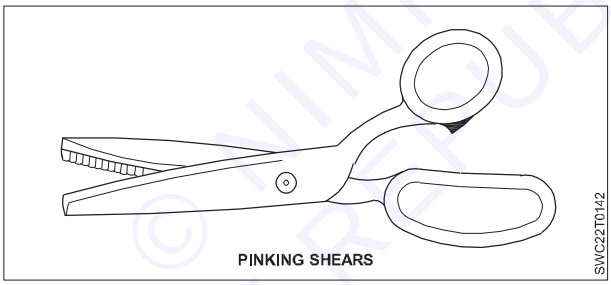
Bent-Handle Shears: They are 8 to 10 inches long. They are used for cutting all types of fabrics. Shears differ from scissors in that they have one small ring handle for the thumb and a large ring handle for the second, third and fourth fingers.



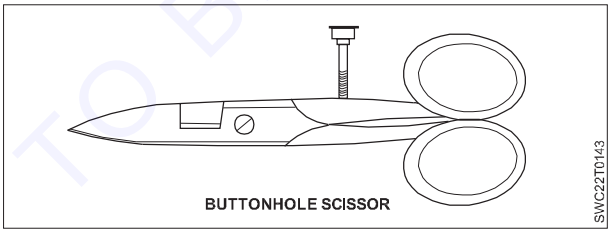
Scissors: They are 5 to 6 inches long. They are used for light cutting. Trimming, clipping corners, and cutting curves. These have round handles for both the blades. They are designed for snipping threads and trimming seams. They should be held so that the wider blade is above the narrower blade.



Pinking Shears: They are 9 to 10 inches long. They produce a notched cutting line (zigzag) which gives a neat appearance to the inside of garments.

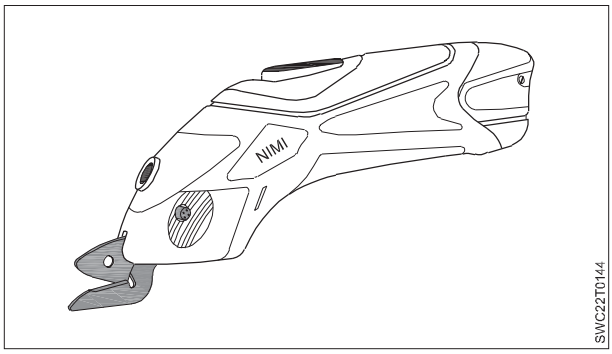


Button Hole Scissors: These can be adjusted so as to cut button holes in any size required. They are useful if one needs to make many button holes.



2 Semi-Automatic Cutting Machine

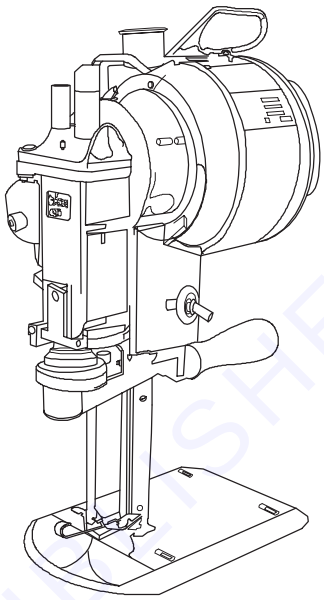
Electric Scissor: Electric scissor are used in most sample rooms. They are ideal for cutting silk, nylon, and soft, hard to cut fabric



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Straight Knife Cutting Machine: It is the most useful cutting instrument in apparel cutting. In apparel industry, more than 99% cases this knife is used. This machine is called straight knife cutting machine because its cutter is straight in shape. It is used for both woven & knit fabric. In this machine different types of straight knife are used according to the different cutting objects. This machine provides good efficiency.





STRAIGHT KNIFE CUTTING MACHINE

SWC22T0145

Features of Straight Knife Cutting Machine

The main parts of this machine are straight knife, electric motor, handle, grinder, base plate, stand/ knife holder, lubricating unit, wheel etc.

1 Could be used to cut higher depth of fabric.

2 Knife height is 10 cm to 33 cm.

3 Knife stroke is 2.5 cm to 4.5 cm.

4 Motor r.p.m. is 3000 to 4000.

5 Auto grinder is used.

6 Auto lubricating unit works for this machine.

7 Different types of knife edge are used for cutting different objects. Such as, straight edge, wave edge, sew edge & serrated edge.

8 A Handle for the cutter to direct the Knife.

9 Knife guard is attached to the front of the knife.

10 Sharp & heavy corners can be cut.

11 Maximum 70% of knife height is used for fabric lay.

12 Wheels are under the base plate to move the machine smoothly.

13 Machine weight is around 12-15 kg.

14 Knife cut the fabric very fast due to high speed of motor. That increases the risk of fabric damage.

Advantages of Straight Knife Cutting Machine

A large number of fabric lays can be cut by the machine due to high length of knife & r.p.m. of the motor. So, productivity is high.

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1 Automatic grinding.

2 Automatically lubrication.

3 Comparatively cheap.

4 Can be moved easily by wheel.

5 Suitable for straight line & curve line.

6 Can be cut high curve line than round knife.

7 Fabric can be cut from any angle.

Disadvantages of Straight Knife Cutting Machine

High speed of the machine causes high risk of damage.

1 Faulty knife could damage fabric layer.

2 Motor weight creates knife deflection which may be creates faulty pieces.

3 Risk is high for physical damage of operator.

4 Knife required to replace.

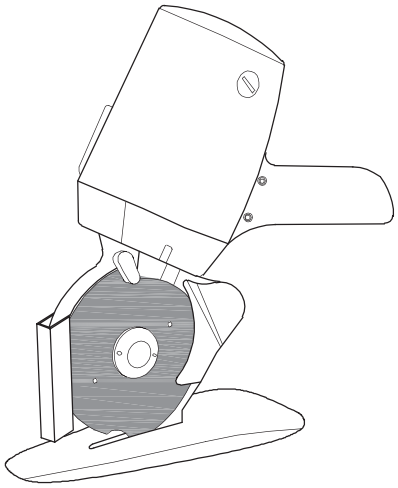
Uses/Application of Straight Knife Cutting Machine

It's suitable for straight line cutting, curve line cutting & for large part cutting. It is used for large production. Most commonly used in Garments Industry of Bangladesh (99%).

Round Knife Cutting Machine

This machine is called round knife cutting machine because its cutter is round but slightly octagonal in shape. This machine is small in size, flexible & used for small production. It is also a popular cutting machine.





SWC22T0146

ROUND KNIFE CUTTING MACHINE

Features of Round Knife Cutting Machine

It contains a round but slightly octagonal type knife with sharp edge.

1 The other main parts of this machine are base plate, electric motor, handle & knife guard.

2 Knife diameter varies from 6-20 cm.

3 Manual grinder is used.

4 Motor r.p.m. is 800-1600.It depends on machine.

5 A handle for the cutter to direct the knife.

6 Easy to handle & movement due to low weight.

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7 Knife is lubricating manually.

8 Three types of knife edge can be used for cutting different objects. Such as, waved edge, toothed edge & circular edge.

9 A round knife rotating so that the leading edge cuts downwards into the fabric.

10 Flexible movement helps to cut non linear shape.

11 Base plate gives support for fabric.

12 Maximum 40% of the knife diameter can be used for fabric lay.

Advantage of Round Knife Cutting Machine

Suitable for cutting single ply as well as multilayer (say 20-30layers).

1 Easy to handle & operate.

2 Suitable for small scale cutting.

3 Suitable for gentle curve line cutting.

4 To cut the larger part of the garments.

5 With a same r.p.m. its efficiency is 10 times greater than the straight knife.

Disadvantage of Round Knife Cutting Machine

1 Very low r.p.m. & knife height.

2 Manual grinder is used.

3 Low productivity since few number of lay can be cut.

4 Difficult to cut small components & high curve line.

5 Not suitable for large production.

6 Lubrication is manually done.

Uses/Application of Round Knife Cutting Machine

It's useful for gentle curve line cutting, big parts cutting, cutting out fabric block from lay & small scale cutting. It's normally use for small production.

Rotary Shears or Small Round Knife

They are same as round knife machines but the lightweight rotary shears are the best solution for cutting intricate markers, one-of-a- kind pattems, samples, reworks, and plastic or rubber sheeting.

Offering the ultimate in manoeuvrability, rotary shears are the answer for short run cutting jobs common in the industry.

Small round knife machines set the standard for the cutting industry by providing agility, power, and versatility. Each small round knife has a low profile base plate which allows for virtually no distortion when cutting through low lays, or single thickness, of material.

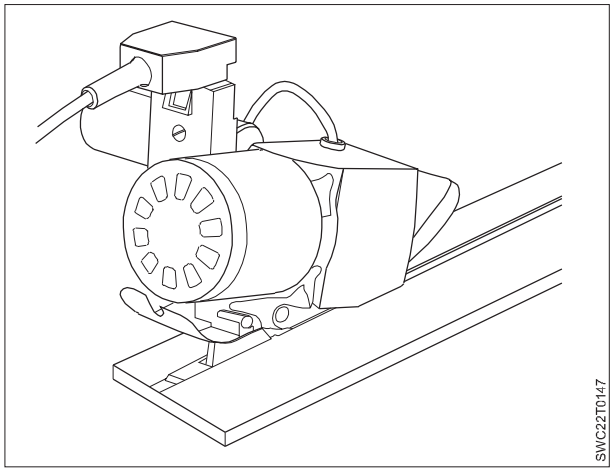
Technical Features of Small Round Knife

- 24" (5.72 cm) round blade for general use or hexagon blade for sheer or difficult to cut cloth.
- Cutting capacity is 25% greater than competitive models.
- Built-in sharpener.
- Ergonomically designed.
- Three different base plates and cutting tips can be selected
- Stabilizer Shoe: the "standard" foot attachment, a utility feature that lends itself well to all cutting and slitting operations.

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End Cutters

End cutters are used to cut the end of every lay spread on the table for starting a new end of the fabric. They provide fast and perfectly straight end cutting as a requirement of marker planning.



Technical Features of End Cutter

- Perma-Field Motor for more cutting torque with less heat build- up.
- Precision engineered profile and interior reinforcing ribs keeps track rigid even at lengths over 72".
- Clamping bracket allows the machine to be attached to any type of cutting table in seconds.
- Standard 40" (1.02m) length handles for use on tables up to 72" (1.83m) wide, with longer handles available.
- Other handle options include a push handle, a dual push/pull handle for extremely wide cuts requiring more than one operator, and a swivel handle for limited space applications.
- Patented Uni-Safe Terminal Block and Attachment Plug allow the operator to engage the power supply to the cutter with one hand.

Band Knife Cutting Machine

Band knife cutting machine is primary device equipment in garment and knitting etc industries. It could accurately cut the pattern of fabrics. This machine is with special blower decreases resistance between fabrics and table, which enables the fabrics be moved easily and be cut precisely. And it could adjustable speed to fit different fabrics. "A" type of MAX series band knife cutting machine is air cushion type, while "B" type is drive type.

Features of Band Knife Cutting Machine

Variable speed control (Inverter System)

Knife speed is shown on the digital indicator and easily contorolled by INVERTER SYSTEM according to the type of material. Inverter Speed Control System provides smooth cutting at the high and low speed.

Air Floating Table

Air Mats is formed on the table to move cutting material lightly, smoothly and provides easy cutting without collapsing the pile of fabrics.

Knife Cooling Silicon Pack

Silicon Pack is easily removed and installed. It eliminates the fusion of chemical yarn and interlining cloth yarn.

Easy Knife Exchange

A Black grip knob at the right of the knife cover provides easy knife installation and removal. Knife is loosened by turning the knob clockwise and tightened by turning counterclockwise.

Automatic Sharping System

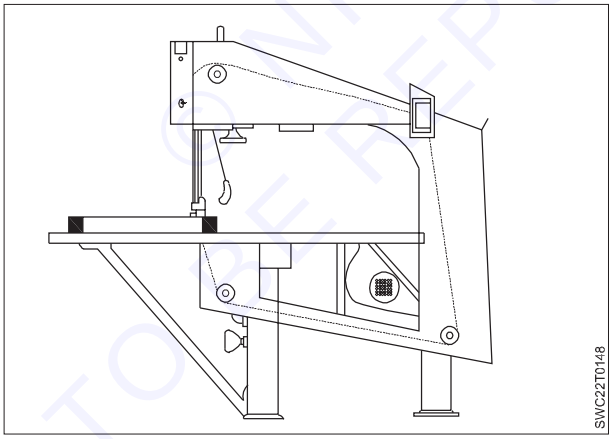
Originally designed Automatic Sharpening Device is equipped. Various grits of sharpening stone are available according to the material.

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Carrying Caster

Carrying Caster is equipped for easy removal to meet the requirement of relocation.





Technical Features of Band Knife cutting Machine

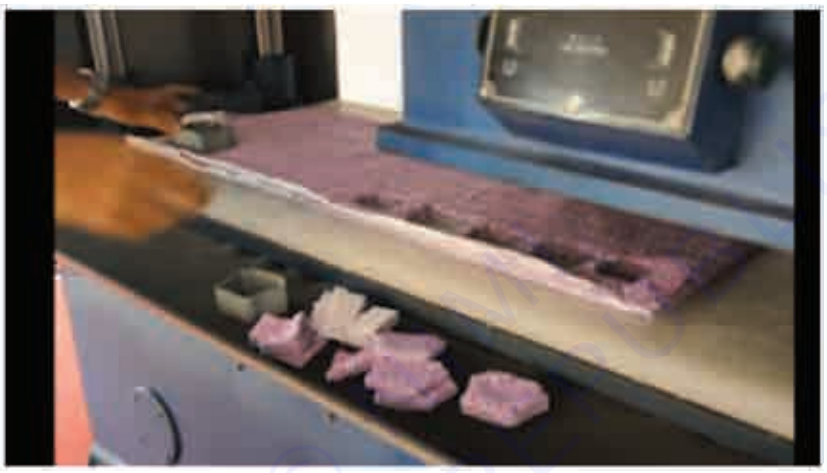
- Automatically set band knife guard
- Warning light indicates band knife running
- All panels are safety switch protected
- Dove-tail guided band knife shrpening unit.
- Band knife blade made of high grade steel.
- Adjustable speed from 400 to 200 rpm, allows cutting all types of fabrics.
- Knife wheels diameter 39cm, 3 cm wide.

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Die Cutting Machine

Die cutting machine involves pressing a rigid blade through the lay of fabric. The die is a knife in the shape of a pattern periphery, including notches. One or more tie bars secure its stability. Free standing dies generally fall into two categories. They can be of strip steel, manufactured by bending the strip to the shape required and welding the joint. These cannot be sharpened and must be replaced when worn. Alternatively, they can be heavier gauge, forged dies which can be re sharpened but which are about five times the price of strip steel. The position of the tie bars determines the depth of cut, which is generally greater with forged dies. Free standing dies cut the small parts of larger garments such as collars and trousers pocketing or the parts of smaller garments such as bras. They can also be used for part of a larger garment part, such as the neck area of a coat front. They provide a high standard of accuracy of cutting but, because of the cost of the dies, they are only appropriate to situations where large quantities of the same pattern shape will be cut.

It is useful where small motifs with particular shape and pattern are needed for cutting. Die cutting is most useful to cut sharp and small parts. Mainly two types of die cuttings are available in market namely, Clickers and Presses. This machine is useful where small motifs with particular shape and pattern and accuracy in cutting are needed.



Advantage of die cutting

- Die cutting is suitable for precession cutting of small parts of a garment.
- It is suitable for cutting the fabric in any angle and any shapes
- Especially suitable for knitted fabric.

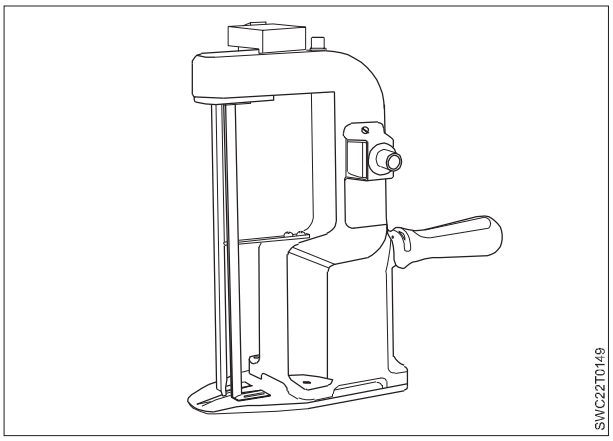
Disadvantage of die cutting

- Die cutting method needs block of fabric lay
- More fabric wastage
- Die manufacturing cost is high.

Notcher Machine

Many garments parts require notches in the edges of them to enable easy alignment during sewing with other garments parts. This notcher can be made by straight knife or other cutting machine but accuracy depends on the operator. Specialized notching equipment provides greater accuracy because a guide lines up the notcher with the cut edge to give consistent depth of notch at a consistent right angle to the edge. Notcher is used to identify folding line, seam line etc.

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Features Notcher Machine

1 A knife notcher is an upright, cylindrical device which cuts the side of a block to a predetermined distance.
2 Both straight notches and V notches are available.
3 An alternative machine, the hot notcher, incorporates a heating element in order that the blade may slightly scorch the fibres adjacent to the notch in order to prevent it fraying and disappearing. This cannot be used with thermoplastic fibres or certain unlined garments.

Advantages of Notcher Machine

1 It is a special type of cutting machine & use in special case.
2 Useful to cut small notch to the fabric.
3 It is most useful to make consistency in notching.

Disadvantages of Notcher Machine

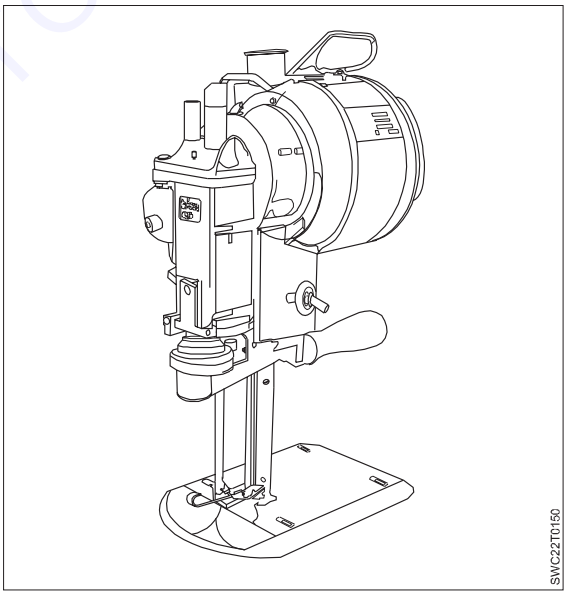
1 Only use to make notch to the fabric.
2 Thermoplastic fibre can't cut by this machine.
3 The use of machine is limited.

Uses/Application of Notcher Machine

To make the notch mark on the fabric.

Drill Machine

Where reference marks are needed away from the edge of a garment Part, such as for the position of pockets, button hole, darts and similar features, a hole is often drilled through all the plies of fabric in the lay.



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Features of Drill Machine

1 The drill mounting includes a motor, a base plate with a hole to allow the drill to pass through, and a spirit level to ensure that the base is horizontal and hence the drill vertical.

2 The momentum of drill is completed at 90˚ angle in the fabric lay by the level of sprit.

3 On many fabrics the drill is used cold and the hole remains visible until the sewing operator comes to use it.

4 For tightly woven fabric the hole is permanent for a long time.

5 On looser weave fabrics, where the hole may close up, a hot drill is used, which will slightly scorch or fuse the edges of the hole to make it permanent for a long time.

6 A hypodermic (or dye spot) drill may also be used which leaves a small deposit of paint on ply of fabric to find the mark place easily.

7 All drill holes must eventually be concealed by the construction of the garments.

Advantage of Drill Machine

1 This machine is needed to mark on the end of components of dresses specially for setting pocket, dart & so on.

2 It can make the hole permanently for a long.

Dis-advantage of Drill Machine

1 The use of machine is limited.

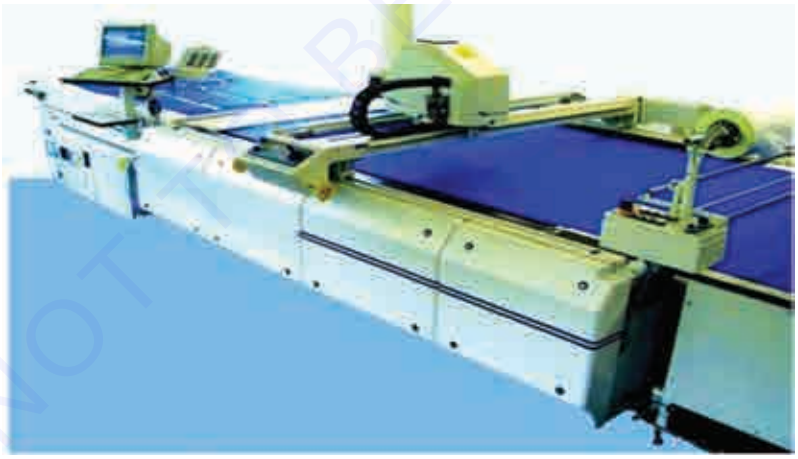
Uses/Application of Drill Machine

It is used to make hole on the fabric for button attaching & to make reference mark for attaching different small components on the garments.

3 Fully Automatic / Computerized Cutting Machine

Computer Controlled Knife Cutting Machine

This cutting machine provides the most accurate possible cutting at high speed. It is suitable for large scale production. Marker is not necessary to put over the fabric lays during cutting. This technology has the advantage of being highly accurate and fast, but does cost considerably more than other cutting techniques.



Advantage

- Very active & fast cutting by computer controlled system
- Suitable for very large scale production
- Speed of cutting can be controlled
- Cutting defects are less than other less labor cost.
- No need of marker paper

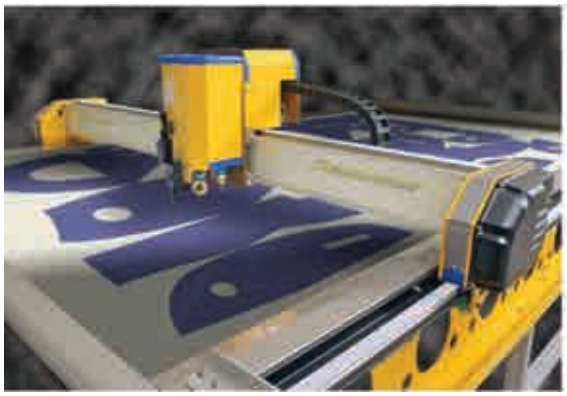
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Disadvantage

- Very expensive machine
- Higher maintenance cost.

Laser Cutting Machine

In laser cutting machine, the fabric is cut by a ray of light in a very fine spot by using a laser. Laser cutting processing depends on its precise processing, faster, simple operation, high degree of automation has been widely used in the leather and apparel industry. The cutting head is controlled by a computer.



Water Jet Cutting Machine

Water jet cutting machine is an industrial tool capable of cutting fabric lay by using a very high-pressure jet of water. A very fine water-jet is passed through a nozzle at a very high speed to cut the fabric lay. The pressure of water is 60,000 pounds per square inch. The high pressure jet acts as a solid tool when it encounters the material to be cut, tearing the fibers on impact.



A water jet cutter is an industrial tool capable of cutting a wide variety of materials using a very high-pressure jet of water or a mixture of water. The cutter is commonly connected to a high-pressure water pump where the water is then ejected from the nozzle, cutting through the material by spraying it with the jet of high-speed water. The features of water jet cutting machine is given below:

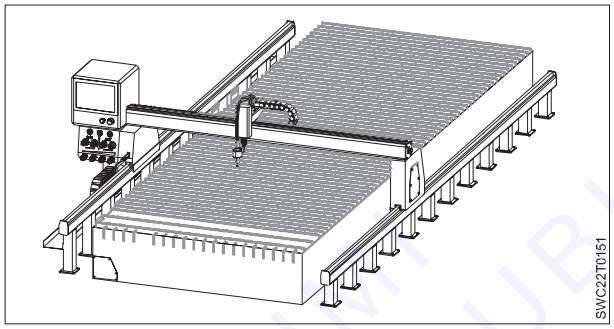


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Features of Water-jet Cutting Machine

1 In water jet cutter, water or mixture of water is used to cut fabric which is controlled by computer.
2 Special software is used to cut fabric.
3 A very high velocity (60,000 lb/ square inch) & small diameter steam of water is created by a water jet intensifier pump.
4 The high pressure jet acts as a solid tool & sharp knife which can easily cut the fabrics, lathers & plastic materials.
5 As the jet penetrates successive plies in a spread, the momentum decreases & cutting ability is reduced. So, the lower lays of fabric cutting will be wide & less effective.
6 The jet of water & loose fibers normally caught & drains away by a catcher when cut the fabric. It is in the bottom of the fabric lays & moves with the same speed & the same direction of water jet.
7 To improve the cutting speed, it is needed to adjust the pressure & radius of the jet.

Advantage of Water-jet Cutting Machine



1 Most effective to cut hard materials such as leather & plastic.
2 Sound of cutting is less.
3 Excess heat is not produce.
4 Higher cutting speed.
5 The table is not cut as catcher is used.
6 Since there is no solid knife so, no sharpening is required.

Disadvantage of Water-jet Cutting Machine

1 There is a danger of wet edges.
2 Water spot may occur on fabric.
3 High costly.
4 Hard water causes rusting. So water must be filtered & de-ionized before use.
5 As in the lower lay, water jet spreads out & then cut is wider & rough at the bottom of the spread.
6. Not suitable for high lay of fabric.
7 The sound of jet need to control.

Uses/Application of Water-jet Cutting Machine

Water jet machine is widely used to cut metal, composite, marble, granite, ceramic tile, glass, cloth, food, leather, rubber, nylon, wood, dynamite and so on. Water jet cutter is not suitable for cutting fabric but this cutter is under research to cut fabric.

Rib Cutting Machine

These are specialized machines used to cut rib or rolls of strips from knitted tubular fabrics. Knit garment industry uses this machine widely.

Plasma Torch Cutting Machine

Plazma cutting was originally developed to satisfy our demand for high quality cutting. It is used for cutting stainless steel and aluminum. But it can also be used to cut textile material. In this system, fabrics are cut by a thin through the nozzle which is made by Argon gas.

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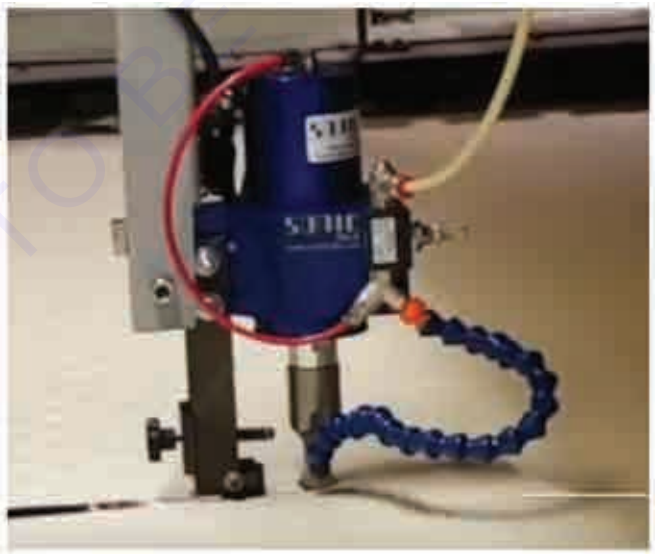




Plasma Torch Cutting Machine

Ultrasonic Cutting Machine

In the textile sector, ultrasonic cutting is distinguished by the fact that the cut edges of the non-woven or fabric do not fray. Instead, they are sealed or fused by ultrasonic technology. Besides which, during cutting desirable material embossing occurs along the cut edges, making the material thinner.

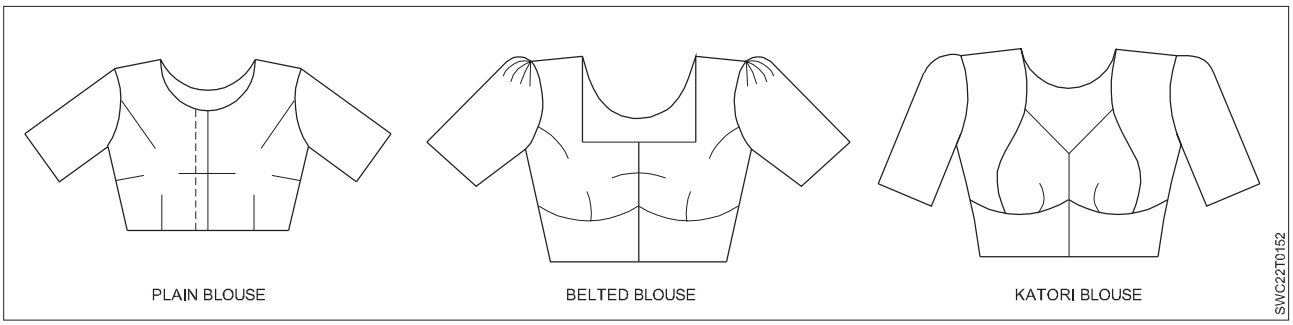


Most recently developed is a cutting system using an ultrasonically driven knife blade. Vibration frequencies in the 20 Khz range produce 1/20 mm movement in the blade, small enough to remove the need for a bristle base to the cutting table, Disposable knife blades save sharpening time and lasting for 10-14 days.

In the systems developed so far, two cutting heads are used, moving in different but synchronized paths. Upto 10 plies can be cut and low vacuum only is needed.

