

DRESS MAKING

TRADE THEORY
NSQF LEVEL - 5

HANDBOOK FOR CRAFTS INSTRUCTOR TRAINING SCHEME



Directorate General of Training

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



**NATIONAL INSTRUCTIONAL
MEDIA INSTITUTE, CHENNAI**

Post Box No. 3142, CTI Campus, Guindy, Chennai - 600 032

Published by



National Instructional Media Institute

Post.Box.No. 3142,

Guindy, Chennai - 600032

Email : chennai-nimi@nic.in

Website: www.nimi.gov.in

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First Edition, 2024

Printed in India at

National Instructional Media Institute

Post. Box. No. 3142,

Guindy,

Chennai - 600032

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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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NOT TO BE REPUBLISHED

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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.

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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 Sethi)

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.

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 Dress Making (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.

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,
Joint Director,
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◆ MODULE 1 : Revision of the CTS contents ◆

Lesson 1- 5 : Concept of Pattern Making

Objectives

At the end of this lesson you shall be able to

- remember the important topics that you have covered in CTS trade.

Concept of Pattern Making

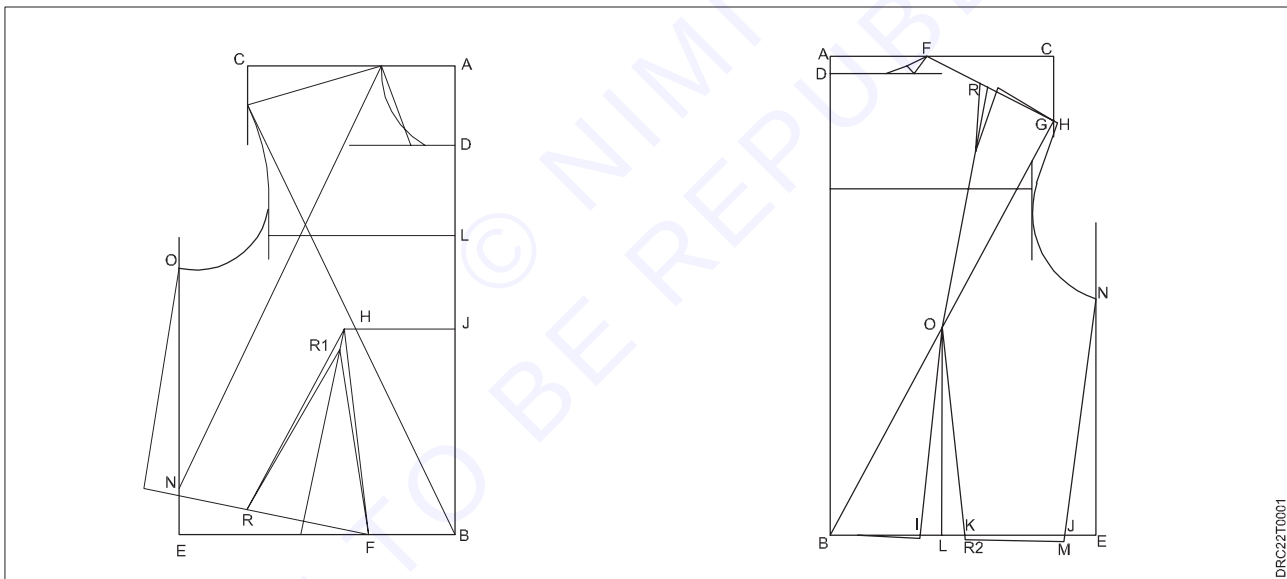
Pattern is a model or set of instructions for making garments.

To make a garment several parts are cut and stitched together. If each of the parts are cut on paper first, then transferred to the fabric and according to that fabric is cut. The paper cutting parts are called patterns.

Pattern is achieved by two methods

i Drafting

A system of drawing patterns on paper on the basis of body measurements is called drafting. This method is used to create the basic shapes that will be used to create the garment. It's more mathematical and technical than other pattern making processes.



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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.

Three different types of pattern are used by designers when drafting patterns.

- i **The block pattern** is the basic pattern that is used as a basis for all adaptations. It is traced or 'wheeled' onto pattern paper to produce the working pattern.
- ii **The working pattern** is used for making out the basic style lines and design features (e.g. pockets, collars, and buttonhole placings). Pattern sections are traced off and may be further adapted. Complicated styles may need a number of trials at this stage.
- iii **The final pattern** is the pattern from which the garment will be cut. It must be clearly marked with all the information required for making up the garment.

When beginning an adaptation, two main decisions must be taken

- Selecting the correct block for the design; for example: 'form' or 'flat' block & inset sleeve or kimono block.
- **The length of the design:** lengthening or shortening the block.

ii Draping

Draping is another way of pattern making.

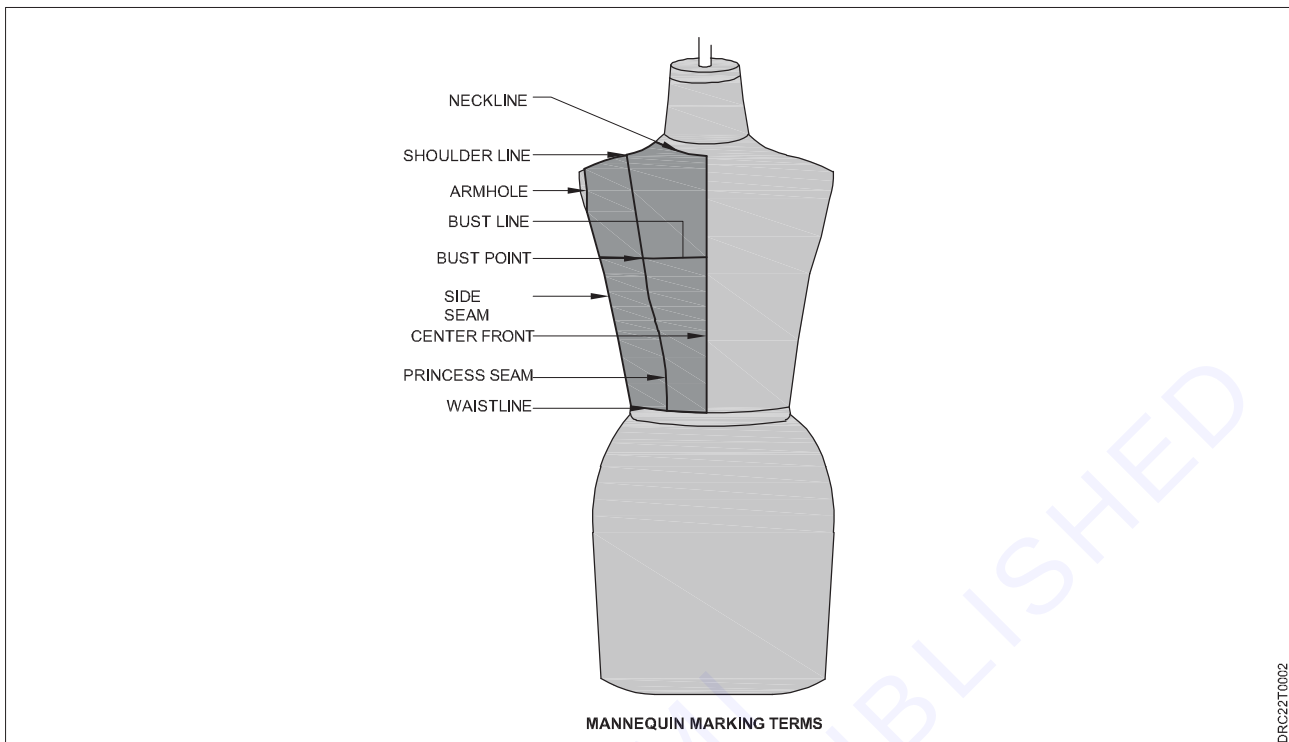
A two dimensional piece of fabric is draped around a form or figure conforming to its shape, creating a three dimensional fabric pattern. This muslin pattern is transferred to paper to be used for corrections & a final pattern.

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:**Draping Tools**

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

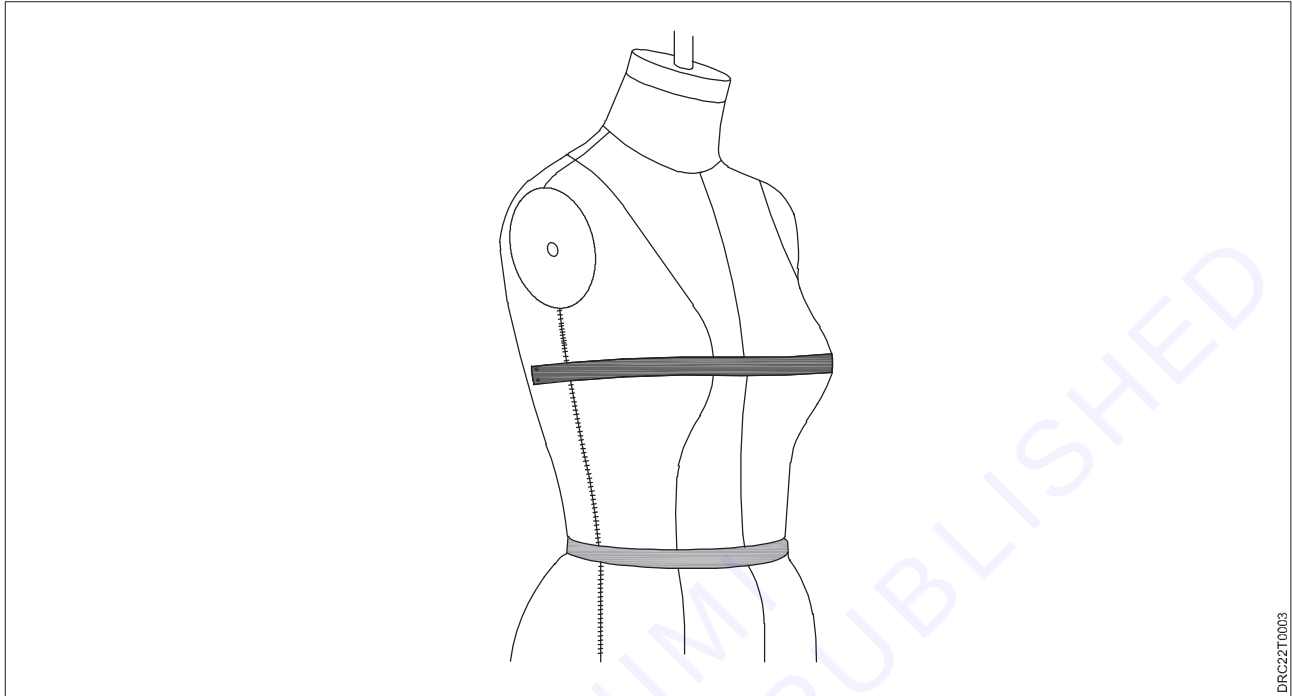
- 1 **Awl:** It is a pointed metal instrument used for punching holes for belt eyelets.
- 2 **1/8-inch Clear Plastic Ruler:** It is a two-inch wide ruler divided into 1/8-inch grids.
- 3 **French Curve Ruler:** An irregular curve ruler used to shape and curve edges of collars, necklines, crotch seams, 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.



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.



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.



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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.

**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.

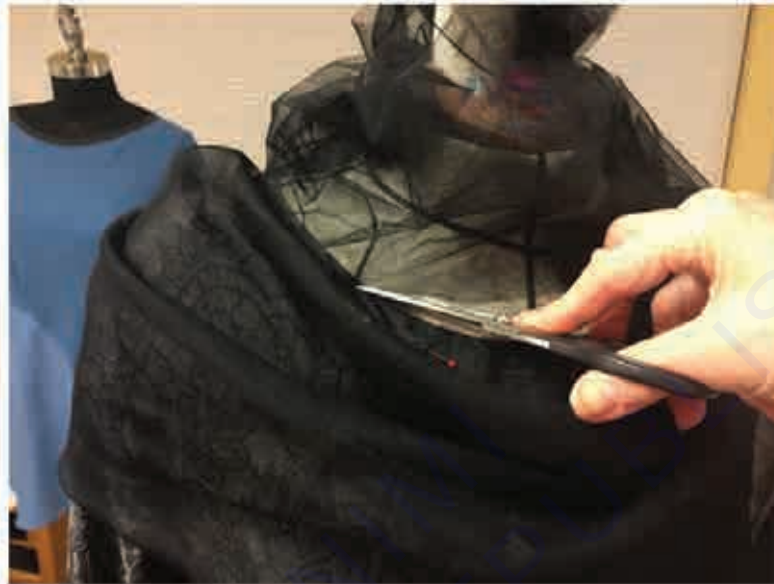


6 Trimming:

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.



Concepts of Grading

Concept of Pattern grading: It is a technique used to reproduce a pattern in other sizes. It is done using a size specification sheet. Grading does not create a new shape, it increases or decreases the size of the original shape of the garment.

The grading technique can be a manual pattern grading process or computer grading using special computer aided design software.

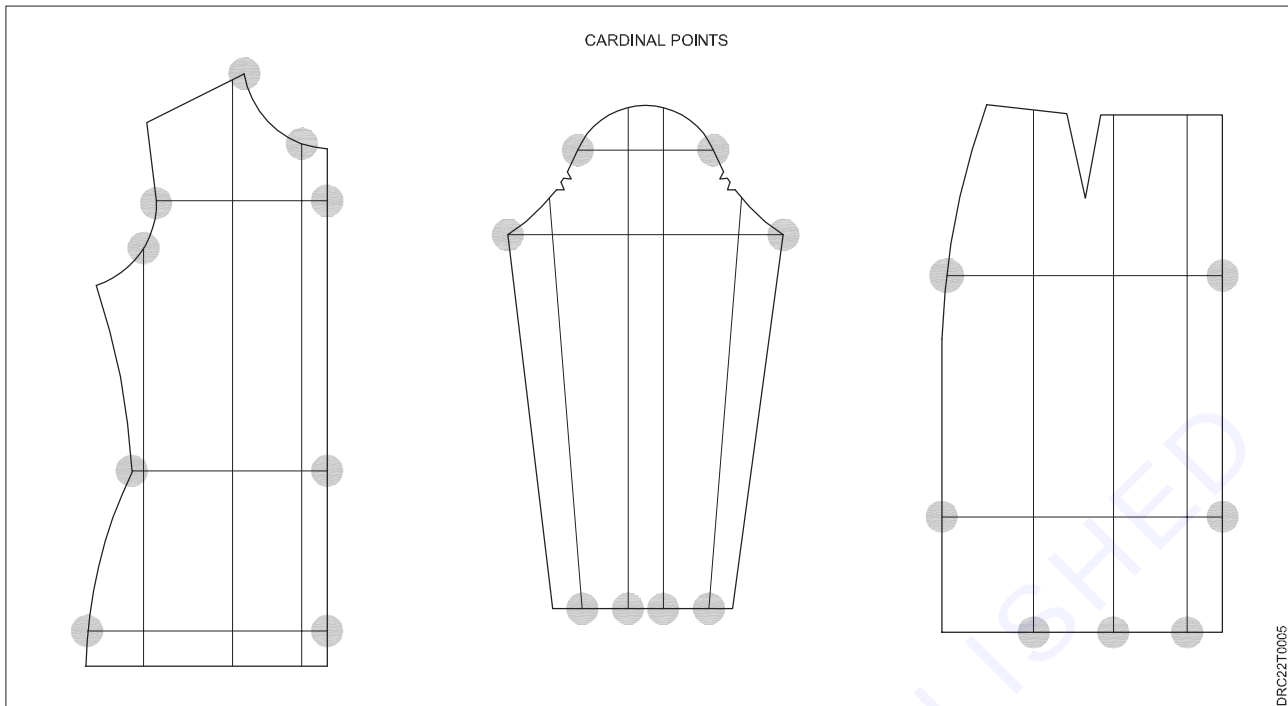
Pattern grading is a technique used to increase or decrease the size of a garment pattern according to the measurements in a given size chart. Pattern grading is the drafting process of enlarging or diminishing a style pattern into patterns for other sizes. The function of grading is to see that this 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.



- **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.

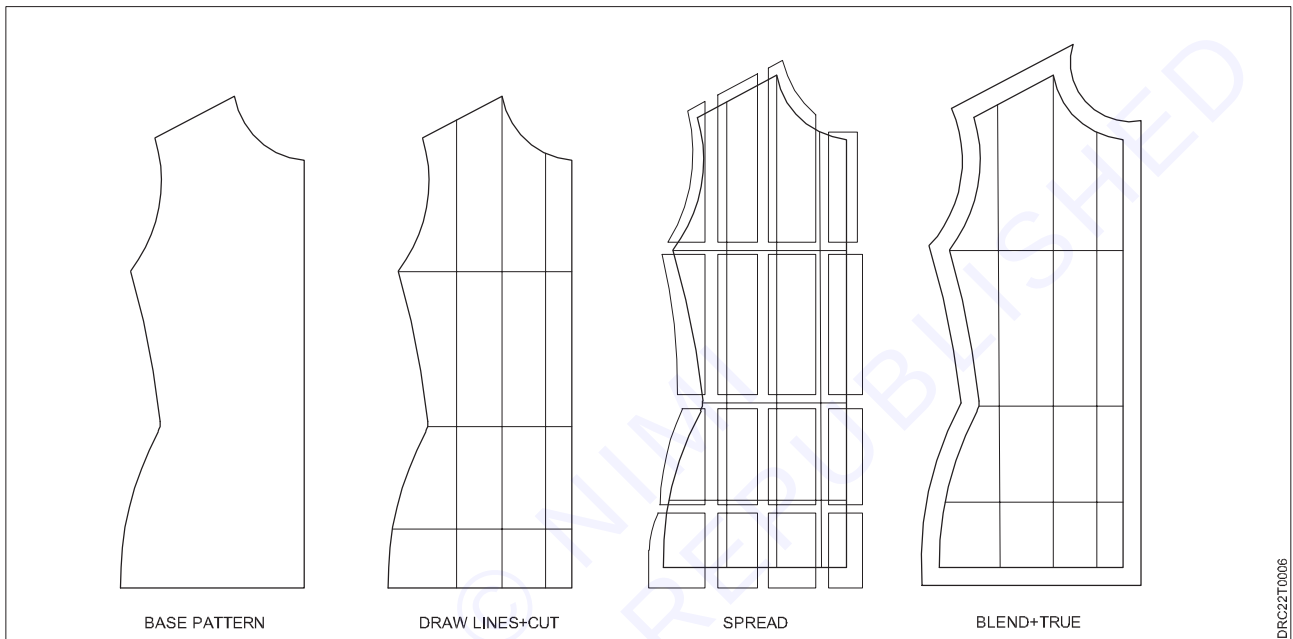
1 Manual pattern grading or two dimensional grading:

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 are later joined up to form the enlarged pattern.

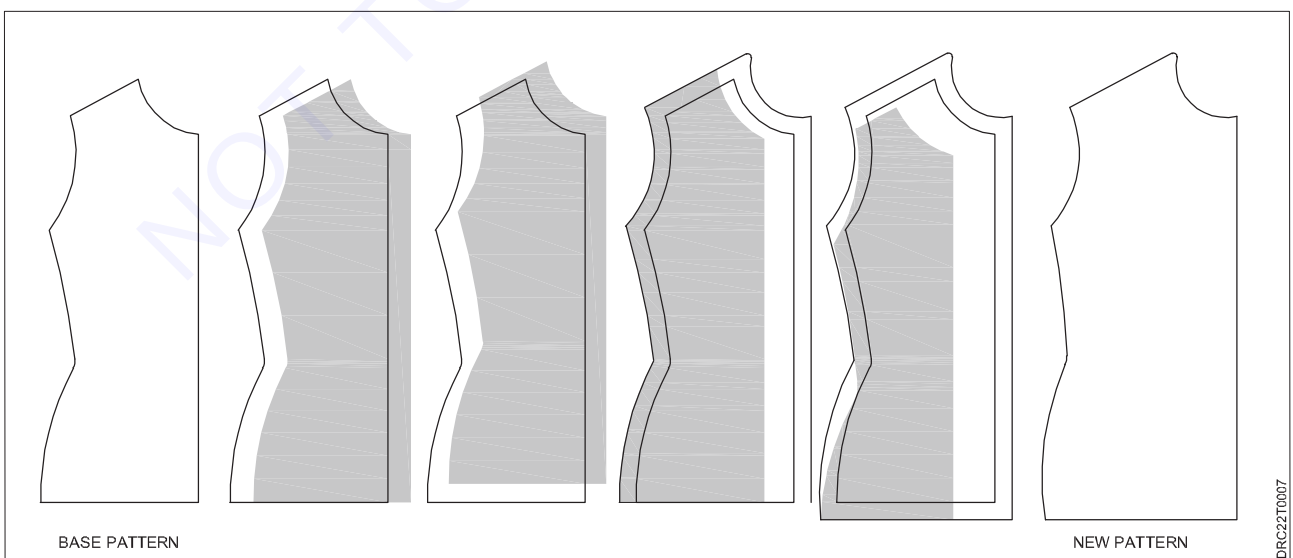
There are two basic methods of pattern grading:

- **Cut and Spread:**

Cut and Spread grading method 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.

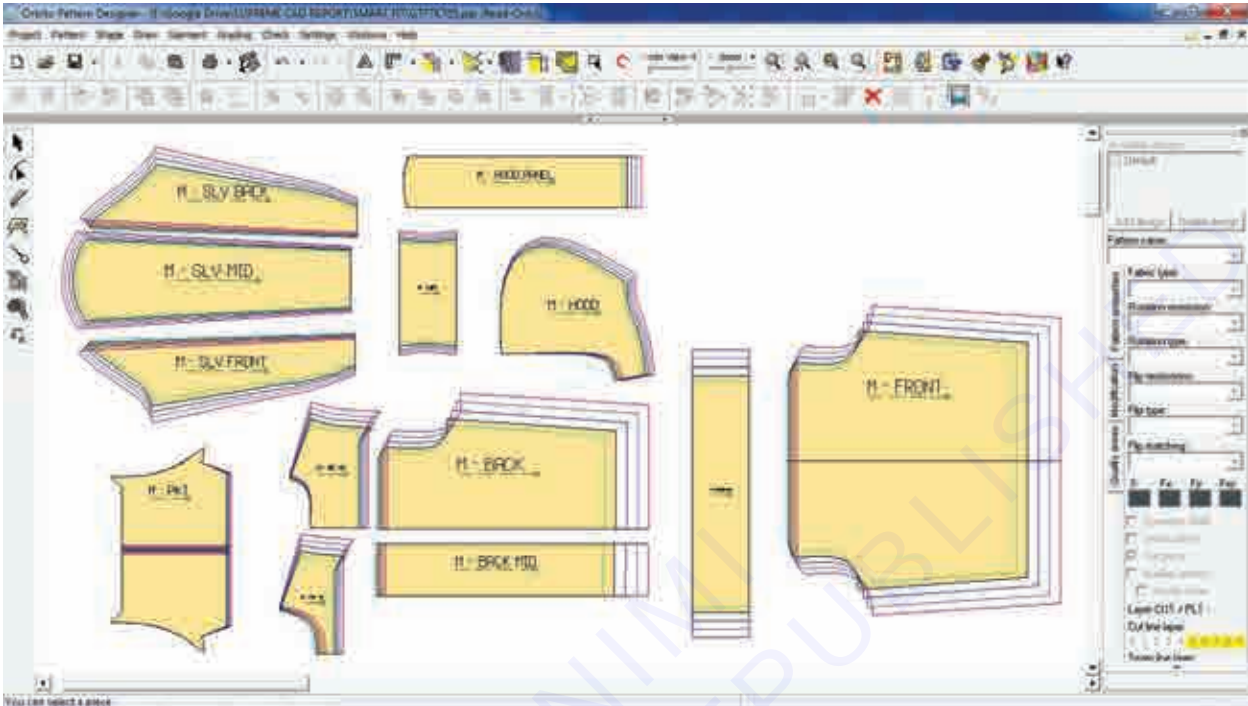


Pattern Shifting: Pattern shifting is another process of pattern grading. When pattern maker or fashion designer want to increase or decrease the overall dimensions of a pattern to get different sizes is called pattern shifting. To make the pattern larger, transfer the original pattern onto another sheet 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 Stitching

Concept of Stitching: Stitching is the process whereby fabric is constructed into a finished product by means of different sewing techniques. The stitching stage holds extreme significance to ensure that the product takes its shape according to requirements. In itself a highly specialized field, stitching requires care and precision.

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:

- **Interlooping:** It is created by passing the loop of one thread through the loop of another sewing thread.
- **Intraloooping:** 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

◆ MODULE 2 : Essential for the Trade ◆

Lesson 6 & 7 (1) : Trade Knowledge & Role of CAD in Garment Industry

Objectives

At the end of this lesson you shall be able to

- understand the origin of Clothing
- impart knowledge of clothing communication and fashion expression
- understand the importance of CAD in Fashion and Garment industry
- understand the roles of Various Departments in the Garment Industry.

Clothing has been manufactured in essentially the same way since the invention of the sewing machine in the mid-nineteenth century. Old-fashioned, labor-intensive methods are still used by some small manufacturers and designers of custom-made apparel because they cannot afford technical upgrades. Personal computers and inexpensive software are changing apparel design, and even small manufacturers can afford computer-assisted apparel production applications.

India is the world's second-largest producer of textiles and garments. It is also the fifth-largest exporter of textiles spanning apparel, home and technical products. Moreover, India is the world's 3rd largest exporter of Textiles and Apparel.

This reality has accelerated use of computer-assisted apparel production methods and the Internet. In the 1970s, grading and marker making was computerized, followed in the 1990s by large computer-aided design (CAD) systems taking over patternmaking, fabric design, and design graphics.

Today, even the smallest manufacturer can rent hardware and software to assist the design and production processes. Computer-generated patterns, markers, specifications, and cost sheets can be sent via the Internet to factories located around the world. Though some jobs have been lost, designers, patternmakers, marker makers, graders, and cutters are still needed in this fast-paced business. Computer companies offer seminars for students and current manufacturing employees to keep them updated on new technology.



Fashion schools have added computer-assisted technology courses to their curriculum. Computer Aided Design (CAD) has been a boon for designing and manufacturing industry allowing efficiency and productivity which a normal pen-paper design can never compare with. The CAD system and its tools have become an essential component of garment manufacturing - fast fashion makers, designers, even traditional fashion manufacturers now own a CAD system.

The most advanced technology in computer aided patternmaking, grading, and 3-D sewing that streamlines apparel production, reduces cost, and increases speed and quality to the market fashion-savvy youth and innovative fashion leaders still demand innovative apparel. The mature customer searches for attractive garments that fit his or her changing figure. Flexibility, research, and knowledge of a customer's needs are the requirements of a successful apparel manufacturer of any size.



Various Departments in the Garment Industry

The various departments or sections in an apparel industry are given below.

- 1 **Merchandising department:** The merchandising process comprises guiding and supervising for the successful processing of an order. It is a vital process that involves planning, developing, executing and dispatching the order (product) to the buyer. Basically two types of merchandising done in garment units are marketing merchandising and product merchandising.

The main objective of marketing merchandising is development of product, costing and ordering, and it has direct contact with the buyer.

Product merchandising is carried out in the respective apparel unit and involves all the responsibilities starting from sourcing to finishing.

- 2 **Sampling department:** In any garment industry the first stage for garment production is sampling. The sampling department coordinates with the merchandising and production department. From sampling, we get information related to cost, timing, labor and production of garment production. The main objective of the sampling is to eliminate the risk of making a wrong purchase of raw material, making mistake in bulk manufacturing that is not accepted by the buyer.
- 3 **Fabric sourcing & purchasing department:** Fabric sourcing is mainly engaged in deciding where and how the fabrics have to be procured. The main difference between the sourcing and purchasing department is that the sourcing section works for sourcing the fabrics alone whereas the nature of the work of the purchasing department comprises sourcing of accessories and trims as well.
- 4 **Fabric inspection department:** The main aims of fabric inspection team are
 - Identification and analysis of fabric defects using various standard methods.
 - Selection of fabric according to AQL (accepted quality level).
- 5 **Accessory stores department:** The main responsibility of this department is to store all the raw material necessary to produce garments. It is centralized in apparel industry and all the fabric and accessories comes to this unit first from the supplier and audited here and kept until it is distributed to other units. The receipt of the raw materials or the accessories is normally completed in terms of documents.

- 6 **Production Planning and control department:** Production planning and control is a department which fixes PCD (Planned Cut Date) ,allocates the style to a sewing line and controls the processes such that the deliveries are met on time.
- 7 **Laboratory department:** The laboratory or testing center in the industry should be equipped with all the essential instruments that are mandatory for the testing of fabric and accessories. If the facility for specific tests mentioned by the buyer is not available in the industry, it should be sent to external laboratories that are authorized by the buyers.
- 8 **Machine maintenance department:** Undesirable quality of garments mostly results from ill-maintained machines. Breakdown and preventive maintenance is mainly aimed toward reducing the downtime and increasing lifetime, respectively.
- 9 **CAD section:** The CAD department is accountable for the following functions:
 - Determining cutting average for costing
 - Making the most efficient cutting marker
 - Development and alteration of patterns
 - Development of size set pattern by grading
 - Digitizing the pattern
- 10 **Cutting section:** The cutting department normally receives the order from the production manager who has approved the cutting order to cut a given quantity of garment styles.
- 11 **Production department:** In the garment industry stitching section is considered as production department. The main function of the production department is stitching garments. But there are many associated activities performed by the production team to run the production floor smoothly.
- 12 **Industrial engineering section (IE):** It coordinates with several departments since this department provides the entire plan of the garment manufacturing and the thread and trims consumption criteria, operator's skill level categorization and other related aspects.
- 13 **Embroidery department:** It comes into play only when the particular garment style demands. It receives the garment panel, style and the embroidery details from the merchandisers and they will also get a sample of the garment on which the embroidery has been already done and it will be used as a reference sample.
- 14 **Fabric washing section:** After the completion of assembling and inspection process, the garments are sent to the washing department for the washing or finishing that is required for the particular style according to the specification sheet.
- 15 **Quality assurance department:** To maintain and control the quality, the quality assurance department divides the work into different stages of manufacturing, which are categorized into three major groups such as preproduction unit, cutting audit and sewing unit
- 16 **Finishing department:** The finishing department is the last section in the garment production prior to packing and dispatch and it plays a significant role in the final garment appearance. It involves the following processes:
 - **Trimming:** It removes the extra threads from the garment at the stitched areas.
 - **Inspection:** The inspection is done as per the AQL 2.5 system and mainly depends on the buyer requirements.
 - **Pressing:** This is carried out after the garment has been inspected completely and the garments are pressed or finished based on the method of their folding during packing.
 - **Tagging /labelling section:** After the completion of fabric inspection and pressing, they are sent for labelling, which includes the size labels, price tags and miscellaneous labels if any are mentioned in the specification sheet.
 - **Packing:** The packing is done in the carton boxes. Individual packing of garments in the poly bag and folding the garments and organizing them in the carton boxes without placing them in the poly bag are the two types of packing followed in the garment industry.

Lesson 6 & 7 (2) : Technical terms related to trade

Objectives

At the end of this lesson you shall be able to

- gain knowledge about different terminologies used in the field of garment construction
- describe their garments in a more professional manner, by using the correct terminology
- enhanced their knowledge and confidence to respond creatively to a design brief within the Apparel market.

To communicate effectively in the workroom and to minimize errors due to misunderstanding, a person should know and understand terminology. This chapter introduces definitions of technical terms used in apparel industry.

Pattern Making Terms

Pattern: A pattern is the template from which the parts of a garment are traced onto fabrics before being cut out and assembled. Patterns are usually made of paper, and are sometimes made of paperboard or cardboard.

The process of making or cutting patterns is called Patternmaking.

A sloper pattern, also called a block pattern, from which patterns for many different styles can be developed. The process of changing the size of a finished pattern is called grading.

Pattern drafting: A system of patternmaking that depends on measurements taken from a form or model to create basic, foundation, or design patterns. An example is the draft of the basic pattern set.



Drafting Process

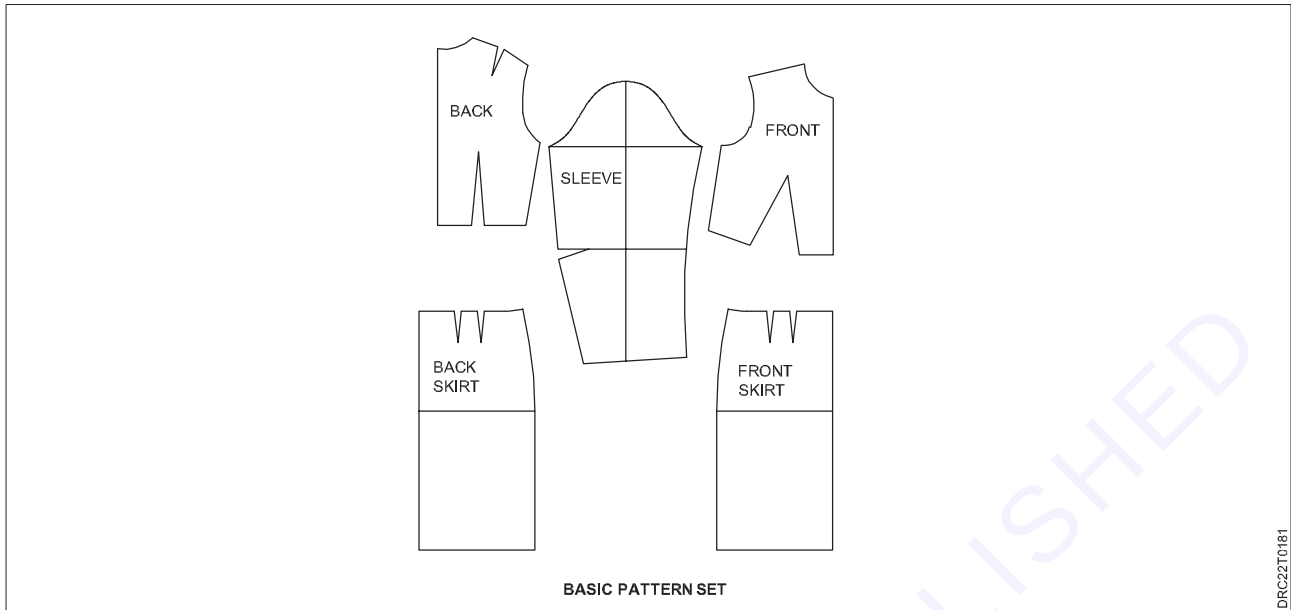
Flat patternmaking / Pattern manipulation: A system of patternmaking that depends on previously developed patterns. The act of slashing and spreading, or pivoting a pattern to alter its original shape. The new pattern shape represents design features of the garment.

Draping: Draping is a process of creating patterns with muslin cloth on a dress form. A piece of fabric is draped on the body or dress form with positions of darts and pleats. Interesting and beautiful drapes can be achieved through this method.



Draping Process

Basic pattern set: A five-piece pattern set, consisting of front and back bodice and skirt and a long sleeve, which represents the dimensions of a specific form or figure. It is developed without design features.

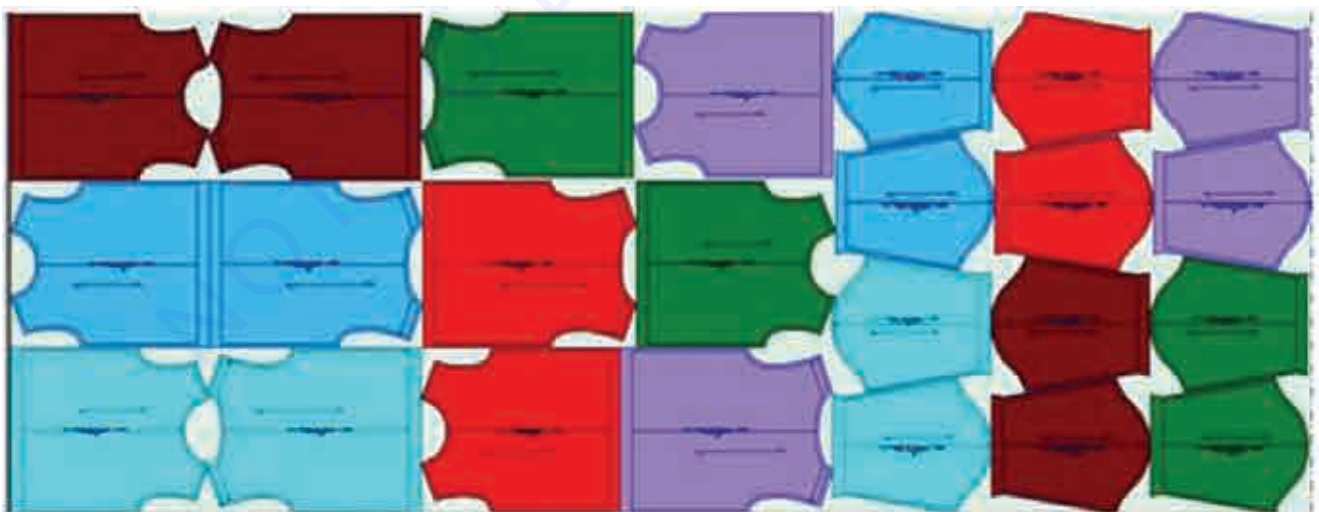


Working pattern: Any pattern used as a base for manipulation when generating design patterns. For example the basic pattern set is the base for design projects.

First pattern: A first pattern is the original pattern developed for designs. The first pattern is generally made on marking paper and requires fitting and pattern corrections. Half a pattern is developed for all symmetrical designs. An asymmetrical design always requires a full pattern.

Production pattern: A production pattern is the final corrected and error-free copy. The pattern contains every pattern piece required to complete the garment. The pattern is used by the grader for sizing and by the marker maker for fabric layout.

Marker: A marker is the arrangement of pattern pieces, either done manually or by computer application. All sizes are mixed to eliminate fabric waste. Grainlines on the patterns lay parallel with the selvage. The marker planning is laid on top of many layers of fabric.



Marker efficiency is one of the important matter in the apparel manufacturing sector. Higher efficiency helps to earn maximum profit from an apparel export order.

The below formula is used to measure the proficiency of the marker:

$$\text{Marker efficiency} = \frac{\text{Area of the pattern in the marker plan}}{\text{The total area of the marker plan}} \times 100$$

Test Fit: As each design project is completed, the design should be cut in muslin (or fabric chosen for the design) and placed on a form or model for a test fit. One-half of the garment is needed when fitting the form (unless it is an asymmetrical design, which requires a full garment). A full garment is required when fitting the model.

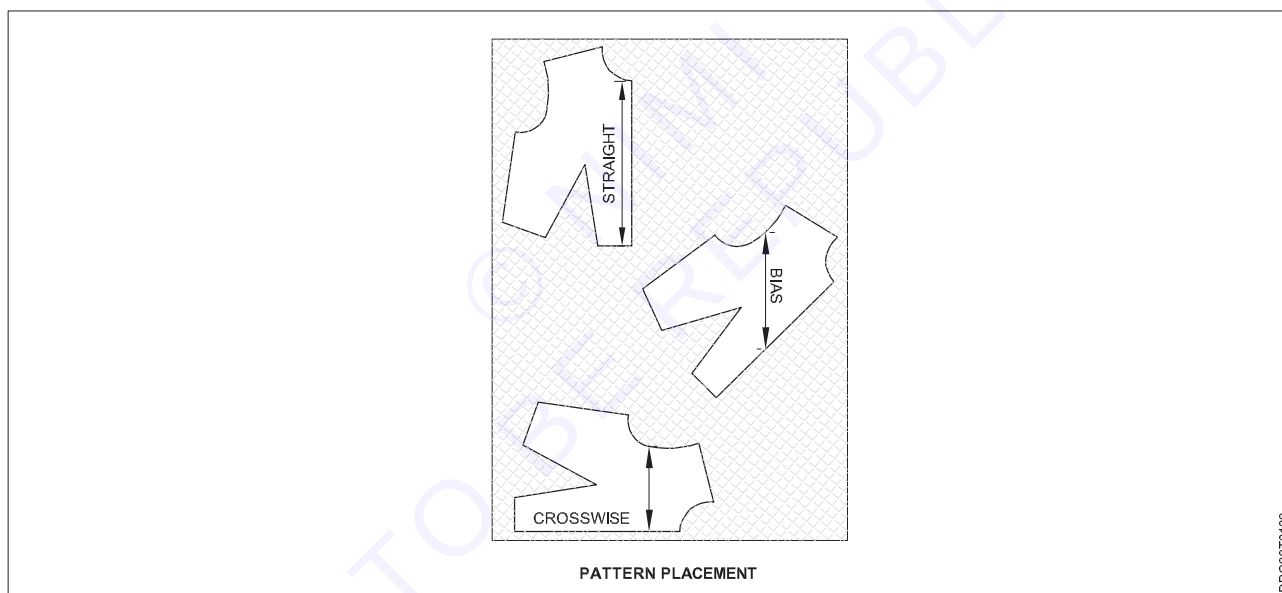
Seam allowances can be added in one of two ways for a test fit:

- 1 The seamless pattern can be traced on cloth, adding seam allowance directly on the fabric.
- 2 Seam allowances can be added to the pattern before cutting in cloth.

Pattern Grainline: The pattern grainline is a line drawn on each pattern piece to indicate the direction on the fabric a pattern should be cut. It will always be placed on the fabric so that the grainline is parallel to the selvage edge.