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Drafting of Ladies Blouse



Blouse is a kind of tops worn by women covering the body from neck / shoulder more or less to the waistline, with or without collar and sleeves. It is a midriff – baring garment worn in India, Srilanka, Bangladesh etc. It is worn in combination with sari. Sari - blouse is an Indian traditional costume. The blouse is cut and stitched to fit tightly to the body. Usually, the garment is prepared with

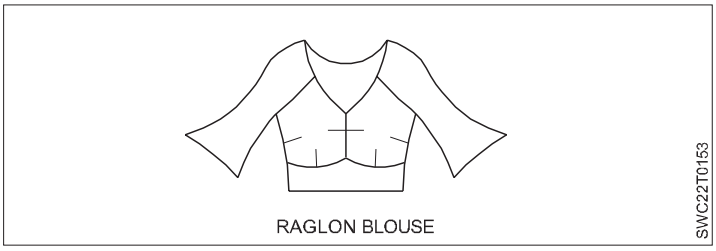
- Dart
- Back bodice
- Front bodice
- Sleeves

Dart plays an important role in blouse. The darts taken around the apex of the bust, gives nice fit. Blouse is stitched with one to four darts at the front part (Fig 2) and two darts at the back part one on each side. The size of the dart depends upon the body shape. It is advisable to taken four darts for a figure with prominent bust. Now – a - days blouse is also stitched in knitted fabrics to give tight fitting without darts.

Back bodice - The back bodice of blouse is normally cut and stitched in the same style with two darts. High neck two - piece placket at the centre - front or sometimes at the centre - back. The placket open is often fastened with hook and thread eye fasteners, where as it can also be fastened with sew - through buttons if desired. Style variations in blouse are created with modifications of its components. blouse is an exceptional style where, the back part of the garment is raised a little higher than usual proportions. The back bodice may also be finished with decorative embroidery works, beads or with ropes to be knotted and various other such designs

Front bodice - Unlike back bodice, the front part is not stitched with decorative finishes, as it will be covered fully by the saree worn. It is advisable to cut on bias fabric. But, it is cut in different styles to give perfect fitting. It is stitched either with or without waist belt. Katori blouse is stitched without dart instead the front bodice is cut into different katori components and joined to give nice fitting at bust. Two separate cut pieces (upper katori & lower katori) and waist belt stitched with the side piece forms the front bodice. This type of blouse is generally worn in Northern India. Semi katori blouse is stitched with one cup piece or katori. Belted blouse as separate panel at bottom of the front blouse.

Sleeve - Blouse is stitched with or without sleeves. Normally short sleeves are preferable where as too shorter sleeves and full sleeves are also suitable. Puff sleeves, flared sleeves, piped sleeves etc will give decorative look. It can be designed to suit the blouse design with ropes, beads, loops etc. The sleeve bottom is finished with a hem. Raglan blouse is prepared with raglan sleeves.



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The style features of blouse selected for stitching

Plain blouse

a Bias binding at neckline

b Four bodice with four darts

c Front open placket

Katori Blouse

a Front bodice with belt

b Katori pieces

c Front open placket

The material required for stitching blouse

Plain blouse

2 length + 1 sleeve length

Katori blouse

2 length + 1 sleeve length

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LESSON 38 : Drafting and Pattern Making of Shirt

Objectives

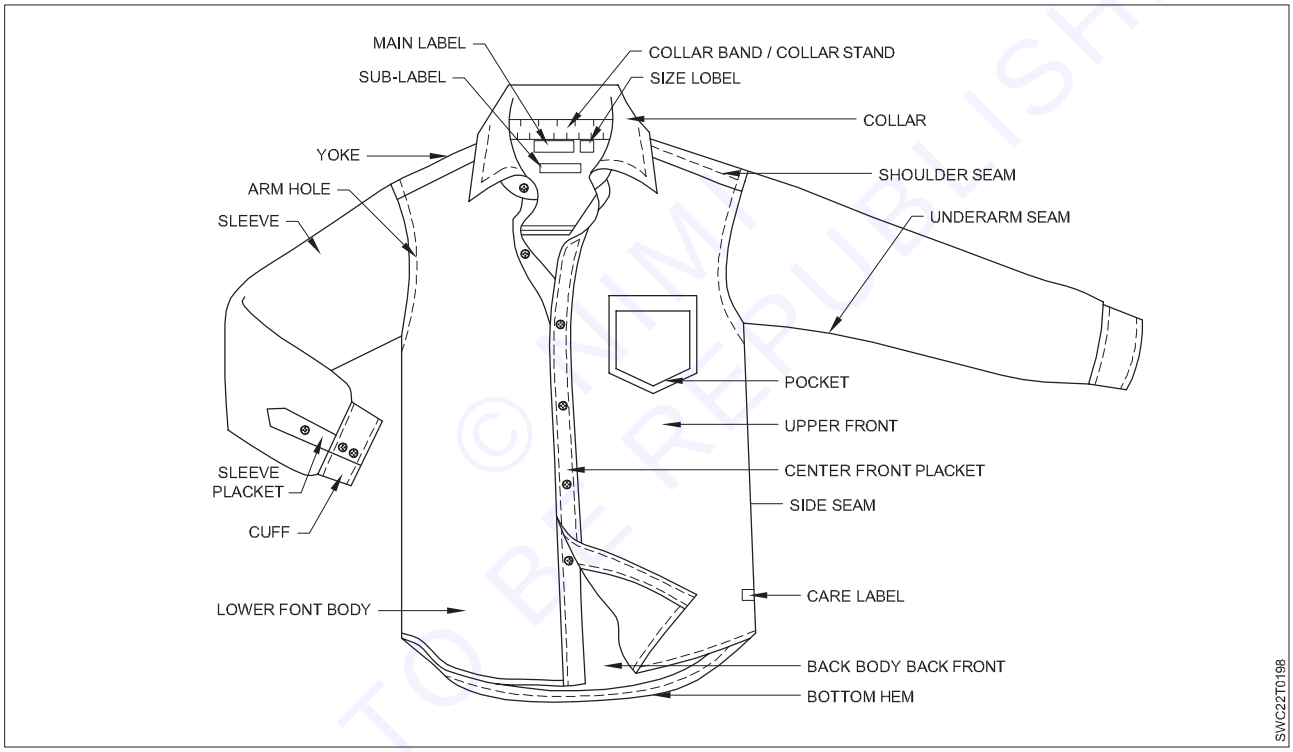
At the end of this lesson, you will be able to:

- explain about the Shirt , its component and types
- understand about the Safari Shirt and Pathani shirt
- describe about the Special Sewing Machines, Work aids, Machine beds, Work chairs and Machine Attachments.

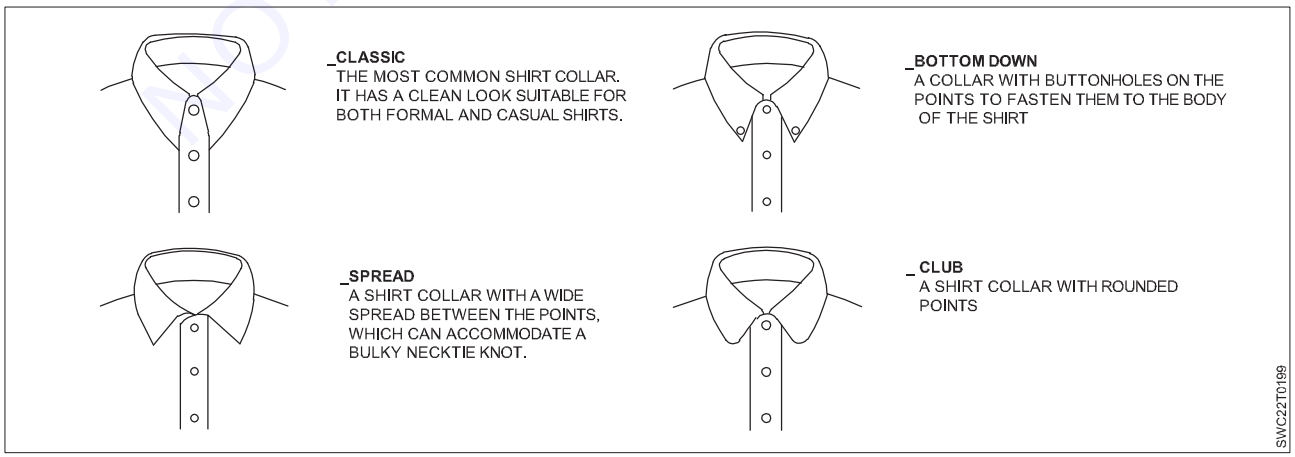
Drafting and Pattern Making of Shirt

A shirt is a cloth garment for the upper body. There are various types of shirt for men and women. Basic shirt is one of them. There's nothing more classic than a woven collared shirt. This dress has a formal collar, a full-length opening at the front from the collar to the hem and sleeves with cuffs.

Components of a Basic Shirt

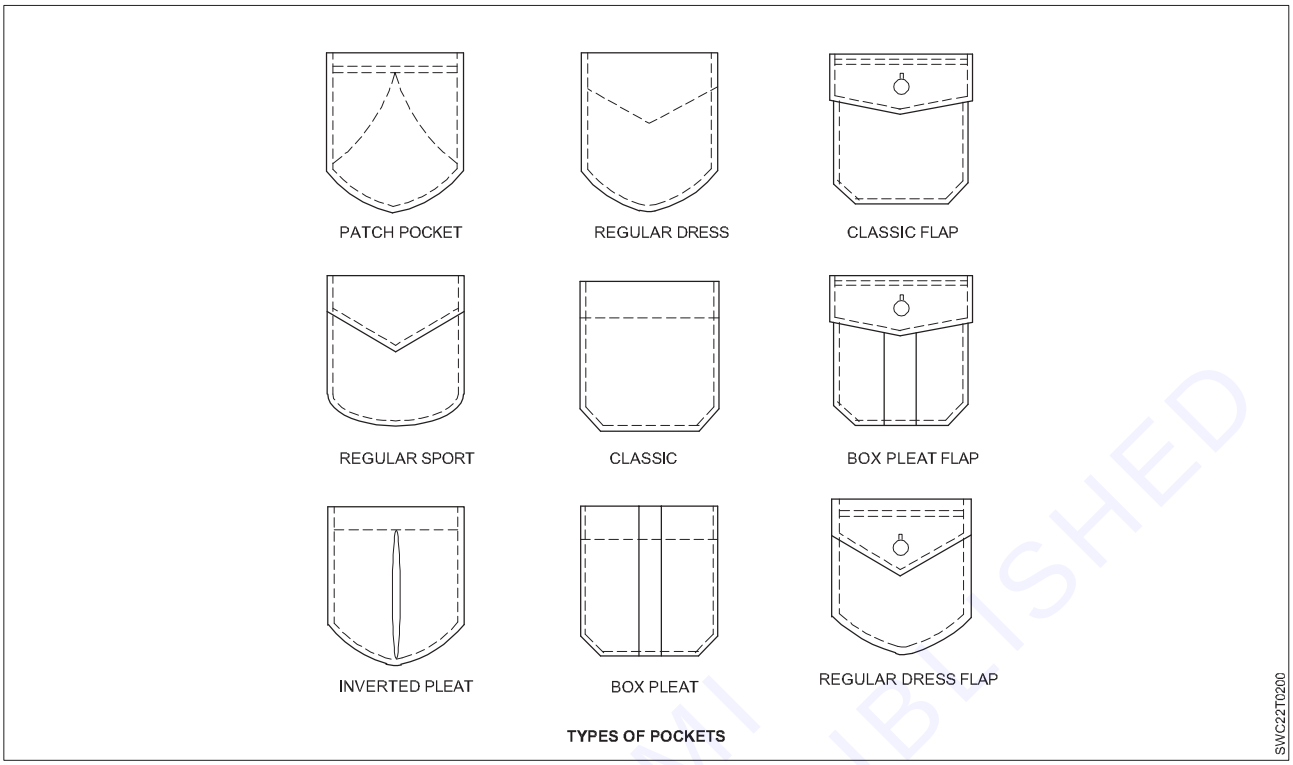


Types of Collar



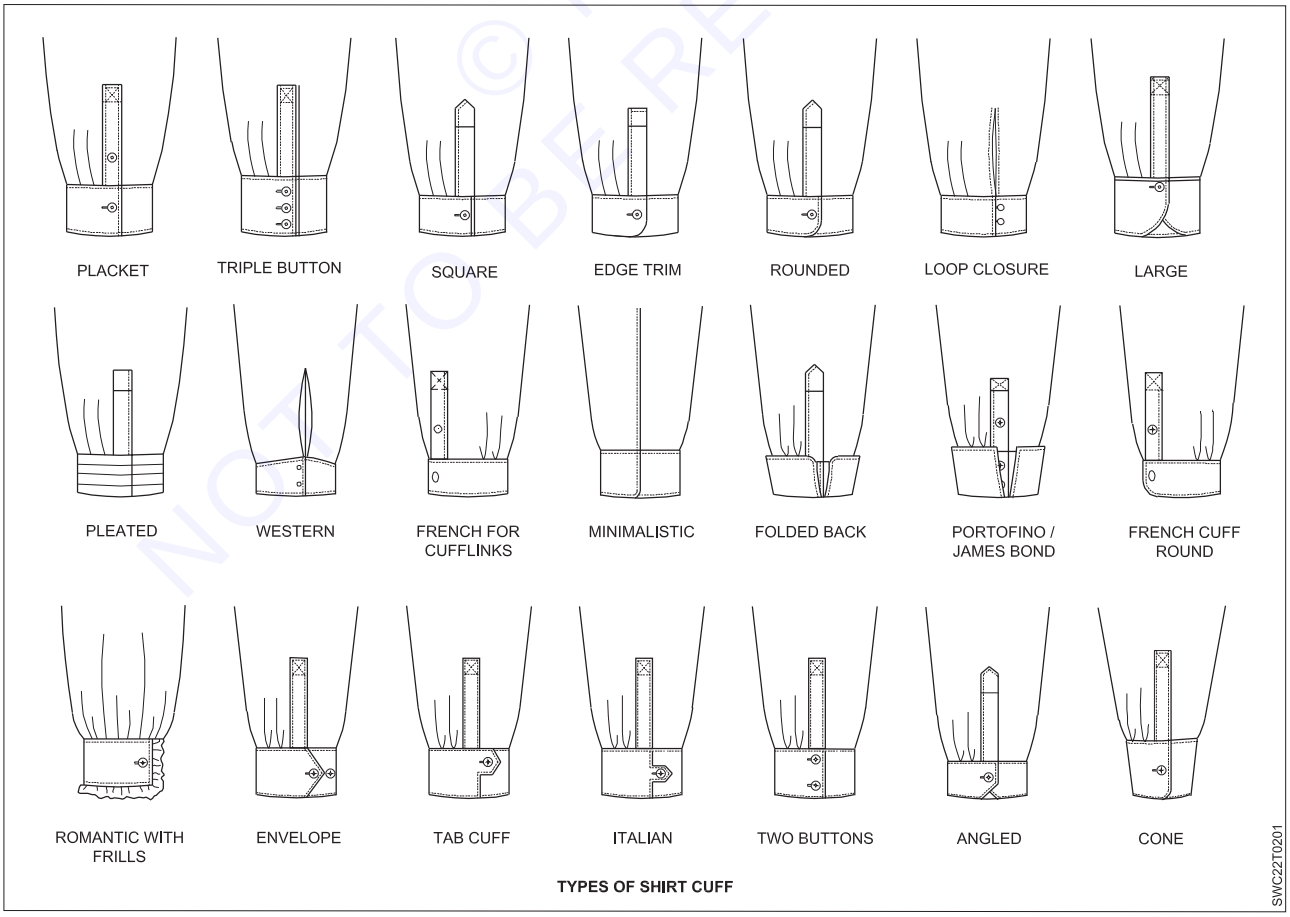
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Types of Pockets



Types of Cuff

Shirt Cuff



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Drafting and Pattern Making of Safari Shirt





Safari Shirt are clothing designed for cross-country travel. Safari jackets were initially designed for military purposes in Britain due to their cool fabric and were to be used in warm climatic conditions.

Another application of the Safari suit was during jungle safaris, where its light green color was used as camouflage, allowing militants to blend in with the natural surroundings. It was also the most common type of clothing worn by professionals in both government and non-government organizations.

Origin and History

The safari suit was given to India as a gift by the British Raj.

In India, the Safari suit was seen as a significant departure from Gandhi's Khadi to a new modern western dress code. Safari Suits became popular among the general public only after 1990, when Reliance Industries began manufacturing Safari Suit clothing in India. Previously, access was restricted to the bureaucratic and political classes.

Another major reason for safari suits' popularity in India is their low cost and ease of use. Famous Indians who have worn the Safari suit include industrialist Rahul Bajaj, cricketer Sunil Gavaskar, and late Bollywood stars Rajesh Khanna and Vinod Khanna.

Safari suits over cotton vest became popular in the United Arab Emirates, South East Asia, and Africa, in addition to India. Furthermore, safari suits were a popular style in Pop culture and were frequently seen in James Bond films.

Style

The safari suit had gained such popularity that it was unofficially designated as the official uniform for urban educated professionals. As the popularity of the safari suit grew, the bureaucratic uniform quickly became a fashion statement at weddings, parties, and other public events. The safari suit quickly became a status symbol for the city's elite and professionals.

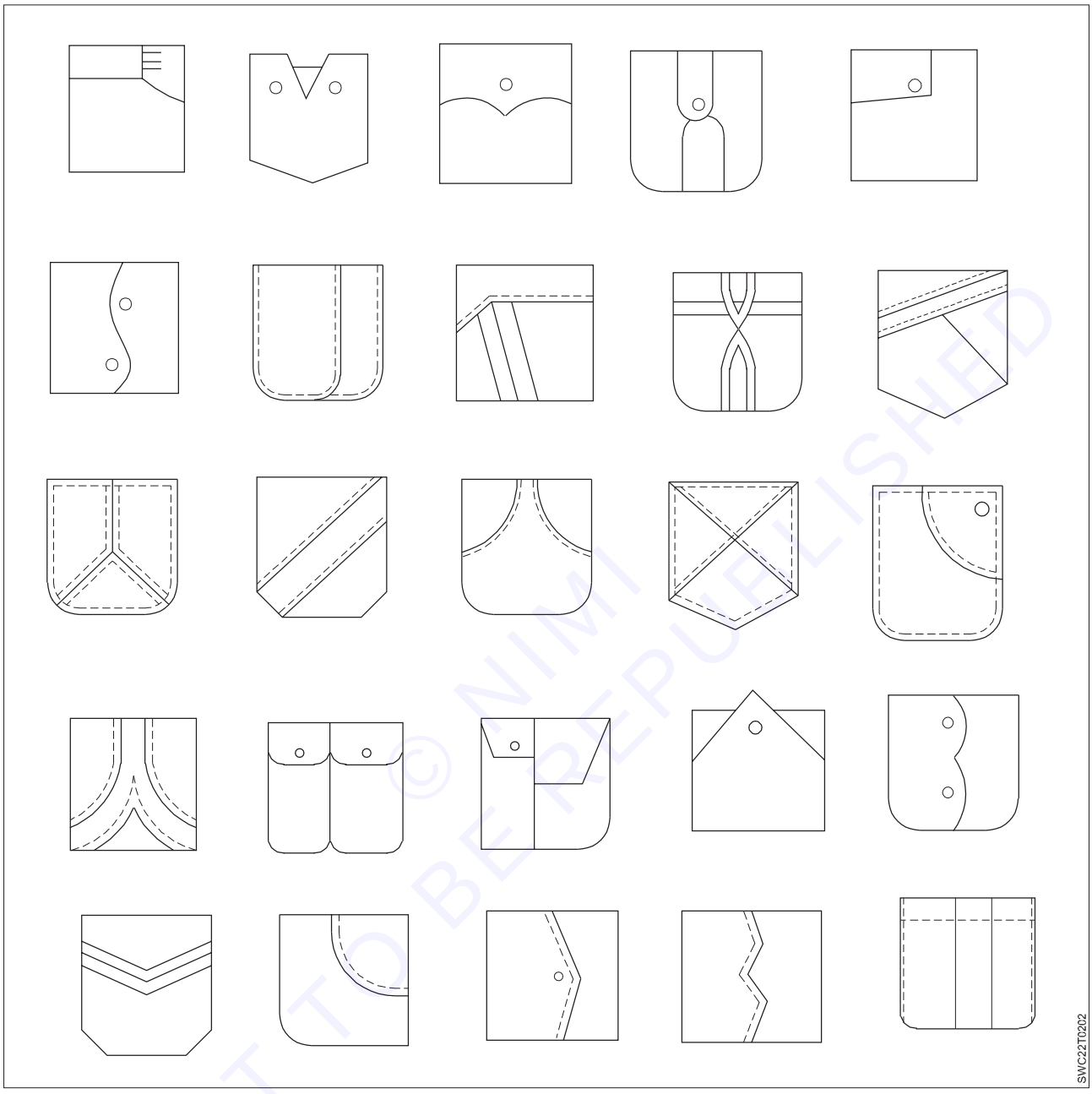
Due to their casual and comfortable design, safari suits were also known as leisure suits. Safari jackets were originally designed for military use, so they had rough and tough styles with patch pockets and open collars. In addition, the fabric used was coarse and thick. The suit can be worn belted or unbelted. A round hat is one of the most common safari suit accessories.

Innovations

Safari suits have undergone numerous changes over time, including changes in the purpose for which they are worn. With the change in usability, finer cloth, such as linen, khadi, and cotton, is used to make Safari Jackets. Furthermore, the collars have been significantly altered and are now more 'shirt-like' and smaller.

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Different types of Pocket designs using in Safari shirt





In the safari shirt, these kind of pocket design gives stylish look and shows the creativity and workmanship of the tailor.

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Drafting and Pattern Making of Pathani Shirt





The Pathani suit is a traditional outfit worn by men in Afghanistan and Pakistan, but it has also become popular in India.

The outfit often incorporates intricate embroidery and vibrant colors, reflecting the rich cultural tapestry of Afghanistan. The Pathani Afghani Suit is a symbol of pride and tradition, worn on special occasions and cultural celebrations.

The Pathani suit has evolved from a traditional Pashtun Dress 'Perahan tunban' or 'partoog kameez'. Perhan or kameez is similar to the Kurta, a top garment, and Tunban or partoog is a lower garment.

Men's Pathani suits can be made from a variety of fabrics, including, but not limited to cotton, linen, silk and rayon.

It has pleat at CF area below the placket,full sleeve with tab ,Shoulder tabs waist,back yoke and CB or side pleats at back panel.

The Pathani suit is a three-piece set of a long Kurta, Salwaar, and a vest. The jacket is an optional choice. Pathani suit goes well with a Nehru jacket. The Kurta and salwar are of the most same color.

Special Sewing Machines

Special sewing machines are specially made for specific sewing needs. It is used for specific seam and stitch classes.

- Over locking / Safety Stitching
- Flatlock
- Feed off the arm
- Button Attaching
- Button Holes
- Bar Tacking
- Zigzag machine
- Double Needle
- Multi needle
- Blind Stitching

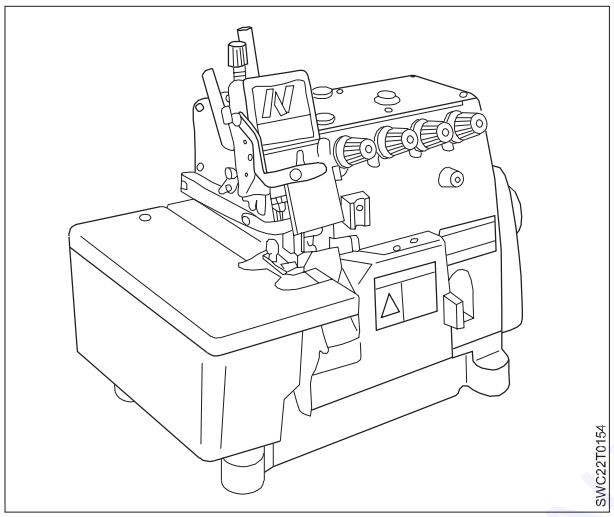
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1 Overlock Sewing Machine

Overlock machine is also called serger.This type of machines works in a cycle and so these are called simple automatic machine. Overlock machines are specialized machines that make the overlock stitch. The overlock stitch is used for edge finishing and seaming. Overlock machines come in both home and industrial versions.

Overlock machines are available in 3 threads, 4 threads and 5 threads over edge sewing. An overlock machine can form various types of stitches like stitch class 503, stitch class 504 and stitch class 512.

Purpose: This machine is used for serging garment panels (for example: trouser panels serging) and for overedge stitch. These types of machine are mostly used in knitted garment sewing for overedge stitch. Like side seam stitch of a t-shirt is done using an overlock machine.





Specification:

- Types : 3, 4 & 5 threads
- SPM (Stich per min) : 6500-8500
- TPI (Thread per inch) : 15-16 (3), 17-18 (4) & 21-22 (5)
- Needle no : 1 needle, 2 loopers (3); 2 needles, 2 loopers (4) & 2 needles, 3 loopers (5)
- Needle name : DCX1
- Needle size : 9, 11, 14, 16, 18, 20 & 21

Main parts of over lock machine

1 Thread stand
2 Thread package
3 Thread guide
4 Disc type tensioner
5 Thread guides
6 Needles
7 Loopers
8 Thread cutter

Description

Mainly over edge machines are overlock machines. In this type of sewing machines there are one or two needles and edge-trimming knife is at the front of needle. To make over lock stitch 2-5 threads are used. Usually SPM of over lock machine is 6500. But SPM of 8500 machines are also found. In this machine there also stretching (stretching max 1: 0.6) and gathering (gathering max 1: 4) systems during feeding cloth. Stitch is done up to maximum 4 mm length and stitch length may also be changed by push button. This type of machines can be used for sewing for both woven and knitted cloths.

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Adjustments Points of Overlock Machine

1 Installation of needle

2 Needle bar height adjustment

3 Needle to lower looper timing

4 Upper Looper Timing

5 Chain looper timing (Safety Stitch)

6 Upper Knife Adjustment

7 Lower Knife adjustment

8 Feed Dog height adjustment

9 Cam Timing

10 Thread Adjustment

2 Flatlock sewing machine

Flatlock machine is called a cover-stitch sewing machine. Flatlock sewing machines normally with 2-4 needles. For the bottom cover stitch machine 2 needle threads pass through the material and inter loop with 1 looper thread with the stitch set on the underside of the seam. Flatlock sewing machine form stitches like Stitch class 406. It is used in swimwear, sportswear, on baby's clothes.

Flatlock machines are available in two types - A flatbed and Cylinder bed





Specification

- Type : Flat or Cylinder bed
- Group : Chain stitch
- Needle no : 3
- Needle name : UY-128
- Needle size : 9, 11, 14, 16, 18, 20 & 21
- SPM : 2500-6000
- TPI : 25-35

Function

Sewing all types of knitted cloth.

Different parts of flatlock sewing machine:

The majority of the flatlock machine parts remain common as discussed in overlock sewing machine.

1 Thread stand

2 Thread guides

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3 Disc type tensioner

4 Pressure feed lever

5 Thread take-up lever

6 Needle

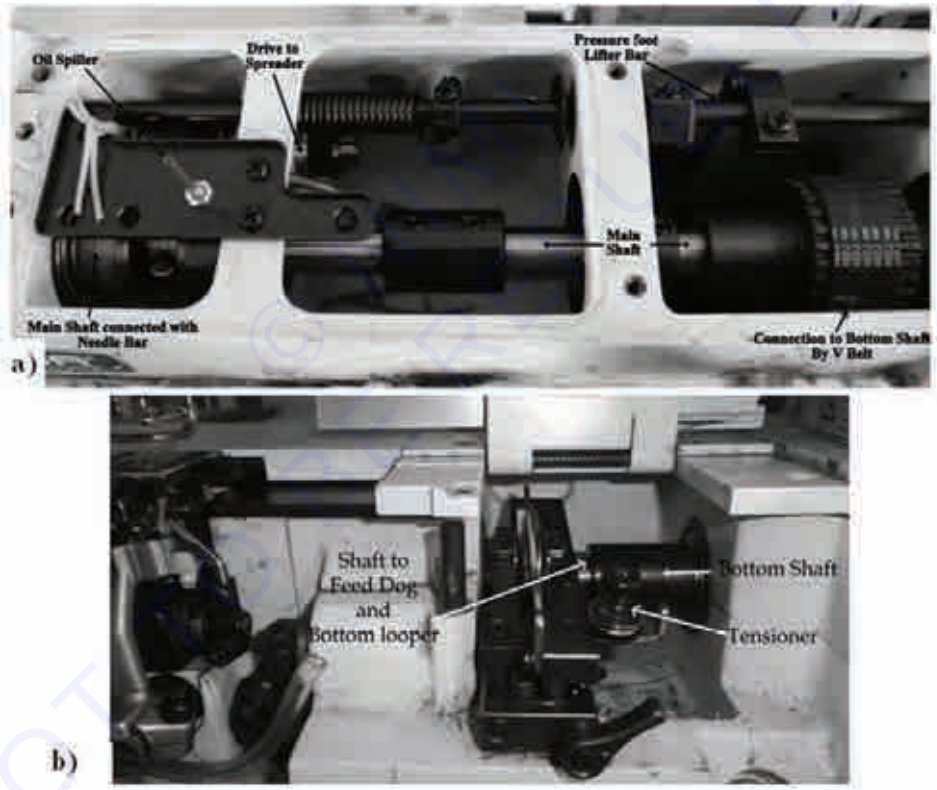
7 Looper

Flat bed is used for sewing body cloth and cylinder bed is used for sleeve cloth. Flatlock machine can be used 4 needles and sewing may be done using from 4 to 9 threads. Sewing with Flatlock machine the most quantity thread is needed. For example, for sewing 1 inch cloth up to 32 inches thread is needed. The SPM of this type of machine is usually 6000 and 8-16 stitches may be done per inch. It is a very expensive machine and is used for mainly sewing knitted goods but also used for making woven cloth.

Usage of these machines: Flatlock machines are used for hemming sleeve and bottom of the knits products. A cover-stitch machine can be used in any part of the garment for decorative purpose.

Working mechanism of flatlock machine

The flatlock sewing machine gets drive from the electric motor which is mounted in sewing table. The main parts of the sewing machine are flywheel, main shaft, needle bar, loopers, feed dog and presser foot.



The motion from the main shaft is directly connected with the needle bar mechanism. A link from the main shaft is taken to spreader mechanism with a cam. The cam rotation is fixed as half revolution per every full rotation of the main shaft. So that, the spreader movement is controlled.

The knee presser foot lifter mechanism is also connected to presser foot bar in the top side. By a 'V' belt, the drive is transferred to the bottom of the machine and the bottom shaft is directly connected to the feeding mechanism. The bottom shaft also controls the movement of the bottom looper. A cam attached with the bottom acts as a tensioner device which controls the sewing thread supply to the bottom looper.

3 Feed off the Arm

This machine is used in making flat and felt seams. Two-needle threads form the chain stitch.

For example, this machine is used for sewing shirt side seams and underarms, and for sewing jeans inseam.

This type of machine works with continuous sewing and so they are called automatic machine. It is used to stitch a tubular seam of narrow width on the edge of shirts and trousers. It is particularly utilized for sewing a lapped seam which has to be closed such that the garment panels become a tube-like structure. These machines are common for sewing outside leg seams in jeans where the lap felled seam is used.

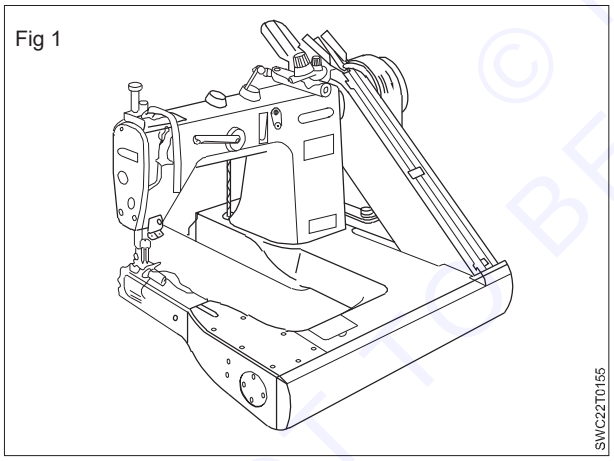
Specification of industrial feed of the arm machine

- Type : Flat bed
- Group : Chain stitch
- Needle no : 2
- Needle name : EYX128
- Needle size : 9, 11, 14, 16, 18, 20 & 21
- SPM : 3000-3200
- TPI : 15-20

Main adjustment points

1 Thread.
2 Tensioner.
3 Needle.
4 Pressure feed.
5 Stitch density.
6 Looper.

Fig 1





Different parts of feed of the arm sewing machine:

1 Thread stands
2 Thread guides
3 Disc type tensioner
4 Pressure feed lever
5 Thread take-up lever
6 Needle
7 Looper
8 Throat plate

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9 Pressure foot

10 Hand wheel

11 Needle clamp

12 Feed dog

13 Thread tension post

Description

The frame has a tube like section for the bed of the machine. This tubular bed may be exactly the same size as the bed arm of a length cylinder bed. The fabric travels on to the bed arm of a length cylinder bed. Such machine permits an operator to sew cylinder, such as sleeves with lapped type seams, the machine is shown in Figure 1. This machine may be of flat bed type. In this machine 2 needle, 2 loopers may also be used & sewing may be done using from 4 threads. Sewing with Feed of the Arm machine, 1 inch cloth up to16 inches thread is needed. The SPM of this type of machine is usually 3000 and 8-16 stitches may be done per inch. It is a very expensive machine and is used for mainly sewing Jeans, Grabidding goods & Double stitching pants.

Working procedure of feed of arm machine

1 Firstly we kept the six thread package on the thread stand.

2 Then we passed the thread according to their passing path.

3 We also maintain the thread tension with the help of tension post.

4 Thread pass through into the needle and set up machine properly.

5 Then switch on the machine.

6 After that fabric stitch will do by the machine.

Uses of feed of the arm sewing machine

1 For making garments of jeans fabric

2 Used in long seam of trousers

3 Frequently used for joining lace

4 Used for joining braid and elastic in the garments.

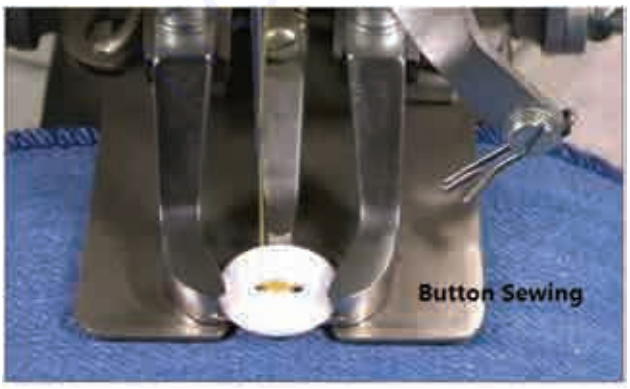
5 This machine is used for sewing shirt side seams and under arms, and for sewing jeans inseam.

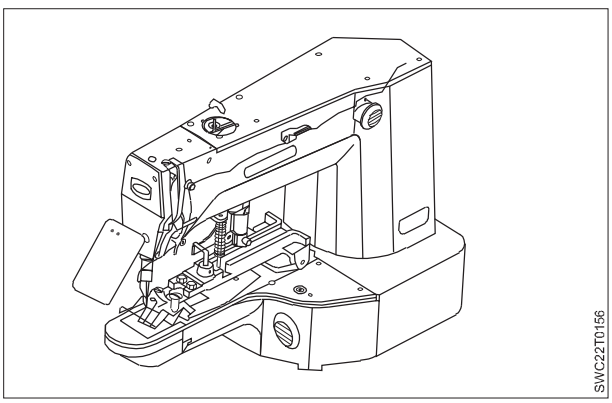
4 Button Attaching Machine

A special machine used only for stitching button in a garment. Different sizes of button can be attached in same the machine by changing the settings.

Button sewing machine is a special type of machine which is used in apparel industries to attach button so it is called button attaching machine.

Purpose: Attach button. Machine stitches button and trim thread automatically.





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A button attaching machine is used to sew the button in the garment without damaging it. Various types of buttons like a button with two holes, four holes or shank could be sewn on this machine by making simple adjustments. The sewing action comprises a series of parallel stitches whose length is equal to the distance between the centers of the holes. The needle has only vertical movement but the button moves sideways by means of the button clamp for stitching. A hopper feed is a special attachment that automatically feeds the button to the clamp of the needle point of the machine. With this attachment, the button and needle are automatically positioned and the threads are clipped. Button attaching machine is ideal for stitching Shirts, T-shirts, Uniforms etc. It is highly applicable in number of different garment applications.

Features of button attaching machine:

In garment sewing, button attaching machines is used because huge amount of apparel is made here. Attaching or sewing button by hand is time consuming. That's why button attaching machine is used in garment industry.

The features of button sewing machine

- It is a simple automatic machine.
- Button positioning can be automatic.
- Sewing is according to the hole in button and may be cross or parallel.
- Button can be sewn using lock stitch or chain stitch.
- Automatic feeding of the shirt buttons
- Buttons with 2 holes, 4 holes or shanks can be sewn on the same machine.
- Generally the needle has a vertical movement only.
- Button is moved from side to side by the button clamp.
- Machine has a number of stitches. i.e. 16, 24 or 32 are adjusted.

Specification

- Group : Chain stitch
- Needle no : 1
- Needle use : TQX1
- Needle size : 9, 11, 14, 16, 18, 20 & 21
- SPM : 1200-1500
- TPI : Per pressure 64
- Adjustment : Thread, tension, needle & button

Different parts

1 Thread stand
2 Thread guide
3 Disc type tensioner
4 Thread guides
5 Thread take-up lever
6 Thread guide
7 Needle
8 Clamp

Description

There are different types of button attaching machine and different types of clamps are needed for different types and sizes of buttons. Especially there may two or three holes in the button. Again button of three holes may be attached by parallel or cross sewing. Buttons may be of different types specially there may be shank below the

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button or during sewing shank may be made by thread. For sewing button lock stitch, chain stitch or hand stitch machine may be used. When using chain stitch the sewing looks neat below the button but the safety of stitch is low that is the button may be fall out opening the sewing. This will not happen when used lock stitch but it is not as neat as chain stitch. In automatic machine by a hopper and pipe button is fed in button clamp in auto system and button is positioned. Moreover a predetermined number buttons can be attached in a cycle in a predetermined distant in a dress.

5 Button Hole Machine

This machine is used for making buttonholes on garments. Buttonholes can be made with different stitch densities. Like in Shirts, Trousers, and Polo Shirts etc.





Specification of buttonhole machine

- Group : Lock stitch
- Needle use : DPX5
- Needle size : 9, 11, 14, 16, 18, 20 and 21
- SPM : 3000-3600
- Pressure : 123

Different parts of button hole machine

1 Bobbin winding
2 Bobbin winding spring tensioner
3 Back stitch lever
4 Driver wheel
5 Driven wheel
6 Spring tensioner post box
7 Thread guide
8 Knife lever
9 Thread take-up lever
10 Needle
11 Knife
12 Wiper
13 Pressure feed guide
14 Throat plate
15 Bobbin
16 Bobbin case

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Main adjustment points of buttonhole machine

1 Thread.

2 Tensioner.

3 Needle.

4 Pressure feed.

5 Stitch density.

6 Looper.

Working principle of button hole machine

This machine works in cyclic system i.e. during pressing switch after sewing one complete button hole the machine will stop. In fully automatic button hole machine more than one i.e. pre-selected no. of button holes can be sewn in pre-selected distance. In this system no mark is needed on cloth for button hole. In buttonhole machine there is system to make big or small button hole and also to increase or decrease the stitch density. Usually lock stitch or chain stitch is used here. Button hole can be made before or after sewing. Both system has some advantage and disadvantage. If hole is made before then the cut edge is closed in sewing and the button hole is seen very good and clean. But the disadvantage is that after starting sewing there is no chance to change the button hole place and cut edge disturbs to sew well due to flagging. But disadvantage is thread of cloth is come out along the sewing line of button hole that looks very bad. Usually for dense woven and coarse cloth before sewing, for thin cloth after sewing button hole is made.

6 Bartack machine

Bartack stitch is made to reinforce the seam and garment component. Like in belt loop joining and at the bottom of side pocket opening bartaking is done.





This type of machines works in a cycle and so these are called simple automatic machine. Bar tack means to increase strength of small length of fabric by sewing on it and then by repeating it. For example – belt loop, opening of pocket. It is a simple automatic machine which produces stitches in a cyclic order.

Specification

- Group : Lock stitch
- Needle use : DPX5
- Needle size : 9, 11, 14, 16, 18, 20 & 21
- SPM : 3000-3600
- Pressure : 64
- Length : 1-1.5 cm
- TPI (Thread per inch) per pressure: 64 stitch.

NOT TO BE REPUBLISHED

Different parts of bartack sewing machine

1 Bobbin winding
2 Bobbin winding spring tensioner
3 Back stitch lever
4 Spring tensioner post box
5 Thread guide
6 Knife lever
7 Thread take-up lever
8 Needle
9 Knife
10 Wiper
11 Pressure feed guide
12 Throat plate
13 Bobbin
14 Bobbin case
15 Pressure lever
16 Tensioner

Description

In a few length of cloth sewing again and again after sewing one time to increase the power of bearing load of that place of cloth is called bar tack. A bar tack machine can sew strongly within a few lengths cyclically. At first doing tack stitch (1-2 cm) then in opposite make cover stitch (zigzag) on tack stitch. A little change can be done between tack stitch and cover stitch.

Working principle bartack machine:

At first this machine produces tack stitches in a small length (1-2 cm) and then sews covering stitches over and at right angles to the first stitches. The variables are the number of tacking stitches and the number of covering stitches. Typical uses are closing the ends of buttonholes, reinforcing the ends of pocket openings and the bottoms of flies and sewing on belt loops. The adjustment points of this machine are needle, pressure feed, stitch length, stitch density.

Uses of bar tack machine

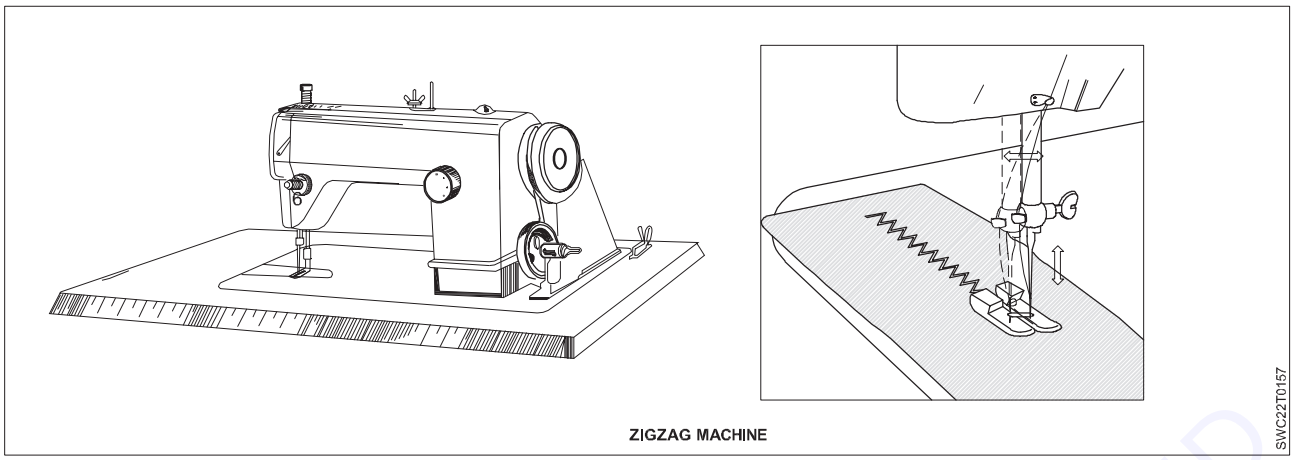
1 Attaching belt loops.
2 Increasing strength in corner of pocket.
3 Closing the two corners of button hole.
4 At the end of zipper.
5 In that place where more strength is needed to support extra load.

7 Zigzag sewing machine

This machine is used for zigzag stitching. Used in bra manufacturing, jacket manufacturing.

- Group : Lock stitch
- Needle use : DPX1
- No. of Threads : 1 Needle thread and 1 Bobbin Thread

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ZIGZAG MACHINE

Uses

Decorative seam, stitching lace, applique and reinforcing buttonhole.

Working Details

When creating a Zig Zag stitch, the side to side motion of the sewing machine's needle is controlled by a CAM. As the CAM rotates, a fingerlike follower, connected to the needle bar, rides along the CAM and tracks its indentations. As the follower moves in and out, the needle bar is moved from side to side. Clutch motor is fixed in this machine.

Standard zigzag stitching creates one stitch, and then, the needle swings to the side for the next stitch as the feed dog move the fabric. Next, the needle swings back to its original position as the feed dog continue scooting the fabric under the presser foot. This left-to-right movement, along with the movement of the fabric, creates the classic zigzag stitching pattern.

Standard zigzag stitching is commonly used to stitch seams in knit fabrics, sew narrow elastics onto knit fabrics, attach appliques and trims to a base fabric, and finish the raw edges of woven fabrics.

It is worth noting that with the availability of sergers, which can produce a professional-looking overlock stitch, the use of regular zigzag stitches has become less common in certain sewing applications. However, the standard zigzag stitch remains a valuable stitch for those who do not have a serger.

To regulate the width and length of the stitch, Generally, the width of the stitch can be adjusted by turning a dial or pressing a button on the machine. The length of the stitch can also be adjusted using a similar method.

When adjusting the machine for a zigzag stitch, remember this–adjusting the stitch length makes the zigzag longer and adjusting the stitch width makes the zigzags wider. In other words, the stitch length adjustment changes the rate at which the feed dog move the fabric under the presser foot. The stitch width adjustment changes how wide the needle swings back and forth.

By changing the length and width of the stitch, can create a variety of effects that can be used for different sewing applications.

Sewing zigzag stitches on thick fabric can be easier than on thinner fabrics. This is because the thickness of the fabric helps to stabilize the stitches and prevent puckering.

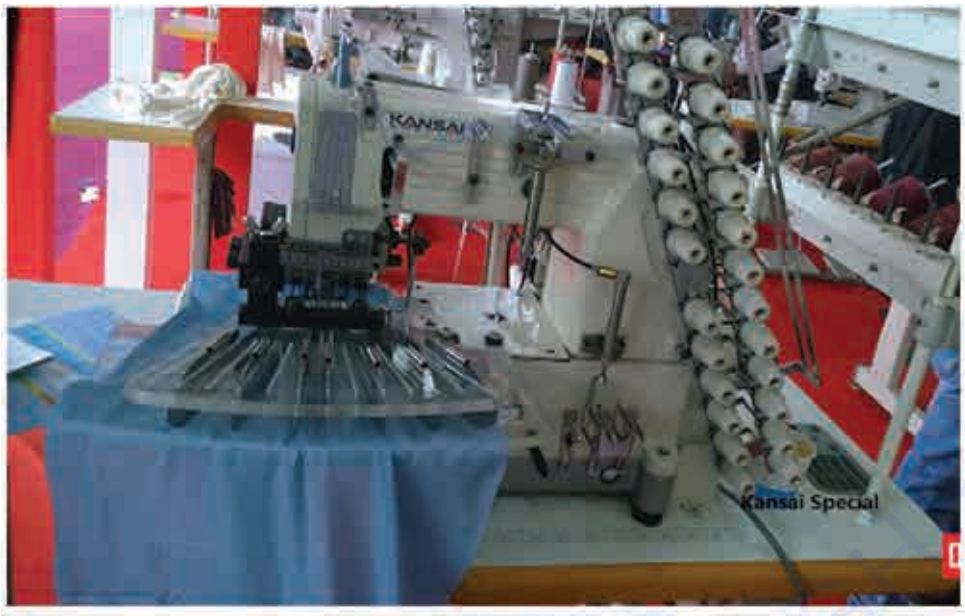
When finishing the raw edges of thin fabric with a zigzag stitch, it can be difficult to achieve a neat and stable edge. The fabric is prone to rolling inside the stitch, the edge is soft and unstable. It is almost impossible to sew a zigzag stitch right at the edge of the fabric without it rolling inside the stitch.

8 Multi-needle chain stitch machine

This machine used for smocking operations and pin-tuck operations.

These series are multi-purpose machine for attaching elastic, attaching waistband sewing the front of shirts, attaching line tapes, smocking and shirring etc... Which are ideal for underwear, sportswear, lady`s clothes, interior decorated goods(curtains, table-clothes etc...). Applicable to general sewing, for decoration of high grade garment.

NOT TO BE REPUBLISHED



1 Upper thread is normal thread, middle thread is elastic thread, lower thread is normal thread.

2 This machine adopts vertical movement of looper, suitable for basic sewing and decoration of high-grade garment.

3 Complete automatic supply system and oil-filter device, ensure the max sewing speed to be 4500r.p.m.(Revolution Per minute)

4 Some key parts are special treatment, which enhance the wear-resistance of the machine.

Characteristics

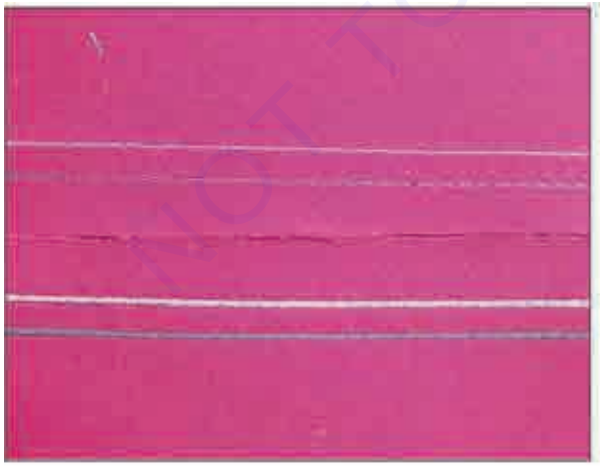
1 This machine adopts vertical movement of looper, suitable for basic sewing and decoration of high- grade garment.

2 Complete automatic supply system and oil-filter device, ensure the max sewing speed to be 4500r.p.m.

3 Some key parts are special treatment, which enhance the wear-resistance of the machine.

9 Double needle chain stitch machine

A double-needle lock stitch machine is used to sew two stitch lines at a time on the garment part. This reduces stitching time where a double stitch line is needed to sew.





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Function Characteristic

1 The machine are to be provided with a inclined cranked type looper mechanism , ensure It is in good durability.

2 It is very easy to set the machine to perform consideration stitching by operating the lever, Condensation stitches that prevent the thread from fraying can be consistently sewn.

3 Stitch length can be adjusted with ease.

4 Inner equipped with mechanical puller engaged with main shaft, make the feed corresponding even more ,very suitable for medium-thick fabric.

Usage: This kind of sewing machine can adapt to many kinds of processes and specifications including hemming, welting and decorative stitching. Accurate stitching performance and durable finished seams are particularly necessary in the chainstitching process.

Specification

mode : Transverse two needles Chain stitch

speed : Max 5.000s.p.m

Length of stitch : 4mm

Range of bar movement :30mm

Needle No :TVx7 #14(#9-21)

Lubrication : Auto lubricating

Looper : metal bar

10 Blind stitch Machine





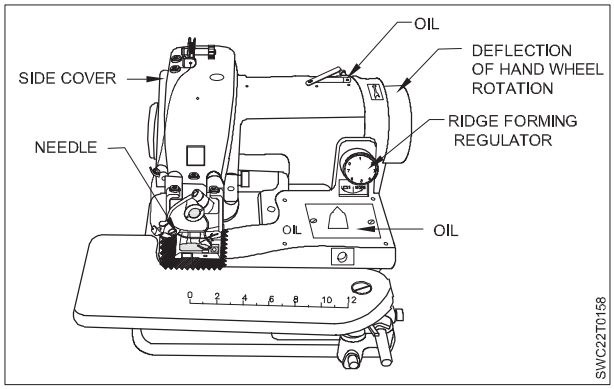
Machine Specification

- Model : CM3-B938
- Group : Chain stitch
- Needle no : 1
- Needle name : LW´6T
- Needle size : 9, 11, 14, 16, 18, 20 & 21
- SPM : 2500-3000
- TPI : 3-4 inch

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Function

- Attaching hemming & facing.



Different parts of blind stitch machine

1 Thread stand

2 Pressure feed lever

3 Skip stitch device

4 Thread guides

5 Thread take-up lever

6 Stitch length adjustment

7 Disc type tensioner

8 Needle Looper

Description

The stitch produced by this machine in the fabric is not shown from face side and so this is called blind stitch machine. Usually curved needle is used in this machine as it can penetrate in the fabric partially. The needle comes out from the side of the fabric through which it penetrated. Again in maximum blind stitch machine optional skip device is attested by which it is possible to penetrate the outside layer after one or two stitch. The speed of this type of machine is up to 2500 SPM and the stitch length can be 3 to 8 mm long. Usually one thread is used to make the stitch but two threads may also be used. In case of two threads blind stitch, it is safe from opening. Mainly for attaching hemming or facing this machine is used.

Work Aids

To facilitate worker in doing their jobs most efficiently number of readymade and customized work aids and equipment are being used in the garment industry.

Especially work aids are designed for material handling, folding etc.

In the following some of the basic work aids are listed those are used in factory in Raw material warehouse, cutting department, sewing floor and finishing department.

Raw material warehouse

Fabric trolley

Fabric roll fork lift

Cutting Department

Fabric roll Stand (Movable and fixed)

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Layer weight
Cloth Clamp
Bakers Trolley
Waste disposal trolley
Bins

Sewing room

Disposal basket
Sewing machine table extension (left/right/front)
Profile for collar and cuff run stitch
Various types of Attachments, folders, hemmers and guides

Finishing Department

Wire mesh WIP trolley
Bins
Hanger stand
Hanger trolley
Carton transfer trolley

Raw material warehouse

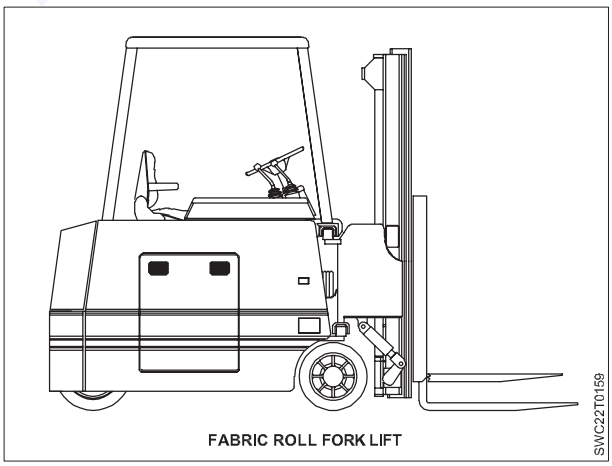
Fabric trolley

It is use to shift the material from one place to another place in warehouse, instead of manual material handling of heavy material.



Fabric roll fork lift

A forklift, also known as fork truck, is a motor-driven industrial truck used for lifting and moving goods on a pallet within the premises of a warehouse, storage facilities and distribution centre. Depending on the design, some Forklifts allow the operators to sit while driving or operating the machine.



FABRIC ROLL FORK LIFT

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Cutting Department

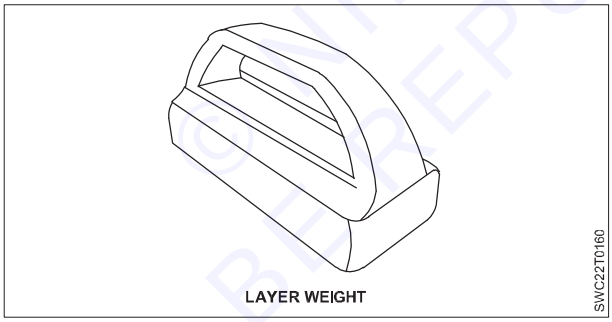
Fabric roll Stand (Movable and fixed)

A fabric roll rack is a storage solution designed specifically for organizing and storing fabric rolls in a neat and efficient manner.



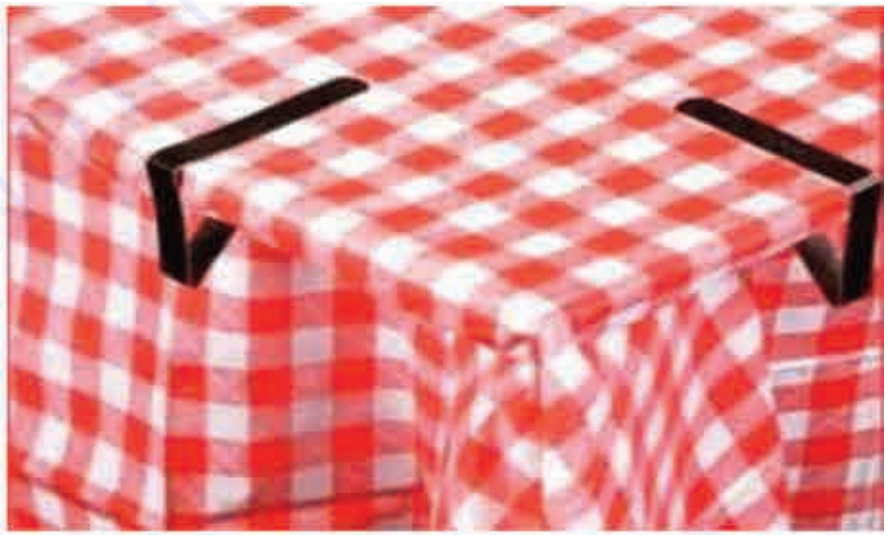
Layer weight

Layer weight is used to hold the fabric from falling down from the table.



Cloth Clamp

It is use to hold the fabric on the table, to avoid fabric falling.



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Bakers Trolley

The stainless baker's trolley is durable and practical solution for transporting materials from to another work station.



Waste disposal trolley

It is used to collect the waste materials from one workplace to another workplace, it is easy to dispose all the waste materials



Bins

It is used to keep material near the workplace; it may be used to put stitched garment or bundles as well as waste material also. It is a multipurpose bin.



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Sewing room

Sewing machine table extension (Left/right/front)

An extension table added to the machine, it is for more comfort and ease of sewing is greatly improved because the table helps to support the fabric to sew.



Profile for collar and cuff run stitch





Various types of Attachments, folders, hemmers and guides. Refer page – Machine Attachments

Disposal basket

Disposal baskets are used to organize waste disposal in the home and work areas, maintaining cleanliness and reducing the mess of scattered waste.

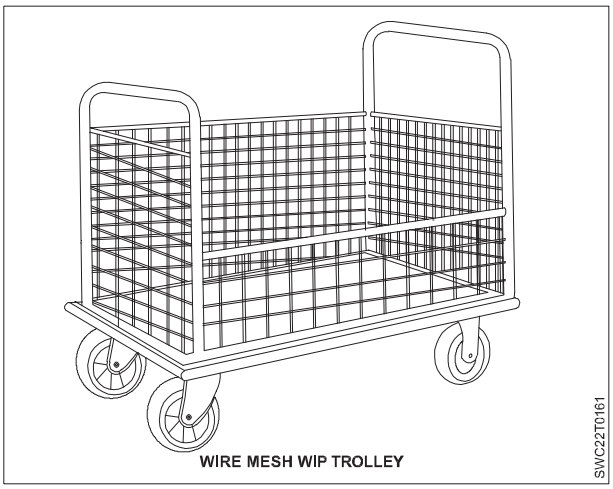


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Finishing Department

Wire mesh WIP trolley

Wire mesh caging with and without wheels used to store large number of items, mesh allows see through for clear visibility of all items in it.