Direction of Grainline:

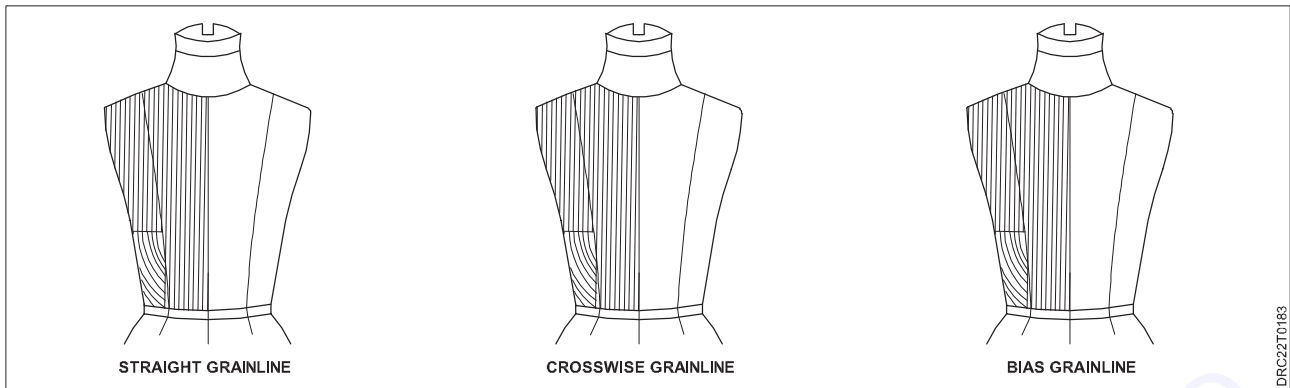
- Vertical grainlines are drawn parallel to center for garments cut on straight grain.
- Horizontal grainlines are drawn at right angles to center for garments cut on crosswise grain.
- Bias grainlines are drawn at an angle to center (45° angle for true bias) for garments cut on the bias.



Grainline Arrows

- Arrows placed at both ends of the grainline indicate that the top of the pattern may be placed in either direction along the lengthwise grainline of the fabric (for fabrics without a nap).
- An arrow placed at the top or the bottom of the grainline indicates that the pattern must be placed in one direction only (for fabrics with a nap)

The effect of grainline on garments is shown below:



Fabric Terms

Muslin: A plain-woven cotton made from bleached or unbleached corded yarns in a variety of weights:

- **Coarse-weave:** Used for draping and testing basic patterns.
- **Light-weight:** Used for softly draped garments.
- **Heavy-weight:** Firmly woven, used for testing tailored garments, jackets, and coats.

Grain: The direction in which the yarn is woven or knitted (lengthwise grain, or warp; crosswise grain, or weft).

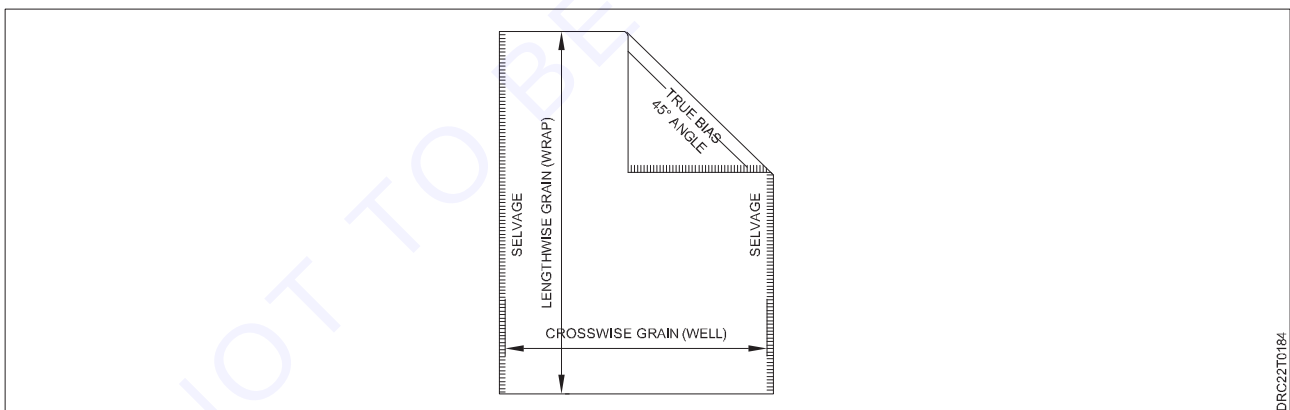
Lengthwise grain (warp): Yarns parallel with selvage and at right angles to the crosswise grain. It is the most stable grain.

Crosswise grain (weft): Yarns woven across the fabric from selvage to selvage. It is the filling yarn of woven fabrics.

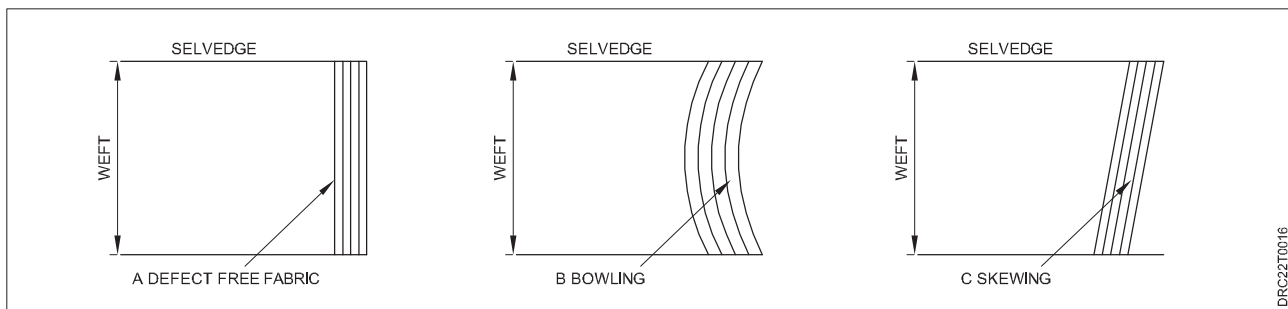
Selvage: The narrow, firmly woven, and finished strip on both lengthwise grain edges of the woven fabric.

Bias: A slanting or diagonal line cut or sewn across the weave of the cloth.

True bias: The angle line that intersects with the lengthwise and crosswise grains at a 45° angle. True bias has maximum give and stretch, easily conforming to the figure's contours. Flares, cowls, and drapes work best when cut on true bias.



Bowing and skewing: Bowing & Skewing are defects which are created when there is a distortion in weft laid across the whole width of the fabric. Both need to be taken care and handled properly during weaving and finishing to avoid wastage at garmenting stage.



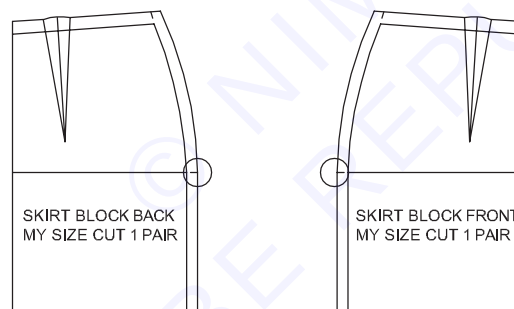
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Balance Line Terms

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. When creating patterns you need to do the following to make sure your pattern will be balanced:

- Correctly mark the pattern grain on the pattern pieces.
- Use notches as balance points to assist in the construction process.
- Ensure that adjoining pattern pieces match (in length and shape – using the balance points to do this)



PLUMB LINE: A VERTICAL LINE THAT IS AT RIGHT ANGLES WITH THE FLOOR. USED TO DETERMINE THE BALANCE OF THE FIGURE.

VERTICAL LINE: A LINE THAT IS STRAIGHT UP AND DOWN.

PERPENDICULAR LINE: A STRAIGHT LINE AT RIGHT ANGLES TO ANOTHER LINE.

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.

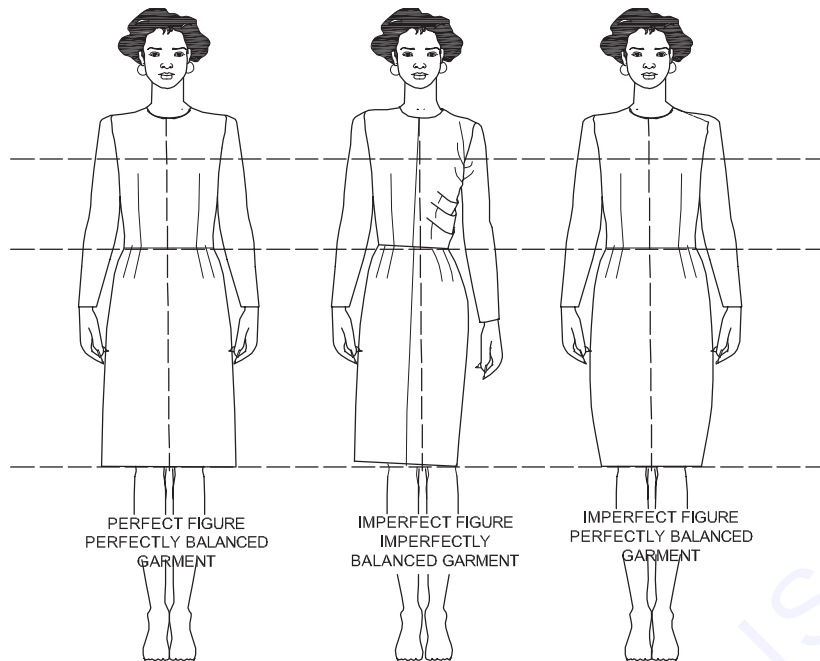
SYMMETRICAL LINE: A CENTER LINE WITH EQUAL PROPORTIONS ON EITHER SIDE OF IT.



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

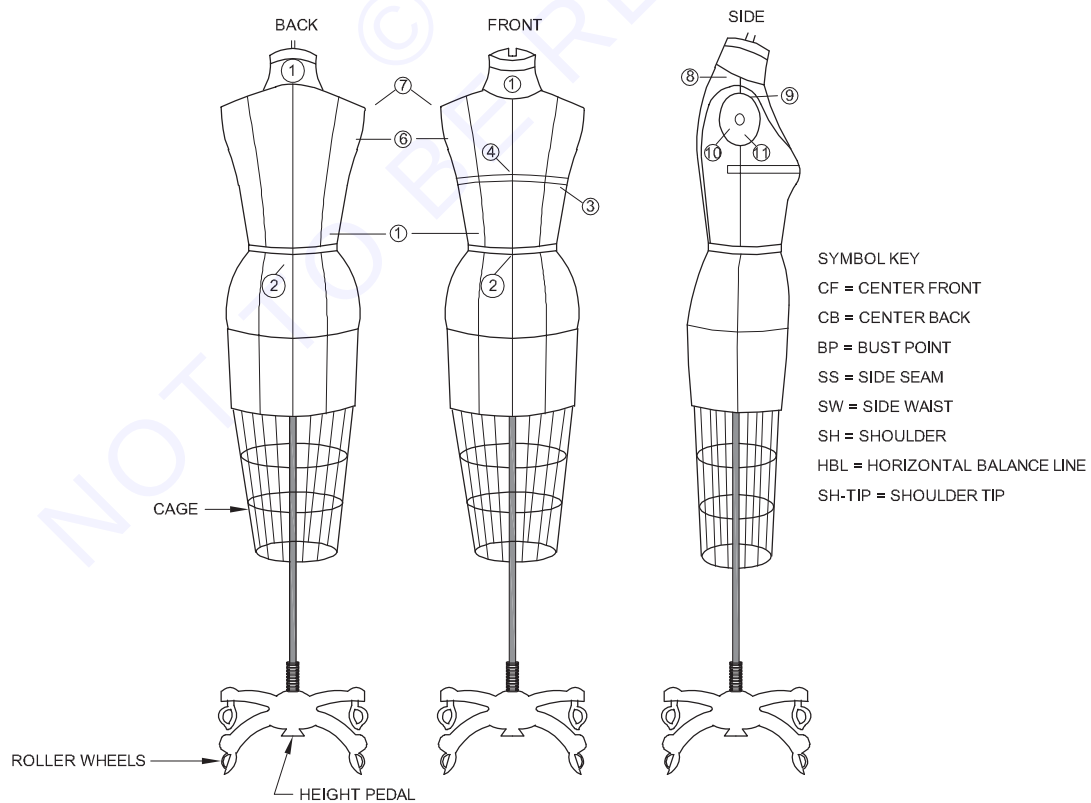
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Landmark Terms

Landmarks are the reference points on human body or dress form from where the measurements are supposed to be taken. They help us in taking the measurements correctly and accurately.



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1	Center front neck /Center back neck	Refers to the center front / back neck of a dress form or body.
2	Center front waist / Center back waist	Refers to the center front / back waist of a dress form or body.
3	Bust points	Refers to the most prominent / highest point of the bust on each side of the body.
4	Center front bust level	Refers to the center front between bust points.
5	Front princess line or (Side front) / Back princess line or (Side back)	A pair of lines running between CF and SS over the bust level dividing the shoulder into halves. A pair of lines running between CB and SS throughout the back.
6	Mid-armhole front / Mid-armhole back	Refers to the point at mid armhole on ridge. (at level with plate screw)
7	Shoulder tip	Refers to the lower shoulder point or the tip of the shoulder
8	High Shoulder point	Refers to the top point of the shoulder on either side of the neck or where shoulder and neck line intersect (Shoulder at neck).
9	Armhole ridge or roll line	Area on the dress form where the shoulder seam and the natural armhole intersect.
10	Plate screw	Refers to the plate screw on arm plate.(Only on dummy or dress form)
11	Armhole plate	Metal plate on the dress form covering the arm socket.

Design Specifications Sheet

A spec sheet, short for specification sheet, is a comprehensive document that outlines the technical specifications of a garment. It includes detailed information about design, measurements, materials, construction techniques, trimmings, and finishing details. Spec sheets serve as a guide for manufacturers to produce garments according to your desired specifications.

Study the chart and compare the information to the design it represents.

	Style name: Flared Sleeves shirt Dress	Season: SS18	1st Proto
	Brand	Date last modified:	Size range: XS-L Protoe Size:S
	Buyer	Product technician:	

	Style name: Flared Sleeves shirt Dress	Season: SS18	1st Proto
	Brand	Date last modified:	Size range: XS-L Protoe Size:S
	Buyer	Product technician:	

No	Measurements	S
A	1/2 Chest, at armhole	
B	1/2 Bottom, straight	
C	Inner armhole depth	
D	Outer armhole depth	
E	Across Neck	
F	Neck drop front	
G	Neck drop back	
H	Sleeve length 3/4	
I	Sleeve length bottom flare	
J	Shoulder	
K	1/2 Sleeve opening	
L	CB length, top	
M	Collar length	
N	Collar stand height	
O	Collar height CB	
P	Collar pointlength	
Q	Pocket width	
R	Pocket height	
S	Front length from HPS	
T	Button stand width CF	

Colour TBC:	Season: SS18	- Make style with patch pockets at chest Make 3 cm wide hem at bottom and sleeve. - Make 2 mm topstitch at collar edge and around patch pockets at chest. - Note different fabric quality and thickness used on sleeve flare.
Fabric: 100% Viscose	Buttons: 7 buttons on CF, quality TBC	
Lining:	Date last modified:	

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Pattern Chart

The pattern chart is a complete record of all pattern pieces within the pattern set. It also includes swatches and special pattern information. Each pattern shape is identified by name and number of pieces to be cut. A color code is used to distinguish linings and interlinings from other pattern pieces. Some charts require sewing guides, as shown.

PATTERN PIECES		STYLE: 3363
SELF 1 Large piece skirt R.S. 11. 1 Small piece skirt R.S. 11. 1 Waistband 1 Belt block of 2 1/2" BELT S/D 1 Buckle cover S/D S/D self fabric for straight loop cut open 158" x 18" 1/2". CONTRAST (1) LINING # 88 (WHITE) 1 Under skirt CONTRAST (2) SOLID TULLE # 30 (WHITE) 1 Bottom Ruffle PELLON: REGULAR IRON-FUSIBLE PELLON #150 1 Waistband		SIZE: 3 - 5 - 7 - 9 - 11 GRADE:
SEWING INSTRUCTIONS: "DO NOT SEW LOT UNTIL 1st GARMENT IS OK'ED" - sew overlock 1/2" all seams. - 1/8" Baby hem bottom skirt & Ruffle. - 1/6" T.S. around waist, under skirt lining seam. - set zipper center back 3/8" T.S. - set loop at waistband notch (at center). - set Ranger tape at sides.		T.S. AROUND WAIST BAND BACK ZIPPER UNDER SKIRT C.B.: 17" WAIST: 28" INSEAM: BUTTONS: ELASTIC: SHOULDER PADS: ZIPPER: 1 9" Nylon D.T.M. HANGER TAPE: 10" x 2" 1 ACME 2 1/2" SELF-COVERED RECTANGULAR BUCKLE BELT W/ SELF EYELETS. CARE INSTRUCTIONS: #9 FABRIC: self # WIDTH 58" MARKER .69 cont ① #88 Lining 44" .36 cont ② #30 Tulle 54" .47 SPECIAL INSTRUCTIONS: SEND OUT S/D self loops, straight grain cut 158" to finish 1/2" x 4 1/2" cut each loop. Total (4) pcs. S/D ACME 2 1/2" self-covered Belt. PATTERN MARKER: Betty DATE: 9-26-09

Lesson 6 & 7 (3) : Tools & Equipment related to the trade

Objectives

At the end of this lesson you shall be able to

- Identify different kinds of tools and equipment used in garment construction
- Understand about variety of tools and their creative use.

Garment construction requires a different tools that can be classified into the following categories.

Measuring Tools	Measuring tools are essential accessories needed to precisely measure fabric, patterns, and even bodies.
Drafting Tools	Drafting means the process of producing a technical drawing or draft. So, the tools used to make those drafts are the drafting tools.
Marking Tools	Marking tools are handy for drawing non-permanent lines onto fabric.
Cutting Tools	A cutting tool is any device used to cut fabric or other materials in sewing.
Sewing Tools	Sewing tools are tools and equipment, both small and large, that are used in machine and hand sewing. The correct tools will make your sewing faster and more professional.

Using the right tool will help to make the garment construction easier. These tools help increase the accuracy of the finished product, saves time and also simplify tasks.

Measuring Tools

1 Measuring tape

It is a common measuring tool consists of a ribbon of cloth, plastic or fiberglass with linear measurement markings. There are two sides of tape measurements – metric and imperial.

Metric measurement markings represent measurements in centimeters and millimeters. The small lines in between the centimeters lines are the millimeters. Ten millimeters make up one centimeter, and 100 centimeters equals one meter.

Imperial measurement markings represent measurements in inches.

These markings allows you to measure a wide range of items, from small details like button placements to larger body measurements or fabric lengths.

When selecting a flexible tape measure material, choose fiberglass or another synthetic material that won't stretch over time.

Tape with Imperial measurement markings



Tape with Metric measurement markings



2 Yard Stick / Meter Stick

A yard stick, made from wood, metal, or plastic, is one yard, or 36" in length. If you use the metric system, you may prefer a meter stick, which is 100 cm, or one meter, long.

Because it doesn't bend, a yard stick or meter stick can be used for measuring straight, longer distances and for checking grain lines.



3 Ruler

Rulers made from plastic, metal, or wood help mark and measure fabric and pattern pieces.

Rulers can be used for adjusting patterns and measuring small fabric pieces because hard rulers don't curl on flat surfaces.

Transparent rulers are also used to easily mark and measure hems and topstitching lines and check grainlines etc.



4 Flexible Curve Ruler

A Flexible Curve Ruler is made from plastic or rubber and has an internal metal core.

It can be bend to any shape for measuring or tracing.

It's perfect for measuring, altering, and drawing awkward curved shapes like armholes and neck holes. The curve ruler also helps to mark accurate seam allowances on curved borders and scalloped edges.



Drafting Tools

1 Drafting Table

A drafting table is a specialized type of desk or table usually 4 feet in width and 6 feet in length with 3 feet in height. The surface of the table is firm and smooth.



2 Pattern Paper

Pattern making paper is used to draft patterns. The pattern paper is of different types and varies in weight. The plain and the dotted paper which can either be soft or thick.

- Heavyweight pattern paper is called tag board or hard paper and is used primarily for production patterns.
- Lightweight paper is called marking paper. Marking paper is used for making markers and to develop first patterns.
- Color-coded paper (color on one side only) has two functions: to indicate right-side-up of the pattern pieces and/or to indicate the design division to which the patterns belong.



3 Pencils and pens

- Pencil used for pattern work.
- Red and blue colored pencils used to identify pattern changes.
- Black, green, red, and blue felt-tip pens used for pattern information.

4 Rulers

There are different types of rulers.

- **The transparent ruler:** It is a large rectangular ruler and also called straight ruler that is see-through and would have grid lines all throughout. The length can vary, but 12 inches (30cm) or 18 inches (45cm) is a good length for dressmaking and pattern measuring.



- **Tailor's L Square:** It resembles exactly as the name entails. Technically the L square with two arms forming a 90° angle that measures, rules, and squares simultaneously. The tailor's L square measures 12 or 14 inches by 24 inches (35cm x 60cm). It is very useful in pattern measuring and scaling down $\frac{1}{2}$ " $\frac{1}{4}$ " $\frac{1}{8}$ " $\frac{1}{10}$ " and $\frac{1}{32}$ " scaled measures. (12mm, 6mm, 3mm, 2mm, 1mm).

- **Set Square:** A set square is a right triangle. It is an essential tool for marking and finding fabric bias, altering and grading patterns.



5 Curve rulers

There are different types of curved rulers with different functions.

- **French Curve:** It is a very useful curved template used for shaping armhole and neckline.
- **Sleigh curve:** It is used to shape necklines, armholes and other curves like pockets, collars and cuffs.
- **Hip curve / leg Curve:** This is a device used for shaping hipline, hem, side seam & lapels.



6 Sewing Seam Gauge

- A sewing gauge or seam gauge is a small, useful tool with a sliding guide to mark out and measure small distances. It can measure hemlines, tucks, and pleats as well as the spaces required for buttons and buttonholes.



7 A pair of scissors for pattern paper: These scissors are primarily suited for cutting paper or cardboard rather than fabric.



8 A Sellotape / Masking Tape: This can be used to secure the pattern paper down to the table/working surface. It is also used for pattern alterations.



9 Pattern Notcher: This is needed to cut an opening at the edge of the pattern to indicate seam allowance, ease notches, center lines and to identify front and back of the patterns.



10 Straight Pin

Straight pins are the most commonly used pin for sewing, also known as draping pins. It is used for:

- Holding the pattern to the fabric to prevent shifting during cutting.
- temporarily holding fabrics and materials together during stitching
- Draping and fittings.



11 Pin holder / pin cushion: A pin cushion is a small, stuffed cushion, which is used to store pins or needles and keep them organized.



12 Push pins: Push pins used for pattern manipulation and transferring muslin patterns to paper.



13 Awl

An awl is a simple tool that consists of a metal shaft with a sharp point on the end. It is used to hole in the pattern to indicate the ending of darts, pocket, trim, and buttonhole placements.



Functions of Drafting Tools

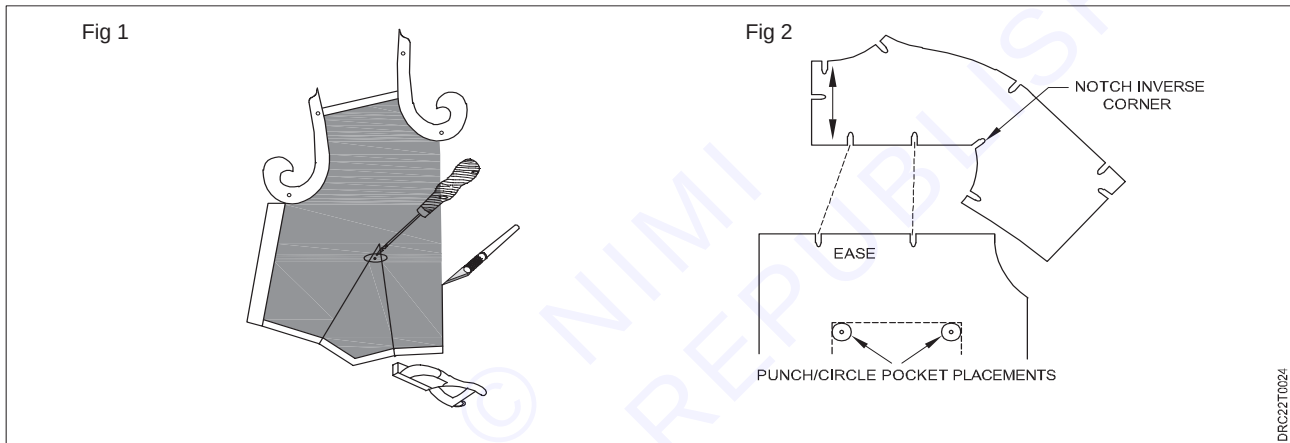
Tools provide the symbols used in marking fabric and patterns in the production of garments. Symbols are like a silent language that are understood among the designer, seamstress, grader, marker maker, and production personnel. Without these symbols, garments would not be cut or stitched with accuracy. Missing or misplaced symbols disrupt the flow of production.

Notch Tool

The notch tool has a cutting blade that slips into the pattern's edge, leaving an 1/8- to 1/4-inch cut-out. As the patterns are traced, the notch cut-outs are marked on the fabric. The cutter slashes the fabric at these locations. The seamstress assembles and stitches the garment parts following the notches (Fig 1).

The notch is used to indicate:

- Seam allowance (Fig 2).
- Center lines.
- Identification of front and back patterns.
- Correct assembling of similar pattern parts (Fig 3).
- Correct location of joining parts. Gather and ease control (Fig 2). Dart intake (Fig 1).



- Shoulder tip of extended shoulders.
- Waistline of one-piece garments.
- Zipper stopping point.
- Fold-back for hems and facings.
- Placement for inserts.
- Tension release (acute curves).
- Inverse corners (Fig 2).

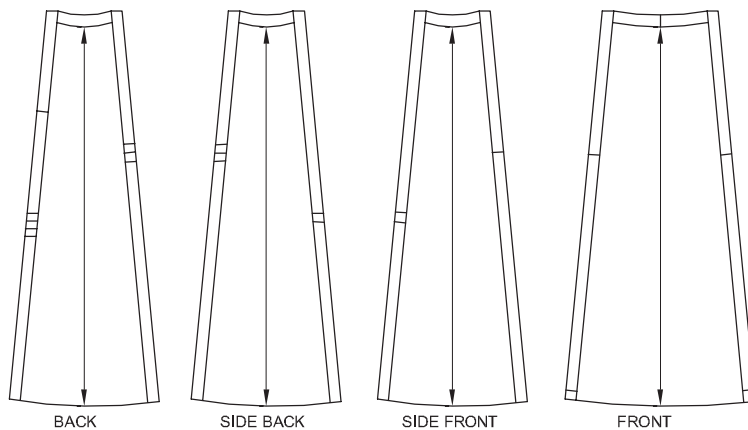
Unless instructed otherwise, 1/4-inch seams are not notched. Overlocked seams are generally not notched.

Awl Punch and Circle

The awl puts a hole (or mark) on the pattern. The hole is circled to notify the marker maker that a drill is needed to burn a hole in the fabric, which damages the garment. That is why the placement of the drill hole is always inside the finished seam (to cover the damage in the fabric).

- Dart back-off point (Fig 1).
- 1/8 inch in from corners.
- Buttonholes and buttons.
- Trimming.
- Pocket placements.

Fig 3



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Marking Tools

1 Clay Tailor's Chalk

Tailor's chalk is specially made for fabric marking and comes in many colors. It is Use for marking adjusted seams and style lines. It is very easy to use, and convenient to hold and is gone with a wet wipe or wash.



2 Wax Tailor's Chalk

Wax Chalk is suitable for almost any fabric. It's visible on darker fabrics and is perfect for heavy, textured materials like wool or felt that can be difficult to visibly mark with other tools. Since it is made of wax, can be more challenging to remove marks.



3 Chalk pencils

Chalk pencil is much better than triangle-shaped tailor's chalk. It doesn't come off easily like the regular chalk but goes off completely when washed. It is available in many colors and can be sharpened, leaving accurate lines on the fabric. There are also pencils available in which you can change the leads.



4 Chalk wheel

A chalk wheel is a commercially available product that makes a line of powdered chalk on the fabric. This is usually washed or brushed away easily.



5 Carbon Tracing Paper

It is a type of thin paper coated with a layer of coloured carbon that transfers markings onto fabric. Carbon tracing paper is often used for marking darts, pleats, and other pattern markings onto fabric. It can also be used to transfer seam lines or cutting lines. First place the paper (carbon-side down) on the fabric, and then place a pattern on top, then trace over the pattern, and the colour from the tracing paper will transfer the markings onto the fabric.



6 Tracing wheel

There are two types of tracing wheel, blunted and pointed. The pointed wheel is needed to transfer pattern, shapes to the paper while the blunted wheel is used with carbon paper to transfer pattern shape to muslin or the fabric.



Cutting Tools

1 Dressmaking Shears

Dressmaker's shears have a long blade and a handy point to clip and notch the curves. These blades have a knife's edge which can cut the fabric in acute angles. Dressmaking shears come in a variety of sizes, ranging from 6" to 12" (or even more).



2 Tailor's scissors

Tailor's scissors are usually shorter. They are a great choice for sewing and crafting as they can cut heavy materials like leather or multiple layers of fabric with ease. The thicker blades of tailor's scissors have the edges that can cut all the way to the tip.



3 Angled / Bent Fabric Scissors

Angled or bent fabric scissors look like exaggerated versions of dressmaking shears. The upward bend in the handles is much more pronounced, giving more leverage (power) when you cut fabric. They're great for making long, straight cuts.



4 Pinking Shears

This scissor is not used in fabric cutting but it is used in raw seams finishes by removing its thread in zigzag way so no overlock is required. Pinking shears have zig-zag shaped blades that cut the fabric in a zig-zag pattern.



5 Rotary Cutters

A rotary cutter is a cutting tool with a circular blade and handle. It cuts fabric quicker and more accurately than scissors. Rotary cutters are always used with cutting mats not to damage the cutting table. Rotary cutters normally come in 4 sizes: 60mm, 45mm, 28mm, and 18mm. The size refers to the diameter of the blade. The 45mm version is the most popular size for everyday use and basic quilting cuts. The 60mm size has a larger blade for cutting thick fabric. The small 28mm and 18mm sizes are often used for cutting intricate patterns and tight curves.



6 Cutting Mats

Generally, cutting mats are a rectangular piece of durable material, such as vinyl or rubber. They are marked on one side with a grid guide of specific measurements. A cutting mat is used both to protect the surface you are cutting on, and to provide measurement guidelines and references to ensure a clean and straight cut. A cutting mat must be used to prevent damaging the cutting surface, especially if one uses a rotary cutter.



7 Embroidery Scissors

Embroidery scissors are small scissors that are frequently used in embroidery projects to cut yarn, but they're also a great sewing tool. You can use them to clip into seam allowances, make precise cuts in small areas like snipping into the corners of a welt pocket, or clean up loose bits of thread.



8 Thread Clippers

Thread clippers are a handy little cutting tool that allows for the snipping of threads. They can come in a variety of shapes: some are spring-loaded, some come with a ring that allows you to "wear" the clipper on your finger, and some are made in a U-shape. They remain open until you close them to make a cut, upon which they return to their open state. This makes it really quick and easy to trim unwanted threads from your fabric.



9 Seam Ripper

Seam rippers are specifically designed for ripping out stitches from seams, either as a result of an error or during alterations. They should be used carefully to prevent damage to the fabric. It has a U-shaped blade where one side is slightly longer than the other side. The most popular way to use the sewing tool is to slide the longer side into the seam and grab the thread you want to cut. The shorter side of the tool usually has a plastic ball for protection. The curved area between the arms is very sharp, and here the thread gets sliced.



10 Buttonhole Scissors

Buttonhole scissors are designed to cut the perfect buttonhole. These scissors can cut the fabric without damaging or stretching the fabric. The length can be adjusted, so it always cut the perfect size hole. Buttonhole scissors have notches in the blades. These notches are there so you can cut a buttonhole without cutting the edge of the fabric. They also have a small screw that is used to adjust the length of the cut. To use the scissors, first determine the length of the hole and adjust the screw, then cut the hole.



Sewing Tools

Dress Form

A dress form is a three-dimensional model of a torso or an entire body, moulded to take the shape of the human body. It comes in different sizes which often differ according to manufacturers. It is mostly used for fitting clothing that is being designed or sewed. These are available for male, female and kids dress forms.

Difference between Dress Form and Mannequins

Most often people get confused with the difference between dress form and mannequins. The difference lies in the material with which they are made. A dress form is usually constructed with a hard interior covered by foam and fabric covering making it helpful for pinning. Whereas a mannequin is made of hard material like fiberglass, plastic or even metal, most often depicting an entire body. Another difference is the postures between them. A dress form will always have a straight pose as it needs to justify draping. Whereas a mannequin can be of any desired position to complement the dress as well as act as an aesthetic addition to a retail store.



Different Types of Dress Forms

Display Dress Form

Display Dress Forms are mostly used for displaying garments and the creation of photoshoot samples. It comes in various sizes with no standard measurements.

Professional Dress Form

These dress-forms are made for the sole purpose of the fitting, draping, pinning, etc. with features including adjustable shoulder for easy put on and removal of garments, wheel stand for easy mobility, caged bottom to assist hemming. These also come with adjustable or removable arms which can be very much useful for the fitting of sleeved garments.

Bifurcated Dress Form

It is similar to professional dress form, with the only difference being included legs for fittings of shorts and pants.

Adjustable dress form

As the name suggests, in this dress form the measurements can be changed according to various sizes. The sizes can be changed with the dials which are placed at critical measuring points as in center back, center front, side seam, neck.

The drawback of these is the lack of collapsible shoulders and are not ideal for pinning or draping. These are mostly light-weighted with a hollow interior and are fragile in use.



Sewing Needle

NEEDLE is a small slender pointed tool that has an eye for thread at one end and that is used for sewing. Whether the sewing process is done by hand or with machine assistance, a needle is always the key component. However, we cannot use the same type of needles for both hand sewing and machine sewing.

Types of Sewing Needles

Sewing needles can be of two main types: hand-sewing needle and machine needles. Each type has its unique characteristics and applications.

Hand sewing needles

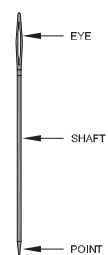
Hand sewing needles are used for hand sewing work or embroidery. These needles are composed of 3 different parts: the eye, the body (shaft), and the point.

EYE: The eye refers to the hole through which the thread passes. The size and shape of the eye can vary based on the needle type and size.

SHAFT: A needle shaft or shank is the long part of the needle that extends from the eye to the point.

The point is the sharp tip of the needle, which is the first point of contact with the material you're sewing.

Ball point: used for knit fabrics. The ball point does not separate the fibers, stretching them out of shape, but rather goes around and between them, retaining the integrity of the fabric.



Regular or Universal point : ideal for light to heavyweight woven fabrics. Universal point needles go through, not around the fibers within the woven fabric.

Needle size is determined by the weight of the fabric to be sewn.

Needles are mostly available in different sizes-the higher the number, the smaller the size of the needle. (Needles with a larger number are finer and shorter and smaller numbers mean the needle is thicker and longer.)

Cutting Point: Cutting point needles have sharp tips like blades. They can be used while sewing sheet type materials like plastic, leather or other materials. Because, in these materials there is no gap within the structure. So the needle point must prepare sufficient hole in the material so that the needle blade and thread can pass through it without excessive friction.

Mainly cutting points are divided into three types

- a Wedge Point
- b Cross Point
- c Twist Point



(a) WEDGE POINT



(b) CROSS POINT



(c) TWIST POINT

Common Types of Needles for Sewing

1 Sharp Sewing Needles (Sharps)

Sharps are medium-length needles with – as their name suggests – a sharp point and a round eye. They are also referred to as general-purpose sewing needles.

Sharp needles are available in different sizes

Size 1, 2, 3 and 4: Suitable for medium to heavy fabrics.

Size 5, 6, 7, 8, 9 and 10: Suitable for light to medium fabrics.

Size 11 and 12: Suitable for fine fabrics or creating small delicate stitches.

Size 16, 17 and 18 are known as Carpet Sharps and, as their name suggests, are most commonly used in the design and manufacture of carpets and rugs.



2 Embroidery Needles

Embroidery needles have sharp tips and longer eyes than a standard Sharps needle, making them more suitable for threading stranded cotton and thick thread.



3 Quilting Needles

Quilting needles are thin and short for accurate and quick sewing. These needles have long shanks and can easily penetrate through quilt layers. They make even small stitches needed for quilting and hemming.



4 Tapestry / Cross Stitch Needles

These needles have a blunt point and a big eye (Oval eye) – an elongated eye for easy threading, and a blunt point enables the needle to pass through fabrics without tearing or splitting its fibers. Sizes range from 13-28. It is especially used for needlepoint, counted cross-stitch and counted thread embroidery. This is also used for needle point embroidery, canvas work, and for stitching on plastic canvas.



5 Chenille Needles

This needle have large eyes and very sharp points. The eyes are large enough to accommodate ribbon and other thick yarn. Sizes 13-24 are generally used. Chenille needles are primarily used for chenille embroidery, a technique that creates a textured, tufted, and velvety appearance on fabric. It is also used for ribbon embroidery. You can also work with textured yarn with this needle.



6 Beading needles

These are the needles used to string beads in bead embroidery. Usually beading needles are very thin and long with tiny eye otherwise small beads would not pass through. You need long needles to string many beads. Sequins are also attached using these needles.



7 Darning needles

These needles have very large eye and are suitable for threading bulky yarn and wide ribbons. The tip of the needle is slightly curved, making it easier to pick up stitches. These long sturdy needles have very sharp points. These needles are suited for mending a hole in a garment and doll making.



8 Curved needles

These needles are also called upholstery needles. This curved needles are used to repair and mend usually upholstery weight fabric and gives almost invisible blind stitches. It is also helpful in reaching for seam which is impossible to reach with normal needles – for eg making the curved wraparound sleeve for a cup.



9 Milliners/Straw

These needles are long with round eyes and are traditionally used in the art of hat making. They are also used for pleating and creating fancy stitching commonly known as smocking.

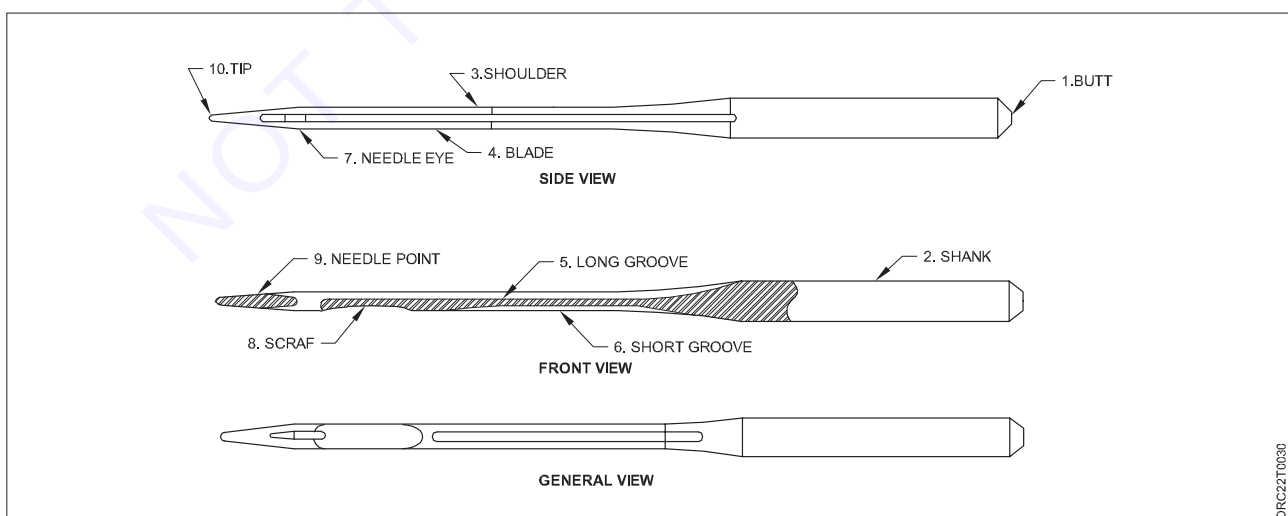


Sewing Machine Needle

The machine needle's purpose is to make a hole in the fabric thus allowing the sewing thread to pass through the material. It also allows the thread to create a loop making the stitch complete.

A sewing machine needle is solid at the top of the needle, and the needle's eye is located near its point. Above the eye of the needle is a short groove called a scarf, which allows the hook of the sewing machine to pick up the needle thread to form the stitch.

A sewing machine needle is comprised of the following elements



- 1 **Butt** : located at the needle's very end. Butt helps for easily attaching the needle with the needle bar or clamp of the sewing machine.
- 2 **Shank**: Shank is the bottom part of the sewing needle which is tied in the needle bar. It may be flat or cylindrical on one side. Shank is wider than the remaining parts of the needle and works as support of the needle.
- 3 **Shoulder**: The shoulder is the part between the shank and blade of the sewing machine needle. It reduces friction between the needle and the fabric.
- 4 **Blade** : The blade is the part from needle eye to shoulder. It is the longest part of the needle and maximum friction with fabric takes place in this area. The blade is gradually tapered to the tip.
- 5 **Long groove** : A long groove is a long and thin groove in the blade from shoulder to needle eye. Sewing thread takes place in this groove during up and down of sewing machine needle through the fabric in sewing time, thus reduce the friction between needle, fabric, and sewing thread.
- 6 **Short groove** : A short groove is placed on the side of the needle where the hook or looper is placed. It is a small groove between the tip and the needle eye. A short groove helps the sewing thread to create a loop.
- 7 **The eye of the needle** : the opening at the needle's top. Its purpose is to hold the thread.
- 8 **Scarf** : The scarf is a curved slot near the eye. It helps to close the setting between the looper and needle. As a result, it is easy to catch the needle loop by the hook or looper.
- 9 **Point** : Point is the part from the needle eye to the tip. It helps to penetrate the needle into the fabric without any damages. Also, proper care should be taken to select the needlepoint appropriately for the fabrics.

Needle System

Each industrial sewing machine is compatible with a specific type of needle, this is the machine's needle system. It is important to ensure you are using the correct needle system for your machine. The needle system governs the needle's length and is usually defined by physical attributes of the needle, such as length, thickness, etc.

Needle Size

Needles come in different sizes (or shaft thicknesses) and are described by an American and European size. The larger the needle size, the thicker and stronger the needle will be. The needle size required corresponds to the thickness of the material you are sewing with and the size of thread you are using. Thicker needles tend to be used for thicker fabrics, and thinner needles for thinner fabrics. A larger needle size will make a larger hole in the material being sewn and therefore accommodates a larger thread size.

The size is written as a series of numbers with the European number first, a backslash, and then the American number.

European	American	How It's Written
60	8	60/8
65	9	65/9
70	10	70/10
75	11	75/11
80	12	80/12
90	14	90/14
100	16	100/16
110	18	110/18



Here are a few examples of which needle to use for which fabric below

Fabric Weight	Examples	Needle Size
Lightweight	Gauze, crepe, chiffon, tulle, organza, silk, voile, tricot, net, lace	65/9 – 75/11
Medium-weight	Taffeta, quilting cotton, jersey, satin, poplin, seersucker, broadcloth, rayon, linen, knit, elastic, thin denim, velvet, gingham	75/11-90/14
Heavy-weight	Upholstery, heavier denim, vinyl, corduroy, gabardine, tweed, canvas, velour, wool, leather, oilcloth	100/16
Very heavy-weight	Extra heavy denim, leather, or upholstery	110/18

- Bodkins**

It is a threading tool used to insert elastic, fabric tubes, ribbons & cord through casings easily and smoothly. These are long thick and blunt needle (sometimes with sharp point) with a large eye.



- Needle Threader**

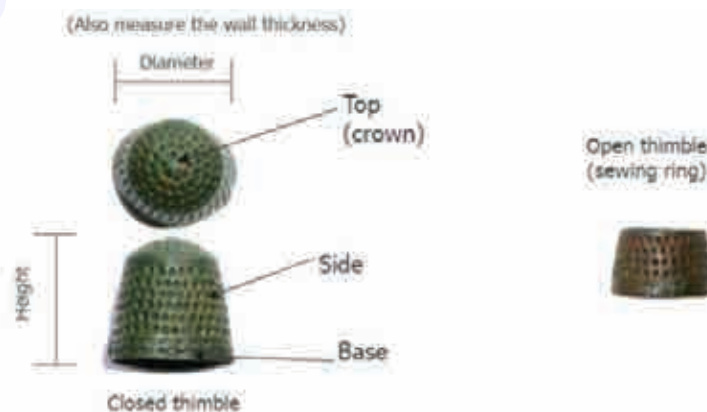
A needle threader is a device for helping to put thread through the eye of a needle quickly and easily. It gives you relief from eye strain. First, you need to insert the small wire (or hook) of the threader through the needle's eyelet. Since the wire is stiff, it should go through the eyelet very easily. Then, you can insert the thread through the wire on the other side of the eyelet and pull the threader so that the thread is pulled through the eyelet.



- Thimble**

A small metal or plastic cap, worn to protect the finger and push the needle in sewing. A thimble is a small metal or plastic cap used for protecting your fingers from needle while sewing or doing embroidery or beading. They are generally worn on the middle finger of your dominant hand but you can put it on your index finger or even thumb if that is more comfortable with your sewing style.

There are 2 kinds of thimbles: open and closed. Closed type thimbles are more regular in shape and have thicker walls. They can be made of silver, iron or more common is copper alloy.



• Loop Turner

A loop turner is a handy sewing tool that is used to turn fabric tubes inside out. It is a thin metal rod with a circle on one end and a hook on the other. The loop turner works by attaching one end of a fabric tube to a hook or wire, and then gently pulling the fabric through the tube, turning it inside out.



Sewing Machine

A sewing machine is used to stitch the fabric and other pliable materials together with threads. It has various parts and attachments, each of which have their own importance and use.

There are mainly two categories of sewing machines that is, domestic sewing machine and industrial sewing machine.

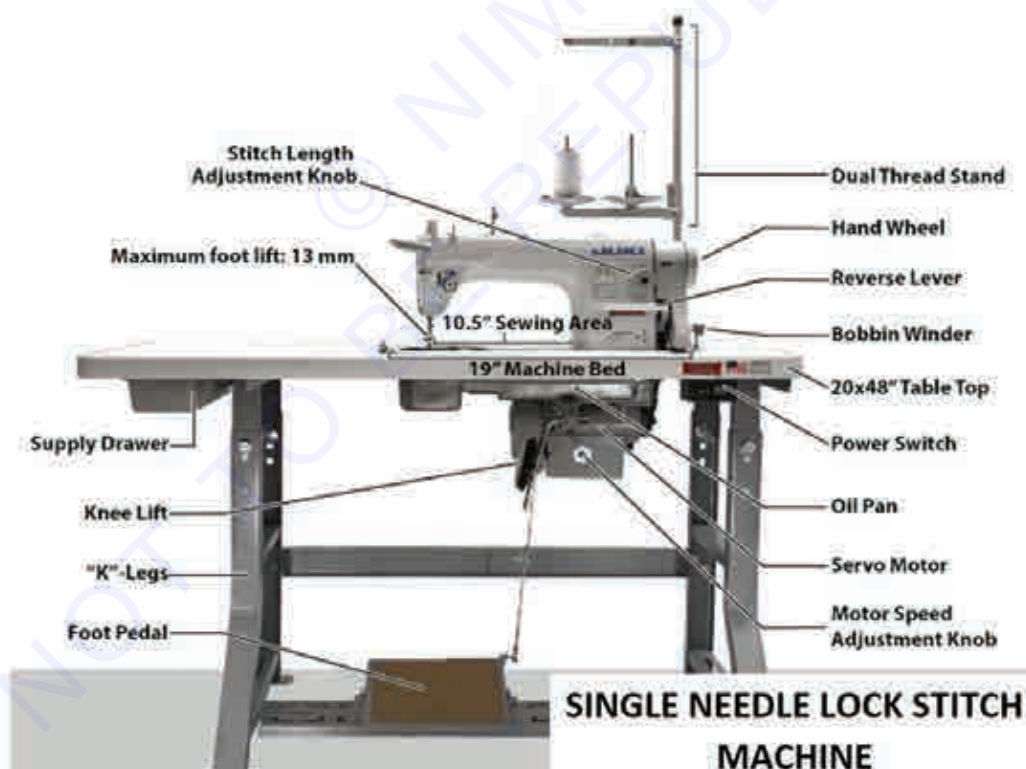
Domestic sewing machines

Domestic, or household, sewing machines are meant for home use. These machines are smaller and slower than industrial machines.

Industrial sewing machines

Industrial sewing machines are typically found in factories, and are mostly used to mass produce clothing and other goods. They offer precision, fast sewing speeds, and higher stitch quality.

Parts of Industrial sewing machine and their functions



Dual Thread Stand: The main function of the thread stand or spool holder is to hold the spool of thread. It specially controls the direction/operation of the thread during the sewing time. The spool holder constantly holds the spool so that the flow of thread can pass well.

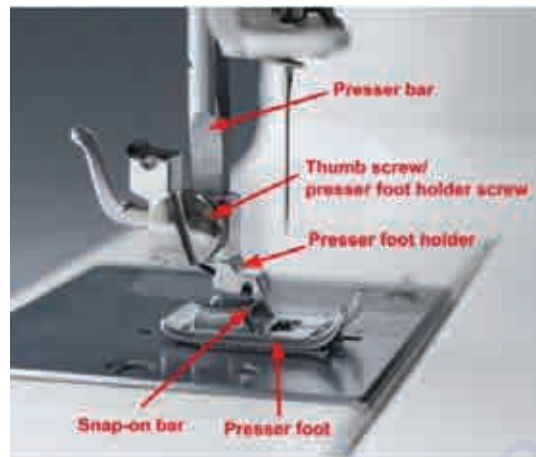
Hand Wheel: The hand wheel, also called a flywheel or balance wheel manually controls the needle. Hand wheel is utilized to raise and lower the needle, and it typically on the right side of the machine.

Reverse Lever: The machine will sew in reverse while the lever is pushed. Reverse lever also called "back tacking," which is one of the best ways to secure a seam you have just stitched.

The bobbin winder: A bobbin is placed here during winding as it is called a bobbin winder. It helps to wind the sewing thread to the bobbin. The bobbin winding mechanism consist of a bobbin pin/winder to hold the bobbin while the thread is being wound, thread guides for maintaining tension, and a start/stop lever.

Table Top: The flat bed table top design is best for sewing and give a nice and wide working area for laying workpieces flat.

Power Switch: The power switch operation feeds the electrical power supply to the sewing machine. Through operator can switch on and off the sewing machine with just one click. Normally power switch is located on the right side of the machine.



Servo Motor: Servo motors make a sewing machine move. Some modern sewing machines have servo motors that can run at up to 45,000 revolutions per minute, when combined with a powerful electrical motor.

Stitch Length Adjustment Knob: Stitch length adjustment knob or regulator is used to control the length of the stitch. It determines how long each stitch will be on the fabric.

Presser Foot: The presser foot attaches to the presser bar lifter and exerts a small amount of pressure on the top of the fabric to hold the fabric onto the feed dogs as you sew.

Thread Take-Up Lever: The thread take up lever carries the thread from the top of the machine down to the needle. The lever rises up and down as the machine sews, helping the thread easily move up and down with the motion of the needle.

Tension Control Dial: The tension control dial controls the tension of the upper thread. The tension of your thread may need to be adjusted depending on the type of thread or fabric to be used. An incorrect tension will cause thread to pull or loop, and can make fabric pucker.

Feed dogs: Feed dogs are toothed metal bars that grab and feed the fabric through the machine.

Needle bar: A steel rod that holds the needle in place with the help of a needle clamp. Its main function is to give motion to the needle.

Pressure foot Lifter: Pressure foot lifter helps to raise and lower the pressure foot.

Knee Lift: Knee lifts are simple tools that make sewing easier and faster. A knee lift in a sewing machine is a lever located near the foot pedal that allows you to raise and lower the presser foot without having to use your hands. This making it easier to pivot or turn corners of fabric while sewing. Knee lifts are especially useful when working with thick fabrics or multiple layers of fabric, as they allow for more precise control over the fabric.

Foot Pedal: The foot pedal works by telling the machine when to sew and when to stop sewing without using your hands.

Bobbin & Bobbin Case: The bobbin is very small rolling parts of sewing. The bobbin is also called a small spindle to roll up thread. It supplies thread toward the lower layer of the sewing machine. It helps well in stitch formation. The bobbin cover or case is a plate or hinged door that protects the bobbin mechanism. The bobbin caser is used to keep the bobbin on it.



Safety Precaution

- When turning the power on, keep your hands and fingers away from the area around/ under the needle and the area around the pulley.
- The power must be turned off when the machine is not used, or when the operator leaves his/her seat.
- The power must be turned off before tilting the machine head, installing or removing the "V" belt, adjusting the machine, or replacing parts.
- Avoid placing fingers, hairs, obstacles, etc. near the pulley, "V" belt, bobbin winder wheel, or motor when the machine is in operation. Injury could result.
- Don't put fingers into the thread take-up lever cover, around/under the needle, or pulley when the machine is in operation.
- If the belt cover, the finger guard, and/or the eye guard are installed, don't operate the machine without these safety devices.

Precaution before Starting Operation

- If the machine's oil pan has an oil sump, never operate the machine without filling oil in it.
- If the machine is lubricated by a drop oiler, never operate the machine without lubricating.
- When a new sewing machine is operated, verify the rotational direction of the pulley with the power on. (The pulley should rotate counterclockwise when viewed from the pulley.)
- Verify voltage and (single or three) phase indicated on the nameplate of the motor.

Precaution for Operating Conditions

- Avoid using the machine at abnormally high temperature (35°C or higher) or low temperature (5°C or lower). Otherwise, machine failure may result.
- Avoid using the machine in dusty conditions.
- Avoid using the machine in conditions filled with a lot of electric noises such as high frequency welders.

Lesson 6 & 7 (4) : Importance of Pattern

Objectives

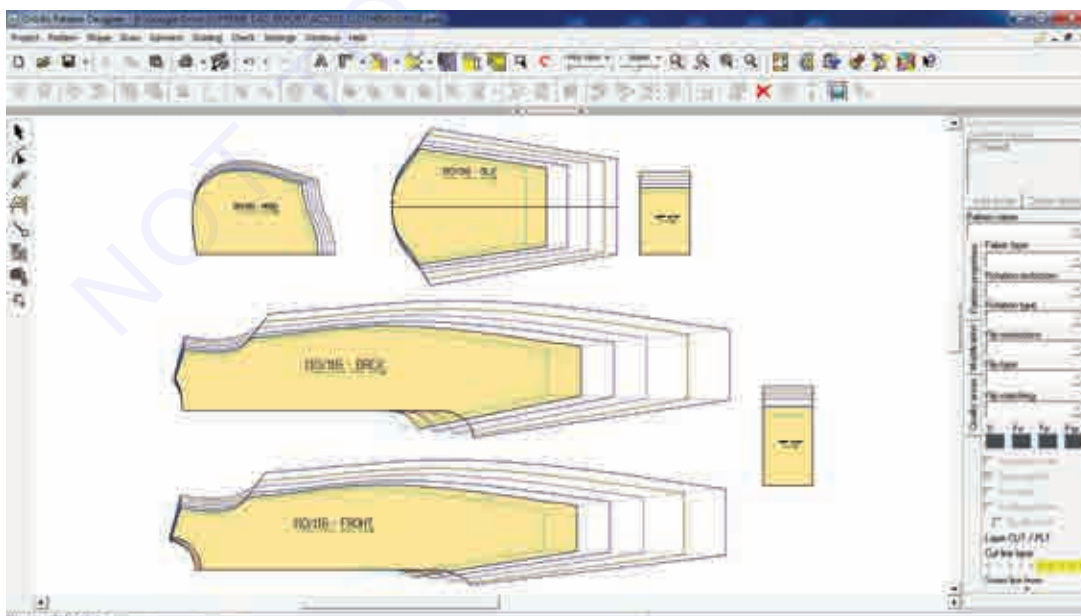
At the end of this lesson you shall be able to

- understand the importance of pattern in fashion and Garment industry.

Introduction

The pattern-making process begins with the collecting of body measurements. These measurements are used to develop a basic block pattern, which is then tweaked 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 patterns. Patterns can be created either by hand or by computer.



Benefits of Pattern Making in Garment Manufacturing

- **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.
- **Increased creativity:** Patterns can help designers to create more creative and innovative garments.
- **Improved communication:** Patterns can help to improve communication between designers, manufacturers, and sewers.
- **Reduced risk:** Patterns can help to reduce the risk of errors and mistakes in the garment manufacturing process.
- Overall, pattern making is an essential part of garment manufacturing. By investing in the right pattern making tools and training, you can improve the efficiency, quality, profitability, creativity, communication, and risk reduction of your garment manufacturing business.

Completing the Pattern

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

- complete the patterns in a professional manner, by using the correct symbol and information
- know the actual requirement of Seam allowance to make a perfect garment.

A completed pattern has seam allowance, pattern symbols (notches, a punch, and circles), grainline, and pattern information. Pattern symbols guide the seamstress in constructing the garment, and pattern information assists in the production process.

Pattern instructions

The following instructions must be marked on the pattern.

The name of each piece: Label each pattern as bodice front, back, skirt, sleeve, collar, and pocket.

- Label Centre back and center front clearly.

The number of pieces to be cut:

Write the number of pieces cut from each pattern to complete the garment.

Folds

Balance marks used to make sure pattern pieces are sewn together at the correct points.

- Construction lines include darts, buttonholes, pocket placings, tucks and pleat lines. These lines are marked on the pattern or shown by punch holes.

Grain lines are a symbol (usually an arrow) to show how to place the pattern on the correct grain of the fabric. The grainline is drawn through the length of the patterns.

Pattern size: Record the pattern size

Style no: Write the code number of the pattern set—for example, 3363 (33 may identify the type of garment and 63 may identify the fabric).

Seam allowances are marked by lines round the pattern or notches at each end of the seam. If a pattern has no seam allowance, mark this clearly. The following are general guidelines:

1/4 Inch :

- All faced areas
- Sleeveless armholes
- Narrow spacing
- Extreme curves

1/2 Inch

- Armholes with sleeves
- Waistlines
- Center lines
- Style lines
- Side seams (vary: 3/4 inch, 1 inch)
- Zipper seams (vary: 3/4 inch, 1 inch)

Overlock Seam:

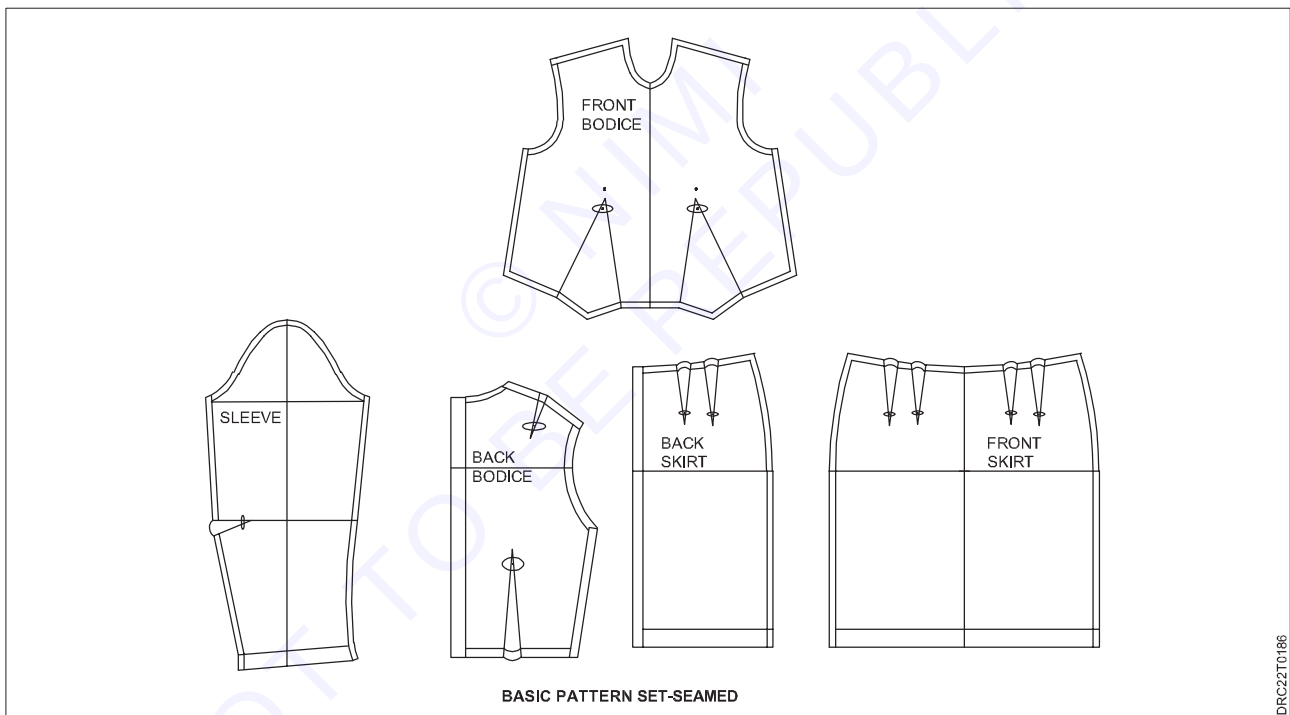
- 3/8-inch seam allowance

Punch/Circle: A symbol to indicate:

- Nearing the end of darts
- Pocket, or trim locations
- Button/Buttonhole placement
- Inverse corners

Note

- Write the above pattern instructions clearly.
- Patterns information should be written in black felt-tip pen.
- Lining patterns are written in blue, interlining in green, and interfacing in red.
- Pattern information can be placed in the center of the pattern or placed along the grainline and on the right-side-up of each pattern.



Basic Pattern Set - Seamed

SOFTWARE - 1

(8 & 9)

NOT TO BE REPRODUCED

◆ MODULE 3 : CAD Software - Software - 1 ◆

LESSON 8&9 (1) : Basic Knowledge of CAD

Objectives

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

- learn about the features of Pattern CAD.
- understand the importance of CAD in fashion and Garment industry.

Introduction

Carrying out Apparel Pattern Engineering, Grading and Marker Planning manually is a notoriously inefficient and cumbersome process. Pattern CAD effects significant time and labor savings by automating this process.

Pattern CAD streamlines and improves efficiency of the Apparel product development team by safeguarding against people turnover, eliminating manual errors, building a knowledge base that can be used to create and re-create garment patterns and garment makers and by enabling collaborative team working. Manual patterns of garments get worn-out and torn and cannot be re-used to create even slightly different fashion styles.

Pattern CAD uses apparel specific intuitive and user-friendly tools to engineer garment patterns, grade the base garment pattern to various other sizes and to tightly pack these garment patterns to form the most efficient garment makers. Figuring out optimal layout of clothing patterns to form tight clothing markers needs the application of spatial visualization skills: this is best done on a computer monitor and not by going back and forth on a table.

Computer companies

Computer companies offer automated systems that include fabric and garment design; pattern design, grading, and marking; high-speed jet plotters; single ply cutters; spreading and cutting; unit-production system; and electronic tracking in sewing, warehousing, distribution, and manufacturing.

Service to manufacturers by computer companies varies.

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.
- 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.

REACH CAD is discussed in this chapter.

Benefits of using pattern CAD

- Make dimensionally accurate garment patterns that fit.
- Modify garment patterns as required. Easily and Fast!
- Add precise seam and other allowances to garment patterns easily.
- Add notches, darts, pleats etc. to garment patterns in a few clicks.
- Make garment patterns anywhere and modify them anywhere without the need for pattern tables and tools.
- Eliminate human errors in garment pattern design.
- Grade garment patterns accurately and quickly.
- Save hours of hard work while grading garment patterns.
- Superimpose garment patterns over one another and visually inspect the grading
- Production stage modifications of clothing patterns/grading become easy. Production Planning and Control (PPC) and Production teams get the opportunity to quickly work on various options in clothing grading to achieve the desired results.
- Avoid human errors in the repetitive and laborious process of clothing grading
- Calculate fabric consumption quickly while doing garment costing or fabric procurement.
- Easily visualize various options in clothing patterns laying on various fabric widths.
- Enable production teams to avoid errors while laying clothing patterns on raw material
- Ensure that checks and stripe matching is maintained in bulk by fixing the positions of clothing patterns on markers so that the final product is perfect.
- Include printable clothing markers and clothing mini-markers as part of your email communication with customers as required
- Maintain historical records of styles, consumption, clothing patterns, clothing markers etc. easily for future styles and re-orders

LESSON 8&9 (2) : Overview of reach PDS

Objectives

Objectives

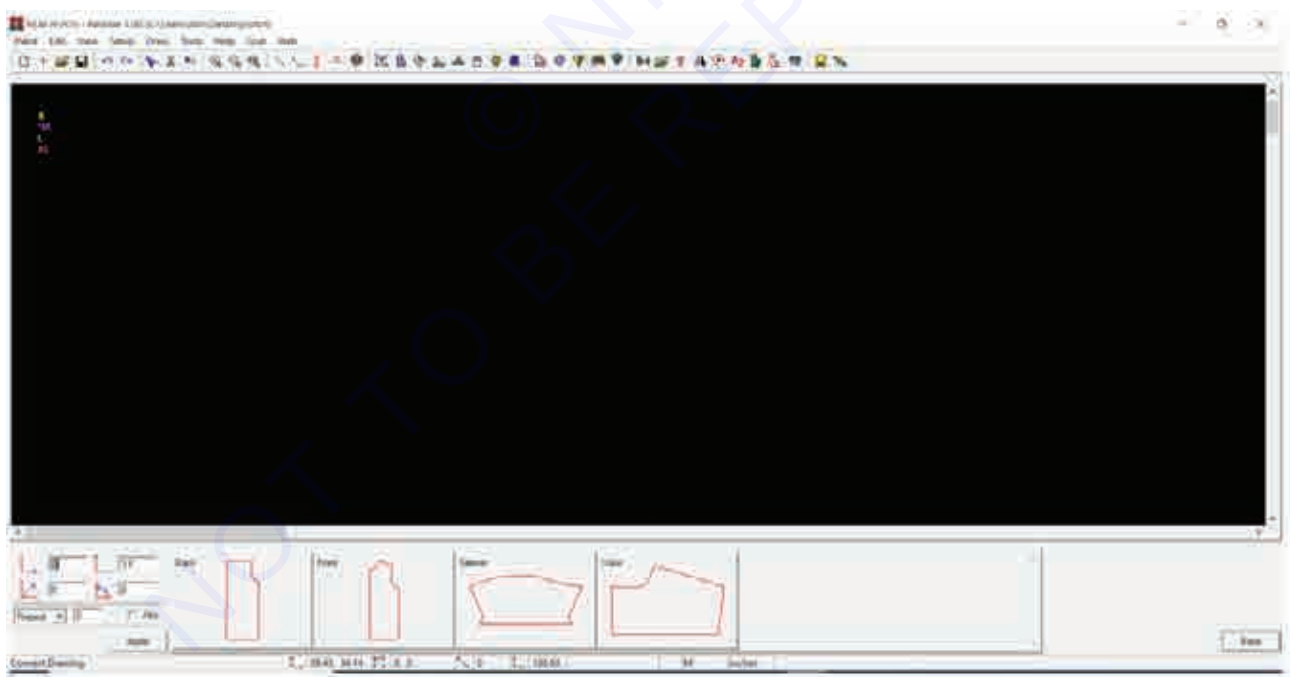
At the end of this lesson you shall be able to:

- learn about the features of Reach PDS
- understand with the window arrangements of REACH PDS.

- ## Objectives
- At the end of this lesson you shall be able to:**
- learn about the features of Reach PDS
 - understand with the window arrangements of REACH PDS.

Overview of reach PDS

REACH PDS is the pattern designing and grading software in the REACH CAD family. This software enables designing and grading of a pattern. It can also be used to estimate the consumption of the garment or lay the markers in REACH MARKER. This module enables printing of the patterns that are designed in the software.



Module name and storage area

The window headings specify the name of the module with version information, and the path of the stored file.

[illegible]

Menu bar

A menu is a list of items. Listed under each menu item are submenus. The menu also lists out the hot keys that are associated with a particular feature.

Hot keys

Hotkeys enable quick access to the desired feature. For example, the hotkey Ctrl + S saves the piece that are displayed in REACH PDS.

Toolbar

The toolbar displays many tools; each button is associated with a particular feature. Any feature can be activated by a left mouse click. When the cursor moves over any tool bar option, REACH PDS displays the brief feature information of that option.

Working area

Below the tool bar is the working area. The working area has a black background. The work area displays all the pieces, tracings, piece information, and size information of the style that the user is currently working.

The four different user input in the REACH PDS work area are listed as given below:

Left mouse click

Activates any feature that is selected by the user. Follow the hint message displayed to carry out the task of a particular feature.

Right mouse click

This feature works in two ways. Firstly, when any selected feature is operating, this feature will cancel the operation. Secondly, this feature helps in selecting the pieces from a group of pieces.

Right mouse double-click

Double clicking the right mouse helps in the selection of the piece that is to be displayed in the working area. All other pieces are not on display.

Mouse move

When you move the cursor over the working area, the status area will display the current coordinates. It also displays the modification that would occur by left-mouse click.

Move point area

The move point area is a small pop-window of tools that used to position the coordinates of the current tools. It is useful while designing a new pattern. It can be repositioned anywhere in the REACH PDS window.

Edit window area

It is useful for pattern modification, base pattern creation and also for making repeated marking on a pattern. The changes that are desired in the next marked position have to enter in the fields of the window. The changes are applied when a user makes the next mark in the working area.

Piece bar area

The Piece Bar Area is the list out all the pieces that are currently available in the storage area displays only six pieces in REACH PDS. The other pieces are accessible using the vertical scroll bar. If any modification are made to the piece, the corresponding piece has a blue star marked on it, indicating that piece has been modified.

Tools and option area

This Area displays the various option, that area available for particular feature. The setting window also may appear as a pop-up window.

Status bar area

The area displays the feature of the tool which is selected by the user, there are ten sections in the status bar which displays the hint message, the current X and Y coordinate values, deviation of one point from another point, the length of the curve or pattern, base size & unit of pattern etc.

LESSON 8&9 (3) : Menu and commands

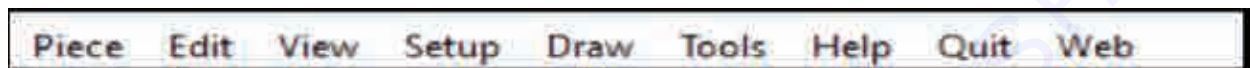
Objectives

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 a menu heading 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

Piece	Edit	View	Setup	Draw
New				Ctrl+N
Add				Ctrl+A
Rename				
Delete				
Open				Ctrl+O
Save				Ctrl+S
Save All				Ctrl+K
Open Tracing				
Save Tracing				
Import				Ctrl+I
Export				Ctrl+E
Plot				Ctrl+P
Digitize				Ctrl+D
History				Ctrl+H

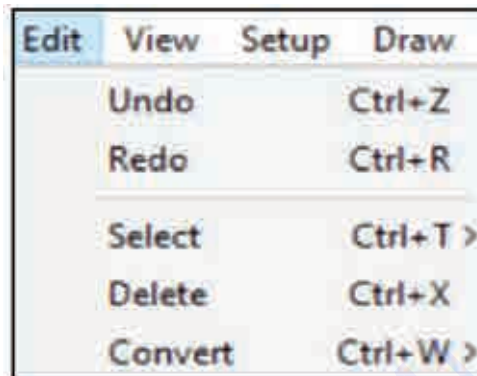
NEW (Ctrl +N): Create a new Style, Piece or clear the tracing. You will see a dialog box as shown below:



- **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.

- **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:



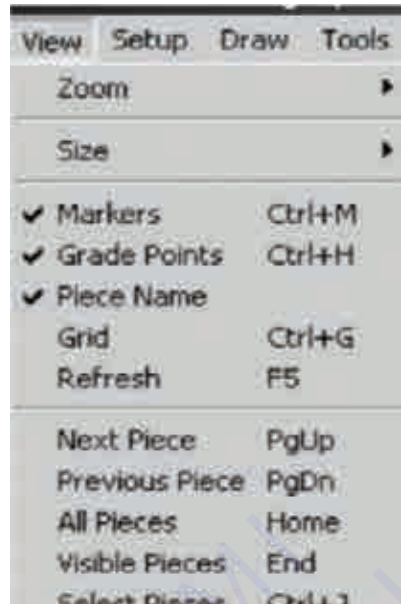
- **Tracing in area:** This is to select all our tracings using area selection/window method.
- **Internal:** This is to select all our internals elements created inside a piece. Notch is not selected using this tool.
- **Tracing:** This is to select a tracing segment wise. This will enable you to select 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.

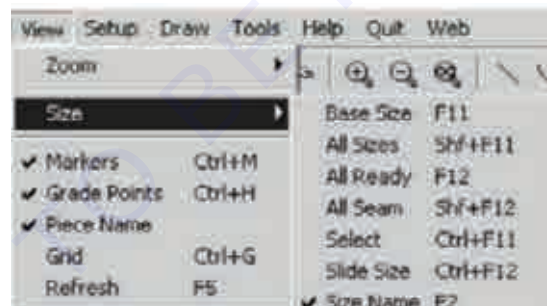
The following various options/features available in the ZOOM sub-menu:

- **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.

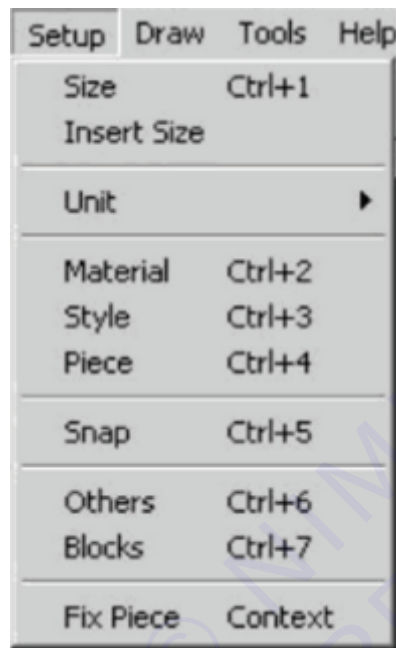
- **Base Size:** It is used to view only the Base Size on screen.
- **All Sizes:** It is used to view All Sizes as nested on the screen.
- **All Ready:** It is used to view all the components/patterns to the ready mode/sewing line mode.



- **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:** It 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.

- **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.

SNo	Size	Color
1	s	
2	m	
3	l	
4	xl	

Apply [Icon] [Icon] Back

- **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.

Size Name

Insert Append Back

- **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.

The image shows a 'Style' dialog box with the following fields and controls:

- Name:** Text field containing 'front'.
- Client:** Empty text field.
- Order No:** Empty text field.
- Base Size:** Dropdown menu.
- Season:** Empty text field.
- Unit:** Dropdown menu showing 'Cms'.
- Buttons:** 'Apply' and 'Back' at the bottom.

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.

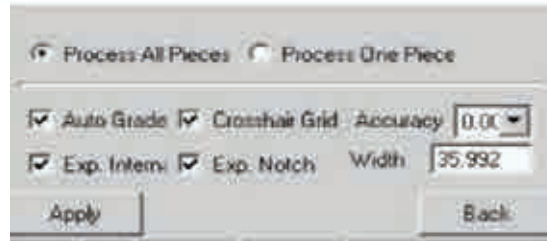
The image shows the 'Piece Attributes' dialog box with a table of attributes for various pieces:

sNo	Piece	Cut	Material	Way	FlipX	FlipY	Annotate
1	Back Cl	1		Any	☐	☐	\$PIECE...
2	Sk	1	Shell	Two	☐	☒	\$PIECE...
3	Colla...	1	Shell	Two	☐	☒	\$PIECE...
4	Collar	1	Shell	Two	☐	☒	\$PIECE...
5	Cuff	1	Shell	Two	☐	☒	\$PIECE...
6	Placket	1	Shell	Two	☐	☒	\$PIECE...
7	Pocket	1	Shell	Two	☐	☒	\$PIECE...
8	Sleeve	1	Shell	Two	☐	☒	\$PIECE...
9	Yoke	1	Shell	Two	☐	☒	\$PIECE...
*					☐	☐	

At the bottom, there are buttons for 'Apply', 'X', and 'Back', along with a status bar showing 'Back Cl'.

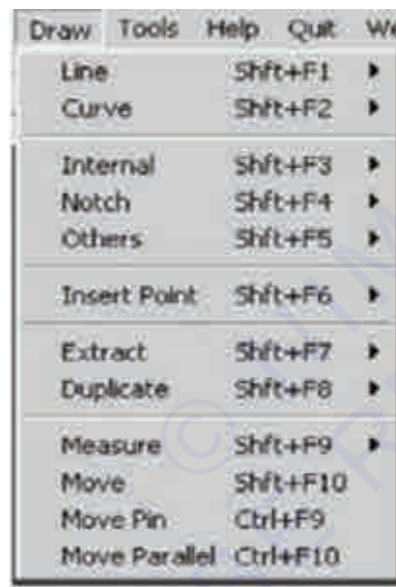
- **Snap (Ctrl + 5):** It is used to setup distance in pixels between the Cursor and the selected point or internal or notch etc.
 - Normally Snap Selection value for all attributes of the pieces is 10 pixels. That is when cursor is at a distance of 10 Pixels it sticks to the particular attribute e.g. 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.

- **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.

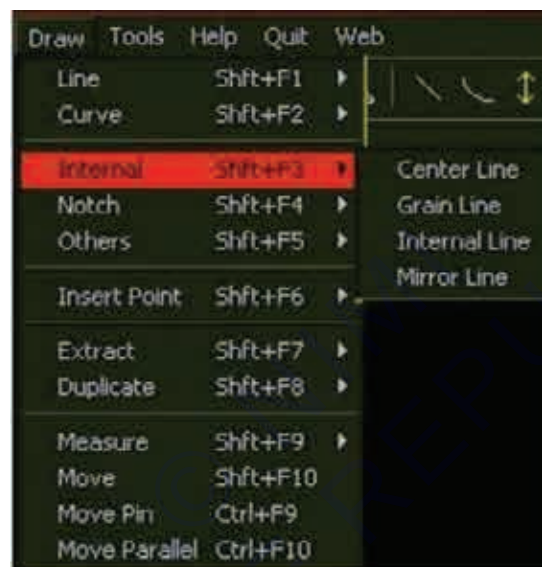
- **Arc:** It is used to create an arc.
- **3 Point Bezier:** It is used to create a Bezier curve by selecting the starting & ending points in the screen & then adjust it according to the shape of the curve required.
- **4 Point Bezier:** It is used to create a Bezier curve by selecting the 3 points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

- **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 internal 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.

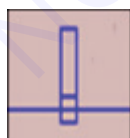
- V Notch



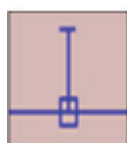
- I Notch:



- U Notch :

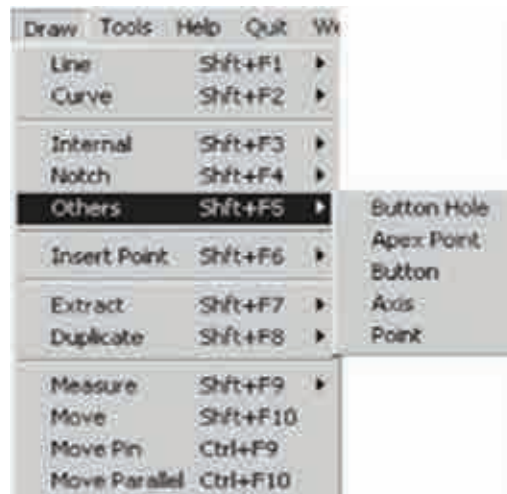


- T Notch :



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



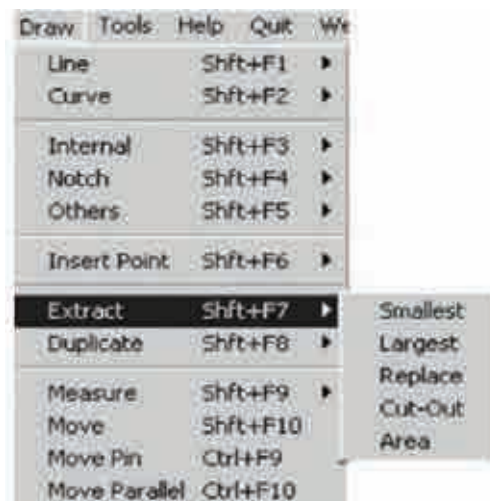
- **Button Hole:** This is used to make a mark inside the patterns so as to enhance the clarity of the pattern.
- **Apex Point:** Apex point is a marking inside the pattern pieces. It is used as a bust point inside the patterns.
- **Button:** This is a marking equivalent to Button Hole. To make sure 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:



- **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.

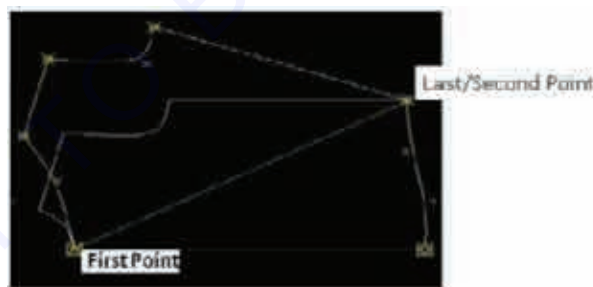
Measure (Shift+ F9): It is used to measure the following segments:

- Pattern segment
- Trace segment
- Internal Segment

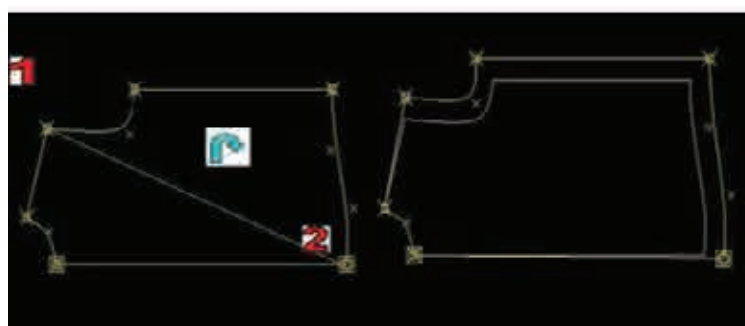
Move (Shift+ F10): This is used to move a Pattern, Internal, Tracing, Pattern Point, and Tracing Point etc. The following options/features available in the MOVE sub-menu

- **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.

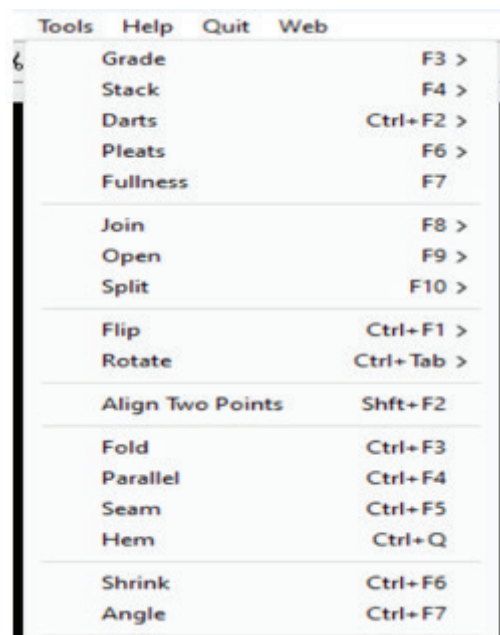
Move Pin (Ctrl +F9): This is used to move a Pattern with Move Pin length parameters using a specific value. First select the segment to be moved by clicking on two points on the pattern in a clockwise direction. Thus, enclosing the segment to be moved. Then move the segment by clicking on the pattern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



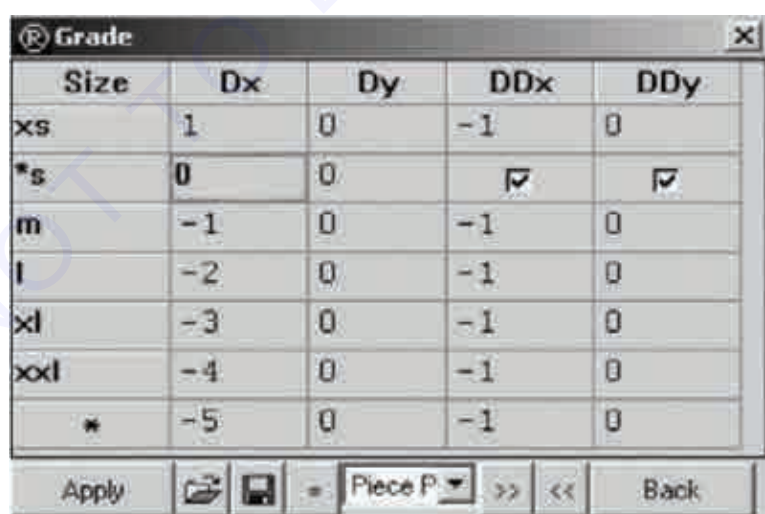
6 Tools menu



- **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.