WIRE MESH WIP TROLLEY

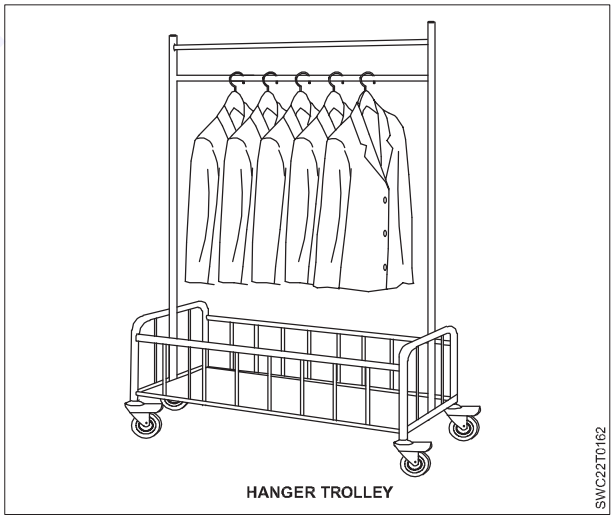
Hanger stand

Hanger Stands are a great method to organize and categorize the garments for quick access by customers and staff. Size, color, brand, etc. may all be used to categorize a collection of items.



Hanger trolley

This clothes hanger rack makes storage and transports the clothes hangers very easy. Due to the wheels, it is easy to move. If any garment fall down, it will be stay in the trolley, it wont get dirty.



HANGER TROLLEY

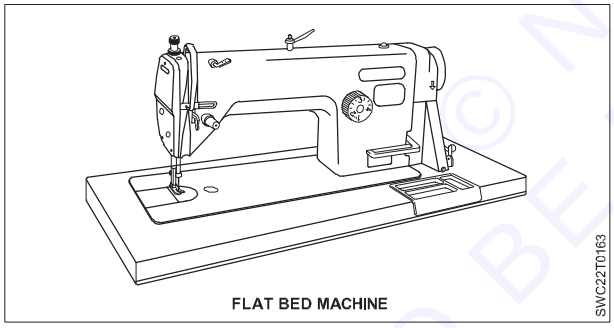
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Carton transfer trolley

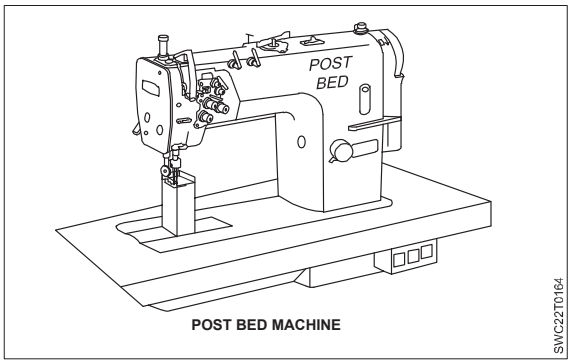
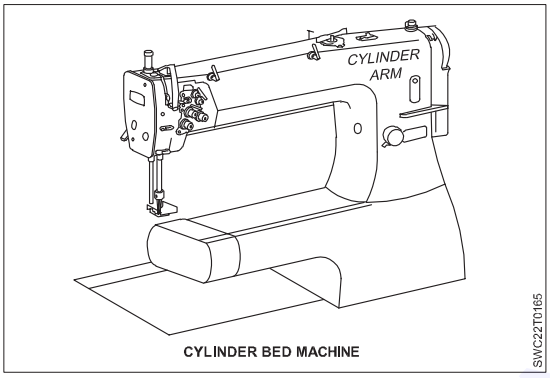
Carton transfer trolleys are devices used for carrying loads or to transport the material from one point to another. For safer use of trolleys, they are to be pushed forward and should not be used on loose or rough surfaces where possible.



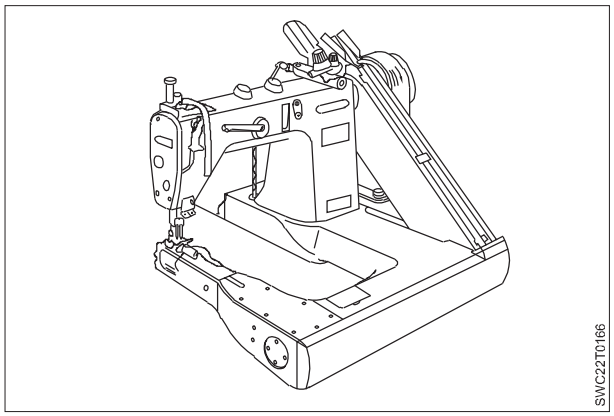
Machine Beds

Classification of Sewing Machine Based on Bed Type		
Sewing Machine	**Features and Application**	**Stitch Type**
Flat-bed machine  	The most common type,these machines resemble traditional sewing machines in that the arm and needle entend over the flat base of the machine .It is used to sew flat pieces of fabric together.	Lock ,chain stitch
Raised bed machine 	The machine bed is in the from of a pedestal which helps in assembling of presewn parts. This is specifically used for attachment of accessories and special attachments. **Raised bed** This group includes several types of sewing machines, such as: 1 **Overlock sewing machine** Over edge machine also have a different type of machine bed which have no fabric space to the right of the needle. 2 **Blind Stitch sewing machine** This machine also consist a different type of machine bed. Example of Blind machine's use is in the bottom hem of trousers and sometimes on closing the curtains etc..	Lock and chain stitch

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Post bed machine  POST BED MACHINE	These machines features bobbin, feed dogs and /or loopers in a vertical column that rises above the flat base of the machine. It has a raised working machine bed and is used for stitching of three dimensional products such as shoes and bags.	Lock and chain stitch
Cylinder bed machine  CYLINDER BED MACHINE	These machines feature a narrow cylindrical bed as opposed to a flat base. This allows the fabric to pass around and under the bed. It has horizontal arm-shaped bed as well as increased working height. It is most suited for sewing tubular components like sleeves, cuffs and trouser legs, and can also utilised for button sewing and bar tacking.	lock and chain stitch

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Sewing Machine	Features and Application	Stitch Type
Feed off the arm  	These are dedicated for edge sewing and requires a lesser working space	Chain over - edge stitch
Feed of the arm The feed-off-the-arm machine is used where a lapped seam has to be closed in such a way that the garment part becomes a tube. They are common in jeans production where the outside leg seam is normally the type known as lap-felled and it is joined after the inside leg seam in the sequence of construction. The operator wraps the part to be sewn around the machine bed and it is fed away from the operator, off the end of the bed, as the operator sews.		

Work Chairs

Chairs are typically used to provide support for the seated person's body and arms, although some chairs are designed for 'perching' (resting) rather than sitting. There are also armless chairs - with or without a back - that may be referred to as stools. Some stools are referred to as backless chairs.

Office Chair

An office chair, or desk chair, is a type of chair that is designed for use at a desk in an office. It is usually a swivel chair, with a set of wheels for mobility and adjustable height.



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Modern office chairs typically use a single, distinctive load bearing leg (often called a gas lift), which is positioned underneath the chair seat. Near the floor this leg spreads out into several smaller feet, which are often wheeled and called casters. Office chairs were developed around the mid-19th century as more workers spent their shifts sitting at a desk, leading to the adoption of several features not found on other chairs. The materials used for seating are fabric, vinyl, mesh fabric, vegan leather, PU leather and leather

Computer chairs (also commonly called task chairs) are a standard choice for office seating because they're specifically designed to pair with computer desks.

Sewing machine operator chair

The chair has six basic features that you should look for and they are as follows: Back Rest, Seat Pan, Cylinder Height, Foot Rest/Pedestal, Glides/Casters and Material Operator Sewing Chair is the perfect seat for long hours of industrial sewing.

The use of footers makes it simple to work properly and safely. When pressing a sewing foot pedal, the footers prevent the operator from slipping. The sewing chair allows user to control their comfort level.

With three adjustable features to fit your seating preferences, you can work with confidence and reduce strain.



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Refer the page – Ergonomics for effective work.

Machine Attachments

Sewing machine attachments make stitching become easier and provide a variety of decorative sewing possibilities. The majority of the attachments are normally secured to the presser bar instead of the foot. A few sewing attachments have hooked ends that rest on the needle clamp.

The following lists the classes and types of sewing machine attachments:

1 Position attachments

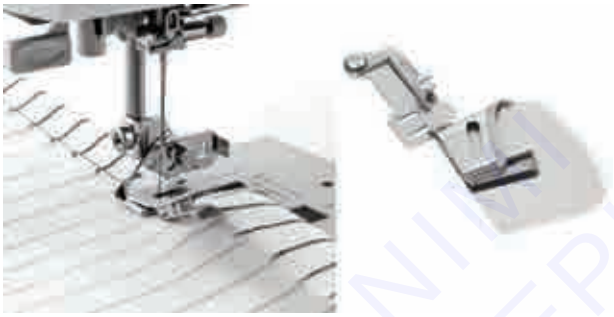
2 Guide attachments

3 Preparation and finishing attachments

1 Position Attachments

a Hemmers

Hemmers construct hems from 3/16" to 7/8" wide, right on the sewing machine. Machine hemming with the hemmer attachments could save plenty of time compared to hand turning and basting. The hemming portion is automatically turned by the hemmer, and simultaneously the line of stitching is guided close to the edge of the hem. Hems are normally done at various widths, which can be made with the hemmers, suitable for the common requirements.



b Ruffler

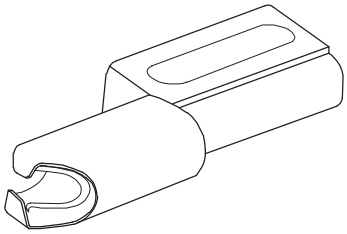
The ruffler attachment has the capacity of doing gathering or pleated frills. It is normally utilised for making children's clothes and curtains. The means of utilising the ruffler attachment varies with different sewing machines.

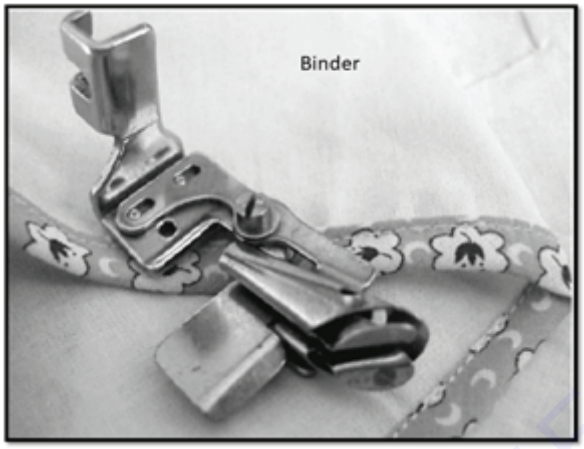


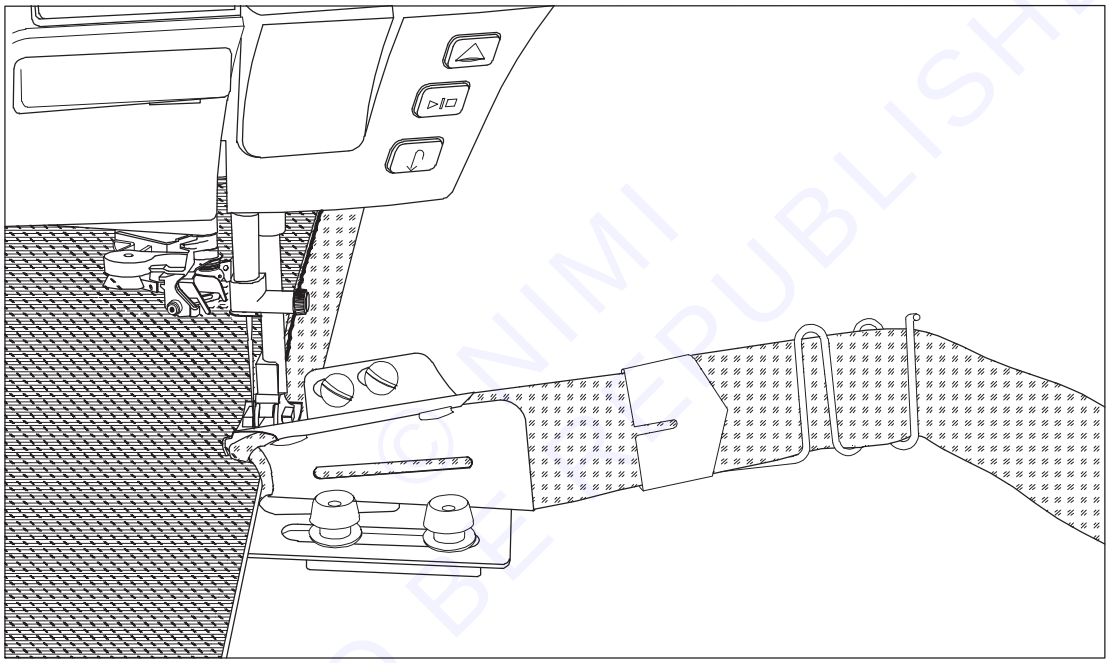
C Binder

It is a valuable attachment in a sewing machine. Though fine bindings can be created by hand, the binding using the attachment on the machine saves a lot of time and is precise and accurate. It is commonly utilised for applying readymade bias binding to a straight or curved edge and is a useful attachment for trimming dresses, etc. The binder attachment has a small funnel-like portion for folding and guiding the binding over the edge of the fabric before it reaches the sewing needle. This attachment could be used for sewing straight, zigzag as well as decorative stitches. The quilt binder set is used to make 1/2″ binding, which can handle quilt fabric and other thicker and heavy weight fabrics. The two upper screws can be adjusted to line up the binding's top and bottom folds with the needle for precision. The quilt binder set makes straight line binding for large quilts and also adds an eye-catching accent to any small items such as placemats and hot pads. The tape binder is utilised for covering or finishing the raw edges of stretch fabrics. The tape binder folds the fabric to use as tape around the raw edge during sewing and binds any raw edge with ease.

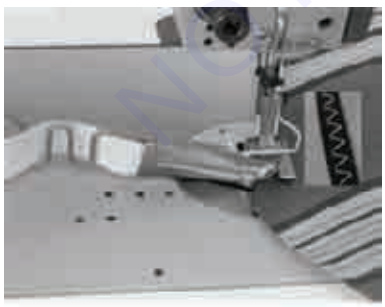
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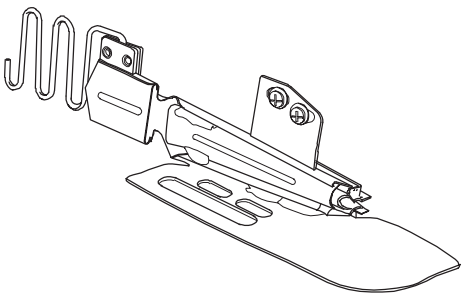






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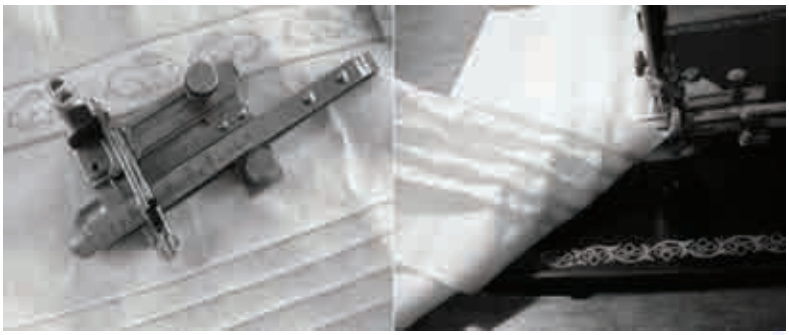


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d Tucker

This attachment is used for creating uniform tucks from 1/8" to 1" width. Finest pin tucks having 3/4″ width could be created easily without any basting. Delicate twin-needle pin tucks are a breeze with the grooves on the base of the presser foot. The pin tucking foot is used in conjunction with a 2-mm twin sewing needle to make multiple rows of pintucks. The grooves on the base of the pin tuck foot make it easy to stitch multiple rows parallel and uniformly spaced from each other.



e Gathering Foot

The gathering foot attachment is used for making soft gathers swiftly particularly in lightweight fabrics. The gather size in the garment depends upon the fabric GSM, tension of the needle thread and stitches per inch. The base of the gathering foot is raised up at the back of the sewing needle and has a thicker bar section in front of the sewing needle for gathering and ruffling of fabric simultaneously.



2 Guide Attachments

a Zipper Foot

The zipper foot could be set to stitch on both sides of the zipper. The edge of the foot directs the zipper to make sure placement is straight. Normally ready-to-wear garments will commonly have an invisible zipper fitted onto them invisible (concealed) zippers are appropriate for all garments made from fine silk jersey through to suit weight wools and tweeds, which can be secured on the garments using a concealed zipper foot. The grooves underneath the concealed zipper foot contain the zipper teeth and hold them in place during stitching. The main criterion is to get the needle as close to the zipper as possible, which this foot achieves by slightly unrolling the zipper just before the needle. An adjustable zipper foot can also be set to sew on each side of the zipper by regulating the location of the foot and tightening the screw.



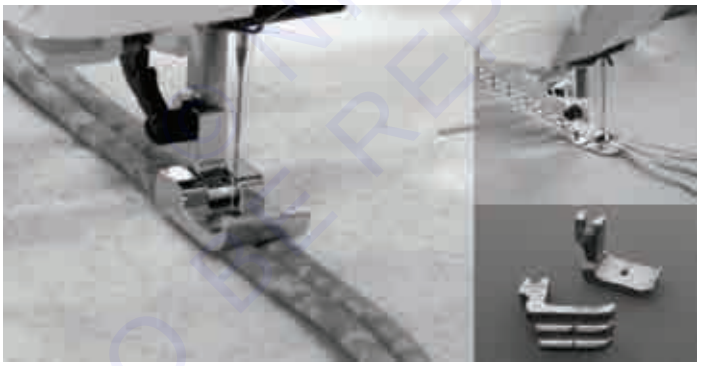
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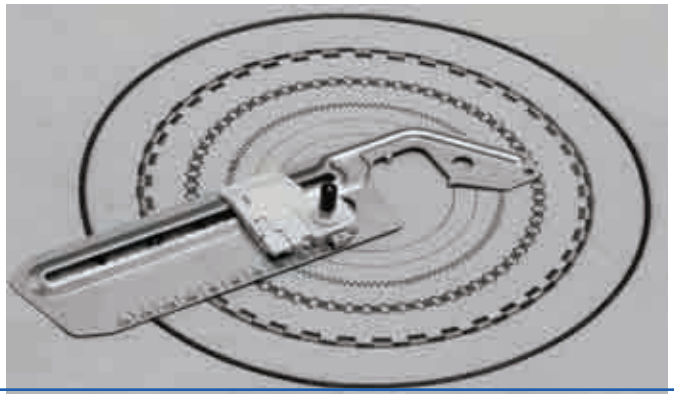
b Cording Foot

The 3-way cording foot will grip three fine cords or threads. Since it is attached to the presser foot, the requisite design can be easily followed and the cords are perfectly placed. A range of functional or decorative stitches could be sewn over the cords to put them onto base fabrics.



c Circular Attachment

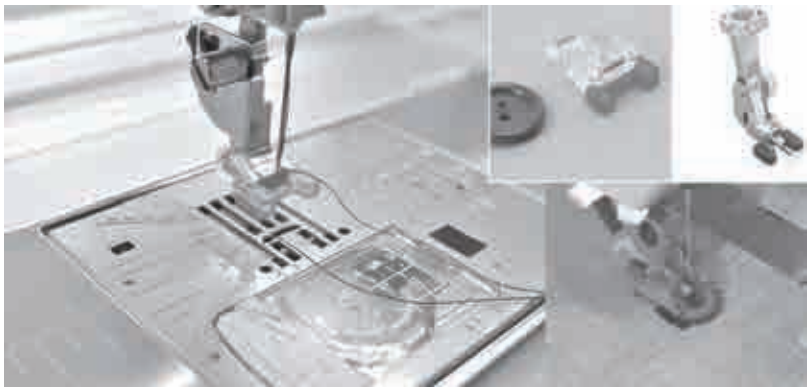
The circular attachment is the most suitable one for sewing of circles using straight, zigzag or decorative stitches. Circles up to 26 cm in diameter can be stitched perfectly using this attachment, which is vital for craft and decorative work.



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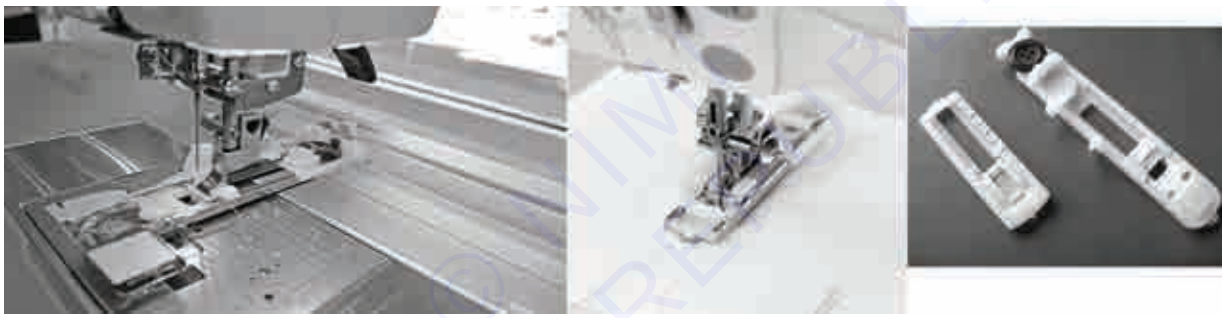
d Button Sewing Foot

The two bars in the button sewing foot are fixed to the shank of the presser foot to give additional firmness and it has a rubber sleeve for better gripping of the button during sewing.



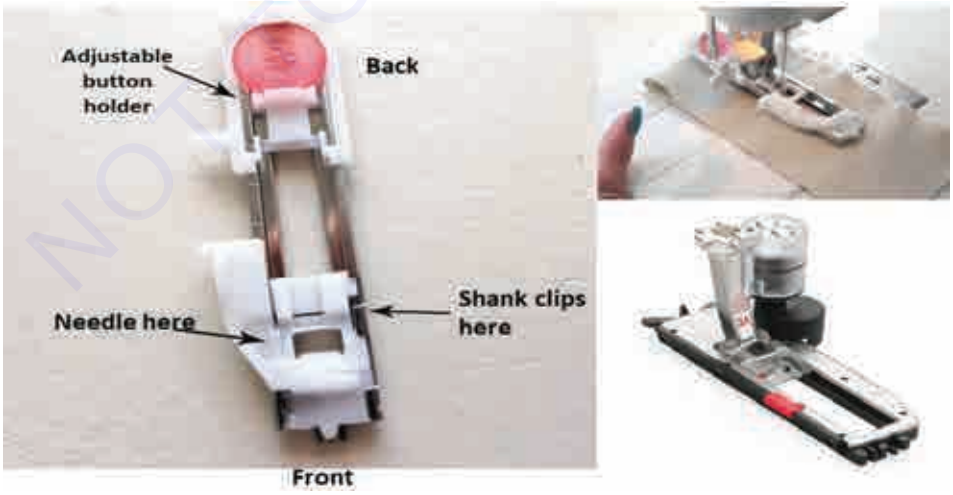
e Buttonhole Stabiliser Plate

With the buttonhole foot, which is secured to the buttonhole stabilizer plate, the machine feeds a range of fabrics and uneven layers smoothly instead of causing the needle to stick in position.



f Buttonhole Foot

The buttonhole foot is used for sewing buttonholes on the fabric. Two kinds of buttonhole foot are available, namely, transparent buttonhole foot and sliding buttonhole foot. The transparent buttonhole foot is used for stitching buttonholes on tight zones like cuffs and a sliding-type foot is used for stitching buttonholes on areas where more freedom of movement is essential.



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3 Preparation and Finishing Attachments

i **Pinking:** It is a common finishing operation on garments. A power pinker is normally used for this purpose or pinking mechanism could be attached to the sewing machine. The two major actions carried out by the pinkers are chopping and cutting.

ii **Pressing attachments:** It is used for finishing garments after the fabric is sewed. For example, on a belt loop attachment process where a flat iron or rotary press pressing device is attached to the machine head.

iii **Thread cutters:** These are extensively required alternatives that minimize production time and get rid of manual thread clipping. On a few machines, sewing threads are cut beneath the throat plate, and a wiper pulls the residue portion of cut thread out of the way in preparation for the next process. Most of the 400, 500 and 600 class stitch machines have chain cutters and latch back devices built-in since the chain stitch formed by these kinds of machines should not be broken by a hand-tearing action.

iv **Chain cutters:** The chain cutters cut the chains in such a way that the stitch is secured against unravelling. Stitches produced on these machines cannot be cut as close as like in lock stitch machines, and some remnant thread remains.

v **Tape cutters:** It could be used with the application of shoulder reinforcements, neck bindings, elastic, lace and so on. As stitching is finished, a photocell sensor finds the fabric end or piece and connects the cutter automatically. Tape may be cut at the beginning and end of the garment piece.

vi **Needle and stitch devices:** On several sewing machines, options are designed especially for assisting in the construction of the perfect line of stitches

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LESSON 39 : Pattern Marking & Construction of Various garments

Objectives

At the end of this lesson, you will be able to:

- explain about the Bush Shirt and T Shirt
- describe about the Ladies shirt and its types.

Drafting and Pattern Making of Shirt

Refer lesson No: 38 (Page No: 325)

Drafting and Pattern Making of Bush shirt

A bush shirt is usually a loose fitting cotton shirt with patch pockets and long length belt. It is also sometimes referred as Bush Jacket or Safari Slack or Safari Jacket. Bush shirt is a common dress of males. This dress is the men's upper torso wear. Bush shirt may has two pockets or four pockets, two pockets on the top part and 2 pockets on the bottom part. The color of the bush shirt will be dark gray or khaki.

A bush shirt is a loose-fitting, lightweight shirt typically worn in warm or tropical climates. It is designed to be comfortable and breathable while providing some protection from the sun and insects.

Bush shirt is lightweight and loose thus it is very comfortable to wear during heavy works or travel. Unlike other shirts it is not very attractive in color or design. So it is known as bush shirt.

It is worn while going to hunt in the forest, bushes, etc.

It is their rugged and adventurous style, are perfect for outdoor activities. They are the ideal choice for activities such as hiking, camping, and even safari expeditions. However, modern designs of bush shirts have also made them suitable for casual wear, adding a touch of adventure to the everyday look.

Suitable fabrics are terene, polyester, viscose-cotton, terry-wool are mostly suitable. People wearing this dress usually wear the same color and material for the lower torso wear, like trousers or pant, now a day this dress is used for official uniform.



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Drafting and Pattern Making of T shirt

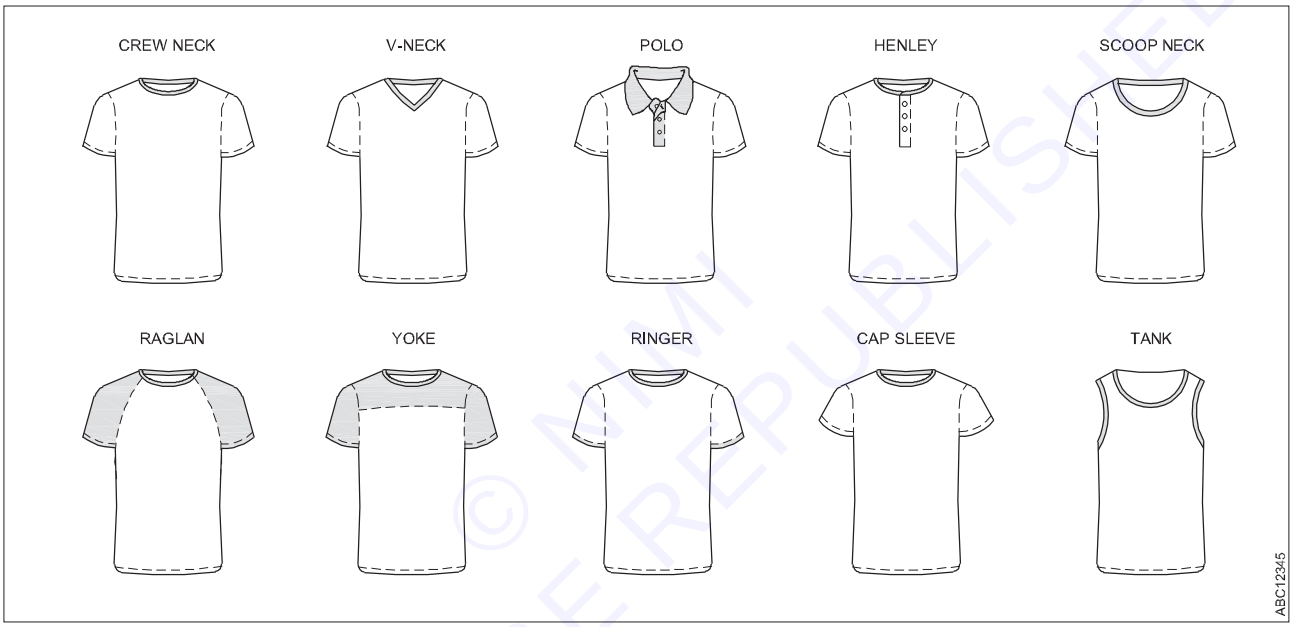
A T-shirt (also spelled tee shirt, or tee for short) is a style of fabric shirt named after the T shape of its body and sleeves. Traditionally, it has short sleeves and a round neckline, known as a crew neck, which lacks a collar.

T-shirts typically have short sleeves and a round neckline, and the body of the shirt has a rectangular shape that resembles a “T” when laid flat.

There are different types of T Shirt

The best fabrics for t-shirts include cotton, polyester, and cotton/polyester blends. Cotton t-shirt fabric is soft, comfortable, biodegradable, and easy to print on. On the other hand, it takes a long time to dry and shrinks in the wash. Polyester t-shirt fabric dries quickly, resists wrinkles, and stays durable.