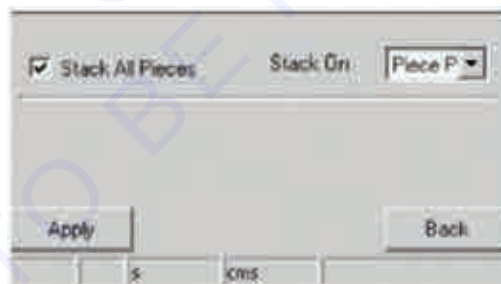
- **Regular:** This grading method allows you to enter grade values for all sizes, one at a time, so as to enable even grading between the sizes in the style.
- **Copy:** To copy the grading of both X and Y values.
- **Copy X:** To copy 'X' grading value of existing point to other points.

- **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.



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.

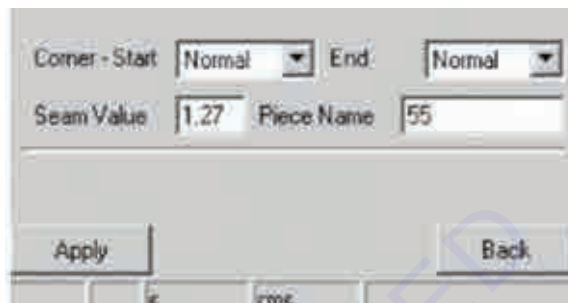
Facing : To open a facing:

- 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.

- 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.

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.

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 + I
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

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

Reach PDS

Tool Bar

	Create new Patterns		Get enclosed angle
	Add Pattern from another style		Move
	Open new style		Move Pin
	Save Pattern		Move Parallel
	Undo Last Change		Grade Patterns
	Redo Last change		Stack Patterns
	Select		Create Darts
	Delete select option		Create Pleats
	Convert drawing		Create fullness
	Mark Starting zoom area		Join two Patterns
	Zoom Out		Open a Pattern
	Zoom all		Cut a Pattern
	Draw lines		Flip Pattern
	Draw curves		Rotate Patterns
	Draw internals		Align Pattern Direction
	Draw Notches		Fold the Pattern
	Other Markings		Create Parallel
	Insert Point In curve		Add seam to the Pattern
	Extract Pattern		Add hem to the Pattern
	Duplicate drawing		Define matching points
	Measure Length		

LESSON 8&9 (4) : Grading

Objectives

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

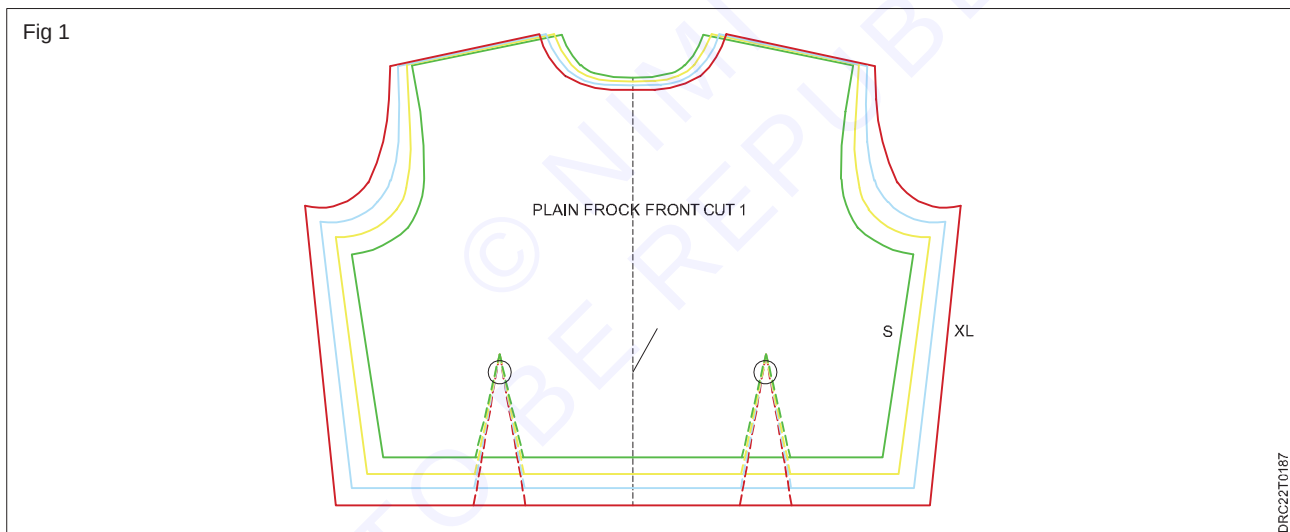
- explain about the grading

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 hrs 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 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

$$S \text{ to } M = 84 - 80 = 4\text{cms}$$

$$M \text{ to } L = 88 - 84 = 4\text{cms}$$

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 = $1/6 \text{ Neck} = 30/6 = 5\text{cms}$.

V.Q for M size = $1/6 \text{ Neck} = 36/6 = 6\text{cms}$.

Hence, the increment S to M of Neck measurement

= V.Q of M – V.Q of S

= $6 - 5 = 1\text{cm}$ or 10 mm

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 interval of M X VQ

= $6 \times 1/6$

= 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 indicating the direction. (Fig 3)

Fig 2

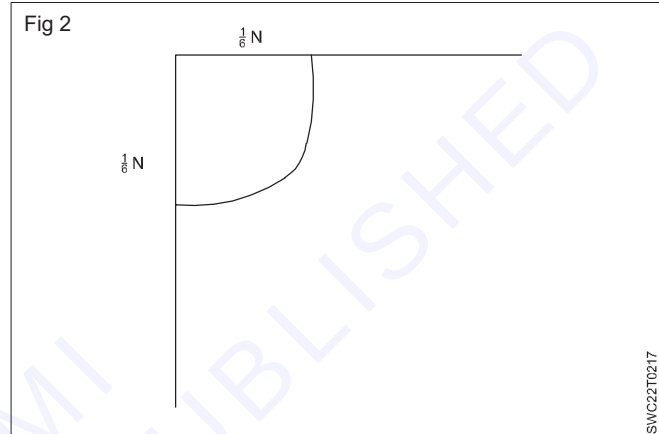
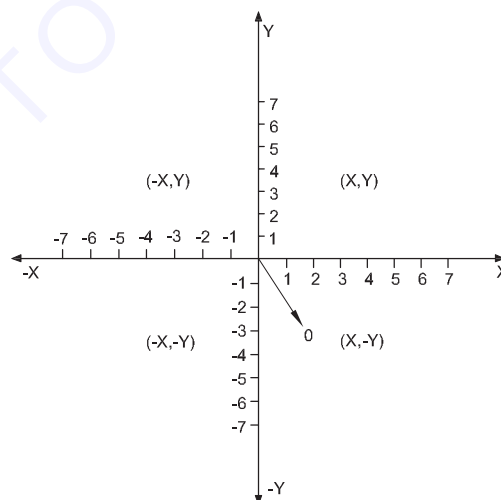


Fig 3



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

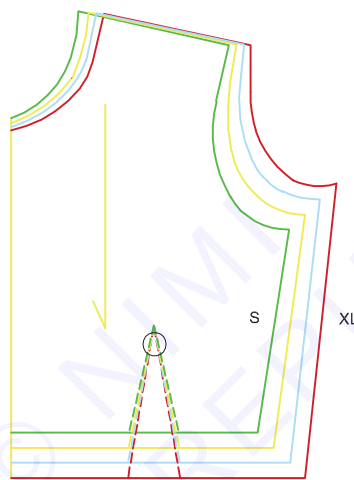
There are two types of pattern grading method. They are,

- 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



DRC22T0189

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.

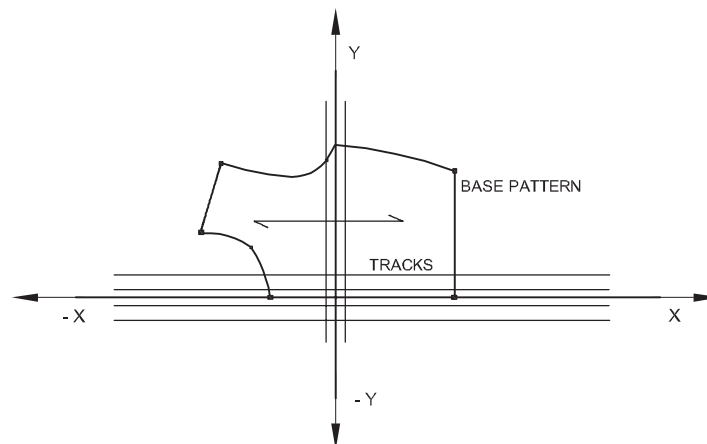
2 Track Shift Method

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.

Advantages

- 1 It is an accurate method.
- 2 It is suitable for all garments.

Fig 5



DRC22T0190

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.

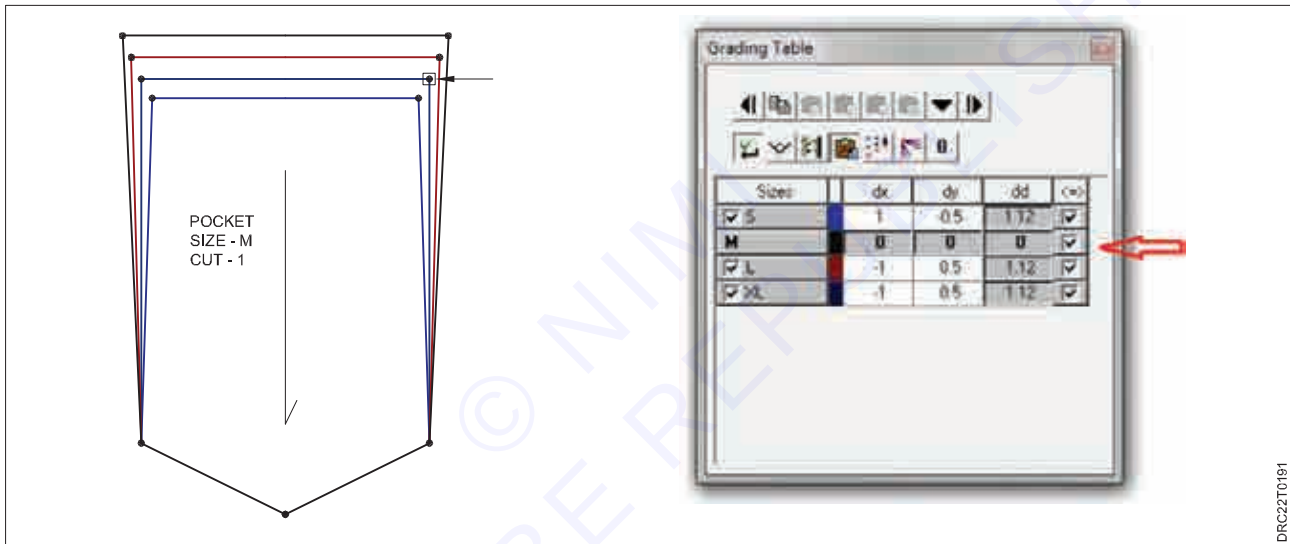
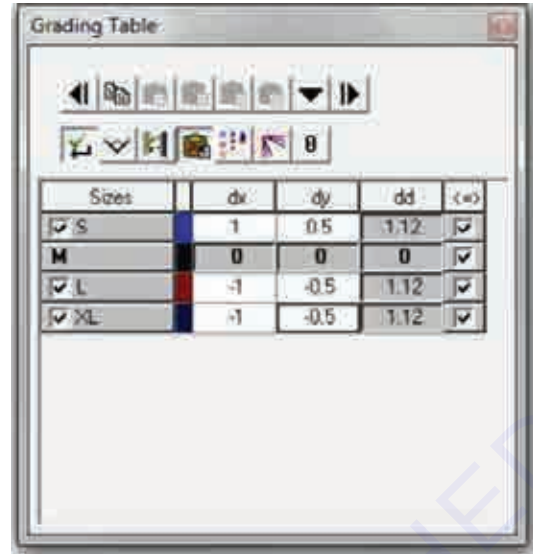
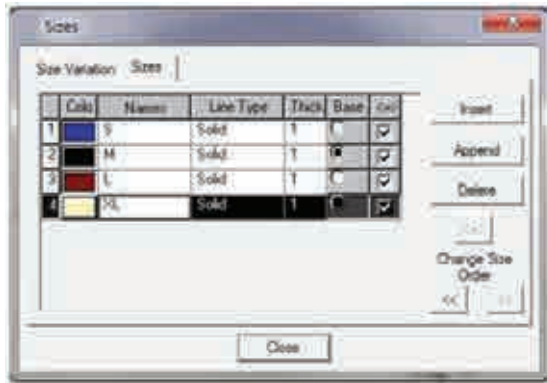
SIZE TABLE:

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.



DRC22T0191

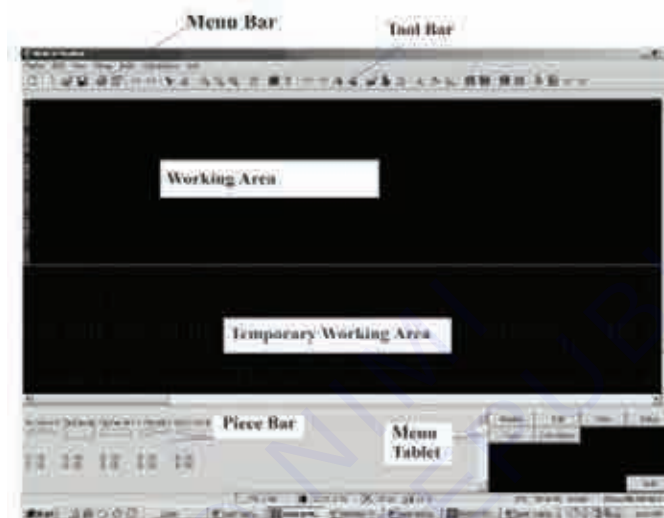
LESSON 8&9 (5) : Overview of reach marker

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.

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

LESSON 8&9(6) : Digitizing

Objectives

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

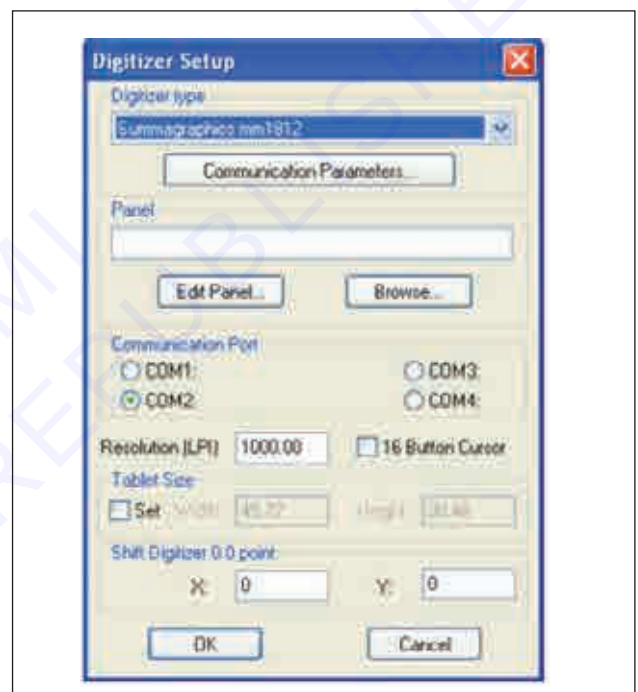
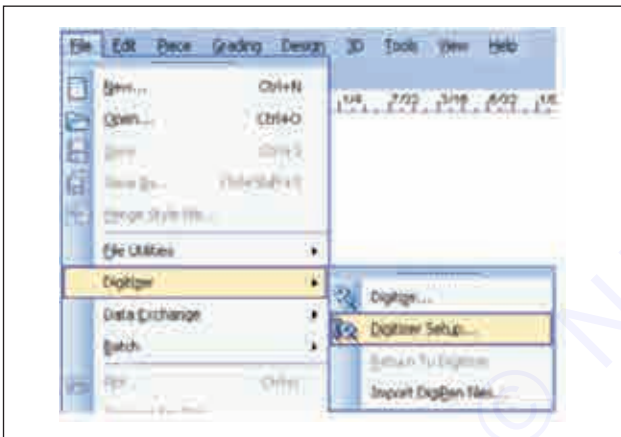
- understand the details of Digitizer tools and importance.

Digitizing - Tools & Importance

Digitizer Settings

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

- The Digitizer Settings window will appear:
- File>Digitizer>Digitizer Settings



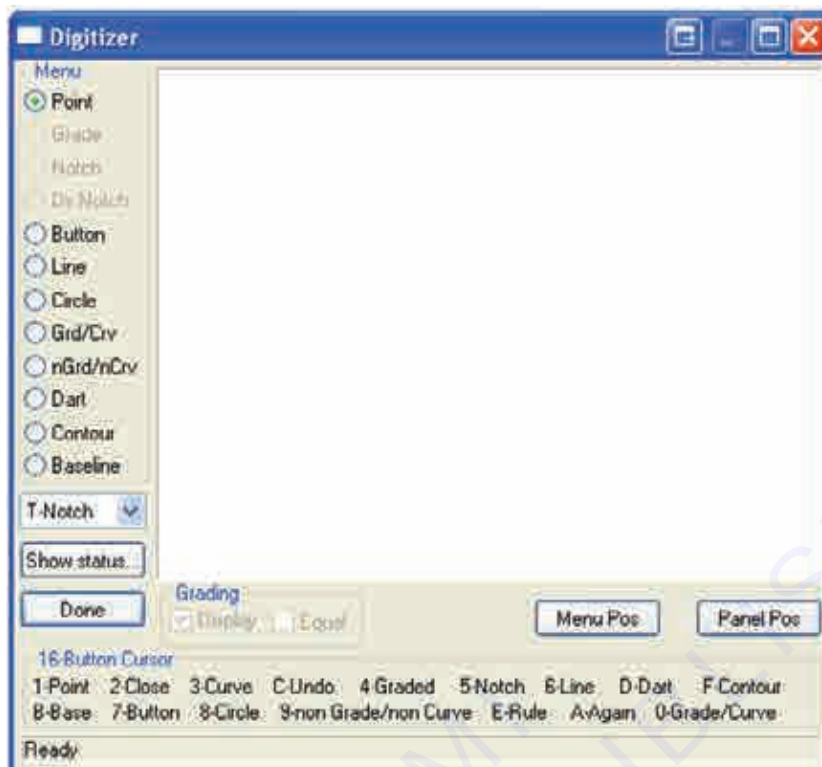
Digitizer Settings

- Check to Make sure that your Digitizer Type and Communication Parameters are set correctly for your type of digitizer.
- Go to Category:** Digitizer Install for a full listing of digitizers and their appropriate settings.

Digitizer Window Overview

- Digitize
 - Location:
- Menu
 - File>Digitizer>Digitize
- Toolbar
 - General
- Toolbox
 - Windows Tools

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:

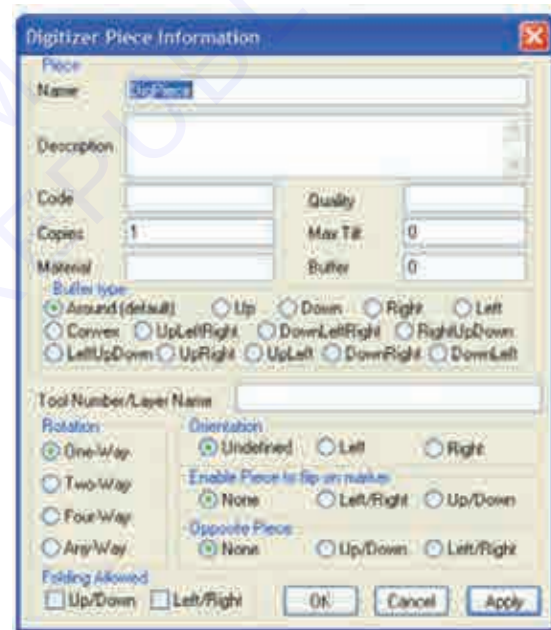
Button	Function
Point	Creates a graded, non-curve point along a contour
Grade	Marks the nested locations of a graded point
Notch	Creates a notch on an external contour
Dir.Notch	Creates a directional notch on an external contour
Button	Creates a button or drillhole on the inside of a closed piece
Line	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 status of the digitizer, as well as the default modes for types of internals.

- 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 digitizer 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.

LESSON 8&9 (7) : Introduction to 3D

Objectives

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

- explain about 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.



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.

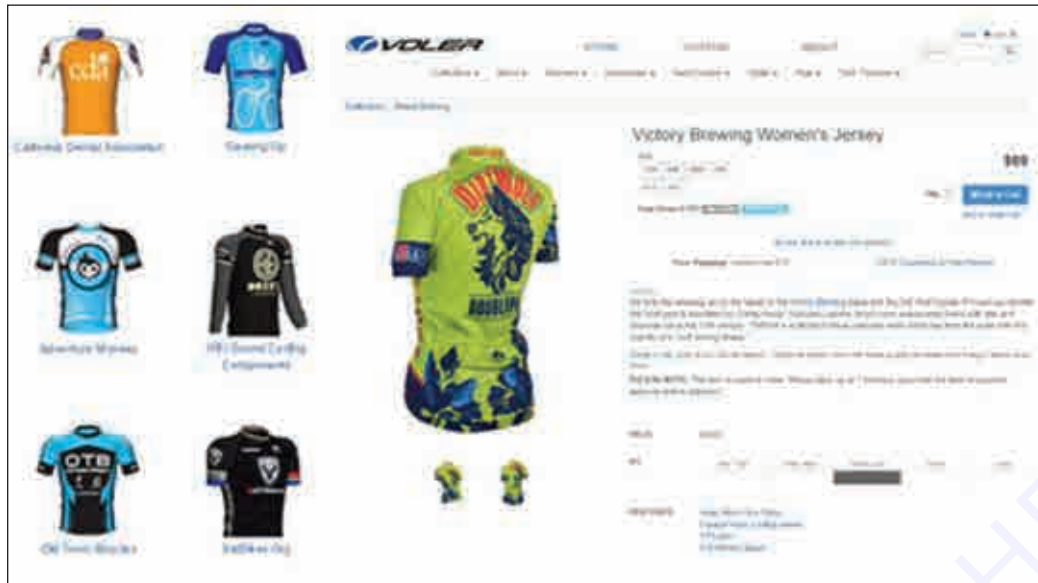
FABRIC SIMULATION

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.



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

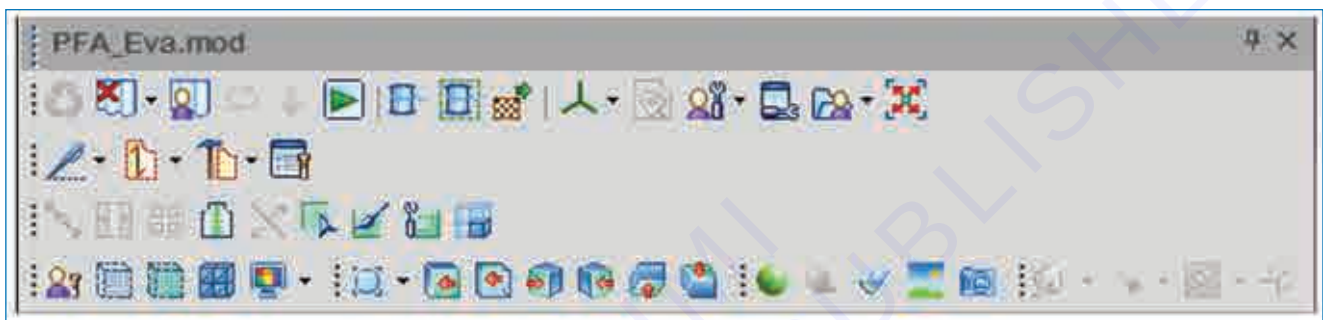


Note: You can always click Reset Toolbars to return to the default view.

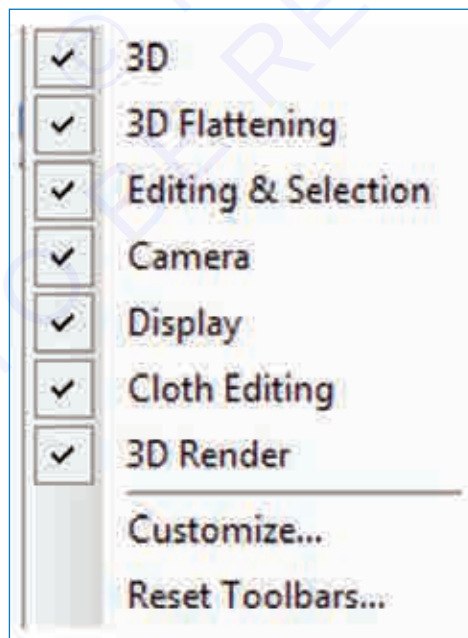
To navigate the 3D Toolbar:

- 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:



3D



Button	Description
	Allows you to refresh any changes that were made to your pattern. For more information, see Refresh.
	Allows you to remove the cloth from the 3D window. For more information, see 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 Lines.
	Allows you to clear all content from the 3D window. For more information, see Using the Clear 3D Window Tool.
	Allows you to place the cloth in the 3D window. For more information, see Place Cloth.
	Turn on Dynamic Updates. When turned on, the 3D window updates according to changes that are made in 2D. For more information, see Continuously Perform 2D to 3D Dynamic Updates.
	Click on Update Now, if Dynamic Updates is off and you want to update changes in the 3D window that were made in 2D. For more information, see Update 2D to 3D Now.
	Allows you to simulate the pattern. For more information, see Simulate Draping.
	Allows you to stitch your pieces together using the 3D Stitch Tool. For more information, see 3D Stitch.
	Allows you to select the stitches using the Select Stitch tool. For more information, see Select Stitch.
	Allows you to move the texture on your pattern in the 3D window. For more information, see Move Texture.
	Allows you to select and move pieces in the 3D window. For more information, see 3D Move Piece.
	Allows you to rotate selected items such as pieces, circumference disks, clt items, models and model parts, i.e., shoulder pads in the 3D window. For more information, see 3D Rotate Piece.
	Allows you to scale avatars, rigid parts, models, etc. in the 3D window. For more information, see 3D Scale Model.
	Allows you to stretch or shrink pieces in the 3D window, for initial positioning. Once you simulate, the piece will go back to its original size. For more information, see 3D Scale Piece.
	Allows you to move or rotate objects or pieces in the 3D window, either by relative or absolute values. For more information, see 3D Transform Piece.
	Allows you to use the 3D digitizer. For more information, see 3D Digitizer.
	Allows you to view the model properties options. For more information see, Model Properties.
	Allows you to measure between two points on pieces/3D objects in the 3D window. For more information, see Tape Measure.
	Allows you to measure the circumference of the avatar in the 3D window. For more information, see Add Circumference Measure.

	Allows you to use a bounding box to measure the height, width and depth of 3D objects. For more information, see Bounding Box Measure.
	Allows you to add a description which points to a certain spot on the 3D model or cloth. For more information, see 3D Text.
	Allows you to view the Simulation Properties. For more information, see Simulation Properties.
	Allows you to load models/3D objects that are supported by Optitex. For more information, see Load Model.
	Allows you to save content of the 3D window in a 3D file format that is supported by Optitex. For more information, see Save Model.
	Allows you to save a cloth file (CLT) A CLT file contains the cloth, shaders, textures, etc. For more information, see Save Cloth.
	Allows you to send the content of the 3D Window to a printer. For more information, see Print Model.
	Click to view the 3D window in full screen mode. To move out of full screen mode, press Shift Ctrl F on your keyboard. For more information, see Full Screen.

3D Flattening



Button	Description
	Allows you to draft lines directly on the 3D object. For more information, see Draw Path.
	Allows you to create a notch on a pin or on a line drafted on the 3D object. For more information, see 3D Notch
	Allows you to add a button on a patch area on a 3D object. For more information, see Using the 3D Button Tool.
	Allows you to create symmetry of the drafted lines. For more information, see Using the Mirror Lines Tool.
	Allows you to set the 3D baseline. For more information, see 3D Baseline.
	Allows you to move a flattening pin and to reshape a curve line between two flattening pins. For more information, see Using the Edit Pins Tool.
	Allows you to use the build patch tool. For more information, see Build Patch.
	Allows you to transform 3D objects into 2D patterns. For more information, see Flatten All.
	Allows you to transform 3D objects into 2D patterns. For more information, see Flatten Whole Mesh.
	Allows you to view the Flattening Options dialog. For more information. Using Flattening Tools.

Editing & Selection



Button	Description
	Allows you to add a vertex. For more information, see Add Vertex Tool.
	Allows you to build a bridge. For more information, see Bridge Tool.
	Allows you to combine surfaces. For more information, see Using the Combine Tool to Combine Surfaces.
	Allows you to weld. For more information, see Using the Weld Selected Object Tool.
	Allows you to flip the normals. For more information, see Flip Normals.
	Allows to you to select a 3D item. For more information, see Selection Tools.
	Allows you to select 3D items using the paint brush. For more information, see Selection Tools.
	Allows you to view the 3D Selection options dialog. For more information, see Selection Tools.
	Allows you to use the View Reference Mode option. For more information, see View Reference Mode.

Camera



Button	Description
	Allows you to reset the camera in 3D and bring the content of the 3D window back to the default position. For more information, see Home.
	Allows you to focus on the selected mesh (3D avatar/pieces) and change the center focus of the 3D rotation. For more information, see Frame Selected.
	Allows you to turn the model around the Y axis continually. For more information, see Auto Rotate.
	Allows you to lock the front facing view rotation. For more information, see Tilt Camera.
	Allows you to view the front view of the content in the 3D window. For more information, see Camera Buttons.
	Allows you to view the rear view of the content in the 3D window. For more information, see Camera Buttons.
	Allows you to view the left view of the content in the 3D window. For more information, see Camera Buttons.
	Allows you to view the right view of the content in the 3D window. For more information, see Camera Buttons.

	Allows you to view the bottom view of the content in the 3D window. For more information, see Camera Buttons.
	Allows you to view the upper view of the content in the 3D window. For more information, see Camera Buttons.

Display



Button	Description
	Allows you to either Show/Hide Model. For more information, see Using the Show/Hide Model Tool.
	Allows you to view the pattern and avatar in X-ray display mode. For more information, see X-Ray Display.
	Allows you to view the pattern and avatar in wireframe display mode. For more information, see Wireframe Display.
	Allows you to view the pattern in springs mode. For more information, see Show Springs.
	Allows you to view each 3D cloth piece in a unique color. For more information, see Display Unique Colors.
	Allows you to inspect simulated cloth objects via a colored map depicting amounts of stretching, tension and distance between the cloth and the model. For more information, see Using the Tension Map.
	Allows you to apply the background of the fabric on the 3D model. For more information, see Use 2D Back-ground with Shader.
	Allows you to display the XYZ axes in the 3D window. For more information, see Show Center Axes.
	Allows you to determine which side of a surface is out or in. For more information, see Normals.
	Allows you to display only selected pieces in the 3D window. For more information, see Show Selected Piece.
	Allows you to depict depth in the 3D window by casting and obstructing light. For more information, see Display Shadows.
	Allows you to display a grid in the 3D window. For more information, see Show Grid.

Cloth Editing



Button	Description
	Allows you to create and define mating rules. For more information, see Create Mating Rules.

	Allows you to view and edit defined mating rules. For more information, see Mating Rules Manager.
	Allows you to use the Magic Glove so you can move pieces on the 3D model during simulation. For more in-formation, see Magic Glove.
	Allows you to move 3D objects before/during/after simulation and add a pin so you can move the pin to fur-ther alter. For more information, see Magic Glove + Pin.
	Allows you to use the Pin Manipulator so you can pin your cloth and manipulate your pattern in the 3D win-dow. For more information, see Using the Pin Manipulator Tool.
	Allows you to move the location of a pin that was added using the Magic Glove. For more information, see Move Pin.
	Allows you to select a single pin and remove it. For more information, see Remove Single Pin.
	Allows you to clear all the pins that were added using the Magic Glove. For more information, see Clear Pins.
	Allows you to increase the resolution of the cloth in the 3D window. For more information, see Refine Cloth.
	Allows you to decrease the resolution of the cloth in the 3D window. For more information, see Simplify Cloth.
	Allows you to smooth out your pattern after simulation. For more information, see Smooth Cloth.

3D Render



Button	Description
	Allows you to view your content in the 3D window in HQR mode (High Quality Rendering). For more infor-mation, see Using HQR to View your 3D Sample.
	Allows you to view your content in the 3D window in PR3D mode (Photorealistic Rendering). For more infor-mation, see Viewing Your Model in PhotoRealistic 3D Mode.
	Allows you to change the lighting presets. For more information, see Modifying the Lighting Via Lighting Editor.
	Allows you to change the background of the 3D window. For more information, see Edit Background.
	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 Snapshot.

SOFTWARE - 2

(8 & 9)

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MODULE 3 : CAD Software - Software - 2

LESSON 8 & 9 : Introduction to PDS

Objectives

At the end of this lesson you shall be able to

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

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.
- 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

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	

4 Update pieces →

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

5 Points & Notches →

Point on Contur	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
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11 Base Line

New Base line	Rotate to Baseline	Baseline Direction	Base Line Perpendicular
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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
the pattern /

- o Horizontal - First select the guide line
- o Vertical - Then select the angle arrow, in the box
- o Angle 45° - 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

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. zabra.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

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

X PDS REPORT

Report contains

- Piece information
- Internal information
- Material information

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

Piece properties

Piece Properties	
Main	
Protected	
Name	Collar
Unique PieceNameUoo19	
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 Mannual

Tool bar Option → To/add/ remove buttons tool

ARRANGE WORK AREA →(Ctrl + K)

It arranges all the patterns in the screen, which are farly 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

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.

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.

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 Lines Between Segments	Ctrl+Shift+T	Cuts off two internal lines at their intersection point.
Hole OverCut		Adds internal contours between two segments. 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.

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.

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 <u>_2_</u> Extension Direction
Extend by <u>_2cm_</u>  

- 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 / ammend 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

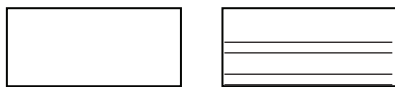
- To Trim more line at same time
- Select the Trim Rectangle tool and
- Select the multi lines. Then it Trims.

Trace and trim: (Control + Shift + T)

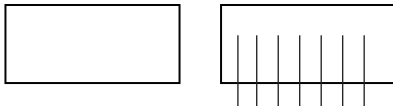
- It traces the line and Trims the line
- First Select the Trace & Trim tool
- Then Select the line to be Traced & Trimmed
- Select the point to be trace then select the Perimeter line upto be extended.
The line gets extended.

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 circle.
- 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.

Join piece (J) :

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

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

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

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.

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.

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

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

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.

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.

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

POINT ATTRIBUTES

TYPE	Name
Grade	
Curve	
X	Y
Previous	Next
Absolute	
Proportion %	

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

POINT ATTRIBUTES

TYPE	Name
Grade	
Curve	
X	Y
Previous	Next
Absolute	
Proportion %	

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

X	Y
Distance	Angle
OK	Cancel

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

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
- Select Current Piece

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

Add Point to all Notches

* Current piece only

OK

Set Basic Seam Line

Seam Width

Piece

All Piece in the File

All Piece on the Work area

All Selected Piece

• Current Piece only

- 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

CREATE WAVE	
Wave	10
Internal Points on Wave 4	
Height	3
Angle	
OK	
Cancel	

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

Name		Duplicate	
Radius	5 cm		3
Location			2
Duplicate	Perform		

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 button relative to the selected point			
X	3	Y	
		OK	

Add several buttons

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

Move the point relative to the selected point			
From Point		To Segment	
X	0	Y	0
		OK	

Evenly distribute Buttons Along Line			
Number and Placement of Buttons			
Along Line	3	Radius	0.5
Before line	-----		
After Line	-----		

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)

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 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

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

Evenly distribute lines Along Segment

Line Numbers	40	Cancel
Line Length	12	
Blank length	0.45	
OK		

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

Create Arc

Number of points

Along Arc → 8

Radius → 14

Distance →

OK

CANCEL

Create Wave

Wave → 10

Internal Point → 3

Height → 2

Angle → 0

*Internal Wave * Contour Change

OK

CANCEL

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)

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.

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

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
- Create 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

Main

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

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	

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

Set Line Distance

From First Point	→ 2
From Second point	→ 2
OK	

Move point (M)

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

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 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 points parallelly (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 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

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 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.

Move Point

From Last point

→ X ↑ Y

OK Cancel

Move Point along Contour

Distance

Min. Distance → 68.5

Max. Distance → 70.5

Ok

Move Segment Proportionally

From Last point

→ X ↑ Y

OK Cancel

Move Segment in a parallel motion

From Last point

→ X ↑ Y

OK Cancel

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

Move Object selected by a rectangular area

From Last point

→ X ↑ Y

- 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.

Rotation	
Angle	Distance
OK -90°	Cancel 20

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.

Rotation	
Angle	Distance
OK -90°	Cancel 20

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 Piece or Internal	
Angle 90°	Rotate Left Rotate Right
• Piece • Select Internals • Piece over Baseline	Close

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.

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 internal 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.

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.

Swap Segment of Contour

First Point Swap

- Substitute

Last Point Swap

- Substitute

OK

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

Create Line Parallel to Segment

Distance → 2 cm

OK

Introduction of Marker

Marker

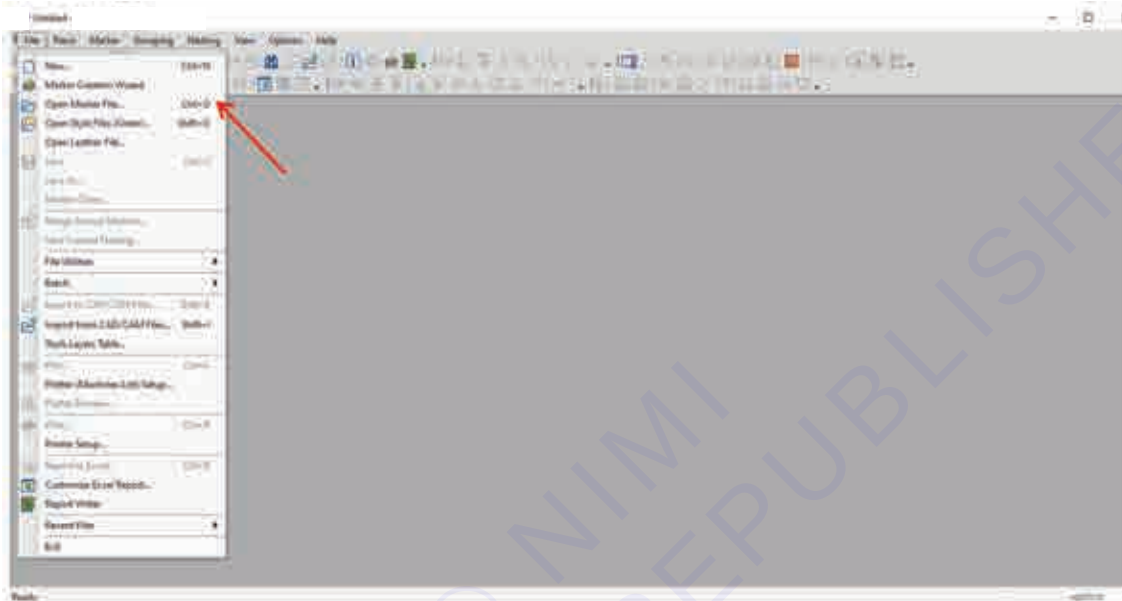
- is a diagram of a precise arrangement of pattern pieces for a specific style and the sizes to be cut from a single spread.

This marker is computerized marker making.

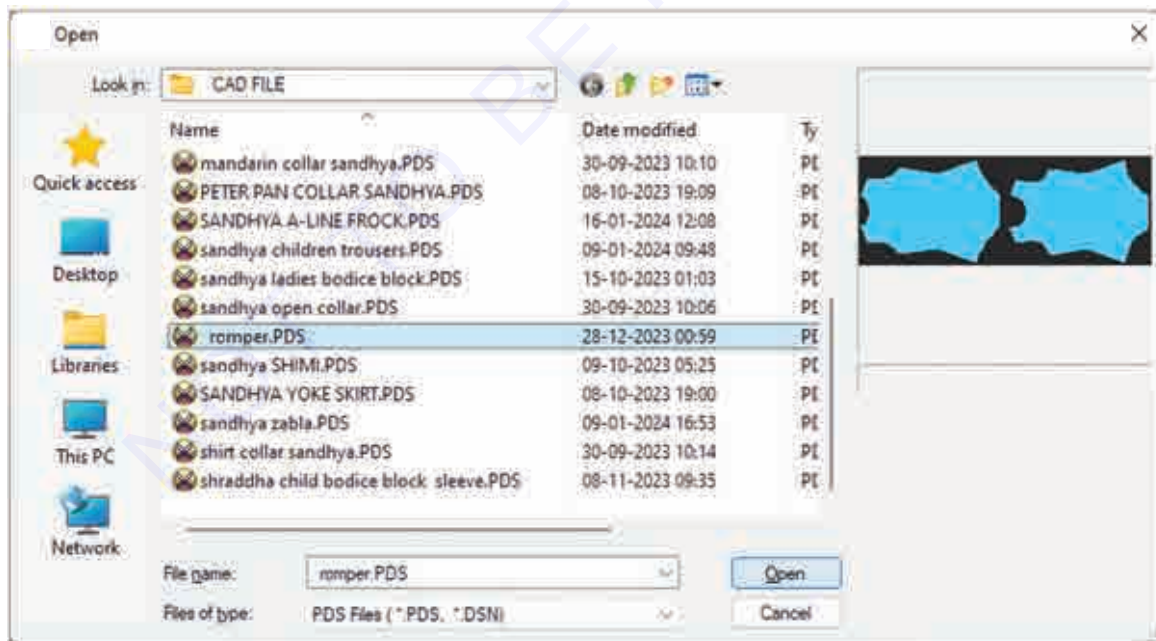
In PDS Software, as per the below details, need to make the Marker.