Create the brand identity or personal style with awesome t shirt designs. T-shirts usually have various designs printed to convey an important message. A t-shirt design comprises typography, color, animation, and many others. Mostly, type of faces, colors, and images appear in big sizes, making a typical t-shirt design.



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Drafting and Pattern Making of Safari shirt

Refer lesson No: 38 (Page No: 327)

Drafting and Pattern Making of Pathani shirt

Refer lesson No: 38 (Page No: 329)

LESSON 40 : Drafting of Ladies Shirt

Objectives

At the end of this lesson, you will be able to

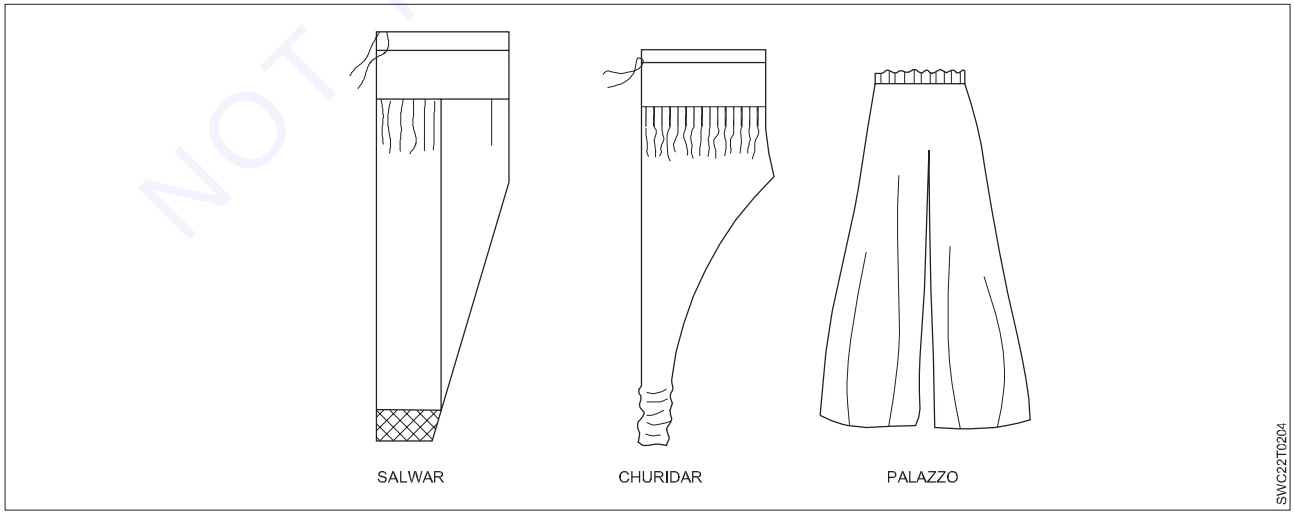
- understand about the ladies shirt and it types

Drafting and Pattern Making of Ladies Shirt

In this chapter, Ladies Shirt means Salwar Kameez or Suit & Chudhidar. The salwar kameez is the present Indian women's outfit in olden days as well as the present time also worn by Punjabi women of North India. Majority of all the states of Indian women of all age group showing their interest to wear this dress more safe and protective and utility purposes. This dress is included a pair of trousers (lower torso) known as the salwar and a tunic (upper torso) is called the kameez. As an upper part to be covered with the dupatta as needful purpose.



The shalwar are loose pajama like trousers. The legs are wide at the top with nore pleats, and considerably narrow at the ankle. The kameez is a long shirt or tunic, kurthis, tops, often common with a Western-style collar; though, for female clothing, the term is now loosely applied to collarless or mandarin-collared/Chinese neck line kurtas, and kalidar kurta.



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The salwar kameez is well known among Indian women as it is a very comfortable outfit which can also be used in changed weather conditions. It is also a very beautiful outfit which can be used at formal events, work place, dinner or even parties.

Features of the Salwar Kameez

Usually, the salwar trousers are tailored to be long and loose-fitting with narrow hems above the ankles that are stitched to look like stiffed cuffs with interlining is placed with 3 inches wider

The kameez is the (upper torso) tops up to knee length to sometimes till mid-calf level with 6" to 8" front placket and two side pockets for utility purpose. Fashion trends decided the fitness factors are mentioned below:

1 Tight fitted,

2 Semi fitted,

3 Medium fitted and

4 Loose fitted.

Decorative neck parts may also be made with sophisticated embroidered to enhance the aesthetic appearance. Sleeves, Hems and Side slits of the portion also made with the surface ornamentations with the following:

- Mirror work,
- Aari work,
- Zardosi and
- Embroidery embellishments.

Suitable materials for spring/summer collections-

- Cotton,
- Cambric,
- Voile,
- Poplin,
- Linen and
- Long cloth

As well as any cotton fabrics with softer to medium weight, mostly suitable.

Suitable materials for autumn/winter collections-

- Silk, pure silk and artificial silk.
- Synthetic,
- Georgette,
- Crepe, and
- Lightweight wool, poly viscose, rayon, jute.

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Trims & Accessories

Objectives

At the end of this lesson, you will be able to

- understand about the Trims and Accessories
- explain about the Costing of garment.

Trims

The materials or components except the main fabric used in the garments are called trims. Besides the main fabric, various additional things are used for making the garments. Trims include Sewing Thread, Button, Zipper, Velcro, Label, Shoulder pad, Linings, Interlinings, etc. Trimmings or trims are of two types namely visible trims and invisible trims. Some trims are used for functional purposes and some are for decorative purposes in garments. Moreover, we can say that the materials used in sewing room other than fabric is called trims.

Trims: Materials used to ornament or enhance garments. These components are attach in the garment by sewing. (Button, Zipper, Sewing thread, Lace, tape etc.)



Types of trims

1 **Visible trims:** This types of trims can be seen from outside of the garments e.g. Button, Sewing Thread, Zipper, Velcro, etc.

2 **Invisible trims:** This types of trims cannot be seen from outside of the garments e.g. Interlining.

Sewing thread

It is one of the most important types of trims used in garments. Almost all garments produced have one component in common; the sewing thread. Whilst sewing thread is usually a relatively a small percentage of the cost of garments, it has an extremely significant influence on the appearance and durability of the finished product. The production of sewing thread is an extensive and complex subject.

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Types of sewing thread

For practical purposes, sewing threads for clothing industry can be divided into three broad groups; Cotton, Synthetics and Core spun.

Thread size

There are many systems for defining thread size but the most widely used system is 'Tex'. This is based on the gram weight of 1000 m of yarn, so a fine thread would have a low 'Tex' number and a thick thread would have a high 'Tex' number.

Button

In clothing and fashion design, a button is a small plastic or metal disc- or knob-shaped, typically round, object usually attached to an article of clothing in order to secure an opening, or for ornamentation. Functional buttons work by slipping the button through a fabric or thread loop, or by sliding the button through a reinforced slit called a buttonhole. Buttons may be manufactured from an extremely wide range of materials, including natural materials such as antler, bone, horn, ivory, shell, vegetable ivory, and wood; or synthetics such as celluloid, glass, metal, Bakelite and plastic. Hard plastic is by far the most common material for newly manufactured buttons; the other materials tend to occur only in premium apparel.



Ligne is a liner unit (1/40 inch) used to measure the diameter of buttons. Usually, watchmakers, button-makers, and hat-makers use Ligne to measure their product size. To purchase button the GG is very important.

1 Gross= 144 pcs of buttons

- 1 inches = 40 ligne = 2.54 cm,
- 1 ligne = 0.635 mm
- 12 Pcs = 1 Dozen,
- 12-Dozen = 1 Gross,
- 12 Gross = 1 GG (1728 pcs).

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According to the number of holes in the button:

- 2-hole button
- 4-hole button
- Special button
  - a Shank button
  - b Snap button
  - c Decorative button used in sleeve.

3 According to material

According to the manufacturing material there are the following types of button-

Plastic button: These buttons are made of polyamide, polyester, polyacrylonitrie etc. They are cheap, not glossy and widely used in shirt.

Metal button: They are used in denim pants, trousers etc.

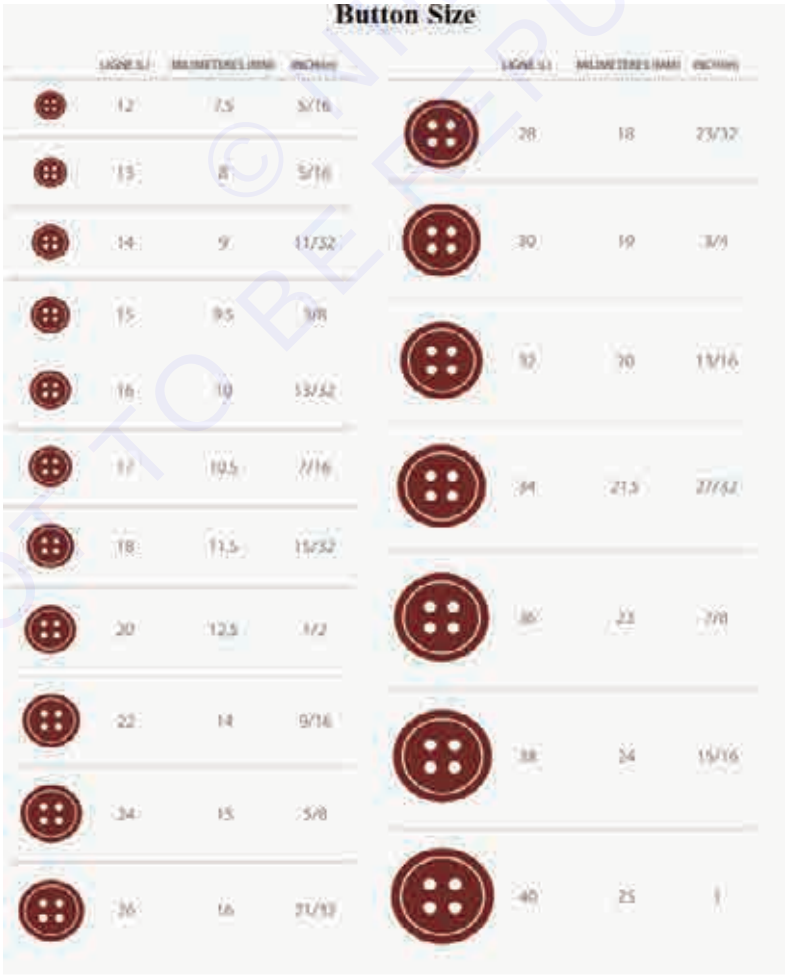
Wooden button: They are used in decorative and functional purpose

Horn button: They are made up of horns of animals used in shirt, pants. Artificial horns are also used which are made up of nylon, plastic and additives.

Chalk button: It is used to make plastic glossy, used in shirt.

Printed button: They are used only in decorative purpose.

Size of the button can check from the button sizechart



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Rivets

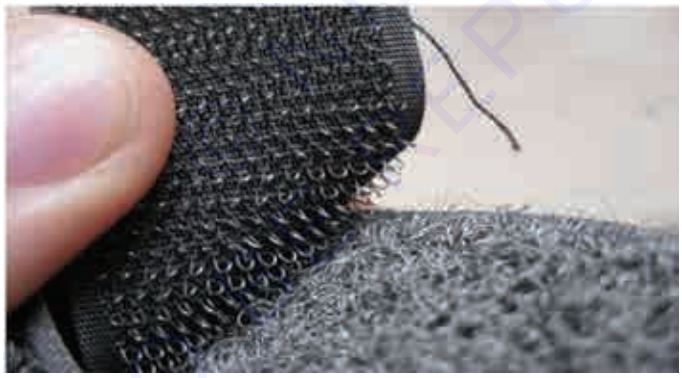
Rivets are not used to open or close the opening parts of garments. They are used for following purposes:

- Widely used for decorative and reinforcement (support) purposes of Denim or Jeans garments.
- It has two parts and requires an appropriate device to attach on garments



Hook and loop fastener (Velcro)

This item consists of two woven poly-amide tapes; one is covered with very fine hooks and the other with very fine loops. When pressed together they adhere (stick) securely to each other. This fastener is also used instead of buttons or zippers. A Swiss inventor made this product and he offered the trade name 'Velcro' for it. This word comes from two French words 'Velour, and 'Crochet'. It is used in only a limited number of garments e.g. shoes, belts, sportswear, children wear, medical textiles, etc. Velcro is available in roll form in the market which has most common width of 5/8 to 3/4 inch.



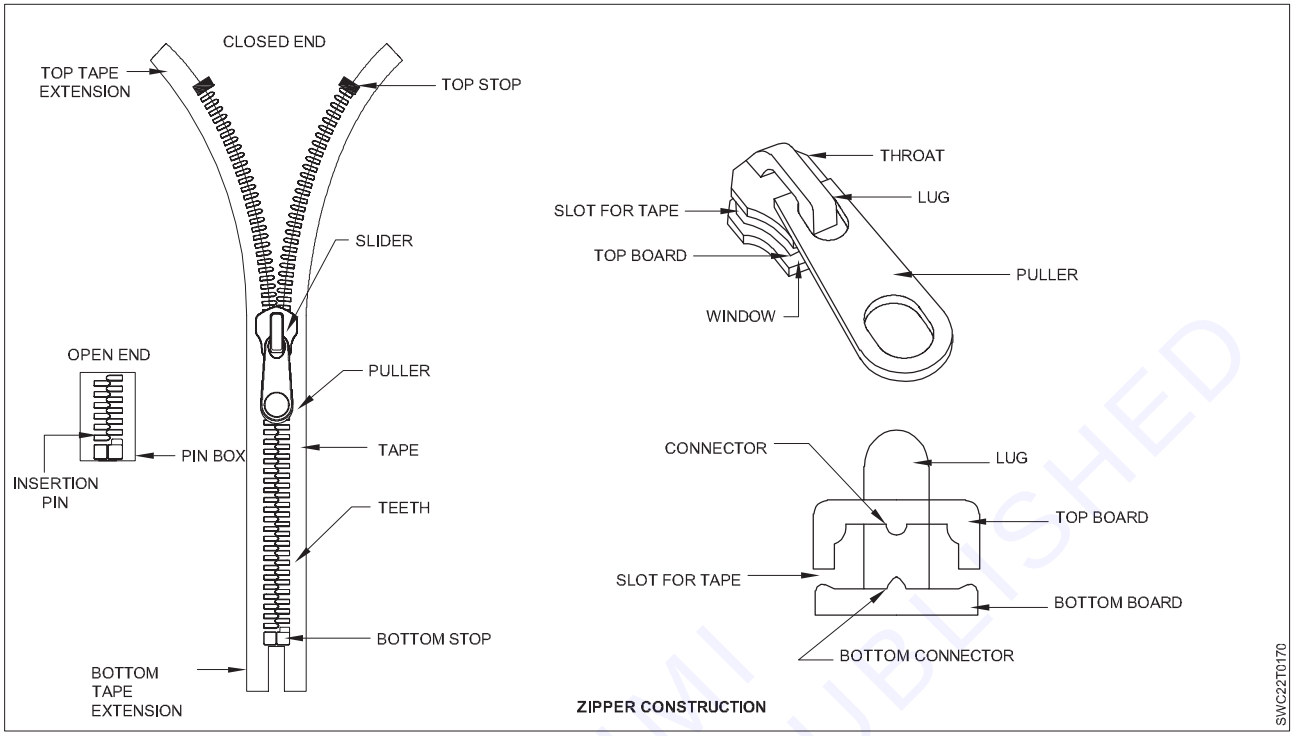
Zipper

A zipper (British English: zip fastener or zip) is a popular device for temporarily joining two edges of fabric. It is used in clothing (e.g. jackets and jeans), luggage and other bags, sporting goods, camping gear (e.g., tents and sleeping bags), and other daily use items. This is one kind of trims used to open and close of some special parts of a garment. It is sometime also used for decorative purposes. In making trouser and jackets, this is an essential component.



This is one kind of trims which is use open and close of special parts of garments.

Zipper construction



Purpose

Functional purpose of zipper is as a part of a garment here zipper is used to open and close the openings.

Decorative purpose: Where zipper is used as a decorative purpose. It inches the beauty of garments.

Uses: In making trousers and jackets, zipper is in essential component which is used to open or close of special parts of garment.

Types of zipper: According to manufacturing material there are 3 types of zipper.

1 Metal zipper: Metal zipper is used in trousers and shorts.

2 **Polyester zipper:** Polyester or nylon zippers are used in jackets. It is made from a continuous filament paced onto narrow fabric tape.

3 **Plastic – molded zipper:** This type of zippers are used in pants.

Slider: It is move up and down. Function of slider is to engage or disengage the teeth of opposite sides of chain. Slider mainly three types they are:

1 Non-locking

2 Semi-locking.

3 Full or auto locking.

Label

Label is an attached component of garment on which important information regarding the garment are written or printed. No garment can be sold without some kind of label attached to it. Specially, in case of export business label on garment is must. For example: the size of garment, trade mark, country of origin, type of raw materials, etc. are written on label. There are mainly three types of label:

1 **Main label:** Main label contains brand name or trade name of buyer which is registered by the buyer e.g. Levi's, Polo, Adidas, GAP, Lewis Philippe, etc.

2 **Size label:** It indicates the size of the garment i.e. S, M, L, XL, XXL.

3 **Care label:** It contains the care instructions of the garment by some internationally recognized signs. It shows the washing, drying, dry-cleaning and ironing conditions of garments.

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The all other labels are called sub-label.

Care code label:

Due to daily usage, normally a garment becomes dirty. This garment should be cleaned and ironed before further using. For this caring of garment, some rules or instructions are expressed by some internationally recognized symbols which are called international care labeling code



Motif

The special component which is attached outside of the garment for decorative purpose called motif. Company name, trade mark or other symbols can be written on the motif.



Lining

Linings are generally functional parts of a garment. They are used to maintain the shape of the garment to the hang and comfort by allowing it to slide over other garment. Linings are available as knitted and woven fabric made from polyester, poly-amide, acetate or viscose for use where decoration and warm handle is required. Linings are joined to main garment by sewing and for this purpose normal plain sewing machine is used. Linings are widely used in jackets, coats, overcoats, pockets, pocket flaps, children wear, etc. Generally cheap fabrics are used as lining materials.



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Interlining

Interlinings are used to support, reinforce and control the shape of some areas of garments such collar, cuffs, waist bands, facings and lappets of coat. They may be sewn into the garment or they may be attached by fusing. Now-a-days sewing interlinings are rarely used and the use of fusible interlining is wide. Interlinings are available in a wide variety of weights and constructions to match the base fabric of the garment.

There are two types of interlining

- Woven Interlining
- Non Woven Interlining.

Both kind of interlining are available with Fusible interlining and Non fusible interlining.



Woven Interlining

Woven interlining is constructed with two threads, horizontal and vertical. The horizontal threads are called the weft and the vertical threads are called the warp.

Non Woven Interlining

Non-woven interlining have been created through a process of bonding fibers together, either by some kind of chemical adhesion, mechanical or heat treatment, or a combination of those. There is no weaving or manual construction involved.

Non-fusible Interlining

The interlining which is used between two layers of fabrics directly by sewing without heat and pressure is called non-fuse interlining. This type of interlining is also called sewn interlining or non-fusible interlining. For the preparation of sewn interlining a piece of fabric is treated with starch and allowed to dry and finally sewn with main fabric.

Fusible Interlining

It is the most used interlining. The interlining which is used between two layers of fabrics by applying heat and pressure for a certain time is called Fusible Interlining. Fusible interlining is used for all kinds of apparel.

Interlining is a textile used on the unseen or “wrong” side of fabrics to make an area of a garment more rigid. Interfacing can be used to:

- Stiffen or add body to fabric, such as the Interlining used in shirt collars.
- Strengthen a certain area of the fabric, for instance where buttonholes will be sewn.
- Keep fabrics from stretching out of shape, particularly knit fabrics.

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Interlining comes in a variety of weights and stiffness to suit different purposes. Generally, the heavier weight a fabric is the heavier weight an interfacing it will use. Most modern interfacing have heat-activated adhesive on one side. They are affixed to a garment piece using heat and moderate pressure, from a hand iron for example. This type of interfacing is known as “fusible” Interlining. Non-fusible Interlining do not have adhesive and must be sewn by hand or machine.



Shoulder pad

Shoulder pad is a standard item in tailored garments for both women and men. Linings are used on the top and bottom of shoulder pad. As a result, the appearance becomes more attractive, comfortable and lasts for a long time. Shoulder pads are used for functional purposes and sometimes for decorative purposes.



Snap fastener

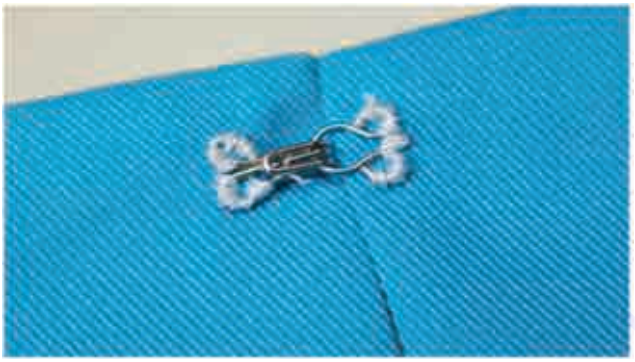
A snap fastener (also called snap, popper, and press stud) is a pair of interlocking discs commonly used in place of buttons to fasten clothing. A circular lip under one-disc fits into a groove on the top of the other, holding them fast until a certain amount of force is applied. Snaps can be attached to fabric by hammering (using a specific punch and die set), plying, or sewing. For plying snap fasteners, there are special snap pliers. Snap fasteners were first patented by German inventor Heribert Bauer in 1885 as the “Federknopf-Verschluss”, a novelty fastener for men’s trousers. These first versions featured an S-shaped spring in the top disc instead of a groove.



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Hook and eye closure

A hook-and-eye closure is a clothing fastener that consists of two parts, each sewn to their respective pieces of cloth, one with a small protruding blunt hook, and the other with a small loop (also known as the “eye” or “eyelet”) protruding. To fasten the garment, the hook is slotted into the loop. Hook-and-eye closures are typically used in groups to provide sufficient strength to bear the forces involved in normal wear. For this reason, hooks and eyes are commonly available in the form of hook-and-eye tape, consisting of two tapes, one equipped with hooks and the other equipped with eyelets in such a way that the two tapes can be “zipped” together side-by-side. To construct the garment, sections of hook-and-eye tape are sewn into either side of the garment closure. Hook-and-eye closures are commonly used in corset.



Frog (fastening)

A frog (sometimes referred to as a Chinese frog) is an ornamental braiding for fastening the front of a garment that consists of a button and a loop through which it passes. The usual purpose of frogs is to provide a closure for a garment while decorating it at the same time. These frogs are usually used on garments that appear oriental in design. Tops with a mandarin collar often use frogs at the shoulder and down the front to keep the two sections of the front closed. Frogs are usually meant to be a design detail that “stands out”. Many sewers make their own because supplies are inexpensive and the results are customizable. Using larger or smaller size cording or fabric tubes will result in larger and smaller frogs. Also, self-fabric can be used to create frogs that are the same color as the garment, though frogs are usually chosen to be a contrasting color to that of the garment. Frogs are made by looping and interlocking the cording or fabric tube into the desired design, then securing the places where the cords touch by hand-sewing. The frog is then stitched onto a garment, usually by hand. When a fabric tube is used, the fabric is cut on bias. This allows the fabric tube to remain smooth and flex easily when bent into curves.



Bias tape

Bias tape or bias binding is a narrow strip of fabric, cut on the bias. The strip’s fibers, being at 45 degrees to the length of the strip, make it stretcher as well as more fluid and more drape able compared to a strip that is cut on grain. Many strips can be pieced together into a long “tape.” The tape’s width varies from about 1/2″ to about 3″ depending on applications. Bias tape is used in making piping, binding seams, finishing raw edges, etc. It is often used on the edges of quilts, place-mats, and bibs, around armhole and neckline edges instead of a facing, and as a simple strap or tie for casual bags or clothing.

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Cord (sewing)

In sewing, cord is a trimming made by twisting two or more strands of yarn together. Cord is used in a number of textile arts including dressmaking, upholstery and couching.



Lace

Lace is an openwork fabric, patterned with open holes in the work, made by machine or by hand. The holes can be formed via removal of threads or cloth from a previously woven fabric, but more often open spaces are created as part of the lace fabric. Lace-making is an ancient craft. True lace was not made until the late 15th and early 16th centuries. A true lace is created when a thread is looped, twisted or braided to other threads independently from a backing fabric. Originally linen, silk, gold, or silver threads were used. Now lace is often made with cotton thread. Manufactured lace may be made of synthetic fiber. A few modern artists make lace with a fine copper or silver wire instead of thread.



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Ribbon

A ribbon or riband is a thin band of flexible material, typically cloth but also plastic or sometimes metal, used primarily for binding and tying. Cloth ribbons, which most commonly includes silk, are often used in connection with dress, but also applied for innumerable useful, ornamental and symbolic purposes; cultures around the world use this device in their hair, around the body, or even as ornamentation on animals, buildings, and other areas.



Accessories

Accessories: Item that enhances the aesthetic appeal or function of a garment including belt, scarves or other objects. In generally these components are sewing less.

Types of Garments Accessories

1 Accessories that are carried (Small pets, toy dog, cats, birds, snakes, taking parrots)

2 Accessories that are worn, (Necklace, Umbrella, Bag, etc.)

3 Accessories used in the garments industry for packing (Hangtags, Price tag, Polybag, Carton, Scotch Tape, Clips, Clothes Hanger)

Accessories are not directly attached with garment by sewing. The materials, which are used to make a garment attractive for sale and packing, other than fabrics and trims, are called accessories

Hangtags

Hangtags are designed to draw attention to the garments and are hung on the side of the garment and sometimes in front of button line so that the customers can see them easily. Hangtags are printed paper tags hung from the garments by plastic staple or string. They usually show the brand name, style number, etc. It is regarded as one of the finishing accessories.



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Price tag

It is a type of tag printed with the sales price of the garment. It is usually supplied from the buyer's side. The merchandiser usually takes it from the buyer and supplies to the folding section.



Polybag

A polybag is a plastic bag used for packing garments. The garment is first folded as per direction of the order sheet then is packed. There are two types of polybag used in garments packing; one is single polybag in that a single garment is packed and the other is blister polybag in that more than one garment are packed. For packing the garments into blister polybag, packing instructions must be followed.



Carton

Carton is the name of certain types of containers typically made from paperboard which is also sometimes known as "cardboard". Many types of cartons are used in packaging garments ready for shipment. The dimensions of the cartons depend on buyer instructions and the number of pieces of garments in each carton is given in the order sheet. Sometimes a carton is also called a box.



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Scotch Tape

Scotch Tape is used to describe certain pressure sensitive tapes used for wrapping the cartons. Scotch tape is available in roll form and contains 25 yards in each roll.



Clips

A clip is a device which holds the fold portion of the garment together by means of pressure: it leaves the fold portion intact and can be quickly and easily removed, unlike the staple, which will damage the paper unless removed carefully, and will always leave two holes in the paper.



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Clothes Hanger

A cloth's hanger, or coat's hanger, is a device in the shape of:

- Human shoulders designed to facilitate the hanging of a coat, jacket, sweater, shirt, blouse or dress in a manner that prevents wrinkles, with a lower bar for the hanging of trousers or skirts.
- Clamp for the hanging of trousers, skirts, or kilts. Both types can be combined in a single hanger.

There are two basic types of clothes hangers. The first is the wire hanger and the second is the wooden hanger. There are also plastic coat hangers, which mostly mimic the shape of either a wire or wooden hanger. Plastic coat hangers are also produced in smaller sizes to accommodate the shapes of children's clothes.



Estimation of Material for different width, size & Texture

Refer Lesson : 37

Garniture for a garment

Refer Lesson : 40

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Costing of Garment

A cost sheet is a statement that records all the costs a business incurs from production to sales. Using this information, a company can fix the price of its products and services. The main advantage of a cost sheet is that you can compare it with previous cost sheets to measure performance. You can then decide whether the cost of an item can be increased or decreased according to your costs.

Prepare a cost sheet using previous cost sheets or current estimated costs. A previous cost sheet shows you the actual costs incurred for producing, storing, and selling a product. Using estimated values, you can produce a cost sheet. However, there may be several changes in the estimate and the final figures. Based on the costing,order get confrimed by buyer.

A cost sheet has to contain the following information:

- Cost per unit of a product
- Total cost
- The four main components of a cost sheet:
- Prime Cost
- Works Cost
- Cost of Production
- Total Cost or Cost of Sales
- Percentage incurred on every expense to the total cost
- If the cost sheet is prepared using historical cost sheets, record of discrepancies, if any
- If two cost sheets of any period are compared, record of discrepancies, if any
- Details about the management for cost control
- Summary of the total cost of the product

Components of a Cost Sheet

1 Prime Costs

Under this header, need to record all the expenses involved in the production process. This is also known as basic or first cost.

For example, if need a textile store, the prime costs will be the costs of purchasing fabric from weavers, employee salaries, packaging, implements needed to measure and cut cloth, etc.

The formula for calculating prime costs is:

Prime Costs= Direct Labour + Direct Raw Material+Direct Expenses

2 Works Cost

Works cost is the sum of prime costs and overhead costs including factory expenses. Overhead costs are those costs that are not directly related to the production of a product but are required nevertheless. For example, you we need to pay electricity bills to keep the production going. Similarly, there are several other taxes and utility costs that fall under the overhead costs category.

3 Cost of Production

Under this header, we should include all the expenses involved in business operations, including rents and work costs. The formula for calculating the cost of production is:

Cost of Production= (Work Costs) + (Administration Overhead Costs) - (Opening and Closing Stock of Finished Goods)

Openingstock is the amount and value of material that a company has use at the begining of an accounting period. The closing stock can be in various from such as row materials in process goals (WIP) or finished goods.

4 Cost of Sales

Cost of sales or total cost contains the details of all the expenses involved in the production and other costs involved in selling and distribution. This value will help to understand how much have spend on a product according to the

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resources used for producing it. It can decide the selling price according to the cost of sales and know how much profit you will earn from it.

Different Types of Costs

There are four types of cost:

1 Fixed costs

These costs are fixed, that is, they do not change according to the number of products. The price of the land or equipment is some examples of fixed costs.

2 Variable costs

These costs vary according to the number of products. Raw material and labour are some examples of variable costs.

3 Operating costs

The business incurs these costs to maintain production daily. Utility costs, office supplies, travelling costs, etc. fall under this category.

4 Direct costs

These costs are directly connected to production. For example, if a car company produces a car in four days, the raw materials and labour involved in the production from the direct cost of the car.

Costing is used in the garment industry to establish the financial feasibility of producing a given design within a defined price range, acceptable to the target market. Costing enables the manufacturer to identify the profit potential of the design, aiding in the decision of whether or not a design should be added to the line.

Once a design has been added to the line, costing in the next stage helps in the formation of line budgets and set up a base selling price. Costing also assists in justification of procurement of new equipment or capacity expansion investments.

Stages of Costing

Costing is done at four broad stages in the entire garment manufacturing process:

- Preliminary or pre-costing done during the pre-adoption phase of the product development process, i.e. before the samples are made. This gives a rough estimate as to what to expect from the design, based on similar styles. This facilitates weeding out or modification of designs that are too costly for manufacturing.
- Cost of line adoption done to determine the expected investment required for the design in materials, labor and overhead. In this stage, the style is broken down into components and the assembly procedures to establish its financial viability and producibility of the design at a specific price point. This is based on the samples and standard data available.
- Post adoption or Pre-Production Costing, also known as Detailed Costing or Tech Design Costs, which include detailed costing, based on specific production methods (machine type, SPI, material handling methods, layout, etc.) and costing standards (in-house standards, PMTS, etc.). It is conducted during the post-adoption stage, prior to the start of actual production.
- Actual costs, estimated during and after production. It includes the material and labor costs, compared to the allowed budget for the style. This costing can also be used to force changes in the style to limit the expense to the allocated budget.

Products Cost

The three main categories of costs for garment manufacturers are, direct materials — contributing about 50% to the total cost, direct labor — contributing about 20% to the total cost and, overheads — contributing about 30% to the total cost:

- Material Costs: As the name itself suggests, this cost head consists of all the material costs of the product like fabric, thread, trims, etc.
- Labor Costs: This head chronicles the wages of the employees directly involved with the garment production, like the cutting, sewing and finishing helpers and operators.
- Overheads: this section comprises of both the variable and fixed, indirect manufacturing costs. This includes indirect labor costs (managerial labor, service personnel, quality control staff, etc. or the staff not directly

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involved in product manufacturing), occupancy costs like rent, depreciation, property taxes, insurance, and security; and other overheads like administrative costs, material management (carrying costs), machinery and equipment costs, compliance and regulation costs, etc.

The importance of apparel costing

Apparel costing is a tool that helps manufacturing companies to determine the cost-per-unit of manufacturing a product. It is essential for getting an accurate analysis of costs and ascertaining the profitability of each product. It acts as a guide for fixing the price of the goods being manufactured.

There are several objectives that can be achieved through apparel costing:

- Costing helps a business classify, sub-divide costs and allocate budgets for every operation. It allows them to set business policies for measuring efficiencies and implement budgetary control.
- Apparel costing also allows a business to clearly see where resources are being wasted or just not being utilized optimally. By doing so, it allows a business to plan and make the best of use of limited resources, thereby helping keep overall costs down and profits high.
- It is an important tool of management control, helping with cost audits and price determination. Costing helps businesses make better business decisions by accurately predicting costs of production, as well as improving profitability and increasing customer satisfaction.
- It helps businesses identify areas where they can reduce their overall expenses. For instance, if certain raw materials are more expensive than others then it will result in higher production costs which can be avoided by substituting those raw materials with alternative ones that are more affordable but equally effective at producing similar results.
- The costing process also helps the management in charting out an effective expansion strategy. It allows them to take suitable steps to account for and manage seasonal variations in volume, costs and so on.
- Apart from problems, costing also shows you what's going well in the business. It helps the management in formulating and implementing incentive and bonus plans.

Overall, it is safe to say to a good apparel costing strategy is the bedrock of any successful business.

Components of costing in garment manufacturing

Typically, a product merchandiser is responsible for doing the costing of a product. The merchandiser has to keep in mind the cost of various raw materials, operating cost of the company, their competition, and expected profit of the company. Simultaneously, s/he has to be mindful of the buyer's costing expectations.

The following are the main components of the manufacturing cost of a garment:

- Fabric – This is generally the most important factor in the costing of a garment, accounting for nearly 60-70% of the cost of a basic style garment. Fabric can often be the significant factor in evaluating the cost of producing any garment.
- Trims – Apart from fabric, anything else used to complete a garment goes into the Trims category. This can include threads, buttons, zippers, elastic, rivets, lace, labels or any other accessories. The cost, quantity, and the labor required to apply trims all add up to the cost of a garment.
- Cut, Make & Trim charges – Also called CMT (cut-make-trim) or CMTP (cut-make-trim-pack) cost, these are the 'cost of making' charges. You can calculate CMT by multiplying the total cost per hour to the total number of hours it takes to make the style, divided by the number of units produced. The contractor's profit is also added to this cost.
- Value Addition – Special processes such as Printing, Embroidery, Washing or Applique, among others are clubbed under the umbrella of 'value added services' in the garment manufacturing industry. Each of these can include a complicated subset of costs of its own.
- Garment Testing – The inspection and testing of garments are done at different stages of garment manufacturing—raw material, partially finished or assembled stage as well as post-finishing. These include chemical tests, appearance after storage test, dimension stability tests, color fastness test and so on.
- Quality Control – The cost of quality control-related processes fall under four main categories, namely, appraisal costs, preventive costs and the costs of internal and external failure. They are the costs incurred for identifying and preventing defects during product development and production.
- Labels and Packaging – The cost of labels and packaging depends on the size, thickness, printing mechanism and material you choose. But the number of labels per item plays a big role too and should be kept in mind.

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- Transportation and Logistic Costs – The expenses involved in moving products from the factory to your store or warehouse are filed under freight and shipping costs. They can vary widely depending on where the sourcing of the products from.
- Overhead – These are the costs incurred by the factory such as rent, electricity bills and repairing equipment. This includes indirect labor costs that aren't necessarily linked with any particular product or service
- Profit of the company – As self-explanatory as it gets, this 'cost' is essentially what the business earns for selling the goods produced.

Cost Sheet

A garment or fashion cost sheet is a statement which shows the various components that constitute the total cost of a particular product. A cost sheet is prepared based on historical costs and estimated costs.

Cost Sheet			**Explanation**
Details	Calculation	Amount	
Direct material consumed	12000		
Opening stock of raw materials	130000		
Add: Purchases		142000	
Less: Closing stock of raw materials	8000	134000	
Direct wages		50000	
Direct expenses		10000	
Prime Cost		194000	Prime Cost = Direct Material Consumed + Direct Labor + Direct Expenses. Direct Material= Material Purchased + Opening stock of raw material-Closing stock of raw material.
Factory overhead is 100% of direct wages		50000	
Works cost		244000	Works Cost = Prime Cost + Factory Overheads (Indirect Material + Indirect Labor + Indirect Expenses)+opening Work in progress-Closing Work in progress
Office and administration overhead is 20% of works		48800	
Total cost of production		292800	Cost of Production = Works Cost + Office and Administration overheads + Opening finished goods-Closing finished goods
Add: Opening stock of finished goods		10000	
Cost of goods available for sale		302800	
Less: Closing stock of finishing goods		15000	
Cost of goods sold		287800	
Selling and distribution overhead		25000	
Cost of sales		312800	
Profit on cost is 20%		62560	
Sales		375360	Sales = Cost of sales + Profit on cost is 20%

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COST SHEET

DETAILS	CALCULATIONS	AMOUNT (Rs.)
Direct Material: Material consumed	12,000	
Opening stock of raw material	130,000	
Add: Purchases	142,000	
Less: Closing stock of raw materials	8,000	134,000
Direct wages		50,000
Direct expenses		10,000
Prime cost		**194,000**
Factory overhead: 100% of direct wages	100*(50,000/100)	50,000
Works cost		**244,000**
Office and administrative overhead: 20% of works cost	244,000*(20/100)	48,800
Total cost of production		**292,800**
Add: Opening stock of finished goods		10,000
Cost of goods available for sale		**302,800**
Less: Closing stock of finished goods		15,000
Cost of goods sold		**287,800**
Selling and distribution overhead		25,000
Cost of sales		**312,800**
Profit on cost - 20%	312,800*(20/100)	62,560
Sales		**375,360**

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LESSON 41 : Drafting & Pattern Making of Shorts

Objectives

At the end of this lesson, you will be able to:

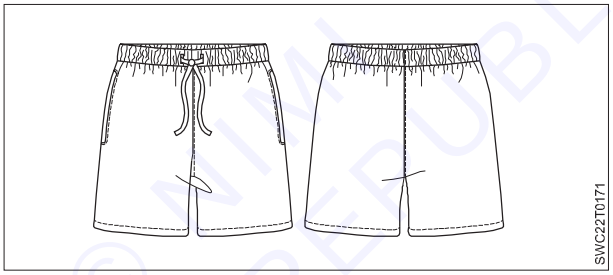
- explain about the Shorts, One Piece Trouser, Two Piece Trouser and Jeans
- describe about the Balance of Garment, Structure of body and deformed figure.

Drafting & Pattern Making of Shorts

Shorts are a garment worn over the pelvic area, circling the waist and splitting to cover the upper part of the legs, sometimes extending down to the knees but not covering the entire length of the leg.

They are commonly worn during warmer weather or for specific activities such as sports or casual outings. Shorts come in various styles, including denim, cargo, athletic, and tailored, catering to different preferences and occasions.

Shorts are a garment worn by both men and women over their pelvic area and the upper part of the upper legs or more, but not the entire length of the leg.



They are called “shorts” because they are a shortened version of trousers (as they are called in British English) or pants (in American English) which cover the entire leg.

There are dozens of different shorts suitable for any gender or comfort level, including:

1 **Athletic shorts:** Athletic shorts are a style of sportswear that includes cycling shorts, running shorts, tennis shorts, swimming trunks, gym shorts, and board shorts. Athletic shorts are often made from stretchable, breathable spandex or nylon fabrics, allowing proper moisture-wicking and air circulation. These bottoms may feature a drawstring that allows the wearer to adjust the tightness or an inner lining that serves as underwear.

2 **Bermuda shorts:** Also known as dress shorts or walking shorts, Bermuda shorts have a slightly baggy bottom with a hem that falls only an inch or two above the knee. Though they work well in tropical climates, wear them in any type of weather with a T-shirt or flowing button-down tucked into the waistband.

3 **Boxer shorts:** Originally worn by male boxers, these soft fabric trunks are now fashionable for men and women outside of the boxing ring or training gym. Some fashionistas pair boxer shorts with a crop top and blazer for casual look.

4 **Boy shorts:** Many people wear boy shorts as underwear, but this style is also a popular bathing suit cut because it flatters most body shapes and covers the hips and butt. These bottoms as casual summer shorts with a tank top or a graphic T-shirt.

5 **Cargo shorts:** The British military designed cargo pants as part of their Battle Dress Uniforms in the early twentieth century. The style has continued to evolve, with shorts being among the most popular iterations. These baggy shorts provide a loose fit and feature multiple pockets (in the standard location and along the sides of the shorts). Pair these shorts with a tee, tank, or polo shirt.

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6 **Chino shorts:** Chino shorts are made from a comfortable fabric like Cotton, providing an easy fit while walking or sitting, like their full-legged counterpart. They are usually knee-length shorts with a zipper enclosure in the front. Pair these shorts with a lightly patterned top or linen button-down.

7 **Convertible shorts:** These shorts start as pants but include snap buttons, zippers, or Velcro that allow the wearer to remove the lower part of the pants, turning the attire into a wearable pair of shorts.

8 **Denim shorts:** Denim shorts come in various cuts and lengths, such as low-rise or high-waisted. Depending on the type of wash, these denim bottoms can work in an array of different settings and occasions, and pair them with nearly any kind of top.

9 **Daisy Dukes:** Colloquially known as "booty shorts," these cutoff shorts—named after a character from the '70s TV show Dukes of Hazard—are typically made from denim and cut high into the buttocks. Hot pants are a shorter and tighter version of Daisy Dukes, though the material isn't always denim.

10 **High-rise shorts:** High-waisted shorts rest above the waist, sitting higher on the midsection than traditional-cut shorts. Pair high-rise shorts with tight or loose-fitting tops and booties, heels, or sandals.

11 **Jamaica shorts:** These shorts fall around the mid-thigh, between the groin and the knee. Pair these bottoms with a crop top, tank, or T-shirt.

12 **Low-rise shorts:** Low-rise shorts—also known as hip-huggers—fall right below the waist, wrapping snugly around the hips. As an outfit, pair these bottoms with midriffs or long shirts and a French tuck, or throw a cardigan over a camisole.

13 **Pleated shorts:** Pleated shorts often fall right above the knee and are high-waisted with elastic inserts, creating a "creased" look in the front of the shorts. Flat-front shorts are a direct contrast to this style and do not feature pleats.

14 **Skorts:** Skorts are shorts with a wrap-around fabric sewn on top to mimic the look of a skirt. Usually wear a skort for any occasion where a skirt is suitable.

15 **Slip shorts:** Slip shorts work similarly to a dress slip, hugging and contouring the body beneath the rest of the outfit. Slip shorts are usually made from a thin, stretchy fabric that can sit seamlessly under other clothes.

Drafting & Pattern Making of One piece Trousers

Trousers and pants are interchangeable terms that describe a garment covering the lower body from waist to ankles, with separate sections for each leg. However, the usage of these words differs between regions. Trousers are commonly used in the UK, while Pants are the preferred term in America.

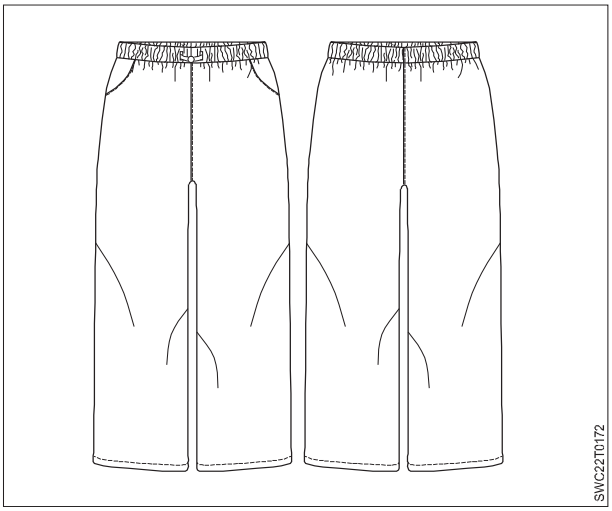
Trousers (British English), slacks, or Pants (American English) are an item of clothing worn from the waist to anywhere between the knees and the ankles, covering both legs separately (rather than with cloth extending across both legs as in robes, skirts, dresses and kilts).

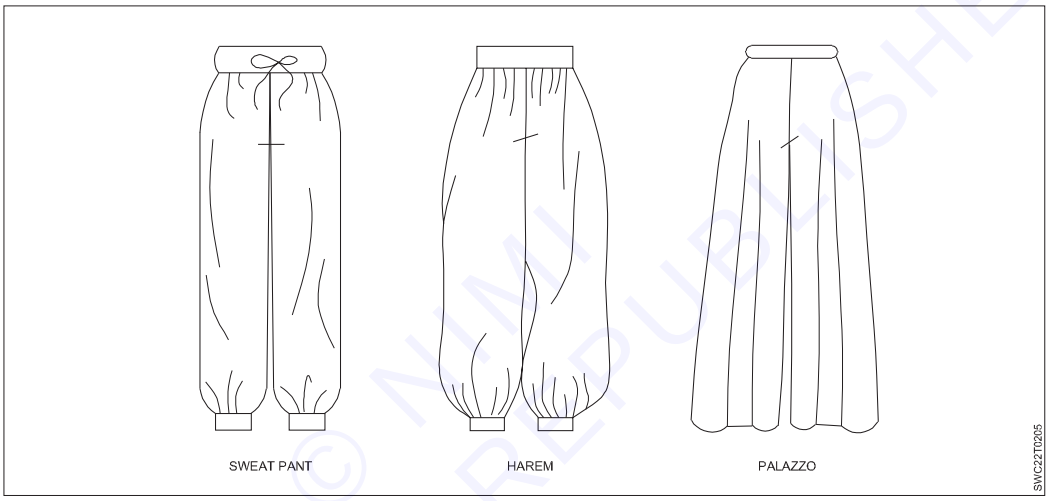
One piece Trouser means the leg of the trouser is made in one piece of fabric without any joint at out seam. It is called Pajamas, also spelled as pajamas in American English, are a type of clothing worn for sleeping or lounging at home. They typically consist of two pieces: a top and a bottom. The top can be a shirt or a long-sleeved top, while the bottom is usually pants or shorts. Pyjamas are designed for comfort, allowing people to relax and sleep comfortably. Pyjamas are made from various materials, including cotton, flannel, silk, satin, and synthetic fabrics like polyester. The choice of fabric often depends on personal preference and the climate or season.

For example, flannel pyjamas are warm and cozy, making them ideal for colder weather, while lightweight cotton or silk pyjamas are suitable for warmer temperatures. Pyjamas come in different styles and designs, ranging from simple and plain to elaborate and decorative. They can feature various patterns, colors, and prints, catering to different tastes and preferences.

Some pyjamas may also have added features like pockets, buttons, drawstrings, or elastic waistbands for added comfort and convenience. Pyjamas are essential sleepwear for many people, providing comfort, warmth, and relaxation during bedtime or leisure time at home.

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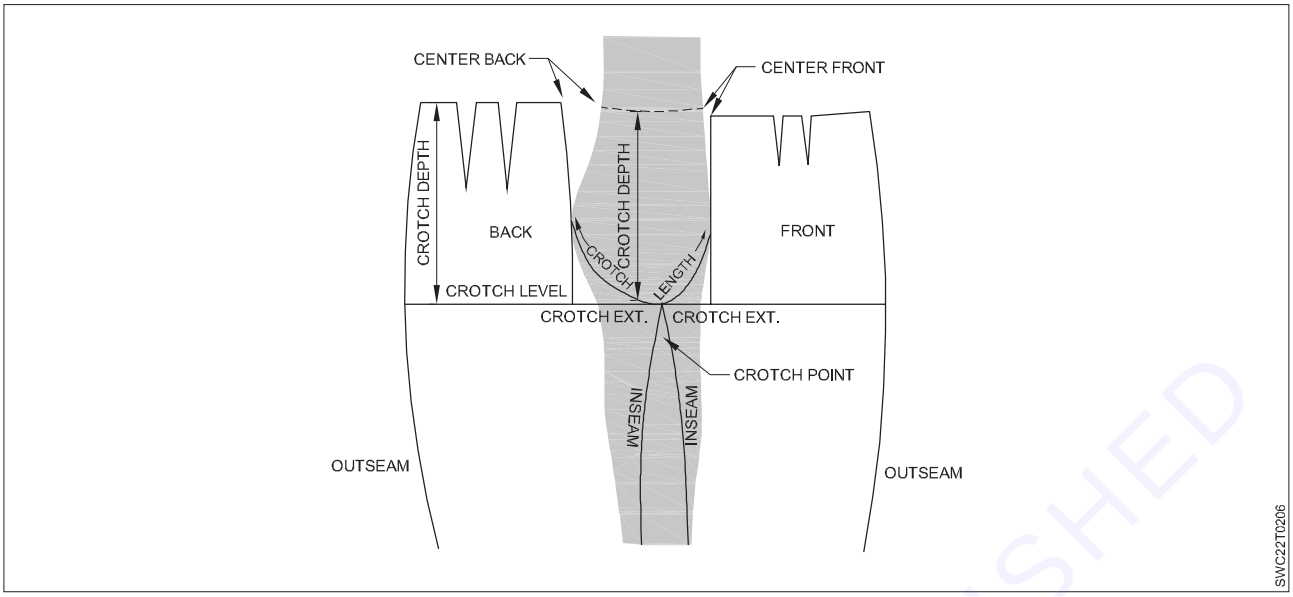
Drafting & Pattern Making of Two Piece Trousers

Two-piece trousers typically refer to a suit consisting of a pair of trousers and a matching jacket, commonly worn for formal or professional occasions. The trousers are designed to match the jacket in fabric, color, and style, creating a cohesive ensemble. These suits are versatile and can be worn for various events, from business meetings to weddings, depending on the fabric and design. They are a staple in men's and women's wardrobes for formal attire.



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Pant Terminology



Bifurcated: Divided into two parts (right and left sides).

Crotch: Base of torso where legs join the body.

Crotch depth: The distance from waist to base of crotch of the figure.

Rise. A tailor's term referring to the crotch depth.

Crotch length: A measurable distance from the center front waist, around the crotch base, to the center back waist.

Crotch extension: An extension of the crotch line at center front and back center lines that provides coverage for the inside part of the leg.

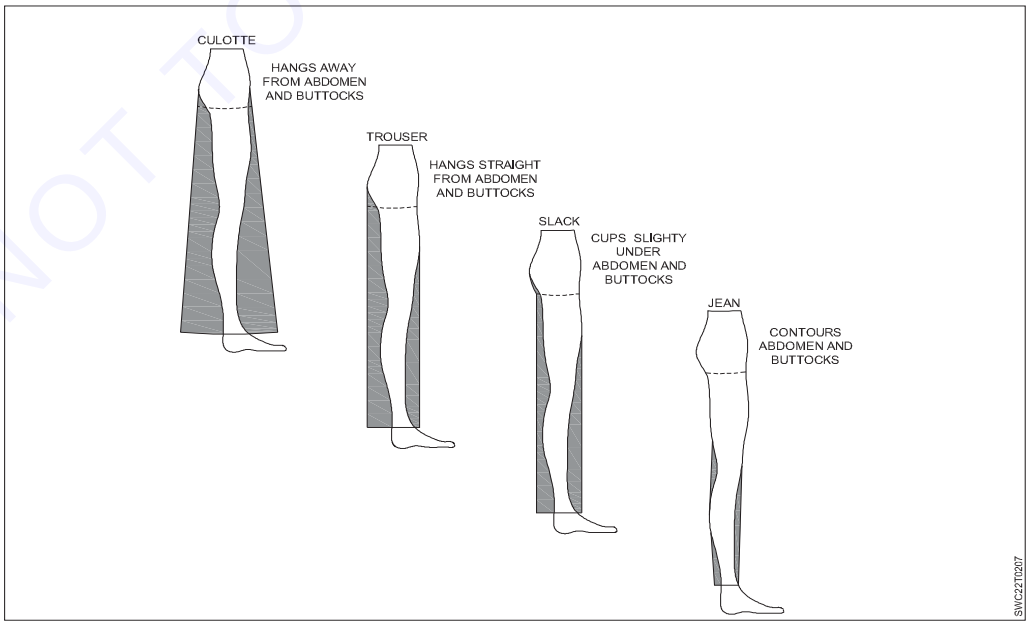
Crotch point: End of the crotch extension.

Crotch level: Dividing line separating torso from legline of the pant. (The total width across the pant from the front crotch point to the back crotch point.)

Outseam: Side seam joining the front and back pant.

Inseam: Seam between the legs joining the front and back pant.

The Pant Principle



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Short shorts: 1 1/2 inches below the crotch of the inseam and 1 to 1 1/2 inches above the crotch at the side seam.

Shorts: 2 inches below crotch level.

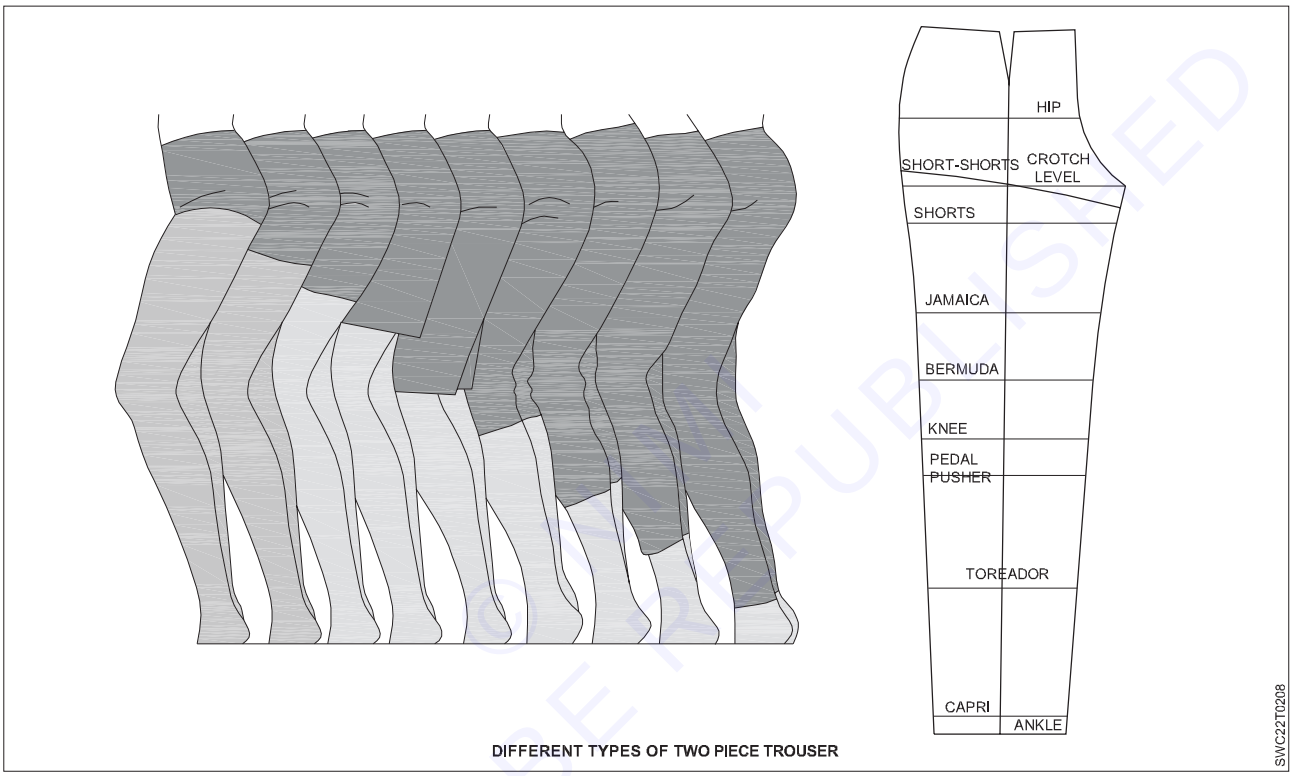
Jamaica: Halfway between the crotch and knee.

Bermuda: Halfway between Jamaica and knee.

Pedal-pusher: 2 inches down from the knee.

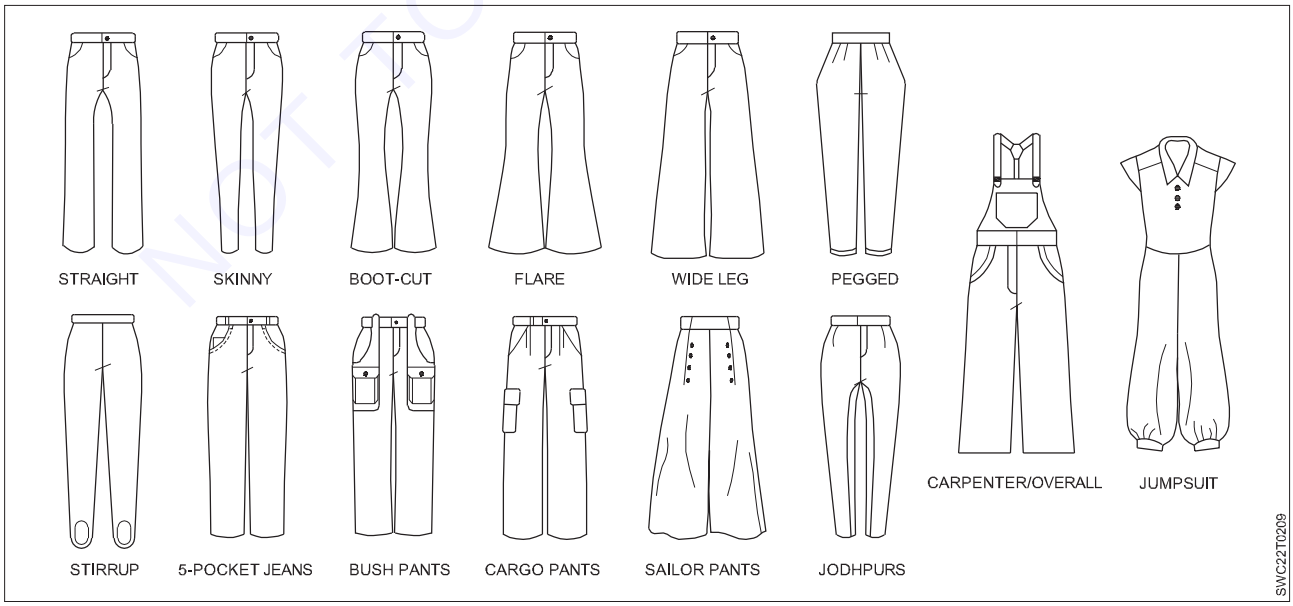
Toreador: Halfway between the knee and ankle.

Capri: 1 inch above the ankle.