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



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

Order for Marker Making

Style File: F:\CAD FILE\romper.PDS

Style Name: Style Set: No Style Set (all the Pieces)

Materials Selection: << Add

Sizes Info Pieces Info

	Size name	Bundles	Sets with Alternative	Rotate 90
1	S	1	0	None
2	M	1	0	None
3	L	1	0	None
4	XL	1	0	None

Multiply Bundle Quantities: Multiply by: Apply
☐ Selected sizes only

Auto Alternative Placing: Ratio: % Apply

OK Cancel Import from Excel Export to Excel Print Report

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

Order for Marker Making

Style File: F:\CAD FILE\romper.PDS

Style Name: 12345 Style Set: No Style Set (all the Pieces)

Materials Selection: << Add COTTON

Sizes Info Pieces Info

	Size name	Bundles	Sets with Alternative	Rotate 90
1	S	1	0	None
2	M	1	0	None
3	L	1	0	None
4	XL	1	0	None

Multiply Bundle Quantities: Multiply by: Apply
☐ Selected sizes only

Auto Alternative Placing: Ratio: % Apply

OK Cancel Import from Excel Export to Excel Print Report

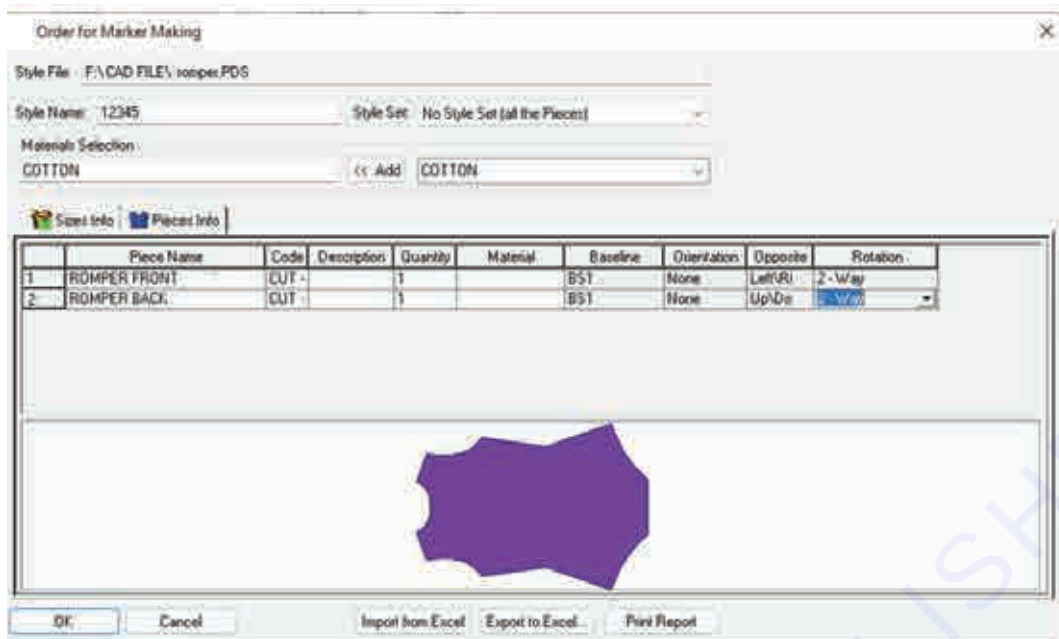
Click the bundles → enter the number of pattern sizes → next sets with alternative →

	Size name	Bundles	Sets with Alternative	Rotate 90
1	S	2	1	None
2	M	2	1	None
3	L	2	1	None
4	XL	2	1	None

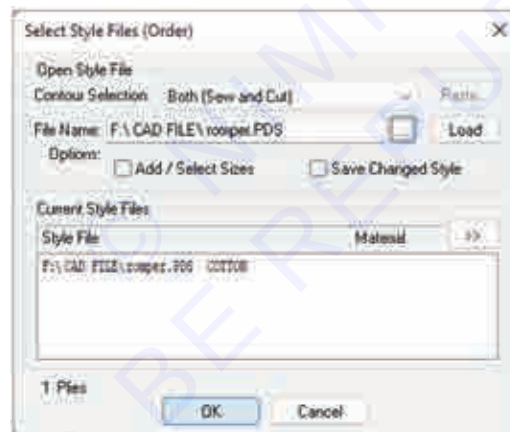
Click pieces into → click rotation → select the scroll button → select as per requirement one way or 2 way

	Piece Name	Code	Description	Quantity	Material	Baseline	Orientation	Opposite	Rotation
1	ROMPER FRONT	CUT		1		BS1	None	None	1-Way
2	ROMPER BACK	CUT		1		BS1	None	None	1-Way

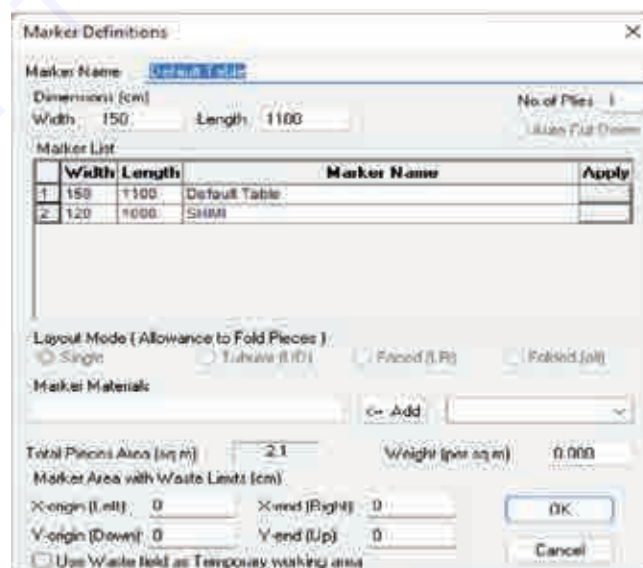
Click opposite option → click the scroll option left /Right or up/down of the fabric used in the marler → click ok.



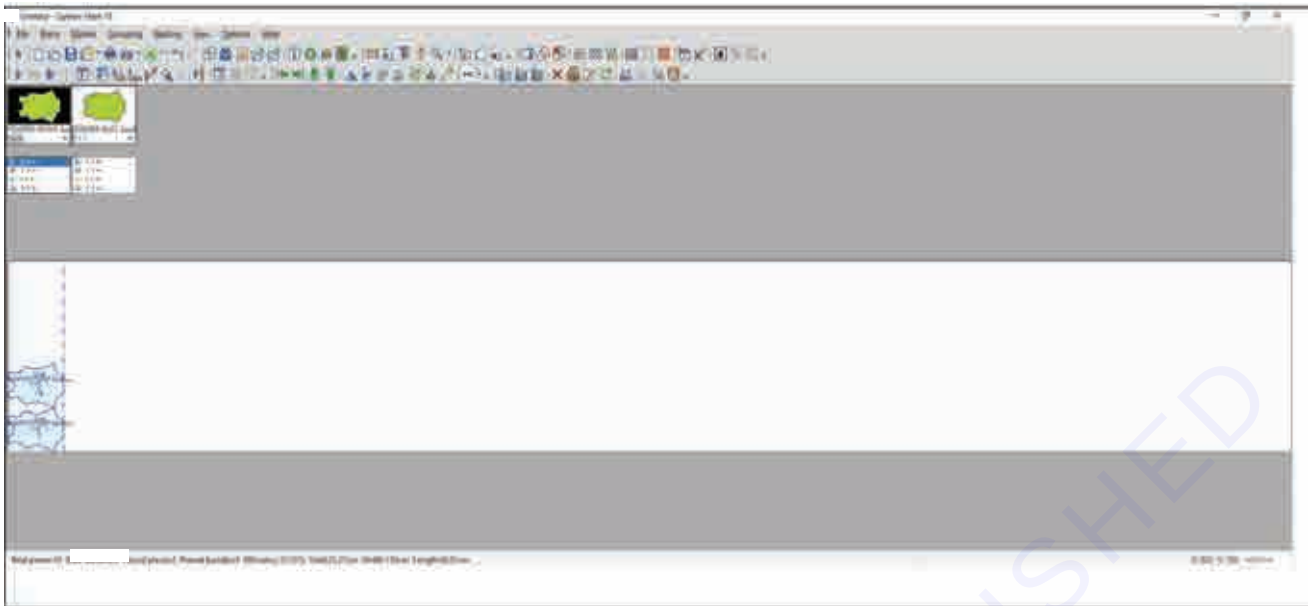
Dialogue box got open → Click ok.



Click ctrl+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.

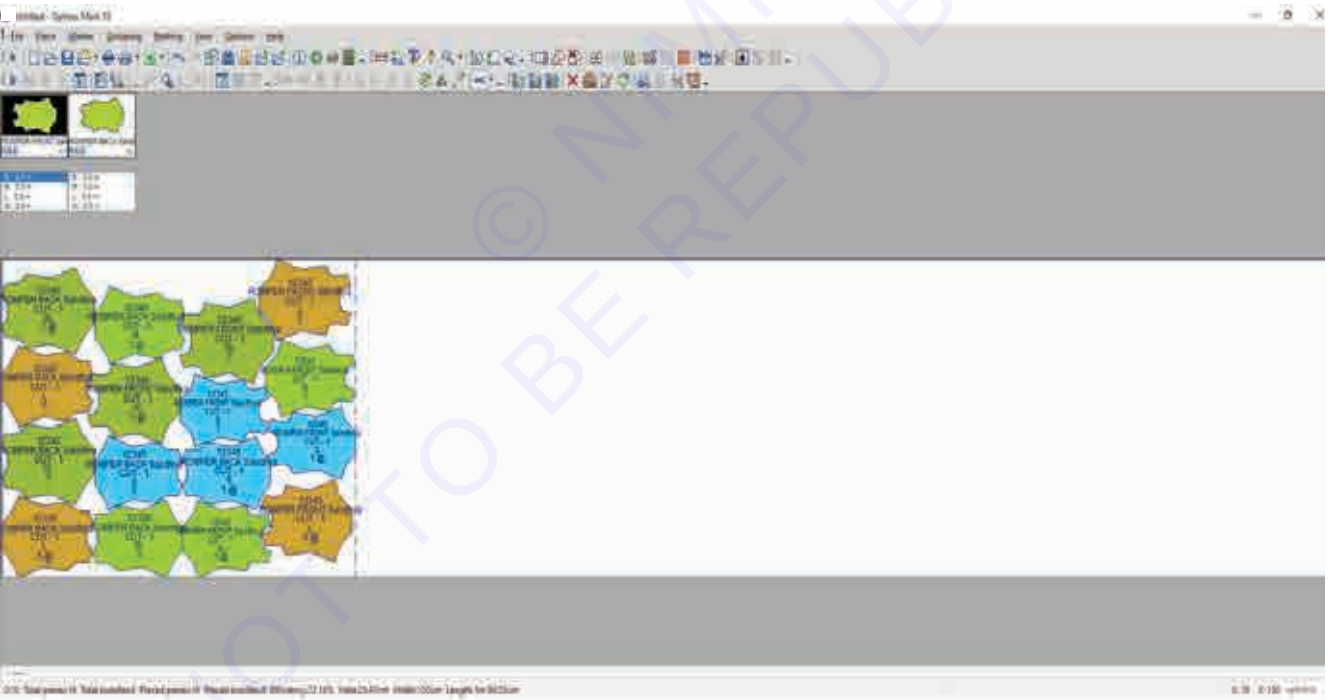


This marker page get open → need to pull all the pattern and place inside the marker.



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.



◆ MODULE 4 : Apparel Enterprises & Marketing ◆

Lesson 10 - 12 (1) : Apparel Enterprises

Objectives

At the end of this lesson you shall be able to

- understand regarding Apparel Enterprises and their roles in marketing
- know various types of Apparel Enterprises along with their works.

Apparel Enterprises

Apparel Enterprises can be defined as the concerns which are ready to carry on new undertakings in the field of apparel marketing. Apparel marketing is not a single process and lot of additional works should be needed to promote the marketing. They provide services or act as advisers, sources of information and propagators of fashion news. The followings are the various types and works of apparel enterprises.

Apparel Career Reporting and Services

They are called as FIS. (Fashion Information Service). Their clients are located worldwide and include fiber companies, textile producers, producers of men's, women's and children's wear, retailers, buying offices and accessories & cosmetics companies. They are doing the fashion forecasting. They polishing magazines, brochures for fashion updates.

Consulting agencies

They will tell the manufacturers - hired by fashion producers, retailers to assist them in some phase of their fashion operations. They will giving advices regarding current and coming trends, style numbers, name of producers and the wholesale prices

Buying Offices or Merchandising Offices

The work is a paid service for retailers to help them locate desirable goods in the market. They are playing an important role but unpaid services for manufacturers by bringing their merchandise to the attention of retailers when it met their needs and standards.

Promotion agencies and organizations

They are helping the retail clients. They helping in product development. To assist retailers with merchandising activities, sourcing, and logistics related to importing, information providers etc.

Trade Association

- They are playing an important role in the fashion industry. The association has business and business executives with common interest. They provide trade and technical information, market research etc. The American Apparel and Manufacturers Association (AAMA) is an example.
- Fashion forecasting is the process of identification of which fashion or styles will be popular during a future period by looking at the past experience and current trends in the context of environmental issues.
- They provide vital sources to keep the industry going.
- They devote their full energies to observe and analyze the fashion scene and assist producers and retailers in clarifying their own thinking about it.
- They help by providing a coherent fashion message to the consuming public, thus impetus to trends in the marketing.

Lesson 10 - 12 (2) : Apparel marketing

Objectives

At the end of this lesson you shall be able to

- understand marketing and classification of markets
- identify a trend and recognize its movement in local markets as affected by global market
- know about Retail business and management.

Market

Market is a group of potential customers or place or area in which buyers and sellers assemble.

Marketing

Marketing is a series of activities that fashion businesses undertake so that customers will buy products from them instead of their competitors. Marketing is the process of developing, promoting, and distributing products to satisfy customers' needs and wants.

Sourcing

Through the internet, apparel manufacturers and retailers can source fabric and finished goods throughout the world. This is used for small and medium sized companies also to access worldwide which was previously available to only larger counterparts. This is used for the buying and designing of apparel and finished goods.

Changing trends in Fashions

The fashion apparel industry has significantly evolved, particularly over the last 20 years, when the boundaries of the industry started to expand. The changing dynamics of the fashion industry since then, such as the fading of mass production, increase in number of fashion seasons, and modified structural characteristics in the supply chain have forced retailers to desire low cost and flexibility in design, quality, delivery and speed to market.

In addition to speed to market and design, marketing and capital investment have also been identified as the driving forces of competitiveness in the fashion apparel industry suggested 'sense and respond' as the key strategy to maintain a profitable position in the increasingly dynamic and demanding market. A key defining characteristic of rapid responsiveness and greater flexibility, in this context, is to maintain closer relationships between suppliers and buyers. Looking at the basic structure of the fashion industry until the late 1980s, traditionally fashion apparel retailers used their capability of forecasting consumer demand and fashion trends (known as ready-to-wear) long before the actual time of consumption in order to compete in the market. However, recent years have seen fashion retailers compete with others by ensuring speed to market with their ability to provide rapidly the fashion trends revealed by fashion shows and runways. Such retailers could be credited with the adoption of quick

fashion' that is an outcome of an unplanned process on the reduced time gap between designing and consumption on a seasonal basis.

Today's fashion market is highly competitive and the constant need to 'refresh' product ranges means that there is an inevitable move by many retailers to extend the number of 'seasons', that is, the frequency with which the entire merchandise within a store is changed. With the emergence of small collections of merchandise, fashion retailers are encouraging consumers to visit their stores more frequently with the idea of 'Here Today, Gone Tomorrow'. This indicates a shorter life cycle and higher profit margins from the sale of fast selling merchandise, skipping the mark down process altogether. Several studies have examined various aspects of the buyer-supplier relationship with quick or fast fashion, such as the apparel design relative to quick response, the role of the supplier in fast moving fashion, buyer behavior, and financial performance.

Classification of Markets

- 1 Domestic Markets: If the marketing is done within the country then it is called as Domestic Market.
- 2 International Market: If the marketing is done from one country to all over the world then it is called as International Market.

- 3 Wholesale market: In wholesale market, goods are supplied in bulk quantity to dealers.
- 4 Retail Market: In retail market, goods are sold in small quantities directly to the user or consumers or consumer market. The consumer gets the goods for consumption and not for profit making.
- 5 Primary Market: Here, the product is sold by the manufacturers to wholesalers or consumers.
- 6 Secondary Market: Here, the commodities arrive from other markets. The dealings are commonly between wholesalers and retailers.

Retail business

Retailing is a part of our life. In recent past buying and selling has become more formal and brand dominated.

- Traditional forms co-exist with organized retailers.
- Retailing encompasses the business activities involved in selling goods and services to consumers for their personal, family, or household use. It includes every sale to final consumer ranging from cars to apparel to meals at restaurants to movie tickets. Retailing is the last stage in the distribution channel.

Retail Management

Retailing includes all the activities involved in selling goods or services directly to final consumers for personal, non-business use.

- The process of bringing the ultimate user to the main producer through series of stages where retailing is the last one.
- It is not limited to quantities but to the exact requirement of last user.
- Bringing about operational efficiency at this last stage and making an environment so compelling that the consumer looks nowhere else.

Fashion Retailing

In Fashion Retailing, the main types of retailers are

- 1 General merchandisers
- 2 Specialized merchandisers

1 General merchandisers

General Merchandisers carry many types of goods in several price ranges. It may be a rural general store or a huge mass merchandiser.

2 Specialized merchandisers

Specialized merchandisers carry certain categories of goods to particular age groups, sizes, and consumer tastes and preferences. They have more distinct group of customers. Examples: ZARA, Victoria's Secret, Allen Solly etc.

Departmental Stores

Department store retailing is a retail establishment that employs at least 50 people and that carries a wide variety of merchandise lines, including all the apparel items. Now home furnishings also added. It has the following features.

- Large-scale mass merchandisers
- Usually carry a wide range of sizes
- Carry household goods
- "Departmentalized" by category/sizes of goods being sold
- Each department may have separate salespeople and payment areas.
- Generally known for high quality, fashion, and customer service.
- Usually offer credit and return or exchange privileges
- Offer numerous customer services such as gift wrap & layaway etc
- Sell to many income levels, but generally target middle to upper income customers

- High operating expenses due to number of employees and customer services
- Advertise heavily
- Large buying and sales volume

Chain stores

It is a retail organization that owns and operates a string in similar stores that are merchandised and controlled from a central HQ office. It is type of departmental stores. It is a group of stores owned, managed, merchandised, and controlled by a central office. It has the following features.

- All stores carry similar goods at similar prices.
- Private label merchandise (Example: Kenmore, Hunt Club)
- Decisions made at central headquarters.
- Merchandise can be produced to the chain's specifications.
- May serve as anchor stores

Shopping centers/malls

A shopping mall is a modern term for a form of shopping precinct or shopping center, in which one or more buildings form a complex of shops representing merchandisers with interconnecting walkways that enable customers to walk from unit to unit. Technical innovations such as electric lighting and escalators were introduced from the late nineteenth century. From the late twentieth century, entertainment venues such as movie theaters and restaurants began to be added. As a single built structure, early shopping centers were often architecturally significant constructions, enabling wealthier patrons to buy goods in spaces protected from the weather.

Globalization

Globalization is a shift from a time when countries did business within their own borders to one in which all countries' economies are connected by various production and marketing networks. It is the process of international integration arising from the interchange of world views, products, ideas, and other aspects of culture.

Global marketing is a firm's ability to market to almost all countries on the planet. With extensive reach, the need for a firm's product or services is established. The global firm retains the capability, reach, knowledge, staff, skills, insights, and expertise to deliver value to customers worldwide. The firm understands the requirement to service customers locally with global standard solutions or products, and localizes that product as required to maintain an optimal balance of cost, efficiency, customization and localization in a control- customization continuum to best meet local, national and global requirements to position itself against or with competitors, partners, alliances, substitutes and defend against new global and local market entrants per country, region or city. The firm will price its products appropriately worldwide, nationally and locally, and promote, deliver access and information to its customers in the most cost- effective way. The firm also needs to understand, research, measure and develop loyalty for its brand and global brand equity (stay on brand) for the long term.

At this level, global marketing and global branding are integrated. Branding involves a structured process of analyzing "soft" assets and "hard" assets of a firm's resources. The strategic analysis and development of a brand includes customer analysis (trends, motivation, unmet needs, segmentation), competitive analysis (brand image/ brand identity, strengths, strategies, vulnerabilities), and self-analysis (existing brand image, brand heritage, strengths/capabilities, organizational values).

MODULE 5 : Apparel Production Technology

LESSON 13 - 21 (1) : Introduction to cutting technology

Objectives

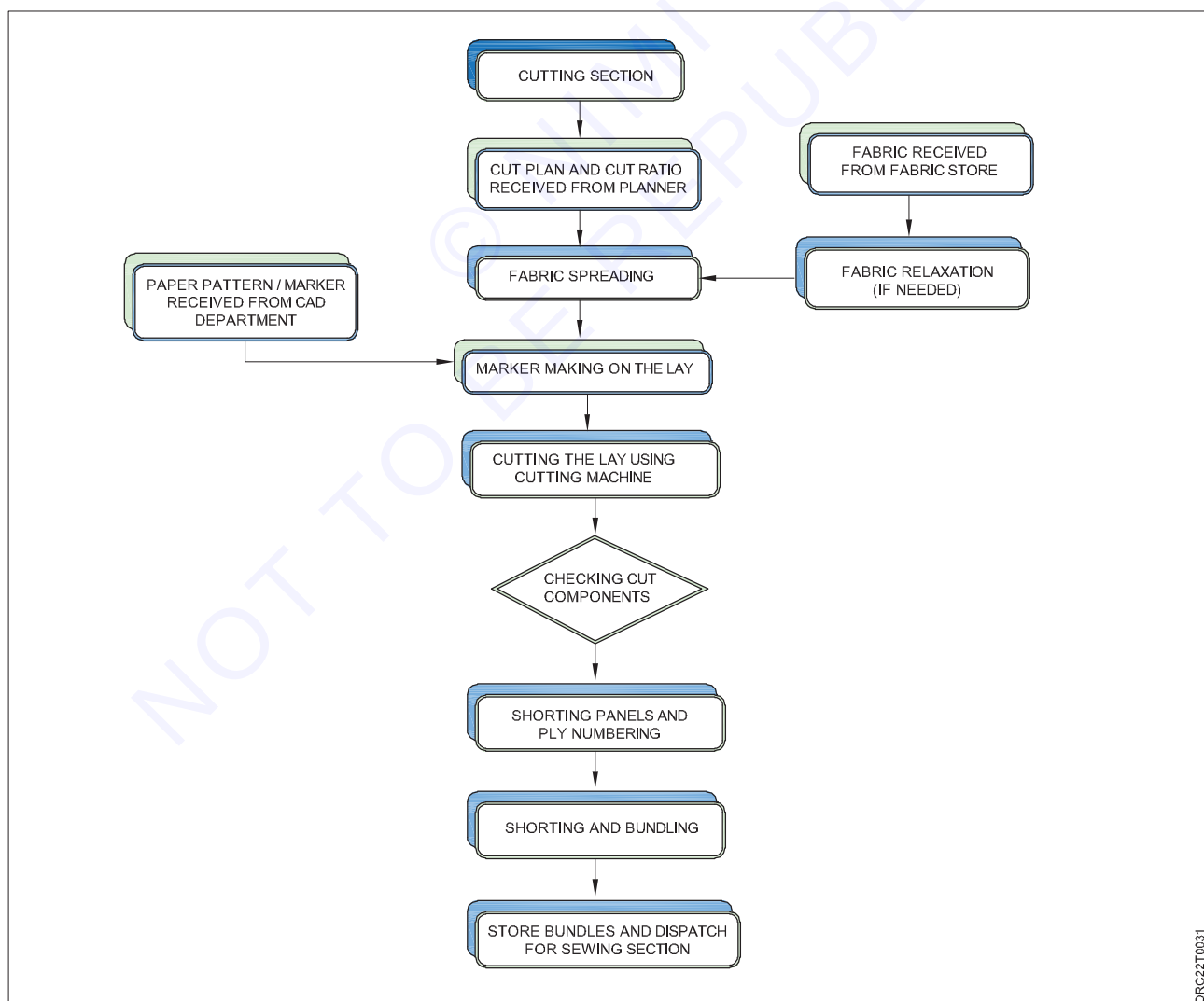
At the end of this lesson you shall be able to:

- understand about cutting room process flow.
- know about the requirements & defects of cutting process.
- know about different cutting machines used in garment industry and their advantages.

1 Cutting room process

Garment production starts with the cutting room process. In this process, fabric is being cut into components. In mass production multiple layers of fabrics are laid on a table and large number of garments is cut at a time. The laid fabric stack is called as lay. The cutting process includes number of sub-processes and flow of the processes. The process is:

Cutting Room process flow



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Pattern / marker: According to the design and fit, patterns of different garment parts are made on pattern paper and cut into pattern pieces. For manual marker, these pattern pieces are used for marker making. On the other hand in CAD system patterns are made on the computer. Later using a plotter marker are made on the sheet. In the second case, the cutting department receives a ready marker.

Cut ratio receiving: Prior to cutting, cutting department get a job sheet from planning department or merchandiser or production manager that includes total quantity of garment pieces to be cut, sizes ratio of the garments and colour-wise size break up. According to the size and colour ratio cutting team prepare one marker or multiple markers. Marker length and number of lay to be cut are planned in this stage.

Fabric receiving: Fabric requirement for an order is calculated according to the average consumption of the fabric from the marker. In case of multiple colour order, colour wise requirement is made. Fabric department issue fabric to cutting against the fabric requirement (generally requisition slip is used).

Fabric relaxation: This process is optional. Specially used for knits fabric. During rolling of fabric it get stretched. So it is essential to bring the fabric on stable form otherwise garment would shrink after making. To relax the fabric roll (thăn) is opened and spread and kept for about 24 hours.

Spreading (fabric layering): In this stage, the fabric sheet is layered one above another maintaining pre-defined maker length and correct ply tension. Fabric is layered up to a certain height to avoid cutting quality problems. Spreading is done by manual layering or automatic layering machine can be used. During layering of the fabric, the fabric edge is aligned at one side.

Marker making: After layering of a lay, pre-made paper patterns (or ready markers made by plotter) are placed on the top layer of the lay. In manual marker making, marking is done around each pattern shape using marking chalk. This process is called marker making. In a marker, all garment components are placed.

Cutting: Lay is cut following the marked lines on the top of the lay. Cutting is done using a straight knife or other cutting means. In the cutting process, the garment component are separated. On the basis of pattern shape, different cutting methods/machines are selected.

Numbering: Separated garment components are numbered to ensure that in stitching all components from the same layer are stitched together. It is important to avoid shade variation in a garment. Between the cutting and sewing processes cut components may be passed through other processes like printing and embroidery. There is a maximum chance of mixing the components. If there is a layer number in each component then at the time of stitching only correct components will be stitched together.

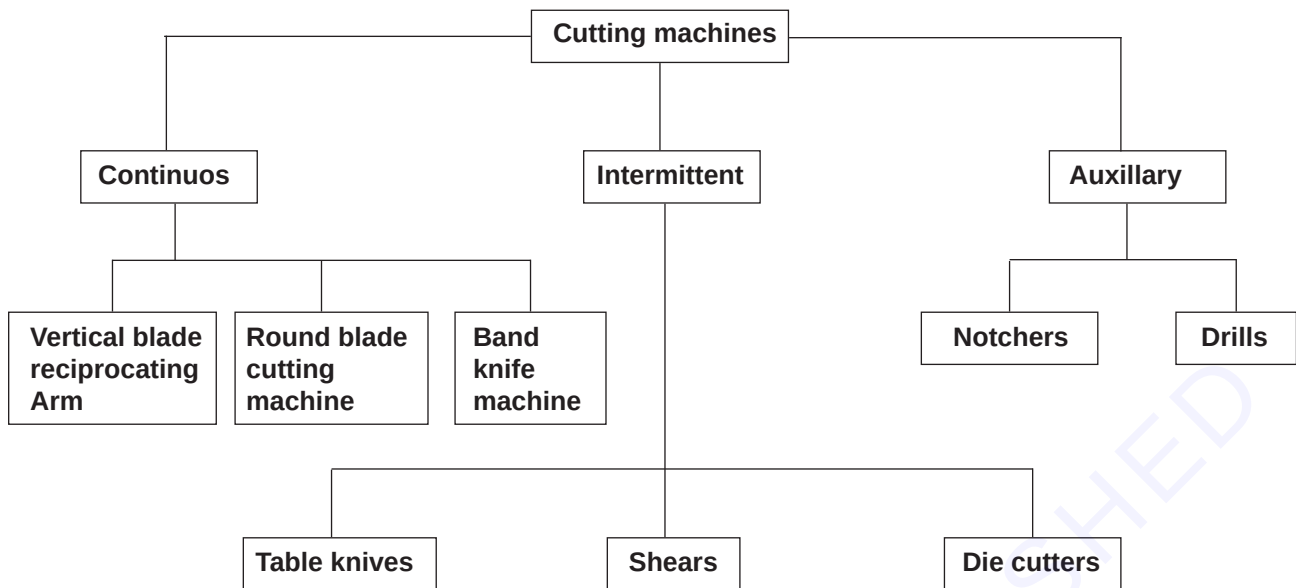
Sorting: According to the production system (Make through, progressive bundle or one-piece flow system) cut components are sorted. In sorting all components of a garment placed together. Size-wise sorting and in case multiple colours are cut in a single lay, colour wise sorting will be required.

Bundling: As per the production line requirement, a certain number of pieces with all components are tied together. This process is known as bundling. Each bundle is marked with bundle number, style name, size number and quantity of pieces in that bundle. At this stage, cuttings are ready to send to a production line for stitching.

2 Requirements of cutting

- Precision of cut- To ensure the cutting of fabric accurately according to the line drawn of the marker plan.
- Clean edge- By avoiding the fraying out of yarn from the fabric edge. Cutting edge must be smooth clean. Knife must be sharp for smooth or clean edge.
- Consistency in cutting- All the sizes of the cutting parts should be of same knife and should be operated of the right angle of the fabric lay.

3 Classification of cutting machines in apparel industry



There are mainly three methods of cutting are as follows:

4 Fully manual

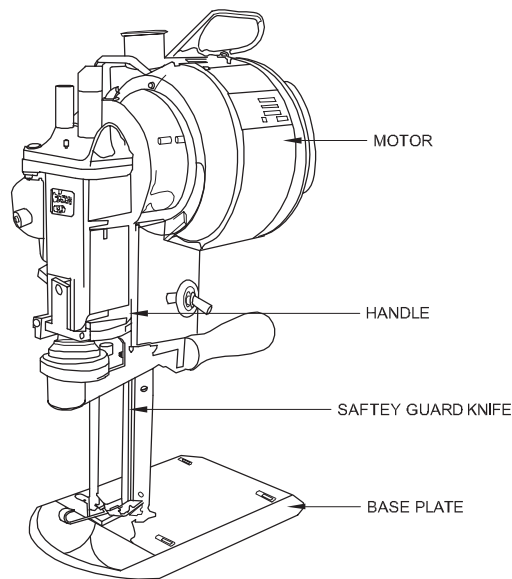
Hand operated scissor: Hand Scissors are normally used when cutting only single or double plies. The lower blade of the shears passes under the plies, but the subsequent distortion of the fabric is only temporary and accurate cutting to the line can be achieved with practice.

- **Advantages of hand scissor**
 - Almost every type of cloth are cut by scissor.
- **Disadvantages of hand scissors**
 - It takes huge time for fabric cutting
 - It is impossible to cut the fabric lay of any height.

5 Manually operated power knife

Straight knife: It is named straight knife cutting machine because its cutter is straight in shape. It is also known as portable cutting knives because it can be moved through a spread. Used for woven as well as knit fabrics.

- **Advantages of straight knife**
 - The Knife is comparatively cheap.
 - Lay of higher height can be cut very easily (up to 300mm)
 - Fabric can be cut from any angle.
- **Disadvantages of Hand Straight Knife**
 - Sometimes deflecting may occur due to the weight of the motor.
 - Chance of accident is high.
 - Blade deflection occurs so quality may be hampered.



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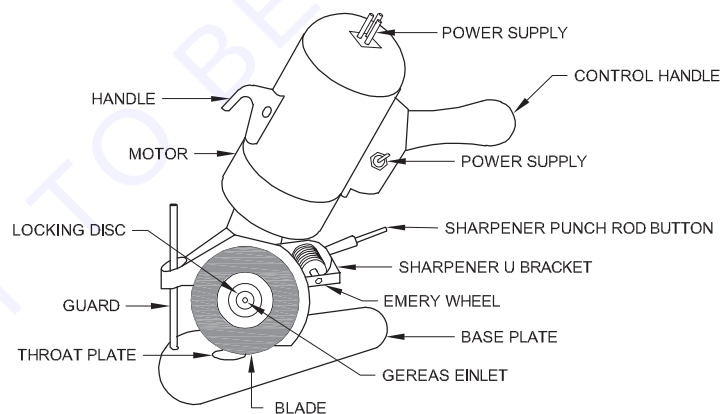
Round knife: It contains a round but slightly octagonal type knife with sharp edge. The other main parts of this machine are base plate, electric motor, handle & knife guard.

- **Advantages of round knife**

- It is widely used to separate the big parts and blocks of fabric from small height fabric lay.

- **Disadvantages of round knife**

- Not suitable for cutting very curve lines in higher number of lays.
- Not suitable for higher production.
- Difficult to cut small components.



ROUND KNIFE CUTTING MACHINE

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Band knife: Fabric cannot be cut directly from lay. Block pieces of fabric required in bundles are cut in this machine. Blade moves vertically through a flat working table. Machine remains stationary and fabric is moveable.

- **Advantages of Band Knife:**

- Used for precision cutting of small parts of garment.
- It has lower noise, less vibration and auto-sharpening device.

- **Disadvantages of Band Knife:**

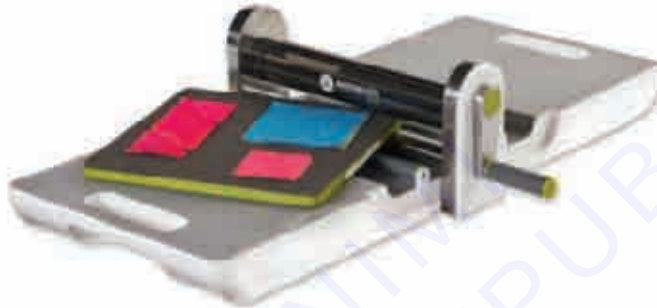
- Not possible to cut fabric directly from lay.



Fig. Hand made cutting machine

6 Die- Cutting: Die- Cutting is process where pressing the rigid blade onto the laid fabric. The die is a sharp shape of the pattern border including notches by bending the strip to the shape required and welding the joint.

Suitable for garments having Critical small parts and are very difficult to use normal cutting or other cutting option. Most suitable to get accurate sharp corners & circular patterns.



Die cutting is mainly used for cutting embroidery applique, shoulder pads, cap, shoe & backpack items to get high standard of accuracy.

- **Advantages of die- cutting**

- It is suitable for precession cutting of small parts of a garment.
- Especially suitable for knitted fabric.

- **Disadvantages of die- cutting**

- Die - cutting method needs block of fabric lay.
- More fabric wastage.
- Die manufacturing cost is high.

7 Notcher: A notcher is an upright, cylindrical device which cuts the side of a block to a predetermined distance. Both straight notches and V notches are available.

8 Drill: The drill mounting includes a motor, a base plate with hole to allow the drill to pass through and a spirit level to ensure that the base is horizontal and drill is vertical.

9 Cutting defects

- **Misplaced Piece Rate Tickets or & Bundle Members:-**Attached to, or marked on, wrong bundles, causing mixed sizes or land shades.
- **Drill Marks:** Drill marks misplaced, not perpendicular, omitted or wrong side drill used.
- **Opening Slits:-**Cut under above to the side or at incorrect angle. Not cut through entire bundle or omitted.
- **Improper Cutting:** Not following marker lines, resulting in distorted parts. Letting knife lean causing top and bottom ply to be of different sizes.
- **Notches:** Misplaced, too deep, too shallow or omitted.
- **Oil Sports:** Equipment improperly oiled or cleaned.
- **Improper knife sharpening:** Causing ragged, frayed or fused edges on bundles.

LESSON 13 - 21 (2) : Introduction to fusing technology

Objectives

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

- understand fusing technology used in Garment Industry
- know about different interlinings used in a garment.
- gain Knowledge about types of fusing processes used in garment and deals with the defects during fusing process.

1 Fusing process in garments

Fusing process is one kinds of alternative method of fabric joining which is vastly used to attach the interlining. At present, apparel manufacturing cannot be imagined without fusing process.

Interlining

Interlining is basically anything used between 2 layers of fabric to give more body. A fusible interlining is thin layer made from woven, knitted or nonwoven material bonded mechanically or thermally which when fused with fabric panel can give reinforcement, durability and can also stabilize and makes sewing work easier while sewing.

Interlining types

- **Woven Interlinings** are made from lightweight fabrics usually used for most demanding conditions like waist band, outerwear plackets, jackets etc.
- **Fusible, knitted interlinings** are basically used in knit garment with stretchable fused areas also. These provide the perfect basis for efficient production. Circular and jersey knit fusible interlines have stretch and recovery properties.
- **High quality nonwoven interlines** are made from 100% polyamide products with ultra-fine coating to heavier blends. These are thermally or chemically bonded and used depending on applications. Generally available in very lightweights.
- **Water Repellent Interlining** is thermal bonded, nonwoven specifically designed for rainwear piece goods. Thermal bonded nonwoven and circular knits can withstand the rigors of commercial wash processes such as garment wash, enzyme wash, stone wash, bleach wash, etc.
- **Embroidery** backings are made from nonwoven non-fusible interlining materials, which are easily tornable. For washed garment nonwoven interlinings are now available, which are easily soluble in hot or even normal water.
- **Hair Interlinings** are woven canvas made from horse hair mostly used in men's formal jackets, blazers etc.

Types of woven interlinings



T&G Curtain Interfacing Fabric



Shape Flex SF101 Alternative



Tricot Woven Fusible Interlining



Stretch Woven Fusible Interlining



Lightweight Woven Fusible Interfacing



100% Cotton Heavy Weight Interfacing



Curtain Interfacing for Curtain Valance



Hair Interfacing for Making Hat

Objective of using interlining

Followings are the primary objective of using interlining in garments.

- Interlinings are primarily used for imparting strength/support, stability and shape retention.
- When fused to the outer shell fabric it acts as a composite and stabilizes the outer shell against any distortion under stress
- Helps improve aesthetic and hand feel of fused laminate.
- Helps retain the shape of the fused part during use and after care treatment
- Improves longevity of fused part

2 Types of fusing process used in garments

There are three types of fusing process used in garments which are mentioned in the below:

- a Reverse fusing:** In this process, the fabric of interlining is spread on the fusing bed and the part consists of resin is directed upward. Then the fabric of garments is spread on the resonated part of fabric and fusing is done there. This is called reverse fusing. In this process, the area of interlining is comparatively small than the fabric of apparel, as a result proper spreading is difficult here.
- b Sandwich fusing:** Generally, fusing is done by continuous fusing machine where the heat is applied from both sides of fabric. In this process, two pairs of fabrics are fused i.e. the two interlinings are placed between or in the middle of two fabrics of apparel. If the heat and pressure are not applied properly then four layers may be joined due to the effect of striking back during fusing. By using this process, the production can be increased but needs more time. It may have unsatisfactory in fused garments.
- c Double fusing:** In this process, two types of interlining are joined with the garment fabrics in a step during fusing. There is needed to control the temperature during fusing and it must be able to set the interlinings parts and garment parts properly. This type of fusing is generally done in collar and the front part of jacket.

3 Defects during fusing process

There are mainly two types of faults found during fusing. Those are explained in the below:

- a Striking back:** When two parts of fabrics are joined by pressure and heat during fusing, it must have the control to the temperature and pressure. Sometimes the pressure and heat are not controlled properly during fusing so that the resin is passed through the lower part of fabric. It is called striking back.
- b Striking through:** When two parts of fabrics are joined by pressure and heat during fusing, it must have the control to the temperature and pressure. Sometimes the pressure and heat are not controlled properly during fusing so that the resin is passed through the upper part of fabric. It is called striking through.

4 The fusing process

Regardless of which fusible and machine are used, fusing is controlled by four processing components:

- a Temperature** - There is a limited range of temperatures that are effective for each type of resin. Too high a temperature causes the resin to become too viscous, which could result in the resin being forced through to the right side of the cloth
- b Time** - Time is the only time element of any value during the fusing process is when the top cloth and fusible are under pressure in the heating zone of the machine. This time cycle for a particular fusible is determined by; whether the fusible has a high –or low melt resin, if a high or heavy substrate is being used and by the nature of the top cloth being used, thick or thin, dense or open.
- c Pressure** - When the resin is viscous, pressure is applied to the top cloth and fusible assembly to ensure that full contact is made between the top cloth and fusible, heat transfer is at the optimum level and there is an even penetration of the viscous resin into the fibres of the top cloth.
- d Cooling** - Enforced cooling is used so that the fused assemblies can be handled immediately after fusing. Cooling can be induced by various systems including water-cooled plates, compressed air circulation and vacuum.