DIFFERENT TYPES OF TWO PIECE TROUSER

Different types of Two piece Trouser



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Jeans

Jeans are a type of pants typically made from denim or dungaree cloth. They are known for their durability and versatility, originally designed as work wear but now widely worn as casual attire.

Jeans come in various styles, including skinny, straight, boot cut, and boyfriend, among others. They are a staple in many wardrobes due to their comfort, durability, and timeless appeal.

Different Parts of Jeans Pant



There are different parts of jeans pant can identify from the following anatomy analysis of jeans pant

1 Waist Band
2 Belt Loop
3 Button
4 Fly
5 Watch Pocket /Coin pocket
6 Front Pocket
7 Back Pocket
8 Jeans Rivets
9 Crotch Point
10 Back Yoke
11 Bottom Hem
12 Back Rise
13 Side Seam
14 Inseam
15 Zipper

Waistband

The waistband is made from denim fabric which surround the waist when wear jeans pant or any other pants. On this waistband, basically wear a belt to fit properly. A pair of jeans pant contains only 1 waistband on it.

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Belt Loop

Belt loops are added with jeans pant so that belt can fix on it and hold the pant where we supposed to hold. There are five to seven loops are there in jeans pants. But most of the designers prefer five loops onto the waistband.

Button

The button is used to close the top of the fly of jeans pant.

Fly of Jeans Pant

The fly is the opening part of the middle of the pant which is used to hide the zipper or button attached in there.

Watch Pocket/Coin Pocket

Watch pocket/Coin pocket is the small pocket that places in the upper part of the front right pocket of jeans pants. The watch pocket is also known as a key holder which makes the jeans pant more attractive. There is only 1 watch pocket for Jeans pants. It may use to keep the Coin.

Pocket

In clothing, a pocket is mainly used for holding small materials but it also increases the attractiveness of cloth. A pocket is one of the main parts of the jeans pant where there are four pockets. Two-pocket are on the front side and the other two are on the backside of the jeans pant.

Jeans Rivets

In a pair of jeans pants, rivets which are made of metal. Rivets actually used in the joining point of pockets of each side which not only holds the denim fabric together but also increases the attractiveness of that jeans pant.

Crotch Point

Crotch point is the joining point of two parts below the fly of jeans pant.

Back Yoke

In a pair of jeans pant, yoke which is located in the backside of the pant, attached with the waistband. Back yoke ensures the close fitting of jeans pant to our body.

Bottom Hem

The bottom hem is in the bottom of the jeans pant which is folded and attached by sewing.

Back Rise

Back rise is the middle back joining point of jeans pant.

Seam

Side seam and Inseam basically the part of jeans pant where two parts joint together by sewing.

Zipper

A zipper is used to close the front opening part of the jeans pant where both Zipper and button system can be used in jeans pant. Two buttons can be used instead of using a zipper.

There is not much difference between parts of jeans pants and parts of normal pants or trousers.

It may have many similarities among parts of pants and jeans pant/trouser. The main difference between jeans and normal pants is the fabric used for making.

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Module 8 :Drafting of Sockets /Coats

LESSON 42 - 44 : Balance of Garment according to Structure of Human Body & its importance Deformed Figure

Objectives

At the end of this exercise you shall be able to

- understand about the human body structure and garment balance
- understand about the different types of deformed figure & importance.

Balance

Balance refers to the "hang" of the garment. If a garment is balanced, it will hang straight, rather than twisting or having folds. When creating patterns you need to do the following to make sure your pattern will be balanced:

1 Correctly mark the pattern grain on the pattern pieces

2 Use notches as balance points to assist in the construction process, and

3 Ensure that adjoining pattern pieces match (in length and shape – using the balance points to do this)

Balance is the visual weight in design. Based on a central dividing line, Balance makes the right and left side of a garment appear to be equal. A garment must be balanced to be visually pleasing.

- **Symmetrical Balance:** Symmetrical or Formal Balance uses two identical objects on either side of the design, such as patch pockets of equal size.
- **Asymmetrical Balance:** In Asymmetrical or Informal Balance composition is different from one side of the garment to the other. Balance is achieved through visual impact.

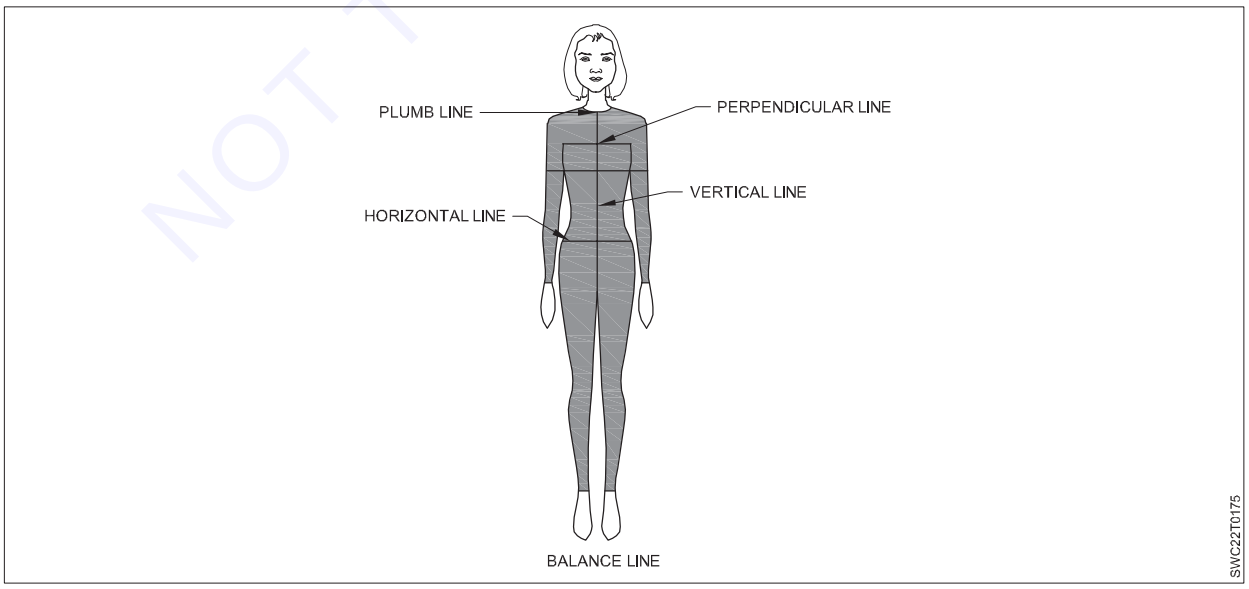
Proportion is the pleasing interrelationship between parts of a design. The various elements in the design should be scaled in size to fit its overall proportion.

Emphasis creates a center of interest in a garment. All other elements support it by echoing its design message. A focal point can emphasize the theme of the design. Creation of a focal point can be achieved by color accents, significant shapes or details, lines coming together, groups of details, or contrast.

Rhythm leads the eye from one part of a design to another part, creating movement through repetition of pattern or color.

Balance Line Terms

Plumb line. A vertical line that is at right angles with the floor. Used to determine the balance of the figure.



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Perpendicular line. A straight line at right angles to another line.

Vertical line. A line that is straight up and down.

Horizontal line. A line parallel with the floor.

Right angle. The 90° angle formed by two intersecting lines, referred to as a squared line.

Asymmetrical line. A center line with unequal proportions on either side of it.

Symmetrical line. A center line with equal proportions on either side of it.

Balance. The perfect relationship between parts that, when combined, form a unit (or whole) in which each part is in exact proportion and harmony with all others.

Balancing a pattern. Finding and adjusting the differences between joining pattern parts to improve

the hang and fit of the garment.

Horizontal balance line (HBL). A reference to any line marked around the form that is parallel with the floor. Patterns are also marked with horizontal balance lines squared from the center lines representing the crosswise grain when the garment is cut in fabric. The HBL lines help when balancing the patterns.

Body anatomy:

The father of tailoring, Mr. Wampon, drew seven imaginary lines across the body structure for the purpose of easy measurement in tailoring. The complete body structure was lengthwise divided into eight equal parts, which is known as the eight head theory. This theory has become the foundation of all fashion drawing and for understanding the body shape and structure for fashion.

For perfect sizing of garment body measurement is very important. Body measurement plays a vital role in better fitting of garments to the human body. Hence, it is crucial for a designer or dressmaker to have better knowledge of body anatomy as well as the correct procedure for taking body measurements. For efficient fabric utilisation in the cutting room, the designer should know the size and shape of the body for which the designing has to be done, and it begins with the eight head theory.

Eight Head Theory:

According to this theory, the normal body structure is considered 5′4″ height. This body is divided into 8 parts in which each part is 8″ in length. A development of this theory is the ten head theory, which is used for all fashion drawing. This figure is referred to as fashion model figure. In this system, the body structure is divided into ten equal parts or heads. The bottom part of the body is longer compared to the eight head figure. The ideal height for this theory is taken to be 5′8″. The division of body structure in the eight head principle

1 Hair to chin:

The garments are generally worn on the body through the head and hence hat or cap head measurements should be taken. The right place on the neck is the chin itself. The head is considered the first portion of the human body and the chin is considered a first imaginary line.

2 Chin to nipple:

The upper body garments are prepared according to the size of the chest only. This is the second part and the second imaginary line passes through the nipples and the armscye. This line denotes the bust level.

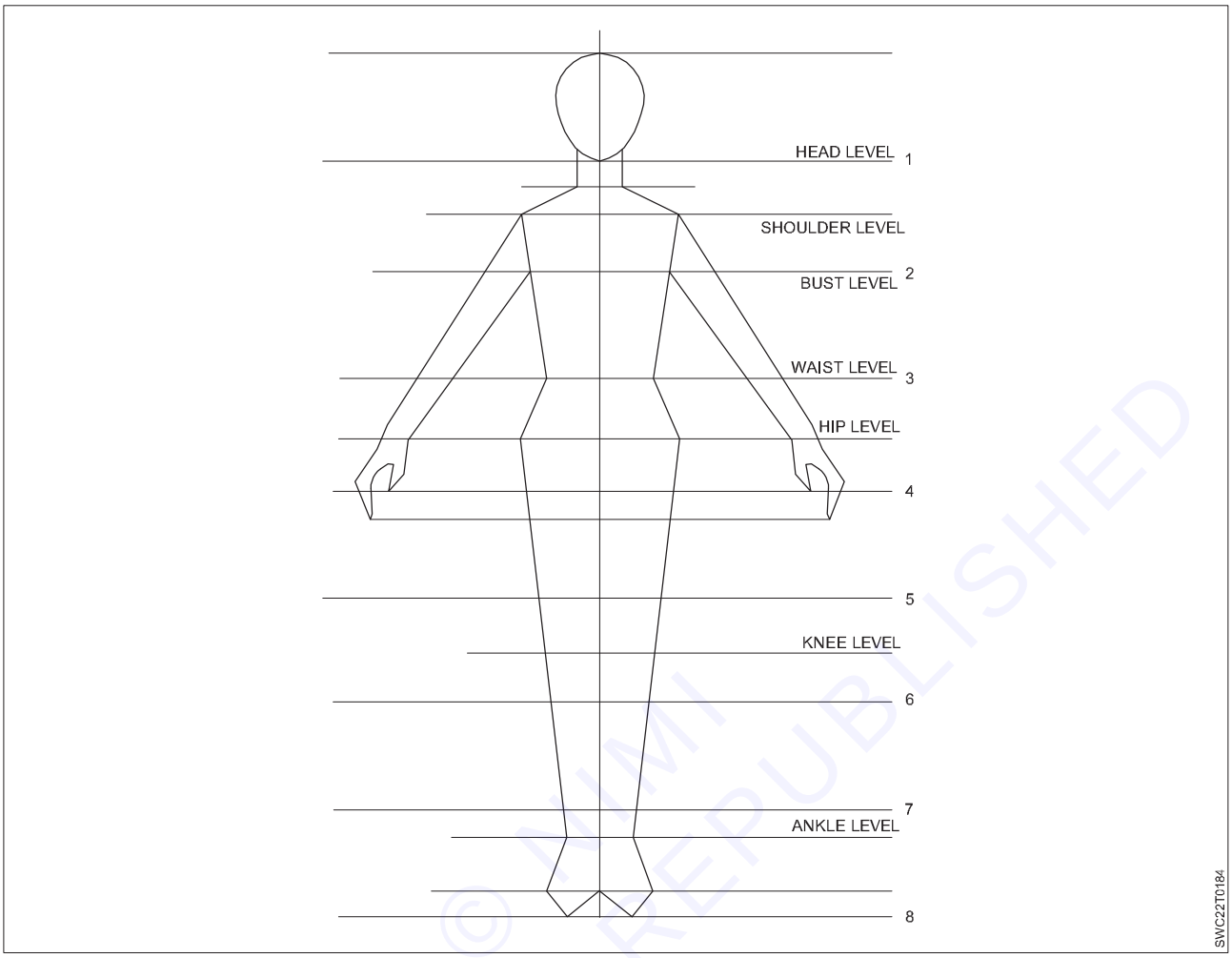
3 Nipple to navel:

The next imaginary line passes through the navel; shoulder to waist is measured up to the navel points. This level is the waist level. But for proper garment fitting, the waist measurement for ladies is taken 1″ above the waist level and for men 1/2” below the line.

4 Navel to pubic organs:

This part is most important for lower body garments. The lower body garments are cut based on the hip size. The hip level is usually 3 –4″ above this imaginary line. This is the most heavy or fat part of the body. This is also as important as the chest measurements.

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5 Pubic organ to mid thigh

This part is important mainly for arm measurements. The finger tips normally end near about this line. The length of the arms is measured as 3 heads.

6 Mid thigh to small

The part below the knee is known as small. The knee level is about 2 –3″ above this imaginary line. Length of gowns is taken around this head.

7 Small to ankle

This head is important for full length garments like trousers. These garments usually end here. The calf level is above this head. House coats, nightgowns, etc. end at the calf level.

8 Ankle to feet

The eight heads are imagined on assuming a person standing on the toes. This is the last head and it comprises only the feet. This is necessary for tight fitting leggings and floor-length garments like evening gowns.

Advantages of the eight head theories

1 By the knowledge of eight head theory, the observation of the body structure becomes easy.

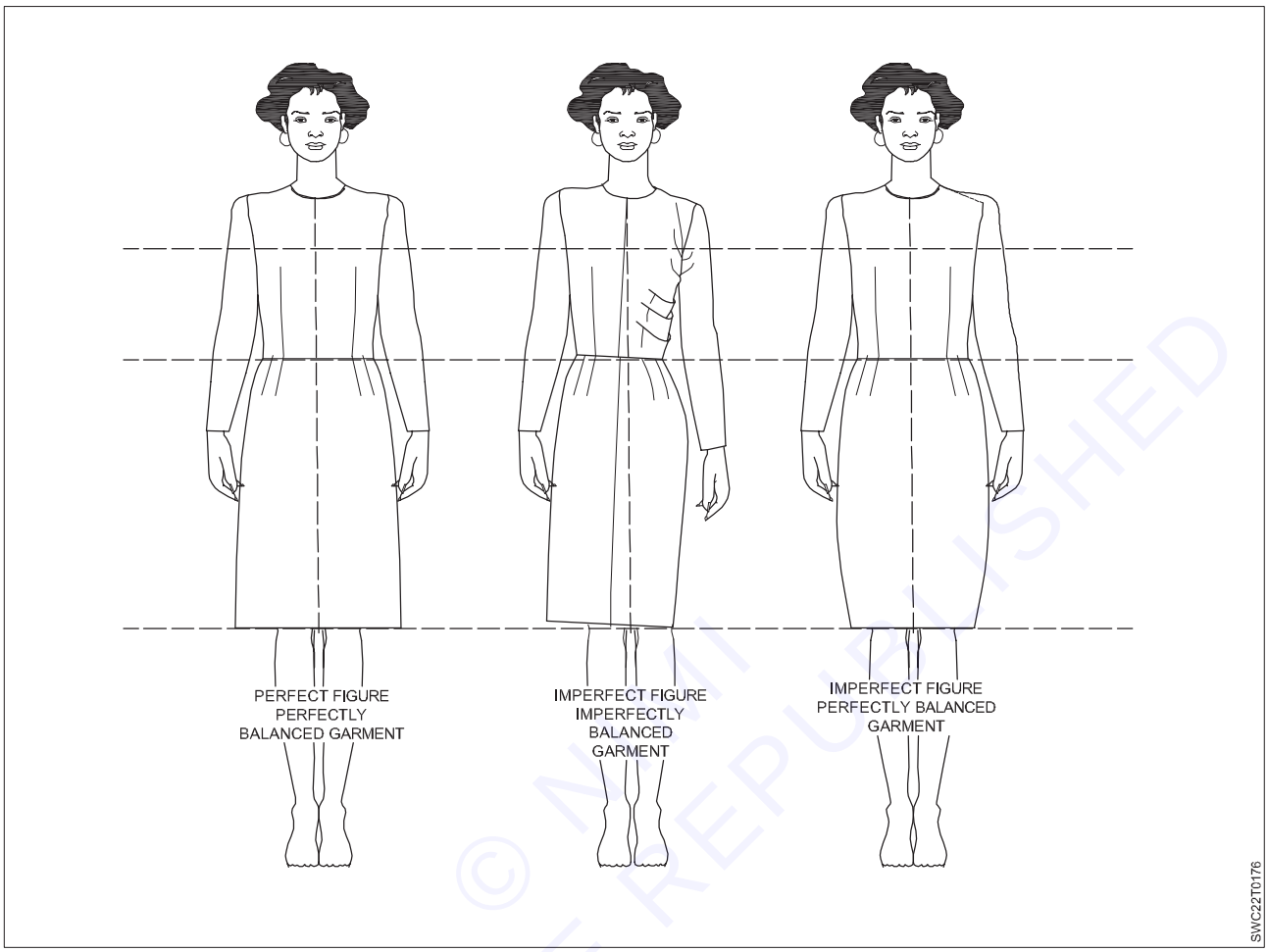
2 It will facilitate drafting and fitting. If there happens to be any fault, then it shall be detected and rectified.

3 Knowledge of body structure shall be helpful in taking correct measurement and this will result in correct cutting and the garment shall be stitched properly.

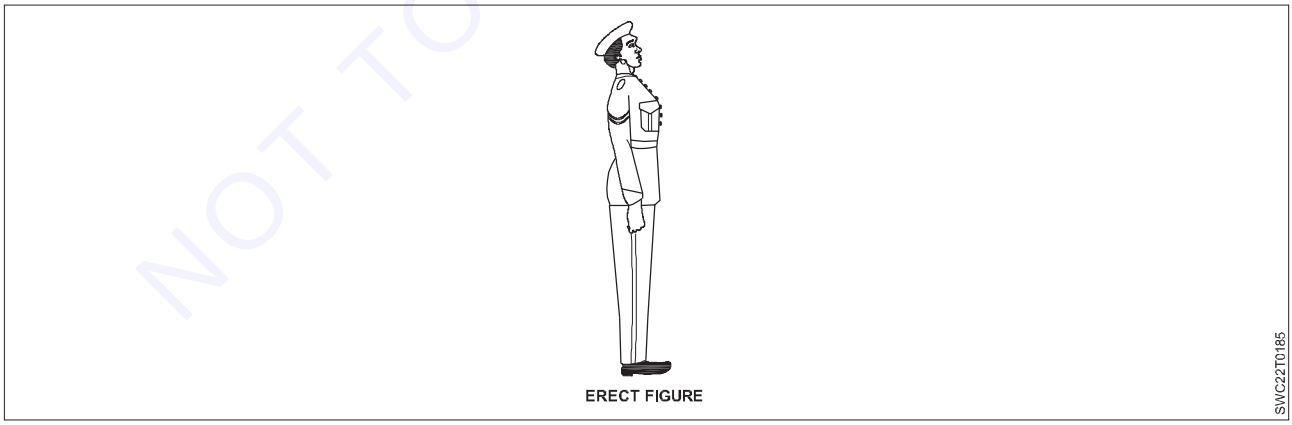
4 Work shall be easily and speedily executed.

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Deformed Figure/Abnormal Figures: The Width and height in abnormal figures are not proportionate to each other. It has deformities.

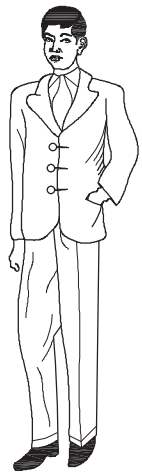


Erect figures: These kinds of figures are normally seen in army or police personalities. The body is bend on the backside and straight in the front. Due to this back length is shorter than front. Across chest is more chest is round in shapes hollowance on the back blade bone.



Tall and thin figure: In this figure the height is more when compared to the width measurement is less than normal. Neck height is more, shoulder measurement can be more or equal compared to normal figure.

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TALL & THIN FIGURE

SWC22T0186

Stooping figure: This kind of figure is bend on the front side and back slightly round shape.

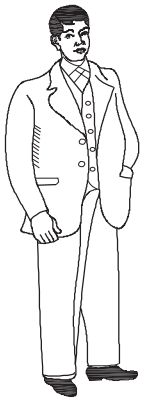
Front length is less. Back length is more. Across chest is less across back more compared to normal figure. It is just opposite to erect figure.



STOOPING FIGURE

SWC22T0187

Short and stout figure: In this figure, width measurement is more than compared to the height. Hip is prominent, thigh are very close to each other girth measurement is lesser. Different between chest, waist and hip is lesser according to normal figure.



SHORT & STOUT BODY

SWC22T0188

Sloping shoulder: It is not parallel to chest and waist line. Shoulder slope is more, neck height look longer depth of scye is compared to normal figure.

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SLOPING & SHOULDER

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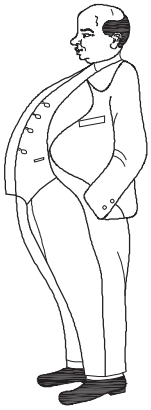
Square shoulder: In this figure shoulder seems to be square having less shoulder shaping, neck height look out to be short, shoulder sloping is parallel to waist and chest line.



SQUARE SHOULDER

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Corpulent figure: This is due to abnormal growth in stomach area. Front length is more than back lengthcross back is less, waist measurement may be more than hip, neck height is smaller, across chest more

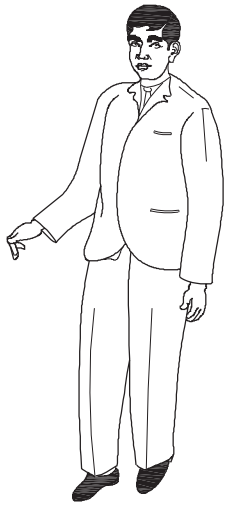


CORPULENT FIGURE

SWC22T0191

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Semi corpulent figure: In this kind of figure waist hip and chest measurement are equal. Balance of front and back is equal. No curve in waist.



SEMI-CORPULENT FIGURE

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Drafting of Nehru jacket & vest coat various style

At the end of this lesson you shall be able to

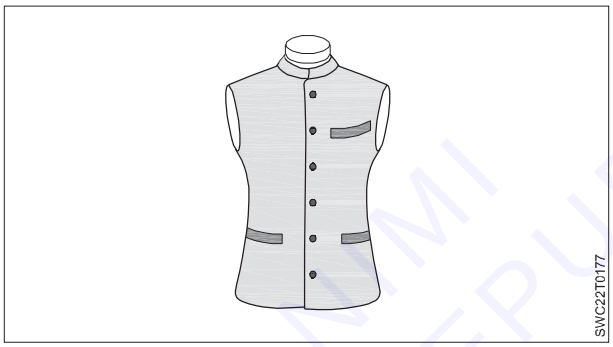
- explain about the nehru jacket, vest coat ,single breast, double breast and sherwani and its details.
- describe about the accessories of jacket & coats and its types.
- explain about the finishing of garments.

Nehru Jacket

The Nehru Jacket also called “Bandi” is a sleeveless tailored coat for men, with a mandarin collar, being inspired by the Indian Achkan or Sherwani, a garment worn by Former Indian Prime Minister Pandit Jawaharlal Nehru from 1947 to 1964.

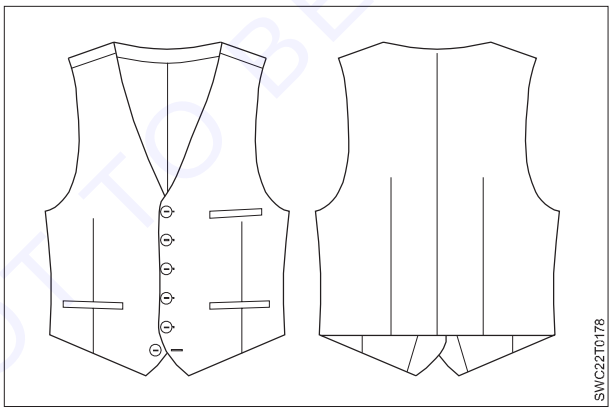
Indian Achkan is longer garment with its reach below the knees where a Nehru Jacket is shorter in length and hardly reaches the hips. The term ‘Nehru Jacket’ became wide recognized post the 1940s.

The Nehru jacket is a variation of the Jodhpuri where the material is often khadi (hand-woven cloth). The Jodhpuri itself is an evolution from the Angarkha. Popularized during the terms of Jawaharlal Nehru, these distinct Bandhgalas made from khadi remain popular to this day.



Drafting of Vest Coat various style

Waist coats are vests that are just a little bit fancy because they’re worn with suits rather than as stand alone items. However, the waist coat can stand on its own as a separate piece of fashion.



Various Styles of Vest Coat

Vests also known as waistcoats, come in various styles and can be worn for different occasions. There are different types of vest coat:

1 Classic Single-Breasted Vest

- Features a row of buttons down the center.
- Typically has a notch or shawl lapel.
- Can be worn with a suit for formal occasions like weddings, business meetings, or evening events.

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- Also suitable for adding a touch of sophistication to casual outfits when paired with jeans or chinos and a button-down shirt.

2 Double-Breasted Vest:

- Has two rows of buttons on the front, creating a more formal and structured look.
- Often features peak lapels for added elegance.
- Ideal for formal events such as black-tie affairs, gala dinners, or formal evening receptions.
- Provides a distinguished appearance when worn as part of a three-piece suit ensemble.

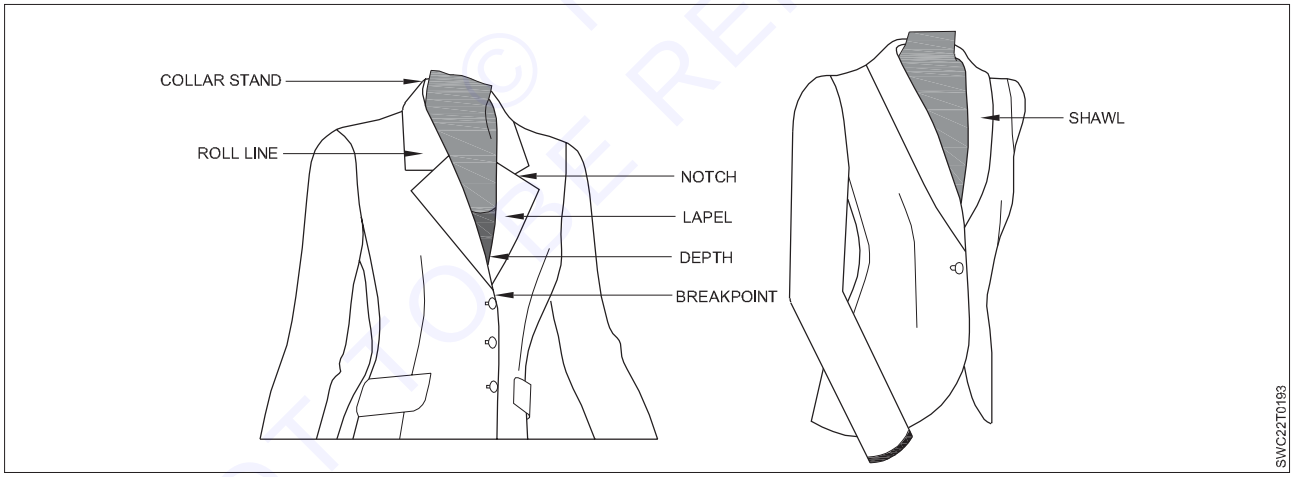
3 Suit Vest:

- Matches the fabric and color of the suit jacket and trousers.
- Completes a three-piece suit ensemble.
- Suitable for business settings, formal occasions, or professional events where a cohesive and polished look is required.
- Adds an extra layer of warmth in colder weather without sacrificing style.

These are just a few examples of the various styles and uses of vests. The versatility of vests makes them a valuable addition to any wardrobe, offering both style and functionality for a range of occasions.

A vest coat, also known as a waistcoat, is typically worn as part of a formal or semi-formal outfit. It's commonly seen as part of a three-piece suit, consisting of a jacket, trousers, and the vest. The vest adds a layer of sophistication and can be worn for various occasions such as weddings, business events, or formal dinners. It's also sometimes worn casually with jeans for a more relaxed yet stylish look.

Single breast



Jacket and Coat Terms

A jacket designed with a skirt is considered a suit. A jacket designed as a separate is generally within a coordinated group.

Roll line. Fold line of the collar and lapel.

Breakpoint. Roll line of the lapel starting at the front extension.

Depth. Distance below center front where the lapels cross each other.

Collar stand. Height where the collar folds over itself.

Lapel. Part of the jacket that folds over itself and to which a collar is attached.

Notch. Space between collar and lapel.