5 The requirements of fusing

- The laminate produced by fusing should show the aesthetic qualities required by the designer in the finished garment.
- 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 which takes place in wear.
- 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.
- The fusing process must not cause thermal shrinkage in the outer fabric. Fusing commonly takes place at around 150°C and at this temperature many fabrics may be subject to thermal shrinkage.
- A further possible effect of the heat of the fusing process is that of dye sublimation. Fabrics may change colour to a level which is unacceptable and in a way which causes a miss-match between the fused and unfused parts of the garment.
- Since the fusing process involves pressure, there is a risk that pile fabrics may be subject to crushing during fusing.
- Where shower proof 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.

LESSON 13 - 21 (3) : Introduction to sewing technology

Objectives

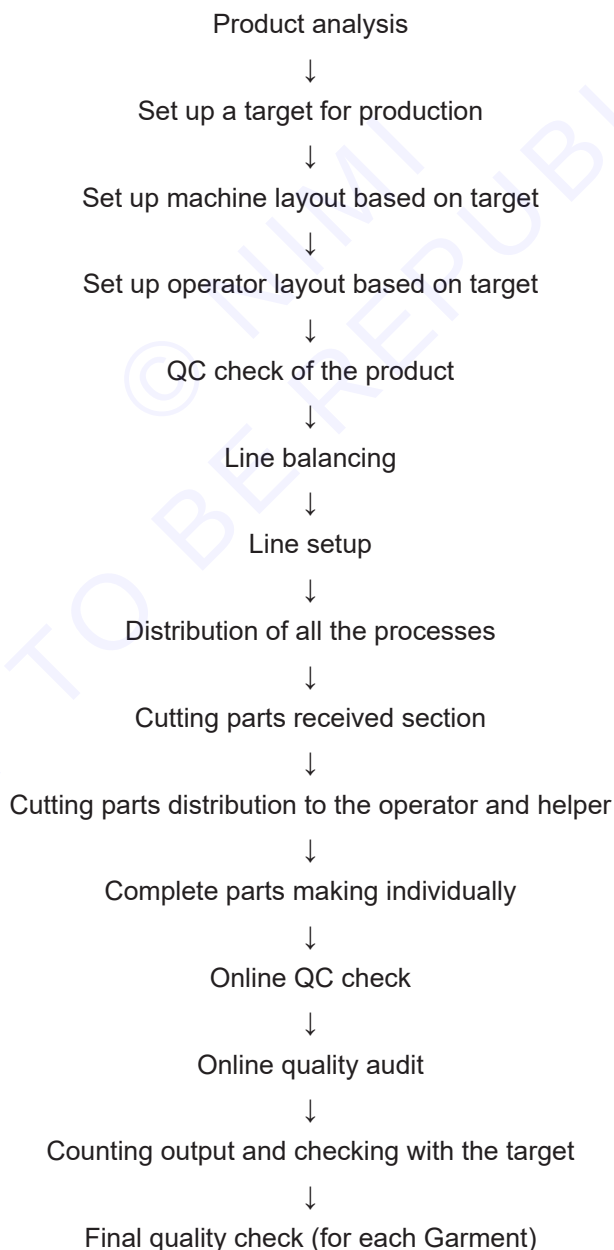
At the end of this lesson you shall be able to:

- understand about sewing machine types and their use in apparel and fashion industry.
- know about all the functions of sewing department.
- understand the sewing faults, causes and remedies during sewing.

1 Introduction

Sewing is an important department in the garments manufacturing industry. All the parts of a garment are joined here by making stitches with the help of a needle and thread. The sewing department converts fabric into garments through different sewing machines and different sewing processes. Where the sewing process flow chart helps to make a complete garment easily. By maintaining the sewing process flow chart, an order can be completed in a timely.

2 Process flow chart for garments sewing department:



All the process sequence of the garments sewing department are discussed below:

SI No	Process	Job
1	Product analysis	In which way, a product has to sew, it's decided here.
2	Set up a target for production	Have to set a target for production based on the shipping schedule.
3	Set up machine layout based on target	Have to prepare a machine setup layout based on daily target quantity.
4	Set up operator layout based on target	Prepare operator layout set up based on machine quantity.
5	QC check of the product	Each garment must have to fulfill its right quality. So, product checking must be needed by QC.
6	Line balancing	Line balancing is a tool used for production line to capacitate the flow line of production.
7	Line setup	Line setup must be needed to achieve healthy production.
8	Distribution of all the processes	All the processes of sewing must be distributed to the right person to avoid the damage of garments.
9	Cutting parts received section	A section, which received the cutting parts from the cutting department.
10	Cutting parts distribution to the operator and helper	All the cutting parts should be distributed to the operator and helper after receiving those from the cutting department.
11	Complete parts making individually	By joining all the parts, a complete garment has to make here individually.
12	Online QC check	During the running of garments sewing, an online QC check must be needed to make fault free garments.
13	Online quality audit	An online quality audit must be needed here to show the buyer actual fault free product making process.
14	Counting output and checking with the target	Comparing with the target quantity, all the output garments should be counted here to make sure achieving the target quantity.
15	Final quality check (for each Garment)	In this section, all the output garments are checked finally by maintaining one by one method to provide fault free clothing into the finishing department.

3 Functions of the sewing department

- Collect input material from the cutting section and feed it to the sewing line.
- Sew the process of the full garment by process as per line layout and operation bulletin.
- Ensure correct sewing thread, label, and shade during process work.
- Responsible for all sewing operations in a garment.
- Fill up daily production targets as per planning and report.
- Responsible for completing all sewing processes and sending to next process washing/ finishing.
- 100% quality inspection before moving from this department.
- Operator by operator efficiency increases and overall productivity improvement.
- Follow up on every individual sewing process maintaining good quality.
- Handover sewing output garments to the next section.
- Taking care overall sewing department and being responsible for this department.

4 The basic sewing parameters include

- Stitches,
- Seams,
- A method of sewing.

Stitch

Loop or loops of one or more threads when bounds with each other, either by interlacing, interloping, interloping or combination of those when sewing fabric, each unit of such configuration is called stitch.

Seam

Seam is a line where two pieces of fabric are sewn together in a garment or other articles. A seam is basically a line of stitching. Seams are stitched on the seam line. The seam allowance is the distance between the seam line and the cut edge.

5 Sewing machine types

- Plain machine: Top stitch, Label attaching
- Over lock machine: Sleeve joining, Side seam joining, Shoulder joining
- Flat lock machine:
 - Cylinder bed: All types of top stitch
 - Flat-bed: Folding and Piping
 - Compressor: Bottom hem and Sleeve hem
 - Feed of the arm: Back tap and Arm tap
- Kansai machine: Placket, Waist band
- Button hole machine: Button holing and stitching it
- Button attaching machine: Button attaching
- Snap button machine: Snap button attaching
- Chain stitch machine: Waist band

6 Sewing faults, causes and remedy

Sl. No	Sewing Faults	Causes	Remedy
1	Needle thread breakage	Misaligned off winding from thread package; excessive tension, poor quality thread	Ensure that the overhead guide is above cop stand pin; use a stronger thread
2	Bobbin or looper thread breakage	Badly wound thread on the bobbin	Adjust bobbin winder alignment
3	Tread fusing when machine stop	Poorly finished or incorrect thread	Use better quality thread
4	Skipped stitches	Hook, looper or needle failing to enter thread loops at the correct time	Changes machine clearance and timings
5	Imbalance stitching	In correct sewing tension	Check for snarling, adjust thread tensions
6	Variable stitch density	Poor fabric feed control	Increase the pressure feet pressure
7	Seam pucker	Variable different fabric feed	Improve the fabric feed mechanism

LESSON 13 - 21 (4) : Introduction to pressing technology

Objectives

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

- know about basic components of Pressing and its purposes.
- understand all types of garment pressing used in apparel Industry.
- know about different types of Pressing equipment and methods used in clothing industry.

1 Pressing

Pressing is the process of application of heat, pressure and moisture either individually or in combination to shape or crease garments or garment components into the geometric forms proposed by the designer.

The pressing process influences the final garment appearance and hence the garment appeal. Pressing is done by compressing the fabric between either two flat or curved surfaces.

Finishing and pressing machines contour the semi-finished garment panels as well as finished garments by bringing down the fibers in the fabric to an elastic state and then deforming and setting them.

2 Purpose of pressing

The primary goal of pressing is to improve the overall appearance of the garment on the outside. The garment's visual appeal is improved with pressing. However, the purpose of pressing are far broader in scope:

- To flatten out the undesirable wrinkles, creases and crush marks.
- To make creases where the garment design needs it.
- To mould the garment to the silhouette of the body.
- To prepare garments for further sewing.
- To refinish the garment after completion of the production process.

3 Basic components of pressing

The main elements of the pressing process are heat, pressure and moisture, which deform fibers, yarns and fabrics to accomplish the required effect.

- **Heat** – It is necessary to soften the fibers, stabilize and set the fabric in the desired shape. Temperature must be selected based on the fibers, yarns and fabrics.
- **Steam (Moisture)** – It is fastest way of transmitting the heat onto the fabric. Steam and heat are essential to ease the fabric from tension and make the fabric with adequate flexibility so that it can be moulded to get the required contour.
- **Pressure** – It is applied to change the form and increase the durability of the moulding. Pressure could be applied by means of a mechanical device or steam.
- **Drying** – Subsequent to the steam and pressure application on the fabric, the garment panel or finished garment must be dried and cooled; thus, the fabric can return to its regular moisture content and steady condition. This could be done by removing the surplus water from the fabric by means of a vacuum action which cools it at the same time.
- **Time** – The time period for which the garment is exposed to steam, pressure and drying depends on the type of fabric being pressed and there will be an optimal time period for each component.

4 Types of garment pressing

The garments are different types, especially, different in design and garments materials. The pressing of garments are five categorized, designs and materials are given below:

- No pressing:** Some garments are available; these are not need to pressing. Such as, underwear, briefs, swimwear. These types' garments are made by knitted fabric.

- ii **Minimum pressing:** Some garments are available; these are not needed finishing done by applying heat but no need pressing. Such as Night gowns, knitted T-Shirt, Leisure wear and so on. These types of garments are pressing by steaming and by flowing dry air to the garments and called minimum pressing.
- iii **Under pressing:** To do help for sewing easily and beautifully, it must need to give minimum pressing to some parts of garments before sewing is called under pressing. Specially, under pressing is done to most of the garments industries for making coat, jacket, and trouser and so on. Sometimes, there is needed of unpicking and again under pressing is done before sewing.
- iv **Final pressing:** These types' garments are applying heat and pressing to the garments. This is done after making of garments. This is generally done in jacket, trouser, skirt and so on. Special type of pressing machine is used for final pressing.
- v **Permanent pressing:** Permanent pressing is a special type of pressing, when it is given to retain the shape of garments or special conditions. Such as, dart and pleat, which cannot be displace or drawn-off after washing of garments again and again. This type of pressing is done by applying high temperature and steam, sometimes, there is needed for pressing.

5 Types of pressing equipment and methods in clothing industry

There is a large range of equipment available for the pressing of garments, from the simple hand steam irons to the sophisticated vertical front and back pressing robot. The following common pressing equipment and methods are used in garment industry:

- **Hand irons:** Iron which is known commonly as iron box has been in existence for a very long time with the traditional one being used with heat generated using charcoal. It is a basic and most important pressing equipment in garment industry. There were also irons which were heated by gas flame inside the metal casting and it was mainly used in touching up of men's jackets. However in recent times, steam and electric irons are used commonly.



Fig. Hand iron in garment industry

- **Iron table:** The significant factor for the proper selection of an ironing station is the air flow through the garment to cool it and set it. The stability of the covering of the ironing table is based on several factors such as hydrolysis resistance, pressure resistance and heat resistance of the used materials. All layers of fabrics in an ironing table together are accountable for the even distribution of steam.
- **Steam press / buck press:** Steam presses commonly consist of a static buck and a head of complementary shape closing onto it, thereby sandwiching the garment to be pressed. It consists of a frame housing the buck which is normally in round shape for pressing different garments and linkages to close the head by a scissor action.
- **Carousel press:** Carousel press is a new development in pressing operation in which a pair of bucks is provided that rotates between operator and the head. The head can be of single or double based on the bucks being identical or an opposite pair for pressing the left and right of a garment part. In this press, scissor action and vertically acting heads can be used.
- **Trouser pressing:** Trousers include a wide variety of garments, ranging from jeans, women's trousers with simpler construction and requiring a less sharp crease, men's trousers including four pockets, and suit trousers. The trouser pressing is carried out in two operations along with under pressing of the seam. The first operation is done for legging on a flat press to set and crease the legs and the second operation for topping in a series of lays around the top of the trouser on a contoured press.



Fig: Steam press machine



Fig: Cannon press for jacket pressing



Fig: Steam pressing machine

- **Steam finisher:** This equipment is known as a form press or a 'dolly' press. It has a compressed air system, frame for a steam distribution system and a pressing form made of a canvas bag in the suitable silhouette of the garment to be pressed.



Fig: Steam finisher machine



Fig: Tunnel finisher

- **Tunnel finisher:** Tunnel finishers are used for finishing knitted goods. They can be used for synthetic fibre garments and their blends also. This garment finishing process involves no pressure application and reduced handling of garments in steam tunnel. In this finishing process, the garments are put on hangers and fed through a cabinet using a motorized rail. The garments pass through sections with superheated steam and it is dried by blowing air. In some cases garments are loaded onto frames and passed through the tunnel on a conveyor.
- **Pleating:** Pleating is the process of creating pleats in the garment. Pleats are a type of fold actually formed during stitching by doubling fabric upon itself and securing it in place. However, these pleats can also be introduced in pressing by creating a set of creases in the garment and making it set by pressing. The pleats can even be according to a geometrical pattern. Pleating is done by using pressure, moisture and heat. There are two types in machine pleating. One is a blade machine in which pleats are formed by the action of blades and then set by heat and pressure when they pass through a pair of rollers and the other type is a rotary machine in which the rollers are fitted with complimentary dies.



◆ MODULE 6 : Apparel Quality Management ◆

Lesson 22 - 29 (1) : Quality Control

Objectives

At the end of this lesson you shall be able to

- Understand what quality is.
- Understand the importance of quality control in apparel Industry.
- Know about Cost of quality control system.
- Know about Quality Assurance System and Statistical Quality Control.

1 What is Quality?

Quality means, meeting or exceeding customer expectations all the time while maintaining a cost competitive market position. A product or service is said to have quality if it has performance, durability, reliability, reparability etc.

American Society for Quality Control (ASQC) defines quality as “A systematic approach to the search for excellence. According to International Standard Organization (ISO), “Quality is the fulfillment of the specified requirements for a product or service”.

However, quality also means much more, they include:

- 1 The degree of excellence that an item possesses.
- 2 The best money can buy.
- 3 Meeting a specification.
- 4 Not more than 1% defective a lot.
- 5 Quality is when the customers come back not the goods.

Quality in apparel industry refers to the product free from staining faults, sewing defects, fabric faults, size measurement faults, matching of color and stripe faults, cutting faults, etc.

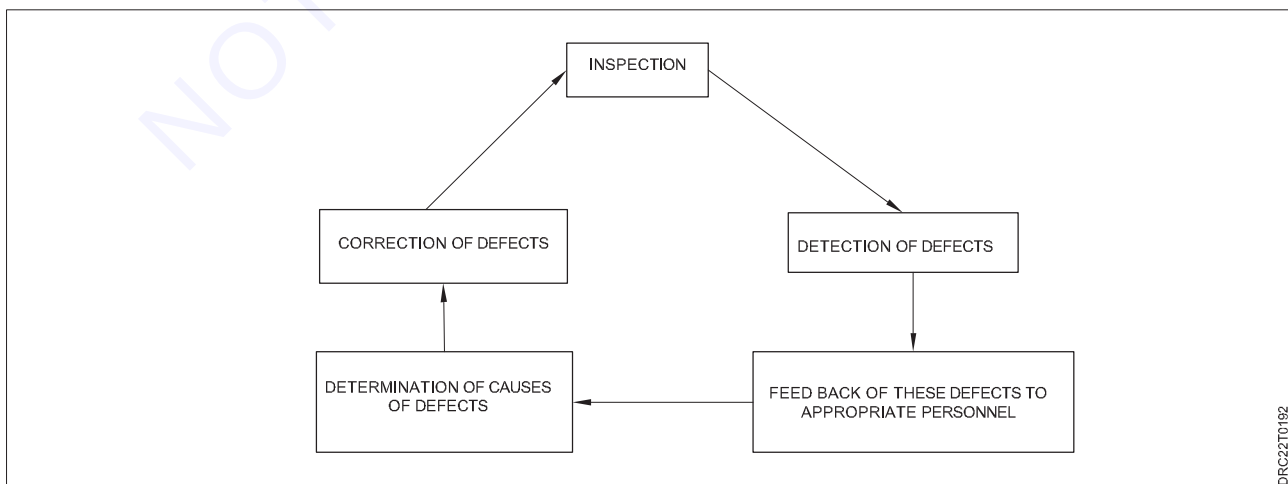
2 What is quality control?

The method of checking, analyzing, verification and controlling the desired or expected quality parameters of the garments is said to be quality control.

For inspection, to be effective, the entire inspection loop must be completed.

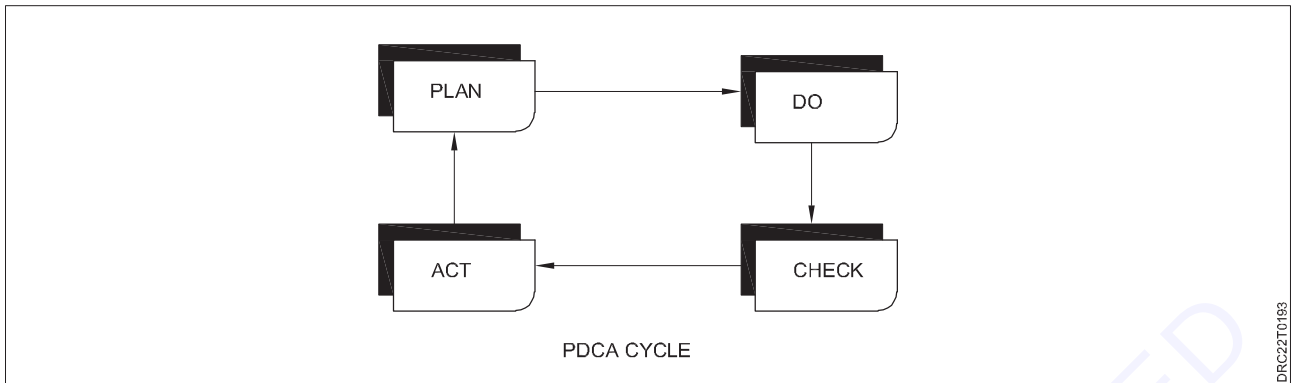
In the garment industry quality control is practiced right from the initial stage of sourcing raw materials to the stage of final finished garment.

For textile and apparel industry product quality is calculated in terms of quality and standard of fibers, yarns, fabric construction, color fastness, surface designs and the final finished garment products. However quality expectations for export are related to the type of customer segments and the retail outlets.



3 Requirements:

The Quality System Requirements are based on the principle of PDCA Cycle.



- 1 Understanding the customers' quality requirements.
- 2 Organizing & training quality control department.
- 3 Ensuring proper flow of quality requirements to the QC department.
- 4 Ensuring proper flow of quality requirements to the Production Department.
- 5 Establishing quality plans, parameters, inspection systems, frequency, sampling techniques, etc.
- 6 Inspection, testing, measurements as per plan.
- 7 Record deviations
- 8 Feedback to Production Department.
- 9 Plan for further improvement.

4 Quality Cost:

Preventing, detecting and dealing with defects cause costs that are called quality costs or costs of quality. Quality costs can be broken down into four broad groups.

- 1 Prevention Costs:** This is the cost of anything you do to prevent quality error or to maintain the consistency of quality .it begins with the orientation and training that you provide to new employees. It can include some part of cost of parching equipment of maintained of designing, planning and ingraining.
- 2 Appraisal Costs:** These costs begin with the inspection of purchased goods and materials. The cost of inspection through the work process and finished goods is included related documentation and record keeping as well as the calibration of test equipment and laboratory changes add to these costs. This category also includes surveying customer satisfaction levels especially in-service companies.
- 3 Internal Failure Costs:** These are the costs that occur when a quality defect is detected before it reaches the customer. Most directly they include scrap and network costs. But the cost of re inspection of idle time because of quality failure, and the related administrative costs, would also be included.
- 4 External Failure Costs:** These are all the related to quality defects that reach the customer. Some are direct returns warranty and replacement costs. Field repairs the cost of responding to complaints. Others are indirect roles cost because of dissatisfied customer.

Associated with statistical sampling of apparels, acceptance quality level (AQL) is the “minimal standard for a satisfactory process or product average”. Acceptance Quality Level (AQL) refers to the maximum number of defective items that could be considered accepted during the random sampling of and inspection. The defects that are found during inspection are classified into 3 categories:

- Critical: Must be 100% accurate. There is no range.
- Major: Normally 2.5%
- Minor: Normally 4%

5 Key elements of garment quality control:

Garment quality control involves a series of processes that ensure that a garment meets certain quality standards before it is shipped to customers. Here are some key elements of garment quality control:

- 1 **Fabric inspection:** The fabric used for making the garment must be inspected for any defects or flaws. This includes checking the color, print, weight, and texture of the fabric.
- 2 **Pattern inspection:** The pattern used for making the garment should be inspected to ensure that it is accurate and matches the customer's specifications.
- 3 **Cutting inspection:** The cut fabric pieces should be inspected for any defects or irregularities. This includes checking the fabric pieces' size, shape, and alignment.
- 4 **Sewing inspection:** The sewing process should be closely monitored to ensure that the garment is stitched together correctly. This includes checking the seams, stitches, and overall construction of the garment.
- 5 **Finishing inspection:** The finishing process involves adding buttons, zippers, and other accessories to the garment. This step should also be inspected to ensure that the accessories are properly attached and functional.
- 6 **Final inspection:** Once the garment is completed, a final inspection should be carried out to ensure that the garment meets the desired quality standards. This includes checking the size, fit, color, and overall appearance of the garment.
- 7 **Packaging and labeling:** The garment should be appropriately packaged and labeled for shipping. This includes ensuring that the correct size and style of the garment are included and that the labeling is accurate and clear.

By implementing these key elements of garment quality control, manufacturers can ensure that their products meet the desired quality standards and satisfy their customers.

6 Benefits of Quality Control In Garment Industry:

There are many benefits to having a set of quality standards in garment industry. Below are just a few examples of the key advantages:

- Ensure the products meet the minimum acceptable level of quality for their garments.
- Ensuring garments will be of good quality and last for a long time.
- Protecting consumers from poor products.
- Reduce material waste and defect rates.
- Improve the operational efficiency.
- Avoid expensive lawsuits and other penalties.
- Higher customer satisfaction.

7 Importance of Quality Assurance System

The quality assurance is 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, whereas with quality assurance is enough precautions are taken that the problem is arrested in the beginning and care is taken to find the very root cause of the problem.

8 Common Quality Assurance Techniques

- **End-to-end management:** It is necessary to manage quality assurance objectives throughout the supply chain, from assessment to distribution. With Enterprise Resource Planning (ERP) systems, quality assurance teams can track all systems and subsystems in the production cycle for flaws or defects.

This ensures that the finished products are uniform, of premium quality, and safe for the consumers.

- **Inspection audits:** This system involve a systematic review of the production process, from the selection of raw materials to the final output. This helps identify any potential flaws or deviations from the agreed-upon quality standards. By closely monitoring production, fashion companies can address and rectify issues timely, ensuring a more consistent and reliable product.
- **Lab testing:** It is another popular method employed within the fashion industry to evaluate the quality and performance of various materials and finished products. This technique includes tests, such as colorfastness, shrinkage, and fabric strength, to ensure the longevity and durability of the garment or accessory. Although lab testing provides valuable information on the performance of a product, it may not cover all aspects or foresee real-life scenarios of wear and tear.
- **Sampling:** It involves randomly selecting a certain percentage of garments from a batch or production run and thoroughly inspecting them for quality. This helps identify any defects or inconsistencies in the finished garments and determine the batch's overall quality level.

By implementing the above quality assurance systems, clothing manufacturers can take preventive action against defects, elevate product quality, reduce costs, comply with industry standards, enhance brand image, and promote sustainable and ethical practices.

9 Statistical Quality Control (Sqc)

Statistical quality control refers to the use of statistical methods in the monitoring and maintaining of the quality of products and services.

9.1. Basic Categories of Statistical Quality Control (S.Q.C):

All the tools of SQC are helpful in evaluating the quality of services. SQC uses different tools to analyze quality problem. SQC comprises the set of statistical tools used by quality control professionals. It can be divided into three broad categories:

Descriptive Statistics

Statistical Process Control (SPC)

Acceptance Sampling

1 Descriptive Statistics:

Descriptive Statistics involves describing quality characteristics and relationships. This group includes the mean, standard deviation, range and distribution of data.

2 Statistical Process Control (SPC):

The statistical process control (SPC) is applied in established technological processes in order to observe, analyze, and regulate them. The use of SPC allows for timely warning in case of a deviation and, if necessary, to correct the parameters of the process. The application of SPC is a prerequisite for the timely detection of the reasons behind quality deterioration. It helps in decreasing the defects, maintaining the quality at a selected level, and improving the technological process. The application of statistical techniques to determine whether a process is functioning as desired. SPC is used to determine whether the process is functioning properly or not.

3 Acceptance Sampling:

This involves random inspection of a sample of goods. The application of statistical techniques to determine whether a population of items should be accepted or rejected based on inspection of a sample of those items.

10 Total Quality Management:

A cost effective system for integrating the continuous quality improvements of people at all levels in an organization to deliver product services, which ensure customer satisfaction.

The concept of bringing a quality focus to every aspect of an operation from raw materials received to accounting invoice accuracy.

Companywide quality management system involving all employees in activities aimed at improvement of product quality, production process and services.

Lesson 22 - 29 (2) : Inspection

Objectives

At the end of this lesson you shall be able to

- What is inspection and its importance
- What are different techniques/types of inspections
- Which defects can be seen during inspection

1.1 INSPECTION (Techniques to maintain the quality)

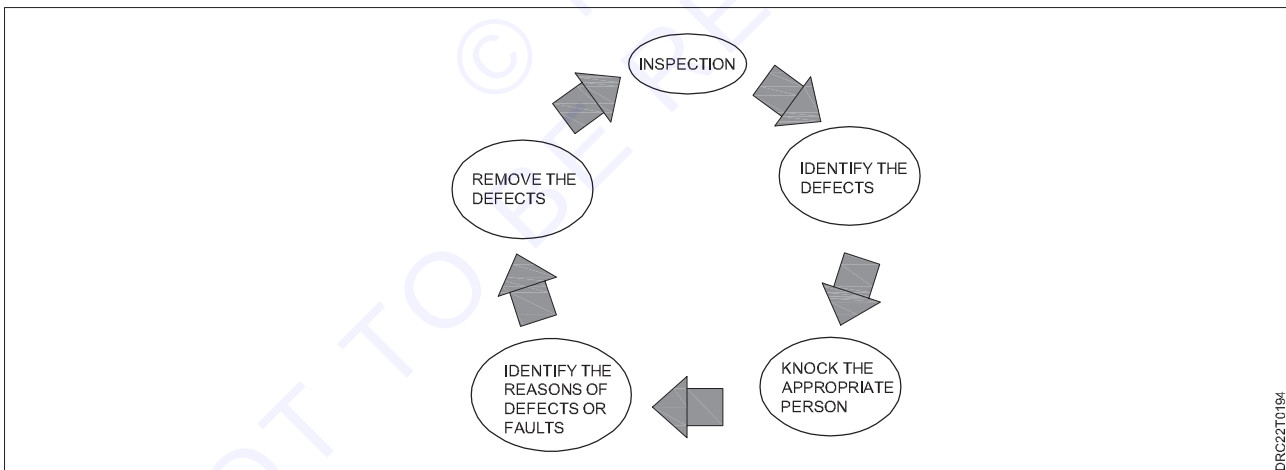
The inspection that is done for controlling the quality of garments is mainly meant to examine in bare eyes. Checking of the fabrics of garments, sewing, button, thread, zipper, measurements of garments etc. with the standard process is called the inspection.

In each section of a garments industry, there are arrangements for inspection. The main purpose of inspection is to identify the faults at the earliest possible steps for production of garments and earlier the defects will be detected lesser will be the wastage of time and money.

For conducting successful and meaningful inspection, steps can be adopted as per the 'inspection loop' described below. First, identify defects through inspection, inform about the defects to the concerned person, identify the causes of defects, and rectify them.

In garments Industry, inspection is generally conducted in three steps:

- 1 Raw Material Inspection
- 2 In Process Inspection
- 3 Final Inspection



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2.1. Raw Material Inspection

In garments industry, raw material means mainly the fabrics, but sewing thread, zipper, interlining etc. also may be considered under the items of raw material. Raw material inspection is important so as to achieve good quality standard in garment. It saves the further labour, repairing and rework which results in low cost of the garment with minimum efforts.

2.1.1. FABRIC INSPECTION: Fabric is the main, plays an important role in garment industry. The Quality of fabric affects the entire finish product. Fabric inspection is usually done on fabric inspection machine to detect the fabric defects. Fabric inspection will remove the burden of quality responsibility from those performing spreading. A spreader will be able to concentrate on spreading more quickly without having any problem. Cutter productivity would increase because the defects are already marked.

Fabric inspection machines are design so that rolls of the fabric can be rounded behind inspection table under default light. Defects in the fabric can be seen readily with the machine. The inspection machines are power driven. Inspector pull the fabric over the inspection table such machines are also equipped to accurately measure the length of its roll as well as monitor the width of the fabric. The defects are located, marked and recorded on an inspection form.

There is no standard viewing condition for inspecting the fabric. No industry standard or acceptable limits for storage in number of yards on a roll of fabric. There is direct co-relation between fabric quality and apparel quality. Poor quality fabric results in excess cause of apparel or garment manufacturing.

Generally, to test the quality parameters of woven, knitted and non-woven fabric, the fabric must be conditioning at 24 hours in the standard testing atmosphere. It is very important for all types of fabric.

Quality Parameters of Woven Fabrics:

There are some quality parameters of woven fabric

- Dimensional characteristics: (Length / Width /Thickness)
- Weight of fabric: (Weight per unit area / Weight per unit length)
- Fabric strength and extensibility: (Tensile strength /Tearing strength)
- Threads per inch of fabric: (Ends per inch / Picks per inch)
- Yarn count: (Warp count / Weft count)
- Handle: (Stiffness / Drape)
- Water resistance
- Shrinkages
- Different fastness properties:
(Fastness to light /wash /perspiration / Rubbing)

Quality Parameters of Knitted Fabrics:

There are some quality parameters of knitted fabric

- Strength and extensibility
- Course density
- Wale density
- Elasticity
- Deformation
- Grams per square meter (G.S.M)
- Yarn count
- Design

Quality Parameters of Nonwoven Fabrics:

There are some quality parameters of non-woven fabric

- Strength and extensibility of fabric
- Weight
- Thickness
- Air permeability

- Crease resistance
- Stability of washing
- Stability of dry cleaning
- Dimensional stability
- Elasticity

2.1.2. INTERLINING INSPECTION:

Interlining is one kind of accessories that is used between the two layers of fabric in a garment. To keep the different component or part of apparel in a desired shape, a kind of fabric is used between the two ply of fabric by sewing or fusing is called interlining.

Interlining of good quality gives the effect of good finished appearance to the garment. Before use the interlining for mass production some tests are to be done to detect the defect less material. The purpose of fusible interlining is to give shape or form and to improve the aesthetic of garment. There is no better test other than to accurately fused the interlining with the aim an item fabric and evaluate such sample before starting the mass production. Therefore cut at least 12x12 inches of fabric and fused there 9x9 inches interlining at recommended temperature and pressure then check three specimens for compatibility shrinkage and stain. Compatibility means the fusible material should provide good durability and support without altering the natural hang of fabric. Shrinkage can be measure by placing gauge bar on the interlining and shade fabric before fusing. And measure the distance between gauge marks after fusing.



2.1.3. SEWING THREAD INSPECTION:

During the sewing process in high speed lock stitch machine the thread is subjected to complex kinetic energy and dynamic condition, sewing threads should be check and tested for the following characteristics:-

- 1 Imperfection
- 2 Finishing
- 3 Colour
- 4 Winding



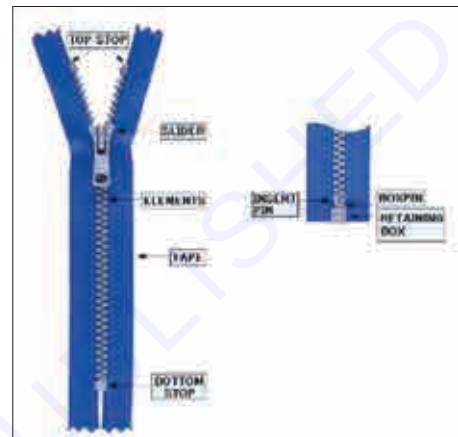
- 1 **Imperfection:** sewing thread should be free of knot or any such defect otherwise there will be excessive stoppage on the sewing machine resulting in lower sewn efficiency.
- 2 **Finishing:** thread finishing is basically lubricant applied to sewing thread so that the thread will slip easily and smoothly through the eye of sewing machine needle and through various thread handling parts of sewing machine.
- 3 **Colour:** colour of sewing thread including white should match that of either original or standard sample and should not vary too much. A sewing thread's colour should not bleed in washing or dry cleaning or fade in sunlight.
- 4 **Winding:** winding of sewing thread on packages should be uniform otherwise it may result in excessive thread breakage again causing lower efficiency.

2.1.4. Zipper Inspection:

A zipper, zip, or zip fastener, is a commonly used device for temporarily joining two edges of fabric.

Zipper should be check for following factors: -

- Proper dimension of zipper
- Top and bottom stops should be fastened securely.
- Zipper tape should uniform in colour if it is important.
- Zipper should not cause wrinkling or puckering after it is sewn into the garment.
- Zipper colour should not bleed in washing and dry cleaning.
- Pull tape should be affixed firmly to the slider body.



2.1.5. Buttons Inspection :

Buttons should be check for following factors:

- Button should have large cleaning holes that are free from flesh and will not cut the thread.
- Holes must be located properly in relation to the edge of button.
- 3. Button should be of uniform thickness.
- The colour of button should be match or in tolerance of visual limits.
- Button should be able to withstand laundering, dry cleaning and pressing without any changes such as cracks, melting surfaces, change in colour etc.



2.1.6. Buckles Inspection :

Buckles should be check for following factors:

- Buckles should be check for any visual defects such as sharps, unfinished buckle edge.
- If a buckle is cloth covered there should not be an appreciable difference in the buckle and garment material.



2.2. IN PROCESS INSPECTION

The process of inspection of the various parts of a garment before joining is called in-process inspection.

In garments industry, inspection is done in each section starting from spreading to finishing. The main objective of in-process inspection is to identify the defects in the primary stages of various sections and to adopt the necessary steps to rectify the defects. Because, the defects detected as earlier, its rectification cost will be lesser. In order to control the quality of garments, the measures that can be adopted in the steps of garments making, are discussed below in steps:

2.2.1. Marker Making

If mistakes or defects occurred in marker making, the quality of garments will be lower. So all the matters involved in marker making, should be inspected properly. As for example, need to examine whether the labeling or code numbers have been placed properly in each of the patterns drawn in the marker.

2.2.2. Fabric Spreading

The defects during spreading of the fabrics, for which the quality of garments may be lower, should be taken care at the time of spreading of fabrics. As for example, during spreading, fabric should be spread as per the length and width of the marker and the edges of fabric both in the directions of length and in width have to be aligned. Otherwise, the wastage of the fabric will increase.

2.2.3. Fabric Cutting

The most important precondition for making of high quality garments is the cutting of fabrics in high quality. So the factors related to fabric cutting, should be inspected carefully. As for example, whether the dimension of the patterns and the cut fabrics are exactly same or not should be inspected.

2.2.4. Fabric Sewing

In garments manufacturing industries, the most specious and the most important section is the fabric sewing section. The jobs of each sewing machine operator of this section should be regularly inspected, and specially, it is to be specified that up to what level of faults in each job is acceptable, and always arrangements should be made for identifying the defects through inspection, and to adopt measures for rectifications, and to control the defects.

2.2.5. Pressing or Finishing

The main objective of pressing or finishing is to make arrangement so that garments look good, because, in most of the cases a customer takes the buying decision of the garment based on whether it looks good or not though buying of a garment also depends on its price, quality, standard etc. For this reason, pressing or finishing is very much important.

2.3. Final Inspection

In the final inspection, mainly the whole inspection of garments is done, because, before this stage, there is no opportunity to do inspection of a complete garment. This final inspection is very much important from the buyers end. In this final inspection, mainly the size of the garments, form fitting, and the defects of the garments are inspected.

3.1. Various Methods of Inspection Systems for Apparels:

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.

All the above Sampling methods have discussed in the following:

3.1.1. 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.

3.1.2. 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.

3.1.3. 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.

3.1.4. 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.

3.1.5. Acceptance Sampling (Statistical Inspection)

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 useful advantage of this system is controllable and minimum risk of accepting the wrong decision. This system for inspection is more practical and economical.

4.1. Role Of Quality Control Inspector

A Quality Control Inspector is involved in a variety of different quality control processes. They check fabrics for flaws and defects, make sure that colours are correct and examine the strength of the final product.

An Assistant Quality Control Inspector will take direction and fully support the Quality Controller.

In the apparel sectors, QC's check that seams and/or stitching are neat and strong, and verify that all products are produced to the same size and standard.

Quality Control Inspectors need to keep accurate records of products checked, sometimes carrying out a statistical analysis. They often produce written reports for the production team and have regular meetings to discuss how quality standards can be maintained, or highlight problem areas that require review.

4.1.1. Responsibilities

- Finding and fixing faults at each stage of the production process.
- Making sure labelling is accurate.
- Checking that production methods meet legislation guidelines.
- Inspecting materials for defects.
- Producing reports of the findings.
- Attending meetings to present feedback and recommendations.

Lesson 22 - 29 (3) : Work Study

Objectives

At the end of this lesson you shall be able to

- Understand the importance and process of Work Study
- Deals with Work measurement & time study techniques for better working condition
- Calculate Sewing Line Efficiency and know the formulas of Work study.

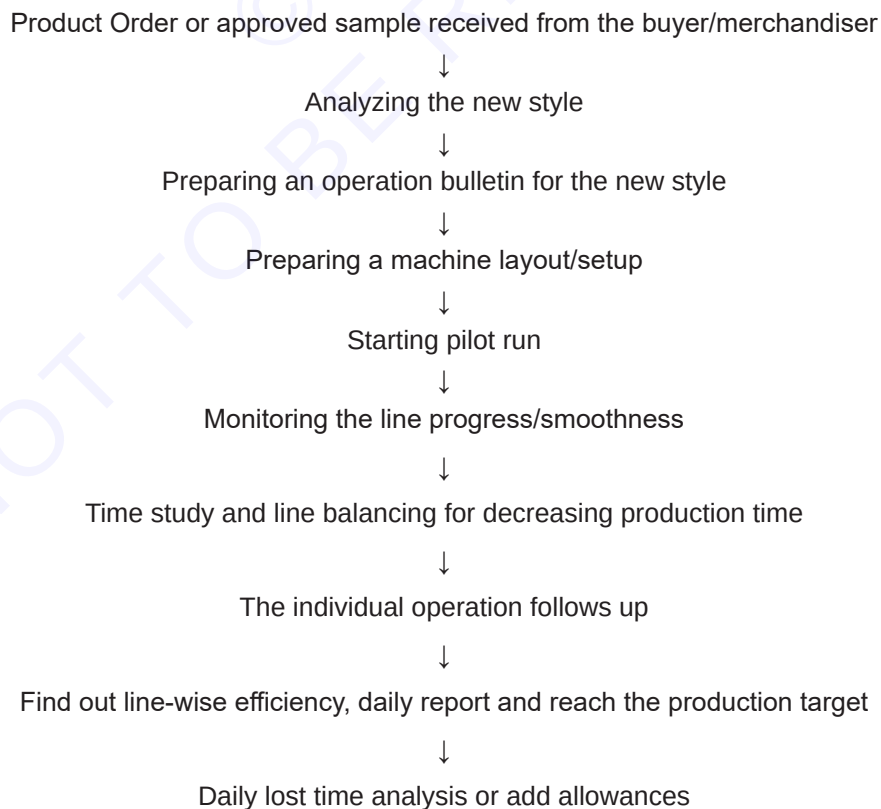
1 Work Study

The Department of Work Studies in apparel manufacturing industries, plays an extremely significant role. The efficiency of production relies on this department. Work-study aims at maximizing manufacturing with the least utilization of time and cost in the industrial engineering department. In order to enhance the efficient use of resources, this Department is based on the systematic review of techniques of carrying out operations.

1.1 Objectives of work-study in the garments industry:

- Scientific and monitored analysis of current techniques for carrying out a job.
- Simplify the job.
- Measure mental and physically skilled workers and define performance measurements as a standard.
- Improve job effectiveness at all levels.
- Workers, plants, equipment, and other resources are optimally used at a minimum price.
- Profitability.
- Improved productivity and improved mood for workers.
- Enhanced organizational effectiveness.
- Maintain the right goal.

1.2. Process Flow Chart of Work study in garment Industry



1.3. There are two kinds of technique are applied in work-study:

- a **Method Study** (The better way to get the job done).
- b **Work measurement** (It requires time and body movement of a worker to get the work done).

1.3. a) Method Study:

A method study is an investigating technique used to determine the best way of doing a job. It determines the most effective means of executing each process. It also engaged in solving problems concurred with methods.

Application of Method Study:

- Designing work station to increase efficiency
- Develop layout
- Improve material flow
- Planning the best rate of movement of people
- Develop a system of various functions

1.3. b) Work measurement:

Work measurement is used to determine the required time to complete one operation & the amount of work that can be performed by one operator at a specific time. It provides a fair way of estimating the time to do a job by a skillful operator with plentiful work supply & proper equipment.

Methods of Work Measurement:

- Time study
- Experience of personnel
- Predetermines Motion / Time System [PMTS]
- Standard data
- Operator reporting
- Work sampling

1.4. Time study:

Time study is the study of each of the step of an operational procedure and time consumed by them for the purpose to increase the efficiency of wears.

1.5. The calculation process of time study:

- First we have to record the names of the operation, m/c used workers information in the time study chart.
- Then using the stopwatch we have to take the required time to complete the 10 cycles as the Operation.
- Then we have to add a 30% allowance of this time.
- At last, using Standard Minute Value (SMV) average time we have to enclose on the time study chart.

1.6. Calculation of Sewing Line Efficiency:

- Line efficiency = $(\text{Total production} \times \text{SMV} \times 100) / (\text{No of operator} \times \text{Working hour} \times 60)$ Formula of Operation

1.7. Work study Formula

- Target/hr. = $\text{Total worker} \times (60 / \text{SMV}) \times 73\%$
- Efficiency = $(\text{Earn hr.} / \text{available hr.}) \times 100$
- Earn hr. = $(\text{Total production} \times \text{SMV}) / 60$
- Available hr. = $\text{Total worker} \times \text{total working hr.}$
- Performance = $\text{Earn hr.} / (\text{available hr.} - \text{total off hr.}) \times 100$
- Target achieve efficiency = $(\text{total prod} - \text{total target}) \times 100$
- Variance = $(\text{total prod} - \text{total target}) / \text{total target} \times 100$
- Basic time = $(\text{Observed time} \times \text{rating}) / \text{standard rating}$
- Standard minute value = $\text{Basic time} + \text{Allowance time}$

Lesson 22 - 29 (4) : Duties of a Supervisor

Objectives

At the end of this lesson you shall be able to

- Know about duties of a supervisor in a garment industry.
- Understand the key responsible areas and qualities of a supervisor.

Introduction:

Garment production supervisor is the key person in garment factory. A supervisor has great role in garment industry to maintain quality and productivity. A garment production supervisor has to manage and motivate workers. Besides, garment production supervisor manages apparel production teams by making sure team members meet quotas, use equipment correctly and adhere to company policies.

Production supervisors widely vary depending on organization structure. Small and unorganized garment manufacturers still don't have industrial engineering (IE) department that assists production supervisor in production preparations, like garment analysis, making line layout, manpower requirement and target calculation etc.

Factories those have established industrial engineering department production preparation is done by industrial engineers. And Supervisor's responsibilities are reduced many times.

Key responsible areas of a line supervisor in a typical factory are as following: (This list is made considering that there is no presence of the Industrial Engineering department in the factory.)

- 1 **Discipline in Shop Floor:** Discipline in the sewing floor is very important to create a good work culture in the company. Like starting line on time in the morning, switch off sewing machine when there is no work or operator is not in the machine. Operators may not be aware of how to behave on the factory floor. A supervisor is responsible to train such things to their operators and helpers. For example, operators should keep the floor clean, keeps accessories on defined place, and should not talk unnecessarily with other operators during working hours.
- 2 **Style Analysis:** It is an essential task for a supervisor to collect a sample of the style that is going to be loaded in his/her line and analyze garment construction and operation details. A supervisor should completely understand what to be done. In case any confusion s/he should contact to merchandiser and get clarification. The quality requirement can be discussed with the quality team or merchandiser.
- 3 **Line Setting:** In line setting, supervisor does sequencing of machine, select most suitable operators from available operators for each operation. Supervisor stands aside of the operator and instruct to her/him how to make the operation on first pieces.
- 4 **Machine Selection:** What sewing machines and equipment should be used for the style and how many machines should be allocated to a particular operation is decided by line supervisors. Unlike industrial engineers, the supervisor is not able to plan machine requirement in advance but they do it based on the actual requirement to meet the daily production target.
- 5 **Line Balancing:** Leveling of workload throughout the line is very important to improve capacity (resource) utilization. No line should have excess work in process as inventory.
- 6 **Operator Training:** Though companies set up a training center for sewing operator training or hire only experienced operators, supervisors need to train unskilled operators on the job. While a trainee operator is allocated for an operation and the trainee operator is not confident how to do that job or hesitating to follow an operation method, supervisor's responsibility is to guide and instruct them the correct method of doing that operation.
- 7 **Meeting Target Production:** Line supervisors are given daily production target based on resources available in a line (machine and manpower). Supervisor is responsible to produce target quantity at the end of the day. To meet the target, supervisor need to monitor operators working pace, loading of works, lost time etc. There might be many reasons for low production. Still supervisor need to find a way to hit the daily production target.

- 8 **Stitching Quality:** Stitching quality of the garment comes from the operators. Though factories involve quality checkers in the sewing line to control stitching quality, line supervisor is responsible for producing right quality garments. Supervisors need to maintain low percentage defective or DHU rate of his/her line.

There are a lot of qualities that a garment production supervisor needs on order to supervise effectively.

- A garment production supervisor should realize and show that many of the ideas he or she uses come from the people in his or her group.
- A garment supervisor should show respect for employees as individuals and as groups. The supervisor should be sensitive to and withstand their needs.
- Supervisors should act as buffers between employees and top management. They can do this by not passing on the pressures put on them to those who work for them. This includes taking personal responsibility for the directions and others they are required to give even when they are not what the supervisors would like to do or would have chosen.
- A Supervisor should be available and understanding when employees come in for help. A supervisor should avoid giving the impression that he or she never has time to help or to listen to problems.
- It is important for a supervisor to be accepted as a member of the work group. It is just as important for the supervisor not to go so far in gaining acceptance that his or her position as a leader is undermine

◆ MODULE 7 : Forms and Measurements ◆

Lesson 30 (1) : Introduction to Children wear

Objectives

At the end of this lesson you shall be able to

- measure the children dress form/figure
- understand the representative sizes and shapes of children
- observe differences about body shapes from infants' through children's size chart.

Creating children's wear offers some new challenges to the designer and patternmaker. Comfort, which reflects good fit, proportion, and function, is nowhere more important than in the creation of childrenswear. While adults are sometimes willing to sacrifice comfort for aesthetics, children never are.

Size Grouping

Sizes for children's clothing are grouped according to body circumference and proportion. Body shapes from infants' through children's size ranges are indistinguishable between boys' and girls'. Although many differences can be observed in styling and color between boys' and girls' clothing from infant through sizes 6 and 6X, differences necessitated by form only become a reality at size 7, when physical shapes begin to diverge.

• Infants or Babies

Physical observations: Newborn to children beginning to crawl.

Sizes: 3 months, 6 months, 12 months, 18 months, and 24 months.

• Toddlers

Physical observations: Child is walking by this time. Head seems to sit on shoulder; neck is not developed. Shoulders are rounded and have almost no width. Outward thrust of tummy is a prominent feature. Boys' and girls' sizes are indistinguishable, and except for color difference and dresses, fashion is unisex.

Sizes: 2T, 3T, and 4T (1T may also be considered in this size range).

• Children

Physical observations: There is rapid growth through this period. Proportions differ greatly as the torso remains about the same length, but the legs grow longer. The prominence of the stomach is reduced. Boys and girls have similar shapes at this age, and the waistline, as yet, is not defined. Boys and girls begin to diverge at age seven.

Sizes: Sizing for children within this group is mixed. They are either sized 3 to 6X (X meaning larger than size 6) for both boys and girls or sized 4 to 6X for girls, and 4 to 7 for boys.

• Boys and Girls (Preteen)

Physical observations: Figures diverge when boys and girls reach age seven. Major changes are taking place. Baby fat is replaced with muscle tissue. Slimming and lengthening of the torso and limbs occur, but the figure does not, as yet, have defined curves.

Sizes: 7 to 10. Another method for sizing this group is girls 7 to 14 classified as elementary to junior high school; boys 8 to 20 classified as elementary to junior high school (with chest measurements used for sizing).

• Young juniors

Physical observations: There is a jump in growth and the figure is more defined. The torso is longer, a natural waistline appears, and bust and hips start to take shape in girls. Boys have slim hips, blending into the waistline. For both boys and girls, this is an interim period when the figure matures at varying stages.

Sizes: 10 to 14.

Juniors

Physical observations: The young woman's figure is developed to almost adult maturity with a defined waistline; high, rounded breast; and shapely hips. The teenager is now ready to wear garments in the junior size range. In young men, the figure is developed almost to maturity. Muscle is more defined and hips are slim, blending with the waistline.

Sizes: 1, 3, 5, 7, 9, 11, and 13.

Measuring the form

Children, 3 TO 6X; girls, 7 TO 14; and boys, 7 TO 14

All measurements must be taken carefully to avoid errors and fit problems. With the exception of circumference measurements, only one-half of the front and back form is measured, using the same half throughout for consistency.

Arc measurements are taken at the bust or chest, waist, and hip areas. Form sizes 7 to 14 have front and back princess style lines, giving the figure some definition. The 3 to 6X forms do not have princess style lines.

To measure the form, place the metal-tipped end of the measuring tape at a landmark on the form, extending the tape to another landmark. As measurements are taken, record them on your measurement recording chart.

Torso Circumference Measurements (Fig 1)

- Bust or chest (1): Measure over the chest or bust and across the back.
- Waist (2): Measure around the waist.
- Hip (3): Measure around the widest part of the hip, holding the measuring tape parallel to the floor. Pin mark the location at the side seam.

Form Preparation (Fig 2)

Place pins through the form to mark the following locations:

- Roll line at shoulder tip.
- Roll line of front and back at mid-armhole (at level with plate screw).
- Armhole depth: Place a pinhead below the plate at side seam of the form, using the measurement indicated by the size of the form.
- Side Length (7): Measure from the pin mark to below waist tape of the side seam.

Fig 1

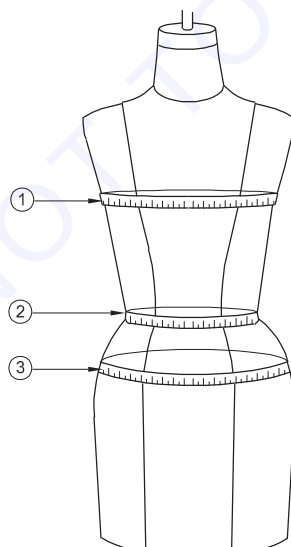
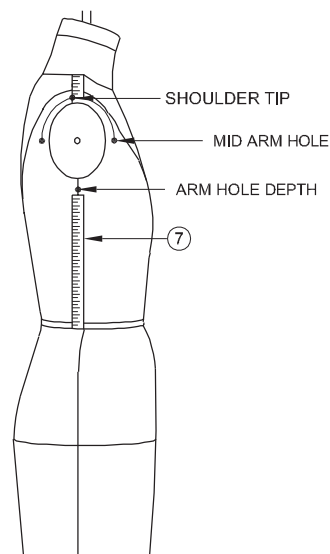


Fig 2



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Armhole Depth Chart: Suggested Measurements (Measurements do not include ease)

Children	
Size	below Plate
3	1/8" to 1/4"
4	1/4" to 3/8"
5	3/8" to 1/2"
6	1/2"
6X	Same

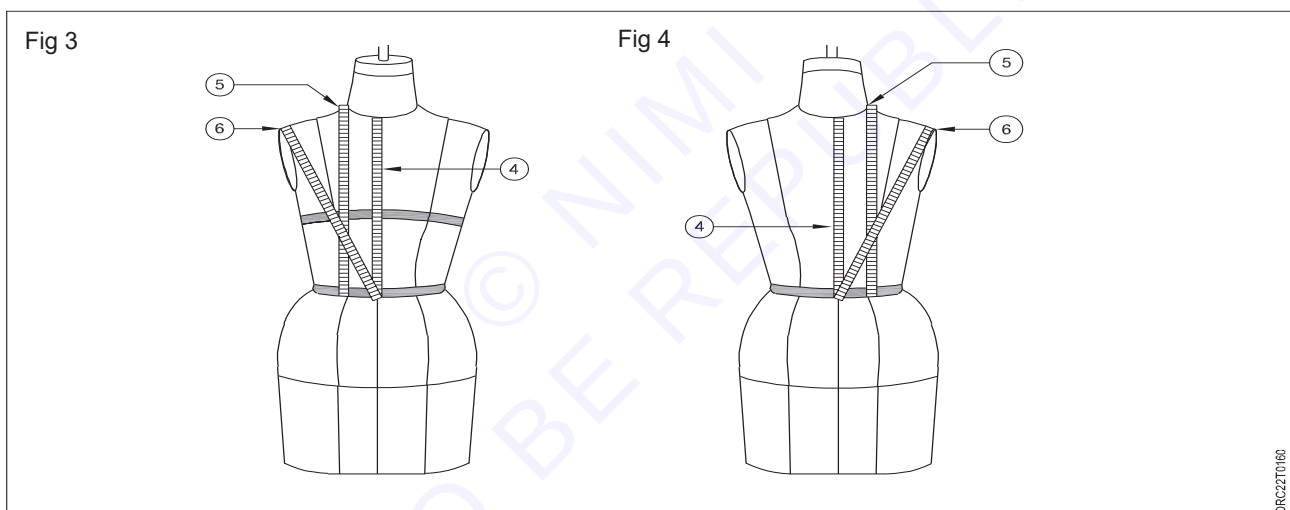
Boys and Girls	
Size	below Plate
7	1/2"
8	5/8"
10	5/8"
12	5/8"
14	Same

Vertical Measurements (Front and Back) (Fig 3 & 4)

Center length (4): Measure at center neckline to the bottom waist tape (front and back).

Full length (5): Measure from shoulder-neck to the bottom waist tape. The measuring tape is held parallel to the center line (front and back).

Shoulder slope (6): Measure from shoulder tip (pin mark) to the center line at the bottom of the waist below the tape (front and back).

**Horizontal Measurements****Front (Fig 5)**

Shoulder length (8): Measure from the shoulder/neck to the shoulder tip pin mark.

The following measurements are taken across the form, divided in half, and recorded.

Across shoulder (9): Measure from pin marks, shoulder tip to shoulder tip.

Across chest (10): Measure from pin marks, mid armhole to mid-armhole.

Bust/chest arc (11): Measure from pin marks, side seam to side seam.

Waist arc (14): Sizes 3 to 6X: Measure from side seam to side seam. Sizes 7 to 14: Measure center front to princess line for dart placement.

Hip arc (15). Measure from pin marks, side seam to side seam, with measuring tape held parallel to the floor.

Back (Fig 6)

Across shoulder (9): Measure from pin marks, shoulder tip to shoulder tip.

Across back (12): Measure from pin marks, mid armhole to mid-armhole.

Back arc (13): Measure from pin marks, side seam to side seam.

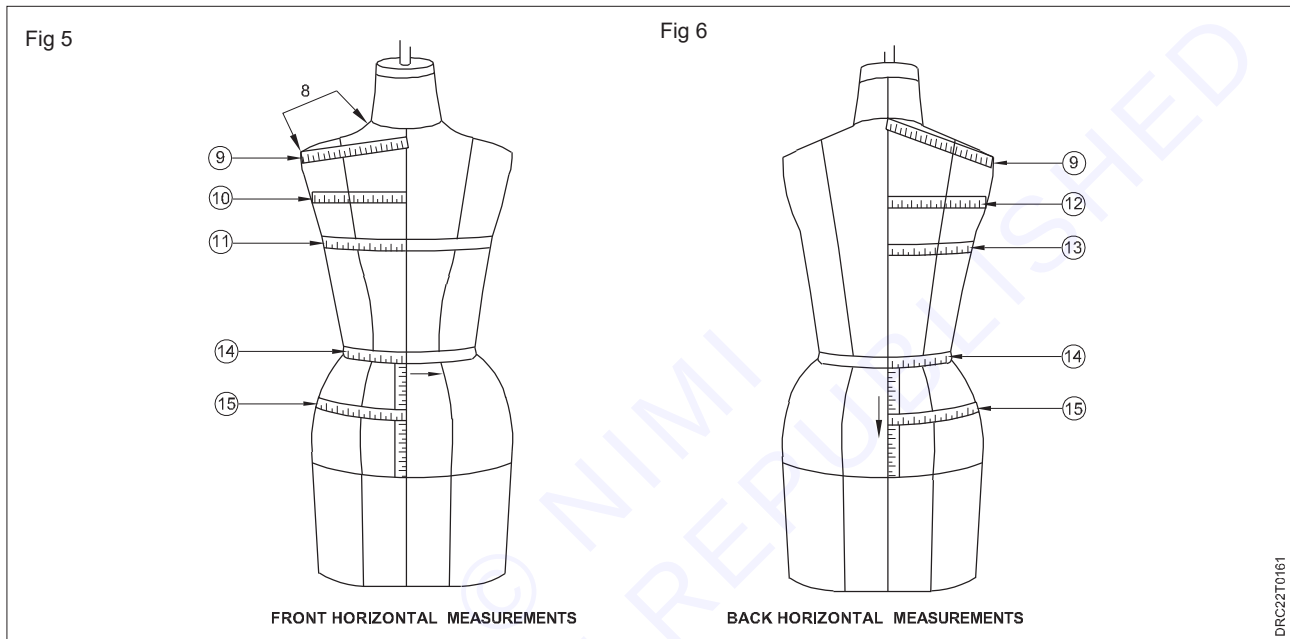
Waist arc (14): Sizes 3 to 6X: Measure from side seam to side seam at waist.

Sizes 7 to 14: Measure center back to princess line for dart placement.

Hip arc (15): Pin mark at widest part of the hip. Measure from side seam to side seam at the pin mark, with the measuring tape held parallel to the floor.

Hip depth (16): Measurement from below waist tape to pin mark.

Forms that have princess seams (sizes 7 to 14) measure C.F. and C.B. to princess line and record: C.F. _____ C.B. _____ .



Leg Measurements (Fig 7)

(If the form is legless, record measurement numbers 16 through 27 from the Standard Measurement Chart for the size of the form being measured.)

The following measurements are taken from below the waistline tape.

Waist to hip level (16): Measure from waist tape to the pin mark at side seam.

Waist to knee (17): Measure from the waist at side to mid-knee.

Waist to ankle (18): Measure from the waist at side to below ankle tape.

Waist to floor (19): Use waist to ankle (18) measurement and add 2 1/4 inches. (Fig 8)

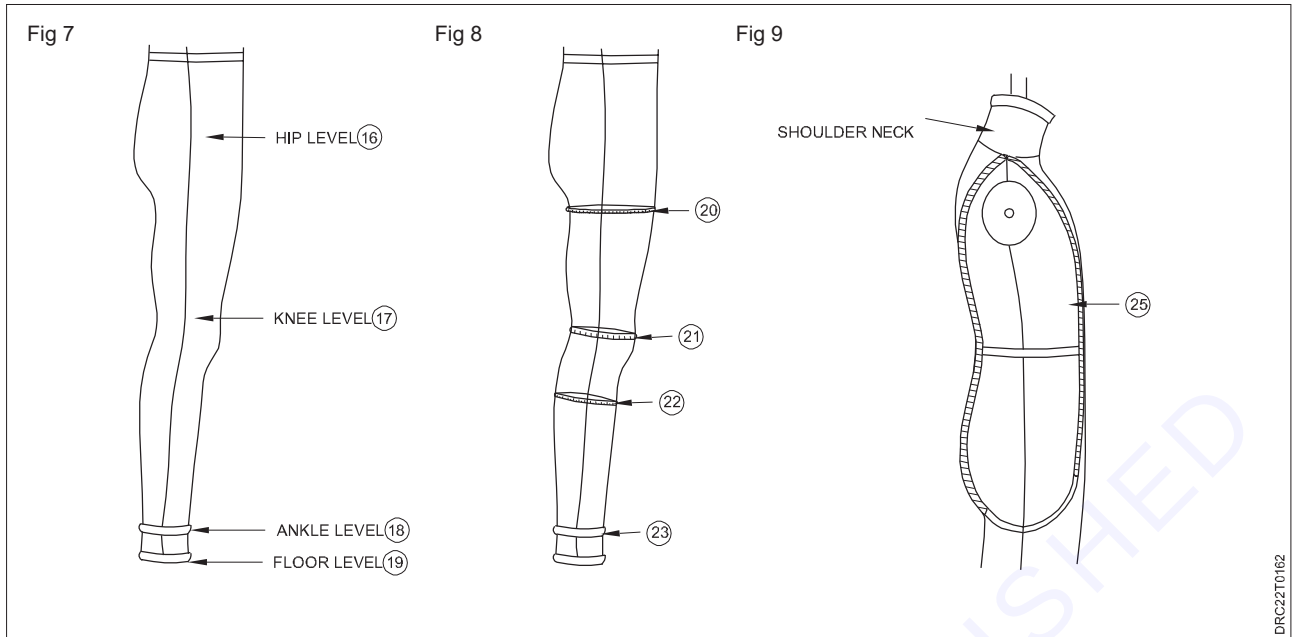
Upper thigh (20): Measure around the widest part of the upper leg.

Knee (21): Measure around the fullest part of the knee.

Calf (22): Measure around the fullest part of the calf.

Ankle (23): Measure around the fullest part of the ankle.

Foot entry (24): Add 2 1/4 inches to ankle measurement. (Fig 9)

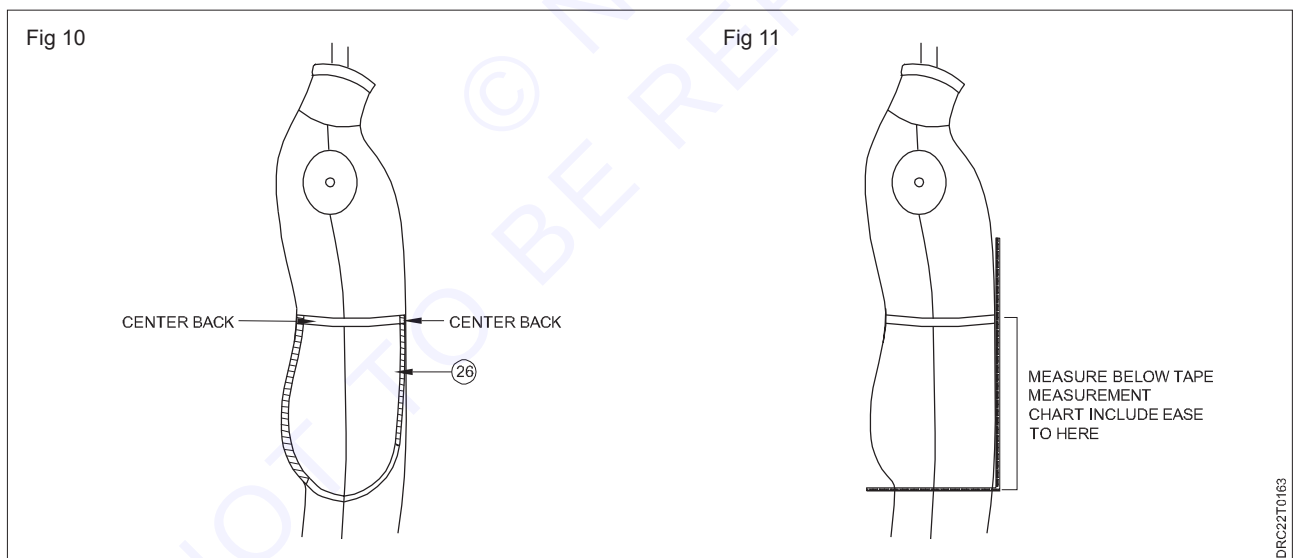


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Trunk length (25): Measure from the front shoulder neck downward, passing under crotch to the back shoulder-neck. (Fig 10)

Crotch length (26): Measure from center front waist, passing under crotch to the center back waist. (Fig 11)

Crotch depth (27): Place a square ruler between legs of the form, with the edges of the ruler arms touching the abdomen and crotch. Measure from below waist to the top edge of the ruler arm at crotch level.



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Standard measurement chart for boys and girls

Sizes	3	4	5	6	6X
Height	36-38 1/2	39-41 1/2	42-44 1/2	45-46 1/2	47-48 1/2
Weight	29-32	33-36	37-40	41-46	47-53
Head circumference	19 3/4	20	20 1/4	20 1/2	20 3/4

Circumference measurements

Grade	1"	1"	1"	1"	1"
Size	3	4	5	6	6X
1 Bust, or chest:	22	23	24	25	26
2 Waist:	20	21	22	23	24
3 Hip:	23 1/2	24 1/2	25 1/2	26 1/2	27 1/2
4 Center length:					
Front	8 1/2	9	9 1/2	10	10 1/4
Back	9 1/4	9 3/4	10 1/4	10 3/4	11
5 Full length:					
Front	10 1/2	11 3/8	11 3/4	12 3/8	12 3/4
Back	9 3/4	10 3/8	11	11 5/8	12
6 Shoulder slope:					
Front	10 1/2	11 1/8	11 3/4	12 3/8	12 3/4
Back	9 1/2	10 1/8	10 3/4	11 3/8	11 3/4
7 Side length:	4	4 3/8	4 3/4	5 1/8	5 1/4
8 Shoulder length:	3 3/8	3 7/16	3 1/2	3 9/16	3 5/8
9 Across shoulder					
Front	5 1/4	5 3/8	5 1/2	5 5/8	5 3/4
Back	5 1/4	5 3/8	5 1/2	5 5/8	5 3/4
10 Across chest:	4 1/4	4 3/8	4 1/2	4 5/8	4 3/8
11 Bust, or chest arc:	5 1/2	5 3/4	6	6 1/4	6 1/2
12 Across back:	4 1/2	4 5/8	4 3/4	47/8	5
13 Back arc:	5 1/2	5 3/4	6	6 1/4	6 1/2
14 Waist arc:					
Front	5 1/4	5 1/2	5 3/4	6	6 1/4
Back	4 3/4	5	5 1/4	5 1/2	5 3/4
15 Hip arc:					
Front	5 3/4	6	6 1/4	6 1/2	6 3/4
Back	6	6 1/4	6 1/2	63/4	7
16 Side waist to hip:	3 3/4	4 1/2	5	5 1/2	5 3/4
17 Side waist to knee:	12 1/8	13 3/4	15	16 1/4	16 7/8
18 Side waist to ankle	20	22 1/2	24 1/2	26 1/2	27 1/2
19 Side waist to floor:	22	24 1/2	26 1/2	28 1/2	29 1/2
20 Upper thigh:	13	13 1/2	14	14 1/2	15
21 Knee:	10 1/4	10 5/8	11	11 3/8	11 3/4
22 Calf:	9 1/4	9 5/8	10	10 3/8	10 3/4
23 Ankle:	7	7 1/4	7 1/2	7 3/4	8
24 Foot entry:	10 1/2	10 3/4	11	11 1/4	11 1/2

25 Trunk length:	38	40 3/4	43	45 1/4	46 1/2
26. Crotch length:	17	18 1/2	19 1/2	20 1/2	21
27. Crotch depth:	6 1/2	7 1/4	7 3/4	8 1/4	8 1/2
28. Overarm sleeve length:	13 1/4	14 1/8	15	15 7/8	16 1/2
29. Biceps:	8 3/4	9 1/8	9 1/2	9 7/8	10 1/4
30. Hand entry	6 1/2	6 3/4	7	7 1/4	7 1/2
31. Cap height:	4 1/8	4 1/4	4 3/8	4 1/2	4 5/8

Some manufacturers use size 6 measurements to include size 6X. The only difference noted is in the length. Others combine size 6X with size 7 (1-inch grade is used for all sizes).

Standard measurement chart for girls

Sizes	7	8	10	12	14
Height	48-50	50 1/2-52 1/2	53-55	55 1/2-57 1/2	58-60
Weight	47-53	54-63	64-74	75-84	85-94
Head circumference	21	21 1/4	21 1/2	21 3/4	22

Circumference measurements

Grade	1"	1"	1"	1"	1"
Size	7	8	10	12	14
1 Bust, or chest:	26 1/2	27 1/2	28 1/2	29 1/2	30 1/2
2 Waist:	22	23	24	25	26
3 Hip:	28	29	30	31	32
4 Center length:					
Front	10 1/8	10 1/2	11	11 1/2	12
Back	11 3/8	11 3/4	12 1/4	12 3/4	13 1/4
5 Full length:					
Front	12 3/8	12 5/8	13 1/4	13 7/8	14 1/2
Back	11 7/8	12 3/8	13	13 5/8	14 1/4
6 Shoulder slope:					
Front	12 3/8	12 7/8	13 1/2	14 1/8	14 3/4
Back	11 7/8	12 3/8	13	13 5/8	14 1/4
7 Side length:	57/8	6 1/8	6 1/2	67/8	7 1/4
8 Shoulder length:	37/8	3 15/16	4	4 1/16	4 1/8
9 Across shoulder					
Front	6 1/8	6 1/4	6 3/8	6 1/2	6 5/8
Back	6	6 1/8	6 1/4	6 3/8	6 1/2
10 Across chest:	5	5 1/8	5 1/4	5 3/8	5 1/2
11 Bust, or chest arc:	6 3/4	7	7 1/4	7 1/2	7 3/4
12 Across back:	5 1/4	5 3/8	5 1/2	5 5/8	5 3/4
13 Back arc:	67/8	7 1/8	7 3/8	7 5/8	7 7/8
14 Waist arc:					
Front	5 3/4	6	6 1/4	6 1/2	6 3/4
Back	5 1/4	5 1/2	5 3/4	6	6 1/4
15 Hip arc:					
Front	6 1/2	6 3/4	7	7 1/4	7 1/2
Back	7 1/2	7 3/4	8	8 1/4	8 1/2

16 Side waist to hip:	5 1/8	5 1/2	6	6 1/2	7
17 Side waist to knee:	15 1/2	16 1/2	18	19 1/4	20 1/2
18 Side waist to ankle	27 7/8	29 1/2	32	34	36
19 Side waist to floor:	30 7/8	32 1/2	35	37	39
20 Upper thigh:	16	16 1/2	17	17 1/2	18
21 Knee:	11 3/4	12 1/8	12 1/2	12 7/8	13 1/4
22 Calf:	11 1/4	11 5/8	12	12 3/8	12 3/4
23 Ankle:	8	8 1/4	8 1/2	8 3/4	9
24 Foot entry:	10 1/2	10 3/4	11	11 1/4	11 1/2
25 Trunk length:	45.5	47 1/4	49 1/2	51 3/4	54
26 Crotch length:	21 1/4	22	23	24	25
27 Crotch depth:	7 5/8	8	8 1/2	9	9 1/2
28 Overarm sleeve length:	16	16 5/8	17 1/2	18 3/8	19 1/4
29 Biceps:	9 3/4	10 1/8	10 1/2	10 7/8	11 1/4
30 Hand entry	7 5/8	7 7/8	8 1/8	8 3/8	8 5/8
31 Cap height:	4 1/2	4 5/8	4 3/4	4 7/8	5

Some manufacturers use size 6 measurements to include size 6X. The only difference noted is in the length. Others combine size 6X with size 7 (1-inch grade is used for all sizes).

Lesson 30 (2) : Form Measurements & Figure Analysis

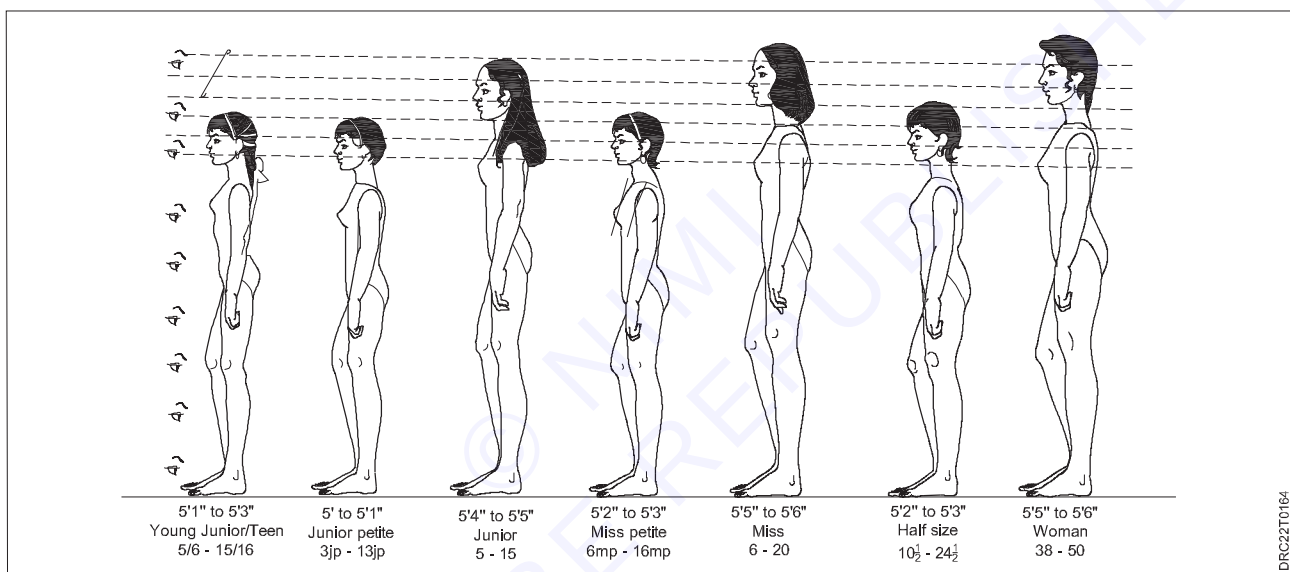
Objectives

At the end of this lesson you shall be able to

- know about the different size charts
- take measurements from the dress form or model
- understand that how different body measurements help to make a perfect garment.

Pattern industry standards

In response to national standards and consumers' needs, the pattern industry established the Measurement Standard Committee, which devised its own standard set of figure types and sizes. The examples below are composites of the pattern industry designated figure types by age and height categories.



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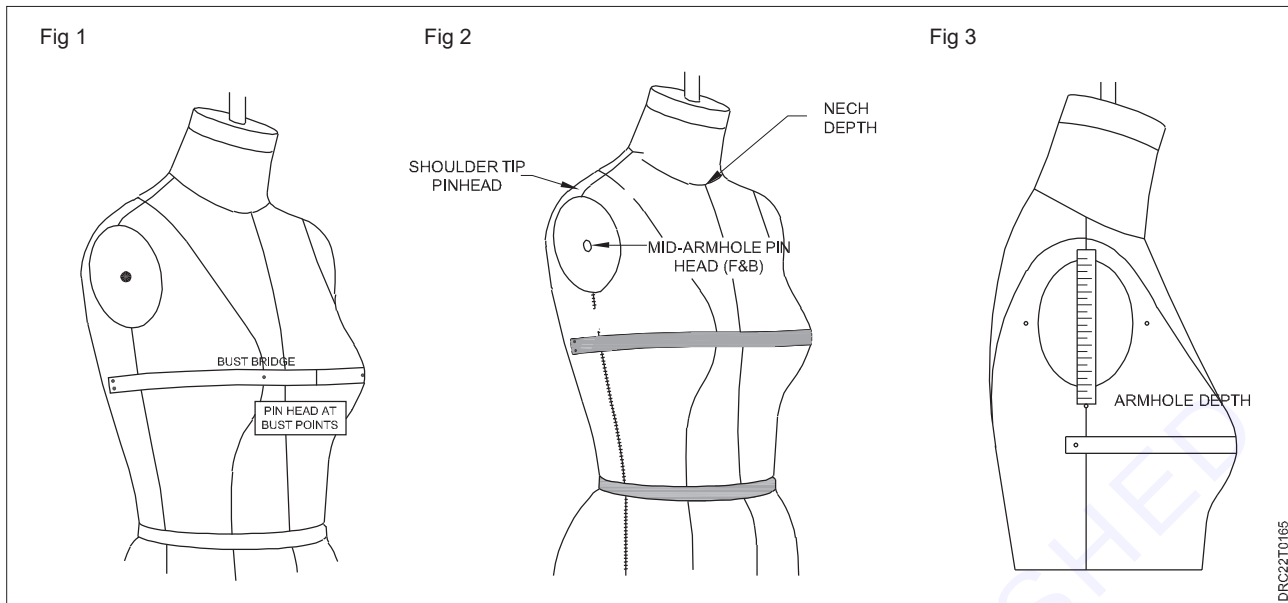
If your figure is less than perfect, remember it's the pattern that must be perfect, not your figure. To begin the process, it will be necessary to assess the unique characteristics of the body being measured.

Measuring dress form: Drafting depends on measurements taken from a form or model. Measurement must be taken carefully to avoid fitting problems.

Preparing the Dress Form for Measuring:

Forms are sometimes imperfect, with measurements not always equal on each side of the center. Check and remark the side seams if necessary.

- **Bust bridge:** Cut a strip of cloth having 1 ½ inch width and 26 inches long. Fold edges to center and fold again. Place across bust points, ending 1 inch past the side seam. Push pins through to secure. Trim unneeded length. Thrust pins through bust points. Mark center line. (Fig 1)
- **Waistline:** Replace waistline tape, if damaged.
- **Pinhead guides:** Thrust pins through shoulder tip at the ridge, or roll line, mid-armhole at level with the plate screw, and 3/8 inch below the center front neck. (Fig 2)
- **Armhole depth chart:** To locate armhole depth, choose the measurement from the Armhole Depth Chart below that corresponds to the form size. Measure down from the armhole plate and thrust a pin head at the location. Grade up or down by 1/8 inch for smaller or larger sizes. As with establishing a set of measurements, they are to be test fitted with sleeve attached. Make adjustments if necessary. (Fig 3)



Size 3/4—3/8"	Size 11/12—3/4"
Size 5/6—3/8"	Size 13/14—1"
Size 7/8—1/2"	Size 15/16—1 1/8"
Size 9/10—5/8"	Size 18—1 1/4"

- To determine cap height, measure up from armhole depth to shoulder tip and add 3/8 inch.

Taking Measurements

- Place the metal tip end of the tape measure at one reference point and extend to the next reference point when taking measurements.
- Record measurements on a Measurement chart.
- Arc measurements are taken from center lines to the side seam.
- The same half of the front and back of the form is measured.

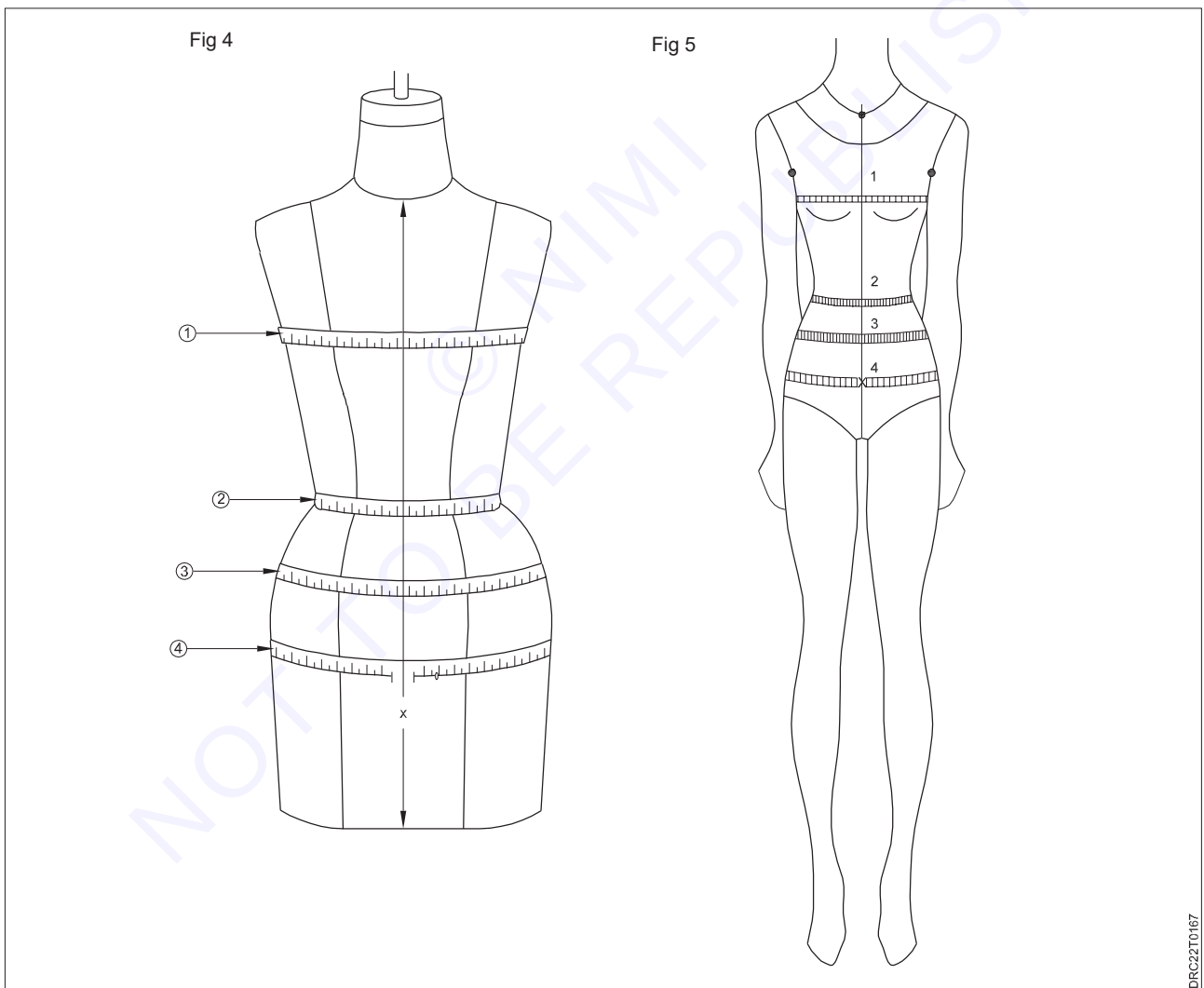
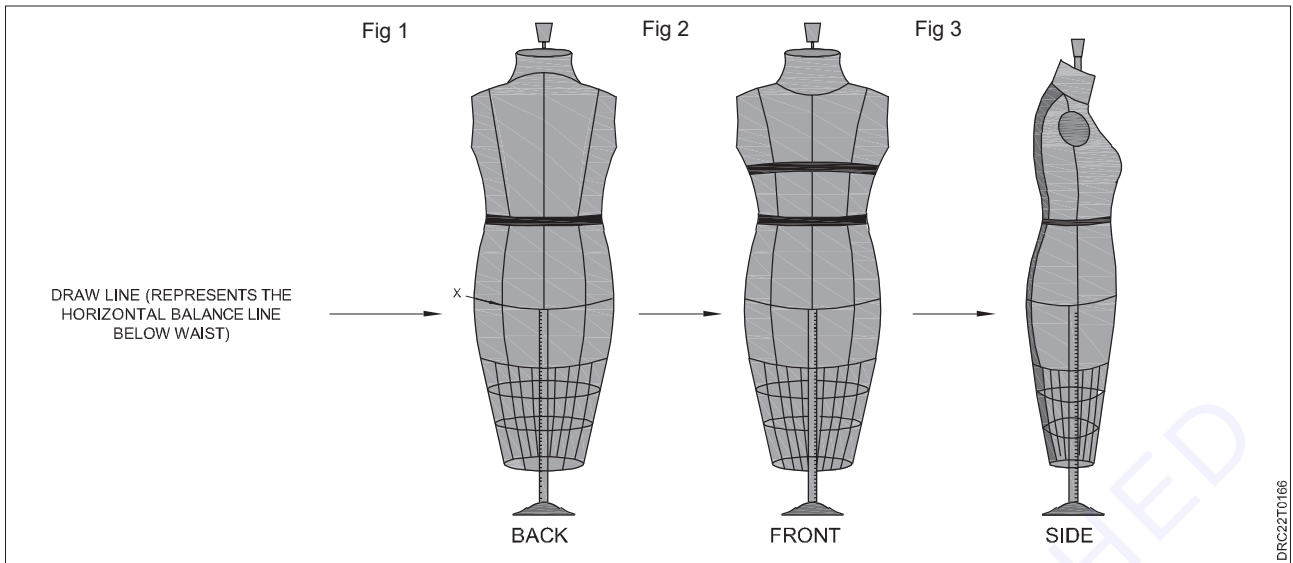
Horizontal Balance Line (HBL)

- Measure up from the floor to the pin mark (X) at center front (Fig 1).
- Use this measurement to measure up from the floor and pin mark center back and side seams. Pin mark at princess lines. Recheck measurements (Fig 1 and 3).
- Draw a line around the hip touching each of the pin marks, or use adhesive tape to mark the hipline. The standard hip depth is 6 to 7 inches down from the center front waist for juniors and petites, 8 to 9 inches down for missy size. Personal fit. Fig 1, 2, and 3

Follow the instructions very carefully and double check. If incorrect, the hemline of the skirt will not hang parallel with the floor.