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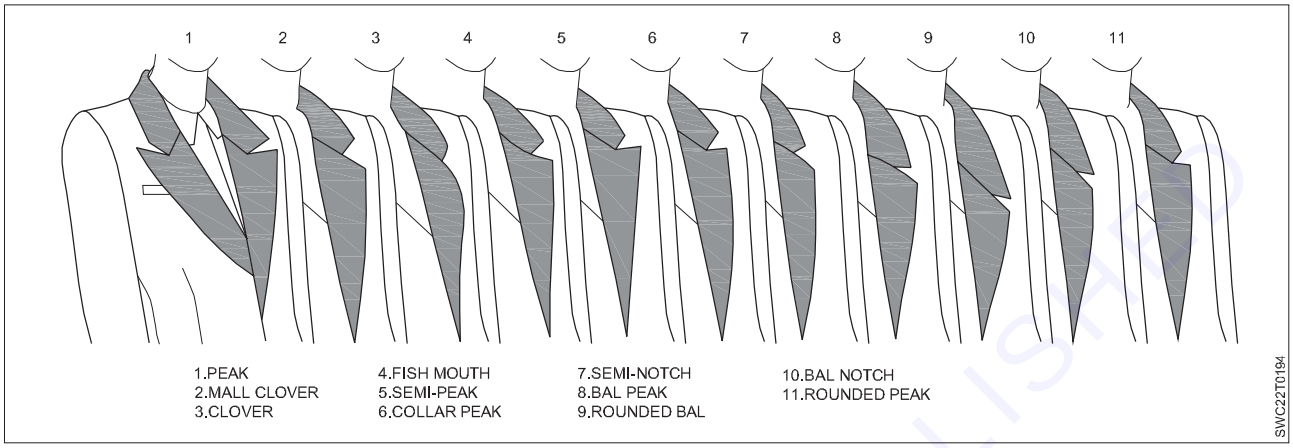
Gorge. Seam that connects the collar with the lapel.

Revere(s). Lapel without a collar.

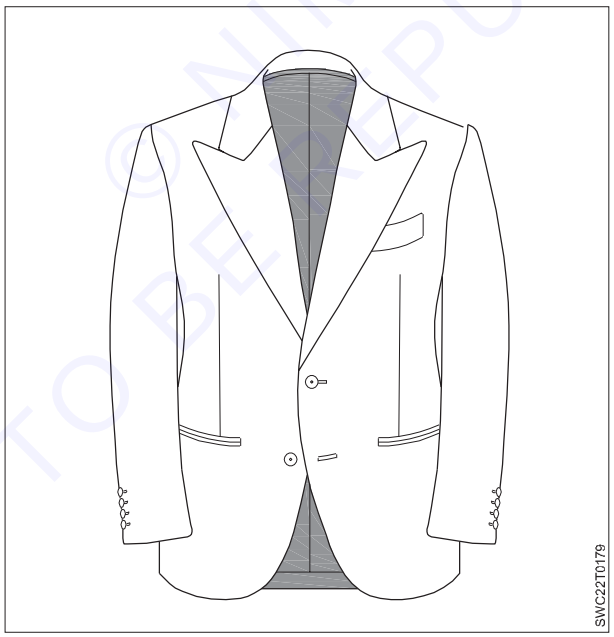
Shawl. Continuous lapel and collar in one.

Collar and Lapel Classic Designs

The classic collar and lapels have their own individual names and characteristics. It has different types of names which are classified based on shape of the collar, lapel and Notch.



A single-breasted coat is a classic style of outerwear characterized by a front closure with a single column of buttons or snaps. Here's some information about single-breasted coat styles, and uses:



Styles

- **Peak lapel:** Features a pointed lapel that extends upwards towards the shoulders. Often found on formal coats like tuxedos.
- **Notch lapel:** Has a triangular notch where the lapel meets the collar. This style is versatile and can be found on both formal and casual coats.

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- **Shawl collar:** Features a rounded collar that extends into the front closure. Commonly found on evening coats and formal wear.

Uses:

- **Formal occasions:** Single-breasted coats are commonly worn for formal events such as weddings, business meetings, or black-tie affairs.
- **Everyday wear:** Depending on the material and design, single-breasted coats can also be suitable for everyday wear, providing warmth and style during colder weather.
- **Professional attire:** In professional settings, a single-breasted coat can add a polished look to business attire, whether it's paired with a suit or worn over a dress shirt and trousers.

Single-breasted coats are famous and commonly worn in various places around the world, particularly in regions with cooler climates and formal dress codes. Some notable places where single-breasted coats are popular include: Western Countries: Single-breasted coats are widely worn in Western countries such as the United States, Canada, the United Kingdom, and European nations. They are commonly seen in urban areas, especially during the fall and winter seasons. Business Hubs: Cities known for their business and financial sectors, such as New York City, London, Tokyo, and Hong Kong, often see a high prevalence of single-breasted coats among professionals due to their polished and professional appearance. Fashion Capitals: Fashion-forward cities like Paris, Milan, and Tokyo showcase a wide range of single-breasted coat styles, from classic to avant-garde, reflecting the latest trends and designs in the fashion industry.

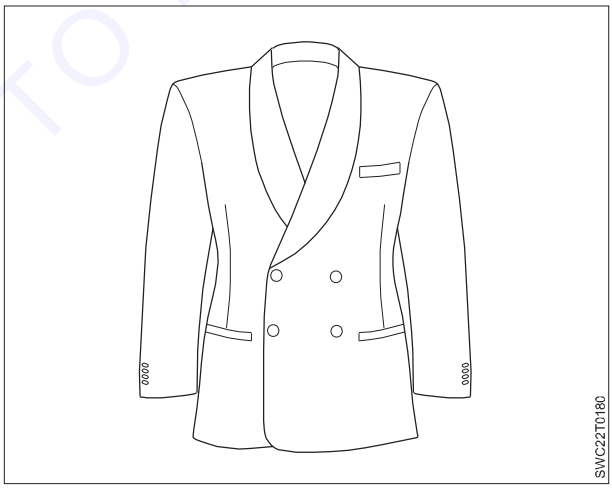
Double breast

A double-breasted garment is a coat, jacket, waistcoat, or dress with wide, overlapping front flaps which has on its front two symmetrical columns of buttons; by contrast, a single-breasted item has a narrow overlap and only one column of buttons.

We're here to put those concerns to rest: Any man from any background with any body shape can wear a double-breasted suit. With modern styling and an impeccable fit, this style works for everyone. The DB is appropriate for any occasion from business casual to formal—just as long as you're willing to get noticed.

A double-breasted garment is a coat, jacket, waistcoat, or dress with wide, overlapping front flaps which has on its front two symmetrical columns of buttons; by contrast, a single-breasted item has a narrow overlap and only one column of buttons.

These typically come in rows of 2 or rows of 3 on either side. Because of the way that a double-breasted suit is fastened, it noticed a bit more fabric that folds over the entire front of the suit. In most cases, the double-breasted suit is seen as the more formal option of the two.



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Sherwani /Achkan

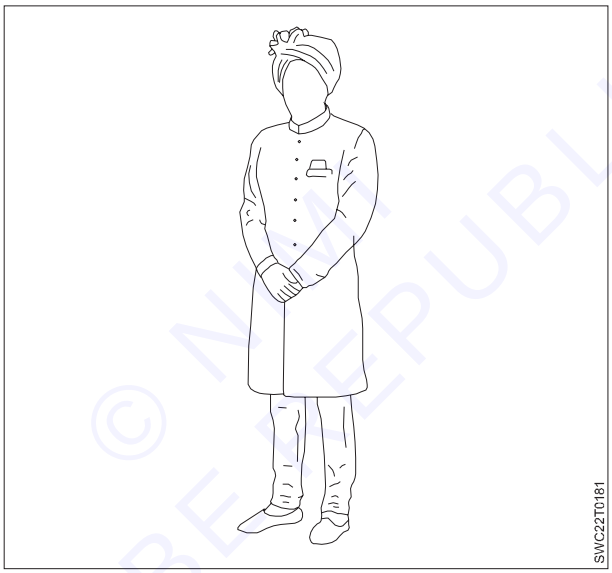
Sherwani is a long-sleeved outer coat worn by men in South Asia. Like the Western frock coat it is fitted, with some waist suppression; it falls to below the knees and is buttoned down the front. It can be collarless, have a shirt-style collar, or a stand-up collar in the style of the Mandarin collar.

The sherwani is now famous as a wedding outfit, and it has always been popular as an outfit which can be worn on formal occasions. The sherwani signified the dignity and etiquette of the nobility, and it used to be the court dress of the nobles of Turkish and Persian origin. It is the national dress of Pakistan for men. A sherwani carries a regal feel.

A sherwani is a long coat-like garment worn in South Asia. It is stylish and is often worn by grooms at weddings. Sherwanis are usually made of silk or other fine fabrics, and they can be decorated with intricate embroidery.

Factors to Consider When Choosing Sherwani Fabric

- Consider the formality of the event and the weather conditions.
- Luxurious fabrics like silk or velvet are suitable for weddings or formal occasions.
- Lightweight options such as linen or cotton are ideal for outdoor gatherings or warmer climates.



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Module 9 : Garment Checking

LESSON 45 : Accessories for Jackets & Coats

Objectives

At the end of this Lesson you shall be able to

- identify the accessories of jackets & coats.

Accessories tend to smallish things add to the outfit and make it unique. It is also a decorative item that supplements ones outfit. Items such as Tie Clip, Lapel Pin and Lapel Flower, Cufflinks, Tie, Belt, Suspenders and Pocket Square.

Tie Clip

One of the smallest and simplest pieces in the suit accessories collection, a tie bar can add volumes of classic style to the look and serve a functional purpose as well. Tie clips are a functional item, meant to secure the tie to the dress shirt. No need to wear a tie clip if have a vest or sweater on as it's no longer needed. Tie clips should never be wider than the tie.Tie clips should generally be placed between the third and fourth buttons of the dress shirt.



Lapel Pin and Lapel Flower

Boutonniere is a fancy French name of lapel flower. A boutonniere is a formal lapel accessory made with a live flower, modern lapel faux flowers can also be fashioned from fabrics like wool or silk. This suit accessory for formal celebratory occasions: formal dances, weddings, holiday parties.



Cufflinks

It is help to hold the cuffs of the shirt together, which is fixed with buttonholes in the cuffs can be adorned with a flashy pair of cufflinks.

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Tie

A necktie, or simply a tie, is a piece of cloth worn for decorative purposes around the neck, resting under the shirt collar and knotted at the throat, and often draped down the chest.



Belt

A belt is a flexible band or strap, typically made of leather, plastic, or heavy cloth, worn around the natural waist or near it (as far down as the hips). The ends of a belt are free; and a buckle forms the belt into a loop by securing one end to another part of the belt, at or near the other end.



Suspenders

Suspenders offer both aesthetic and functional benefits. It is used to keep the wearer's pants up, preventing them from falling down. While a belt also serves this same basic function, suspenders differ in the sense that they provide additional style to the wearer's outfit.

Suspenders (American English, Canadian English), or braces (British English, New Zealand English, Australian English) are fabric or leather straps worn over the shoulders to hold up skirts or trousers.

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Pocket Square

A pocket square is a square cloth that fits snugly in the breast pocket of the jacket, providing a stylish hint of fabric peeking out to increase visual appeal. A pocket square is a low effort, subtle way to upgrade the outfit from "Typical" to ''Different".

In addition to carrying for practical purposes, handkerchiefs have long been displayed in the chest pocket of men's jackets. Used in this way, they are referred to as a pocket handkerchief or pocket square.



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Inspection of Garments

Refer the Related theory for the exercise No.30-33 (Page No: 227)

Finishing of Garments

objectives : at the end of this Lesson you shall be able to

- explain about the finishing of garments.

Garment finishing is very important because buyer's satisfaction depends on it. After the Garments are stitched, based on the buyer requirement and aesthetic look of the garment, it might be Garment wash or Non wash.

Garments Wash:

The garment was is a new technology in the garment trade. Normally washing means cleaning something. But in the garment trade, only cleaning of garments is not the garment wash. Garment washing is a technology which is applied to change or modify the outlook, appearance, comfortability, and design of garments. Garment washing is applied on solid dyed garments or solid printed fabric. Now I would like to discuss the different types and objects of wash in the garment industry.

Types of Garments Washing:

In garments industry, there are mainly two types of washing process for garments products. Those processes are wet washing process and dry washing process. Here also wet washing process is divided by eight ways and the dry washing process is divided by five ways, according to the fabric quality and buyer requirements. But most common and applied wash in garment is normal wash, which is also known as detergent wash. In the wet washing process enzyme wash, stone wash and bleach wash is most popular to the buyer and the manufacturer. On the other hand, Potassium per magnet spray and hand scraping is common for dry washing process in the garments industry.



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A Wet Washing Process

1 Normal wash or Detergent wash
2 Pigment wash
3 Enzyme wash
4 Stone wash
5 Bleach wash
6 Enzyme-stone wash
7 Bleach-stone wash
8 Acid wash



B Dry Wash Process

1 Sand blasting
2 Whisking or wrinkling
3 Hand scrapping
4 Potassium per magnet spray (PP spraying)
5 Destroying



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Objects of Garments Wash:

1 To remove dirt, dust and waste materials from garments.

2 To remove size materials from garments.

3 For garments wash shrinkage occurs, so accurate measurement can be found by customers.

4 Fading effect is varied here by variation of an amount of detergent used, processing time and processing temperature.

5 To increase the brightness of garments.

6 To increase the smoothness of garments.

7 To change the appearance of garments.

8 To make directly wearable after purchase.

9 To make garments become soft and handy.

10 To remove harmful materials from garments.

Garments are Wash or Non Wash, given below process will be followed.

Garments finishing means, mainly applies of pressing, folding and packing of garments. Sewn products are sent to the finishing department. Finishing department takes care of the following functions:

- Trimming
- Stain removing
- Repairing
- Pressing

After stitching, there will be some hanging sewing threads on the finished product. Trimming is the operation of removing these extra hanging threads. Sometimes, finished products get stained during the production process. Finishing department is responsible to remove those stains by using different wetting agents. Some of the sewn products may also have some open seams or other stitching faults. The finishing department repairs such products before packing. The last objective of finishing department is pressing. The sewn products are pressed to remove the wrinkles and to enhance the look of the garment.

Steps of Finishing Process in Garment Industry

Trimming:

In the stitching department, thread trails and thread chains are not trimmed neatly. Uncut threads and thread trails in garments are trimmed in the finishing department by helpers. Uncut and loose threads on garments are considered defects.

Spot Removing:

Spot removing is one of the special inspections which are done after initial quality check.





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Button hole and Bartacking:

During the production, Buttonhole will be stitched. It is inline process. After the wash, trimming and spot removing process, Button and Bartack will be stitched by industrial machine.



BUTTON STITCHING



BARTACK STITCHING

Pressing

Pressing is a finishing process done by a cloth to heat and pressure with or without steam to remove creases and to impart a flat appearance to the cloth or garments. In garment industries pressing is also called ironing. After completing pressing the garments have to be folded.



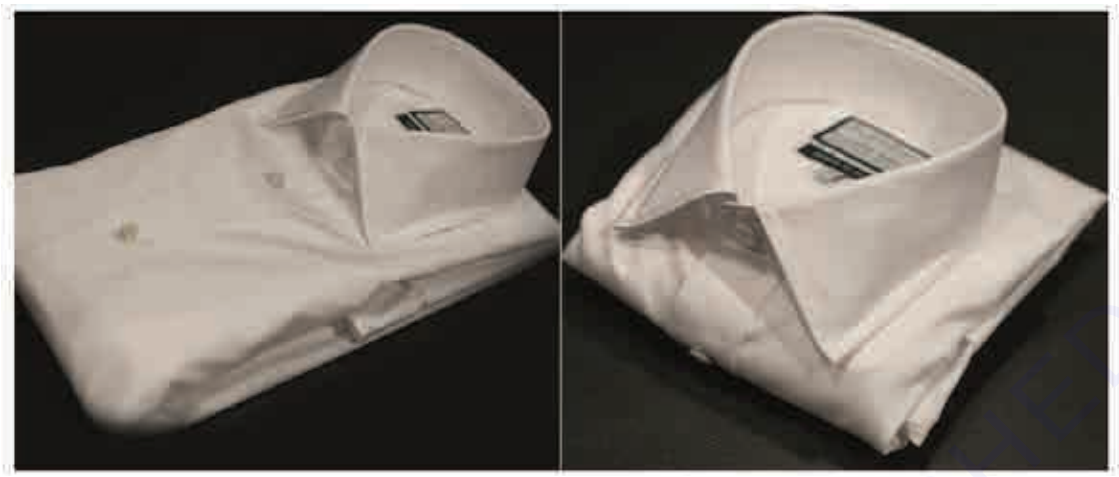
Folding

After completing pressing, the garments are folded with a predetermine area. Garments are folded according to the buyers direction, requirements in a standard area.

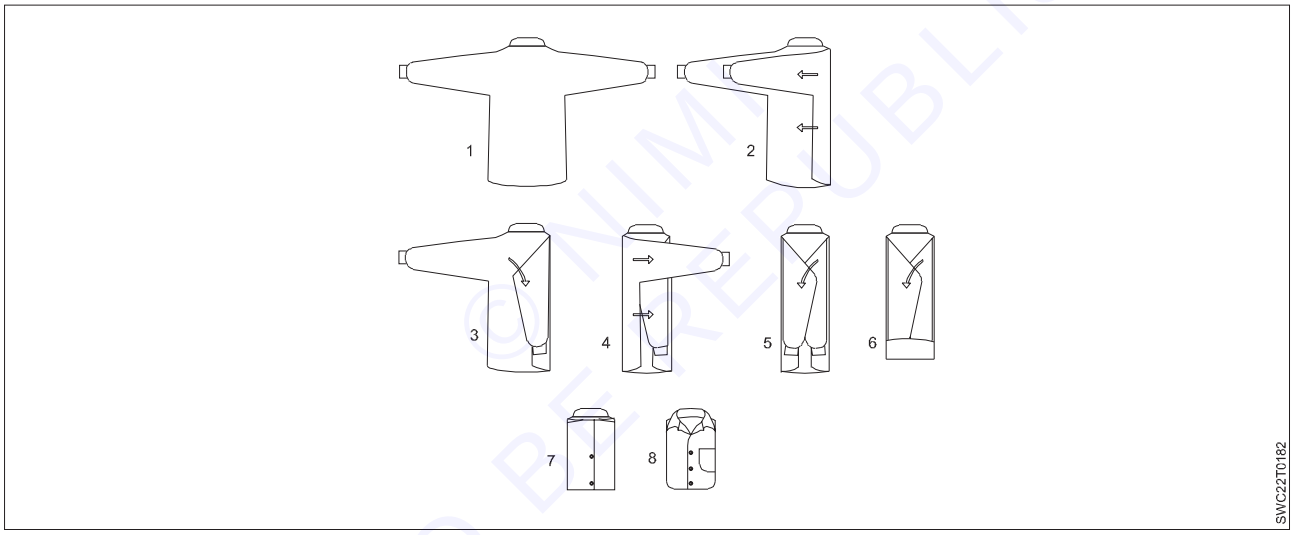


Folding classification depends on the fabric types. There are mainly four types of folding. They are:

Stand up: Collar is folded and situated at 90 angle.



Semi stand up: Collar is folded with body and situated at 45 degree angle.



Flat pack

Collar is spread as a whole on the body of shirt.

Hanger pack

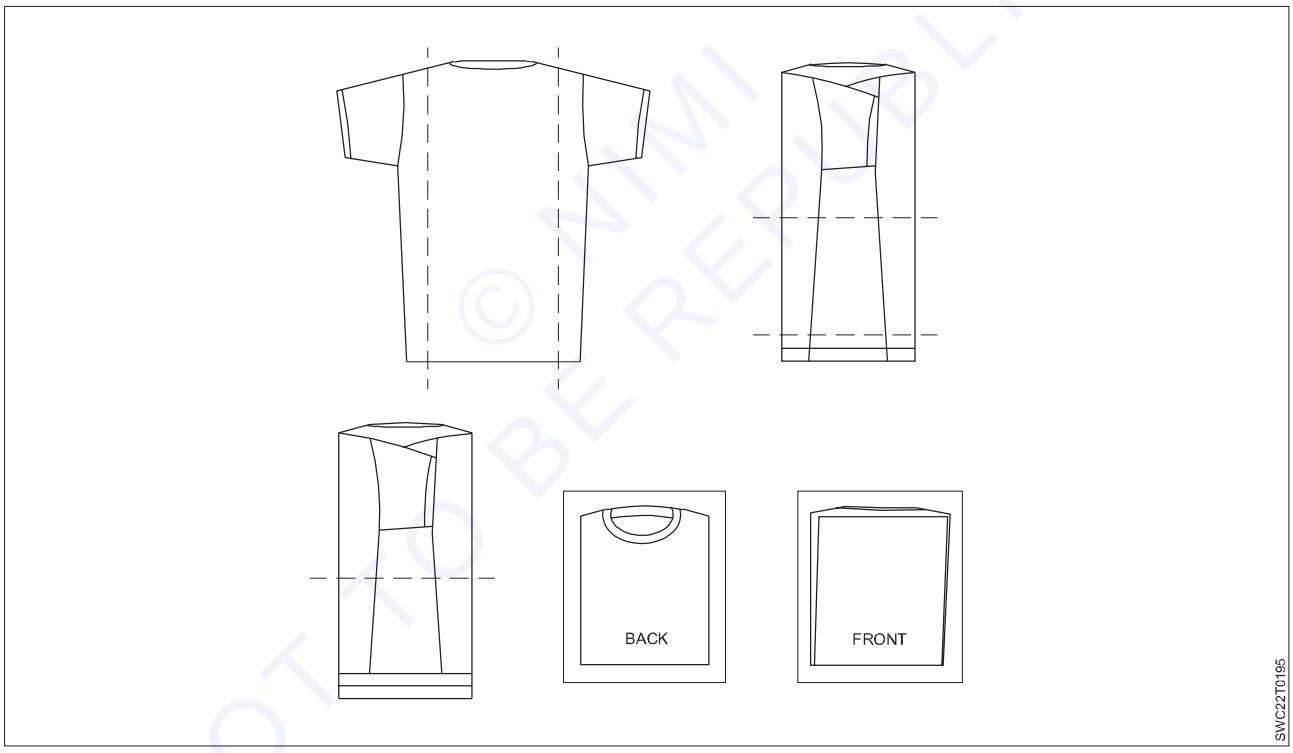
Shirt is packed and transported by hanging on the hanger.

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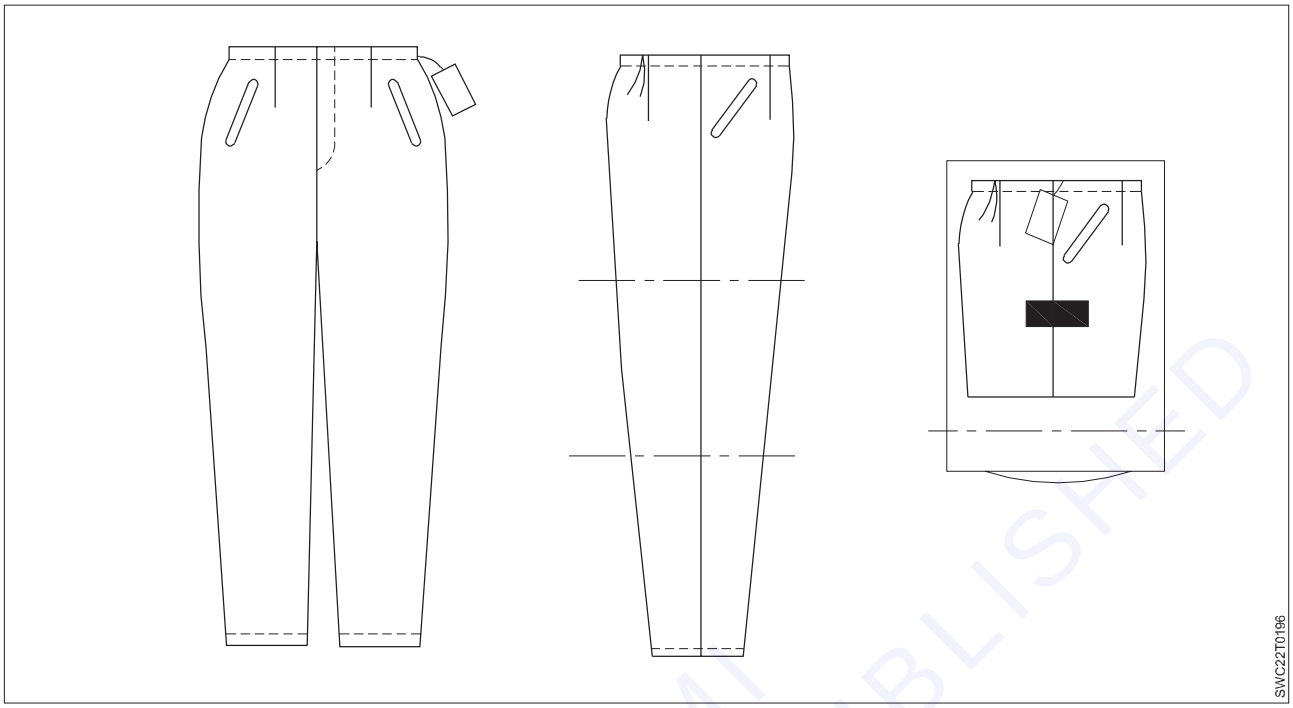
At the end of the folding, garments are placed into a polythene packet.

Folding of a Short sleeve T shirt

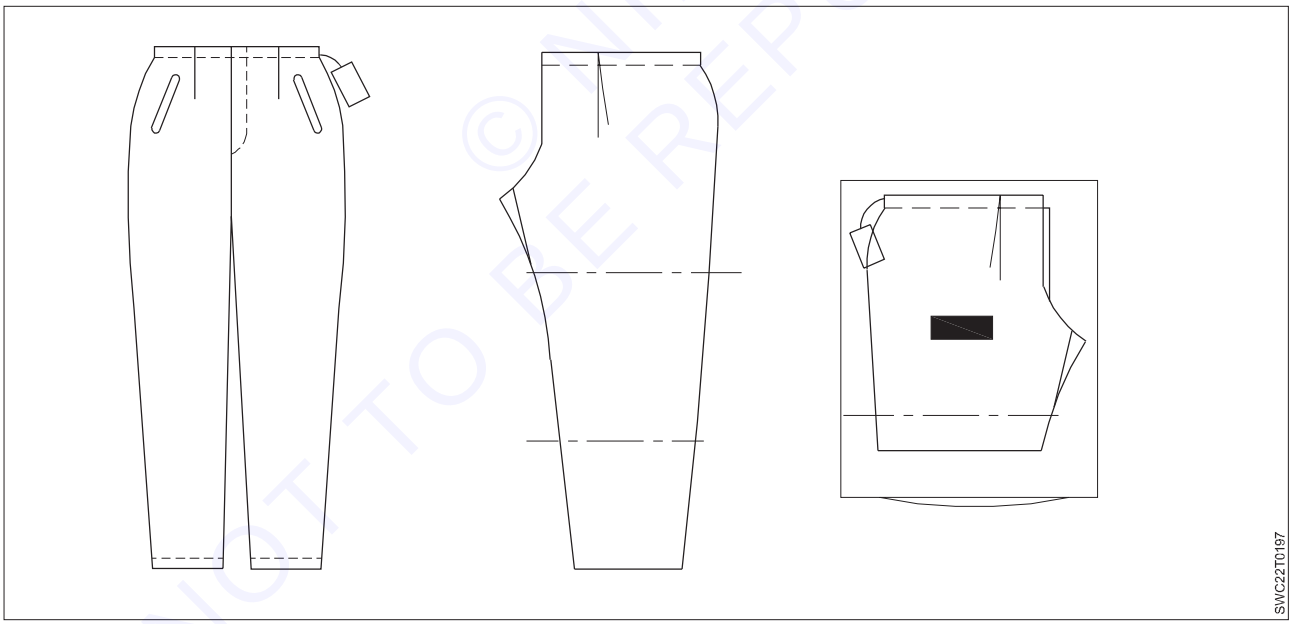


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Trouser Fold – Pant folded side to side



Jean Fold – Pant folded front to back



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Packing

After folding, garments are packing the size of polythene packet is permanent. Specially, it is needed to ensure the placement of sticker in proper place.







Barcode

Barcode is a specially Buyer wise sticker.





Assortment

After completing the packing of garments, it must be placed the garments in a predetermined pack by sorting according to the size and color then garments are packed into inner box according to the size and color. This process working in order is called assortment.

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Metal detector

Metal detector may help at the time of production stage, ensuring that all the products are harmless and free from metal contaminants. It is found that, metal detection procedure in garment could be the final needle detection system.

Metal detection is found to be compulsory for all children wear garments, and this also can change according to the buyer wise requirement.



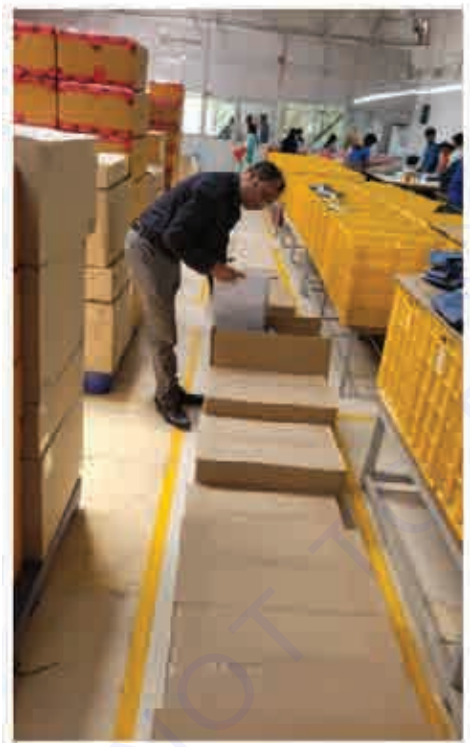
Cartoning

At last cartoning or packing the garments according to Buyer comment. The process of packing of inner boxes entered into the carton is called cartoning. The carton is properly warped by the scotch tape. Some information like carton box no, size, shipping mark and the destination are printed on the carton.



Final inspection

Final inspection is made by buyer. He checks the garments according some rules like AQL.







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