Circumference for form and model measurements (Fig 4 & 5)

- Bust (1). Across bust points and back.
- Waist (2). Around waist.
- Abdomen (3). Three inches below waist.
- Hip (4). Measure widest area with tape parallel with floor. Pin to mark hip level at center front (referred to as X-point).



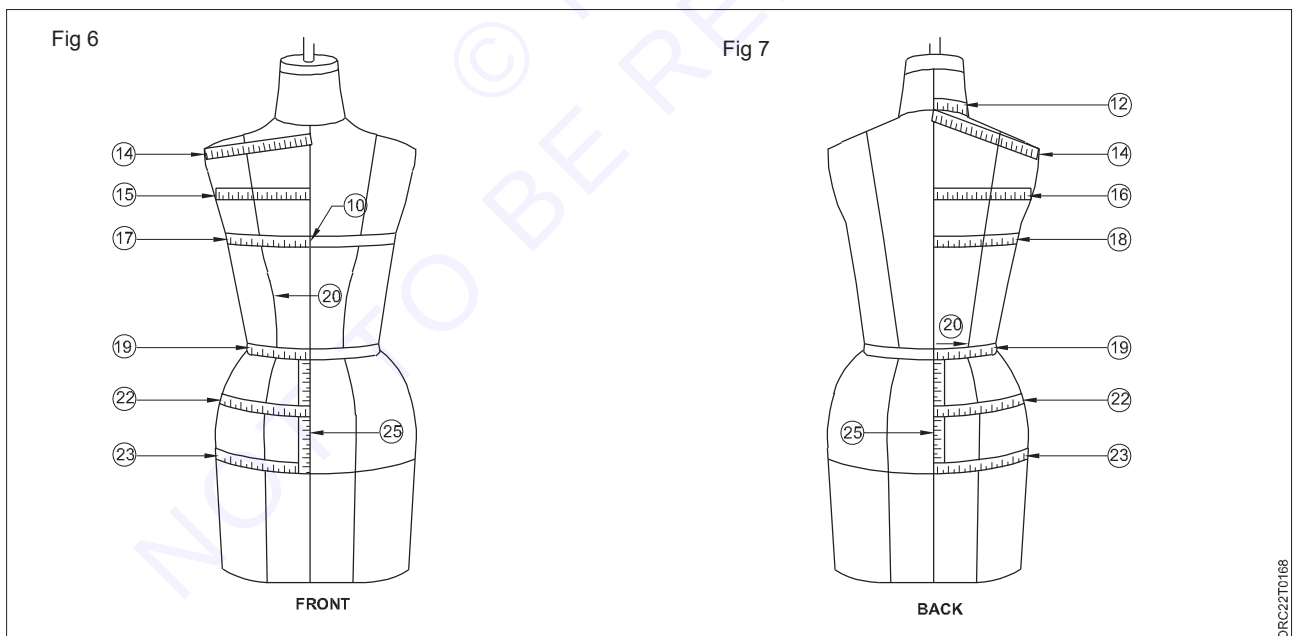
Horizontal arc for form and model measurements

Front (Fig 6)

- **Across shoulder (14):** Shoulder tip to center front neck.
- **Across chest (15):** Center front to 1 inch above mid-armhole (pinhead mark).
- **Bust arc (17):** Center front, over bust point, ending 2 inches below arm plate at side seam.
- **Bust span (10):** Place tape across bust points; divide in half for measurement.
- **Waist arc (19):** Center front waist to side waist seam.
- **Dart placement (20):** Center front to side front (princess line).
- **Abdomen arc (22):** Center front to side seam, starting 3 inches down from waist.
- **Hip arc (23):** Center front to side seam on HBL line.

Back (Fig 7)

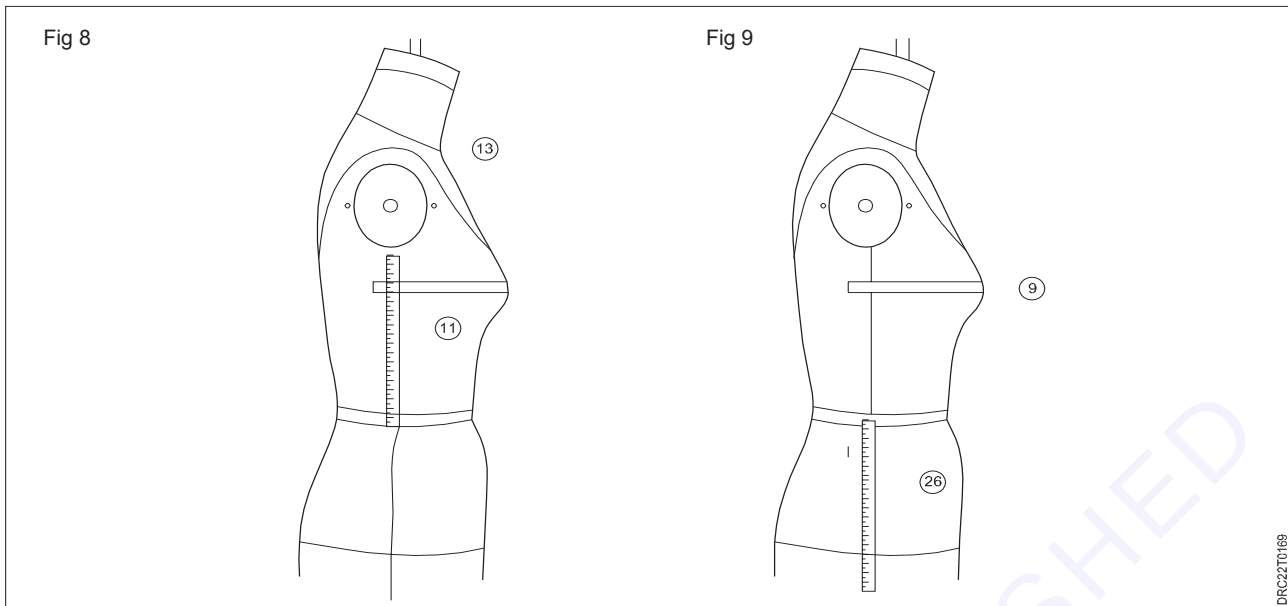
- **Back neck (12):** Center back neck to shoulder at neck.
- **Across shoulder (14):** Shoulder tip to center back neck.
- **Across back (16):** Center back to 1 inch above the mid-armhole at ridge of pinhead.
- **Back arc (18):** Center back to bottom of arm plate.
- **Waist arc (19):** Center back waist to side waist seam.
- **Dart placement (20):** Center back waist to side back (princess line).
- **Abdomen arc (22):** Center back to side seam, starting 3 inches down from waist.
- **Hip arc (23):** Center back to side seam on HBL line.



Measurements can be taken across the model from one landmark to the other, then divided in half and recorded. If the center lines of the front and back are definitely centered, measure from the center line to the side seams of the front and back bodice.

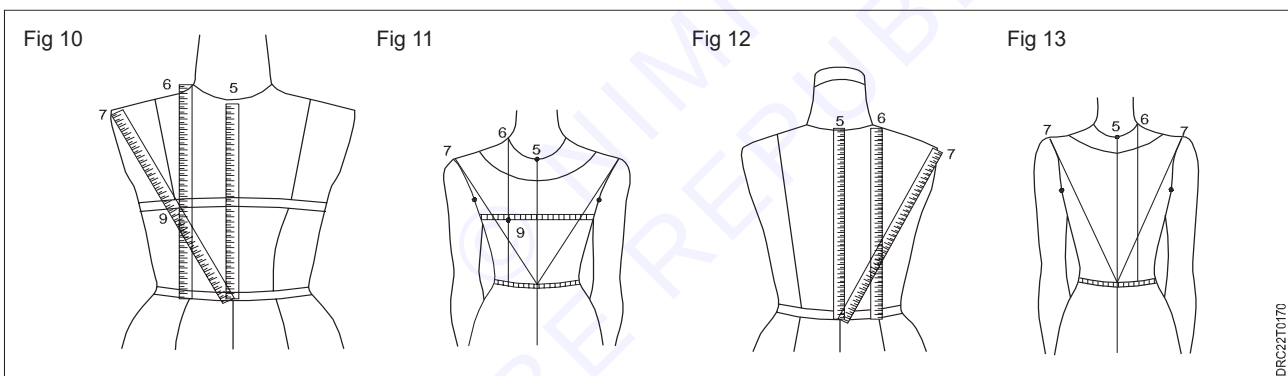
Vertical measurements for form and model (Fig 8 and 9)

- **Side length (11):** Pin mark below arm plate at side seam to side waist.
- **Shoulder length (13):** Shoulder tip to neck.



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- **Side hip depth (26):** Side waist to HBL, on side of form being measured.
- **Bust radius (9):** Measure from bust point ending under bust mound to rib above.(Figs 10, 11, 12, 13)



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- **Center length (5):** Mark neck to waist (over bridge).
- **Full length (6):** Waist to shoulder at neck, parallel with center lines.
- **Shoulder slope (7):** Center line at waist to the shoulder tip (mark).
- **Bust depth (9):** Shoulder tip to bust point.

New Strap Measurement

Place metal tip of the measuring tape at corner of shoulder/neck to bottom of the waist band at the side seam and record.

Personal Fit: Asymmetric Verification

Shoulder slope: Measure on right and left sides. If the slope measurements differ more than an 1/8 inch, the shoulders are asymmetric.

Side hip: Measure both side (see #26), if measurements differ more than 1/8 inch, the hip is asymmetric.

Standard Measurement Chart

CIRCUMFERENCE								
MEASUREMENTS	Grade	1"	1"	1"	1"1/2"	1"1/2"	1"1/2"	"2"
(Ease not included)	Size	6	8	10	12	14	16	18
1. Bust:		34	35	36	37- 1/2	39	40-1/2	42-1/2
2. Waist		25-1/2	26-1/2	27-1/2	29	30-1/2	32	34
3. Abdomen		32	33	34	35-1/2	37	38-1/2	40-1/2
4. Hip		35-1/2	36-1/2	37-1/2	39	40-1/2	42	44
UPPER TORSO								
5. Center length								
Front		14-1/3	14-1/3	14-1/3	14- 1/3	15- 1/3	15-1/3	15-1/3
Back		16-1/4	16-1/2	16-1/4	17	17-1/4	17-1/2	17-1/4
6 . Full length								
Front		16-1/4	17-1/4	17-1/5	18	18-1/3	18-1/4	19-1/4
Back		16-1/4	17-1/5	17-1/2	17 -1/2	18-1/4	18-1/3	19
7. Shoulder slope:								
Front		16-1/16	17-1/5	17-1/4	18-1/3	18-1/2	18-1/4	19-1/4
Back		16-1/26	16-1/4	17	17-1/3	17-1/4	18-1/4	19
8. New Strap		17	17-1/4	17-1/4	18-1/4	18-1/4	18-1/16	19-9/16
9. Bust depth:		9-1/8	9-5/16	9-1/2	9-11/16	9-7/5	10-1/16	10-1/4
Radius:		3	3	3	3	3	3	3
10. Bust span		3-5/8	3-1/8	3-7/8	4-1/16	4-1/4	4-7/16	4-8/16
11. Side length		8-1/5	8-1/4	8-1/3	8-1/2	8-1/4	8-3/4	8-7/8
12. Back neck:		2-5/8	2-7/8	3	3-1/5	3-1/4	3-1/5	3-1/2
13. Shoulder length:		5-1/8	5-3/16	5-1/4	5-3/5	5-1/2	5-3/8	5-13/16
14. Across shoulder:								
Front		7-1/2	7-5/3	7-3/4	7-25/16	8-1/8	8-5/16	8-9/16
Back		7-3/4	7-7/8	8	8-3/16	8-3/8	8-9/16	8-13/16
15. Across chest		6-1/2	6-5/8	6-3/4	6-15/16	7-1/4	7-5/16	7-9/16
16. Across back:		6-3/4	6-7/8	7	7-3/16	7-3/6	7-9/16	7-11/16
17. Bust arc:		9-1/2	9-1/4	10	10-3/5	10-1/4	11-1/5	11-5/8
18. Back arc:		8-1/2	8-1/6	8-1/5	9	9-1/5	9-1/4	10-1/4
19. Waist arc								
Front		6-1/2	6-1/4	7	7-1/5	7-1/4	8-1/5	8-1/5
Back		6-1/8	6-1/5	6-1/8	7	7-1/8	7-1/4	8-1/4

20 Dart Placement:								
Front		3	3-1/3	3-1/4	3-7/16	3-5/8	3-11/16	4-1/16
Back		3	3-1/3	3-1/4	3-7/16	3-5/8	3-11/16	4-1/16
21 Number not used								
Lower torso								
22 Abdomen:								
Front		7-3/4	8	8-1/4	8-5/8	9	9-3/6	9-7/8
Back		8	8-1/4	8-1/2	8-7/8	9-1/4	9-5/8	10-1/8
23 Hip arc:								
Front		8-5/4	8-7/8	9-1/8	9-1/2	9-7/8	10-1/4	10-3/4
Back		9-1/8	9-3/8	9-5/8	10	10-3/8	10-3/4	11-1/4
24 Crotch depth:		9-1/2	9-3/4	10	10-1/4	10-1/2	10-3/4	11
25 Hip depth:								
Center front		7-1/2	7-1/4	8	8-1/4	8-1/2	8-1/4	9
Center back		7-3/8	7-5/8	7-7/8	8-1/8	8-3/8	8-5/8	8-7/8
26 Side hip depth:		7-5/8	7-7/8	8-1/8	8-3/8	8-5/8	8-7/8	9-1/8
27 Waist to knee:		22	22-1/2	23	23-1/2	24	24-1/2	25
Waist to ankle:		37	37-1/2	38	38-1/2	39	39-1/2	40
Waist to floor:		39	39-1/2	40	40-1/2	41	41-1/2	42
28 Crotch length:		24-1/2	25-1/2	26	26-3/4	27-1/2	28-1/4	29
Vertical trunk		59	60-1/2	62	63-1/2	65	66-1/2	68
29 Upper thigh:		20	20-3/4	21-1/2	22-1/2	23-1/2	24-1/2	25-3/4
Mid thigh:		18-1/2	19	19-1/2	20-1/4	21	21-3/4	22-3/4
30 Knee:		13	13-1/2	14	14-1/2	15	15-1/2	16
31 Calf:		12-1/4	12-5/8	13	13-3/6	13-3/4	14-1/8	14-1/2
32 Ankle		8-1/2	8-3/4	9	9-1/4	9-1/2	9-3/4	10
Foot entry:		12	12-1/4	12-1/2	12-3/4	13	13-1/4	13-1/2

FORM MEASUREMENT CHART

Circumference Measurements

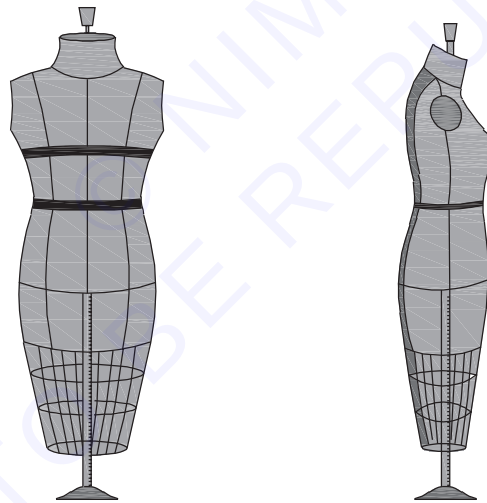
1	Bust:	_____ plus 2" ease _____
2	Waist:	_____ plus 1" ease _____
3	Abdomen:	_____
4	Hip:	_____ plus 2" ease _____
Upper Torso (Bodice)		
5	Center length:	F _____ B _____
6	Full length:	F _____ B _____
7	Shoulder slope:	F _____ B _____
8	Strap:	F _____ B _____
9	Bust depth:	_____ radius _____
10	Bust span:	_____
11	Side length:	_____
12	Back neck:	_____
13	Shoulder length:	_____
14	Across shoulder:	F _____ B _____
15	Across chest:	_____
16	Across back:	_____
17	Bust arc:	_____
18	Back arc:	_____
19	Waist arc:	F _____ B _____
20	Dart placement:	F _____ B _____
Lower Torso (Skirt/Pant)		
22	Abdomen arc:	F _____ B _____
23	Hip arc:	F _____ B _____
24	Crotch depth:	_____
25	Hip depth:	C.F. _____ C.B. _____
26	Side hip depth:	_____
27	Waist to ankle:	_____
	Waist to knee:	_____

	Waist to floor:	_____
28	Crotch length:	_____
	Vertical trunk:	_____
29	Upper thigh:	_____
	Mid-thigh:	_____
30	Knee:	_____
31	Calf:	_____
	Foot entry:	_____

Form

Form make and type _____

Size _____ Year _____



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Special Information

Set form to desired height and measure the following:

C.F. waist to floor _____

C.B. waist to floor _____

C.B. neck to floor _____

personal measurement chart

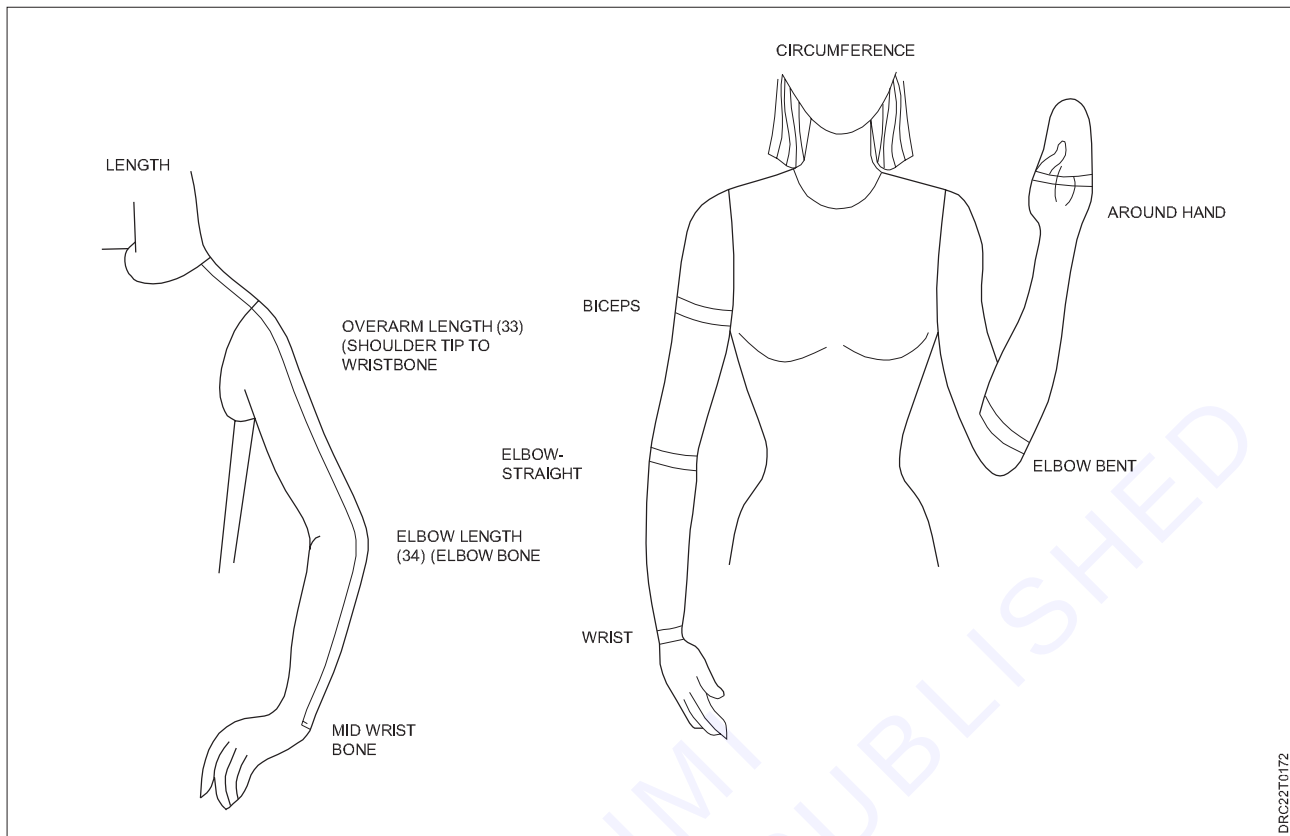
Circumference Measurements

1	Bust:_____ 3	Abdomen:_____
2	Waist:_____ 4	Hip:_____
Upper Torso (Bodice)		
5	Center length:	F _____ B _____
6	Full length:	F _____ B _____
7	Shoulder slope:	F/R _____ F/L _____
		B/L _____ B/L _____
8	Strap:	F/R _____ F/L _____
9	Bust depth:	F _____ Radius _____
10	Bust span:	_____
11	Side length:	F/R _____ F/L _____
12	*Back neck:	_____
13	Shoulder length:	_____
14	Across shoulder:	F _____ B _____
15	Across chest:	_____
16	Across back:	_____
17	Bust arc:	_____
18	Back arc:	_____
19	Waist arc:	F _____ B _____
20	Dart placement:	F _____ B _____
21	Standard dart intake:	
	Front 1 (2 darts 1/2 to 5/8")	
	Back = 2" (2 darts 1 to 1 1/4")	
Lower Torso (Skirt/Pant)		
22	Abdomen arc:	F _____ B _____
23	Hip arc:	F _____ B _____
24	Crotch depth	_____
25	Hip depth:	CF _____ CB _____
26	Side hip depth:	R/S _____ L/S _____
27	Waist to knee	_____ ankle _____ floor _____
28	Crotch length	_____ Vertical trunk: _____

29	Upper thigh:	_____ Mid-thigh _____
30	Knee:	_____
31	Calf:	_____
32	Ankle	_____
A.	Personal Figure Variations Head height relationship:	Bust _____ Waist _____ Crotch _____ Knee _____
B	Bust/back/chest relationship:	Bust _____ Back _____
C	Hip types:	_____
D	Arm types:	_____
E	Abdominal/thigh relationship	
	Abdominal	_____ Thigh _____
F	Shoulder type	_____
G	Shoulder/hip relationship: Shoulder	_____ Hip _____
H	Leg types	_____
I	Leg types	_____
J	Figure stance	_____
K	Asymmetric figure. Record high side, right and left Shoulder	_____ Hip _____
L	Tilting waistline. Record high and low. Front	_____ Back: _____
M	Bust/waist= Waist/hip = Bust/hip =	_____ _____ _____
N	Other variations:	_____
	Personal Arm Measurements	
33	Overarm length:*	_____
34	Elbow length:*	_____
35	Biceps plus 2":*	_____
36	Elbow bent (reference)	_____
37	Wrist (reference)	_____
38	Around hand (reference)	_____
39	Cap height	_____

Measuring the Arm

Use your measurements (shown by asterisks) for the draft of the basic sleeve. Read the instructions. Use the cap height from the sleeve measurement chart, or use the formula to determine cap height.



◆ MODULE 8 : More About Darts ◆

Lesson 31 - 35 (1) : Dart

Objectives

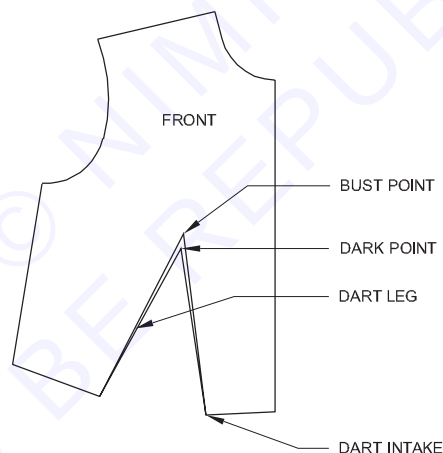
At the end of this lesson you shall be able to

- Know about the importance of darts and their terms
- Identify basic dart locations for creating design patterns
- Understand about dart excess directions and completion.

1.1. Dart Terms

- **Bust point:** A designated place on the bust and pattern and referred to in flat patternmaking as the pivotal point or apex (Fig 1).
- **Dart:** A wedge-shaped cut-out in a pattern to control the fit of a garment when stitched.
- **Dart legs:** The two lines that converge at a predetermined point on the pattern.
- **Dart intake:** The amount of excess (or space) confined between dart legs. Its purposes are to take up excess where it is not needed and to gradually release fabric where it is needed to control the fit of the garment.

Fig 1

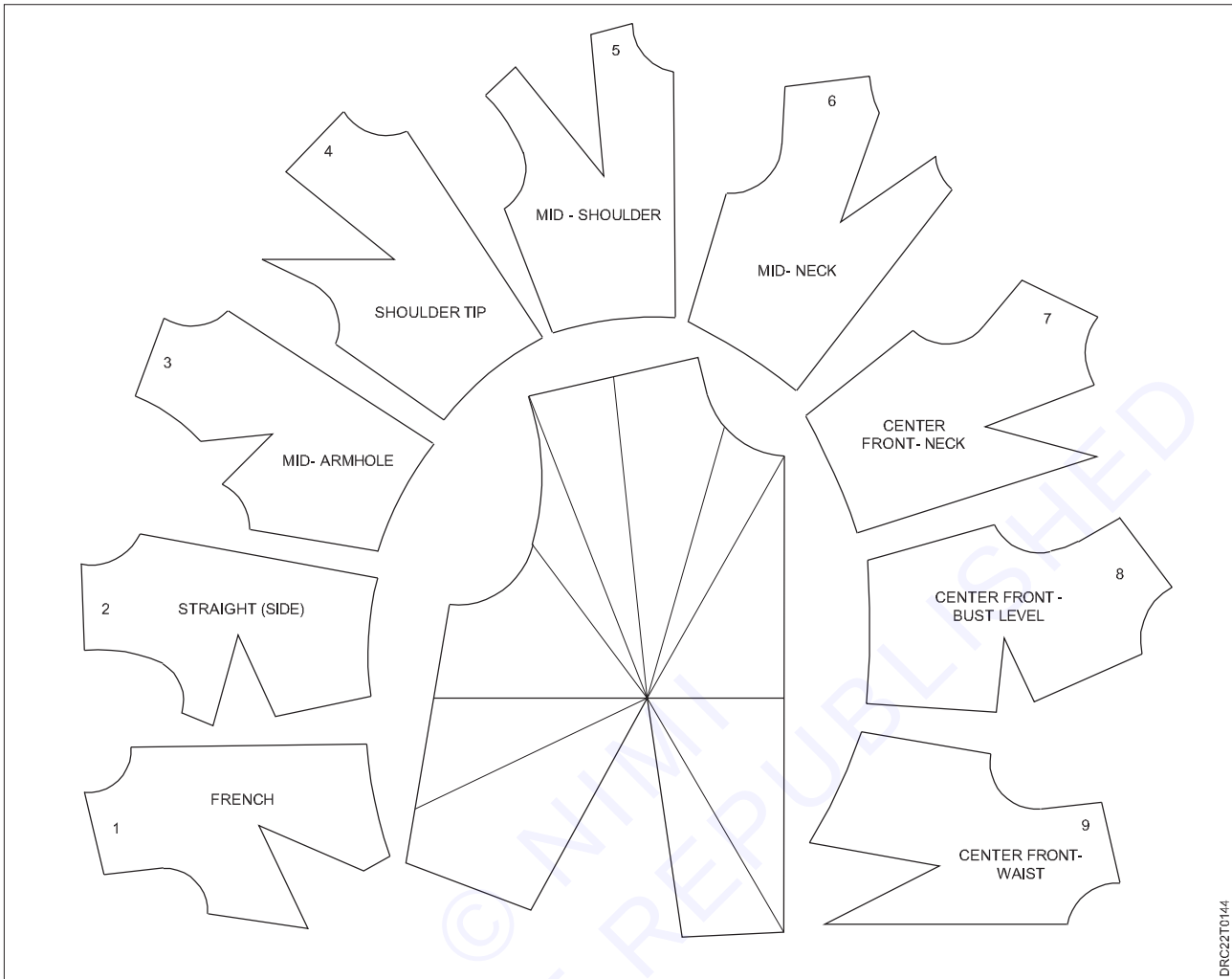


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1.2. Charting Dart Locations

To make a chart of dart locations, trace a copy of the basic front bodice pattern and draw guidelines from bust point, marking each dart location. The guidelines establish common areas for dart relocation and for creating design patterns. However, they are not the only dart locations because a dart can be transferred anywhere around the pattern's outline. The selected dart locations have specific uses and names.

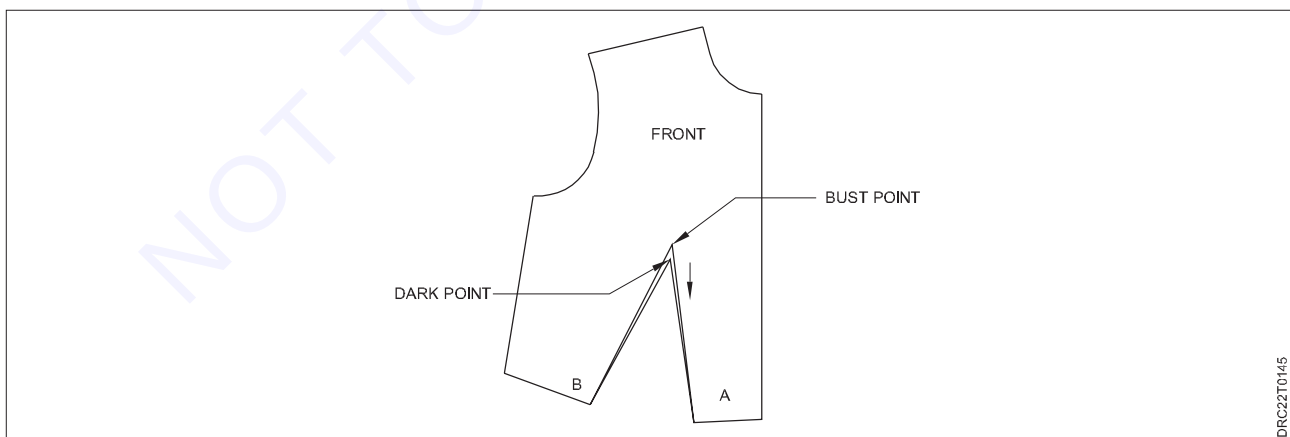
- Label the waist dart legs A and B.
- The French dart can be placed at any angle below the straight dart.
- The C.F. (center front) bust dart and straight dart are squared from the center front.
- The mid-armhole dart is directed from bust point to the armhole notch.
- The shoulder dart is placed at the princess line.



DRC22T0144

1.3. More about Darts

All darts radiate from convex shapes of the figure. The bust is rounded, not pointed. If the dart is stitched to the end of the pivotal point, strain lines will appear around the bust, distorting the fit of the garment. The dart should end at a distance from the bust point to release fabric (fullness) for the bust mound.



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1.4. Direction of Dart Excess (Fig 2):

Follow the arrows for direction of the dart excess when folded. The excess is placed on the back side of the pattern and on the wrong side of the garment.

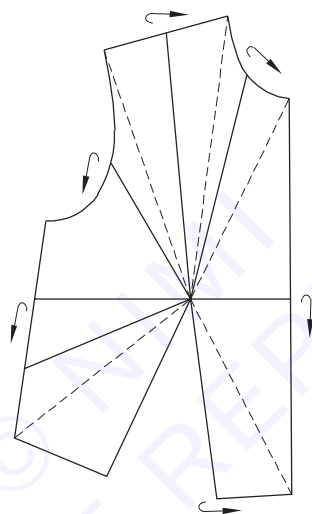
Excess folds downward for darts located anywhere along the

- Armhole
- Side seam
- Center lines

Excess folds toward the center front/back for darts located anywhere along the

- Shoulder
- Neckline
- Waistline

Fig 2



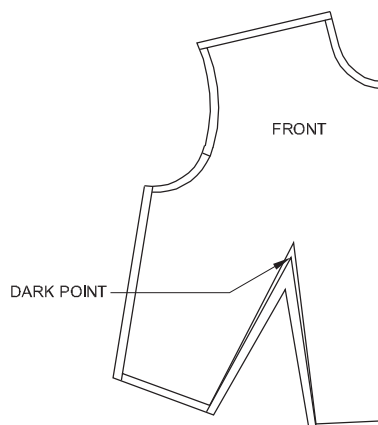
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1.5. Completing the Dart

The dart can be finished one of two ways:

- 1 Trim dart excess to within 1/2 inch of the Seam line before stitching the dart (Fig 3).
- 2 Fold the dart excess under and stitch on the Seam line (Fig 5).

Fig 3



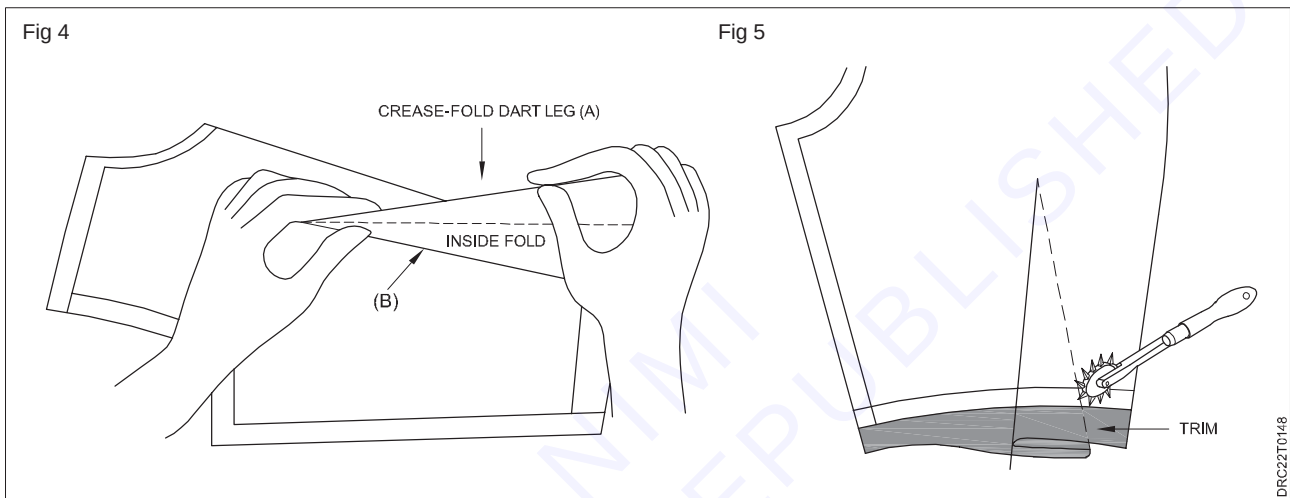
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1.5.1. Dart Excess Trimmed (Fig 3)

- Add a 1/2-inch seam allowance; notch and cut from paper.
- Punch and circles not required.

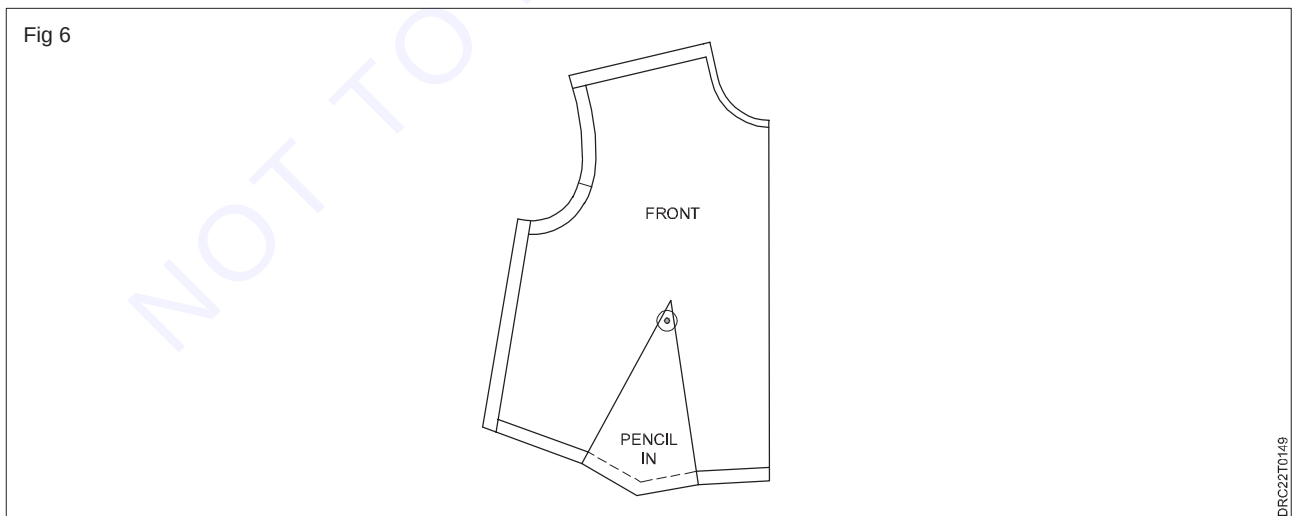
1.5.2. Dart Excess Folded (Fig 4 & 5)

- The example illustrates the waist dart excess folded toward center front. For all other dart locations, see arrow directions in Fig 2
- Cup the pattern when crease-folding the dart leg A to B. The crease ends at dart point (not bust point) (Fig 4)
- With the dart folded, cup the pattern and trace across the fold at waist. The tracing will give the correct shape to the dart excess. (Fig 5)



1.5.3. Punch and Circle Required (Fig 6)

- Unfold the dart and pencil in perforated marks.
- Center a mark 5/8 inch below the dart point for the location of the punch and circle symbol (guide alerting the seamstress to sew 1/2 inch beyond the mark to the dart point).
- Add 1/2-inch seams, notch, and punch/circle.



Lesson 31 - 35 (2) : Dart Manipulation

Objectives

At the end of this lesson you shall be able to

- Know about the importance of dart manipulation and their techniques.
- Understand about single dart series & two dart series.
- Develop the capability and skills of creating the patterns for designer wear with dart manipulation techniques.

Principle: A dart can be transferred to any location around the pattern's outline from a designated pivotal point without affecting the size or fit of the garment.

Dart Manipulation:

It is the process of changing the location of a dart within the pattern frame. The manipulation of darts is most creative around the women's bust area.

There are two techniques of dart manipulation:

- 1 **Slash-Spread Technique:** - In the slash and spread technique, as the name implies the pattern is slashed or cut on the desired line and as the old dart or excess is closed, the pattern itself spreads on the new position, to create the new design. Some of the new dart positions.
- 2 **Pivotal-Transfer Technique:** - The pivotal-transfer technique involves manipulating the original working pattern into a new shape by pivoting, shifting and tracing, instead of cutting.



Single-Dart Series

A one-dart seamless basic bodice is traced for the following projects.

Remember: The working pattern is never altered (only traced) because it is used to create other designs. Save the pattern projects for future use.

Slash-Spread Technique

Waist Dart shifted to Mid-Shoulder Dart

Manipulation steps:

- Trace the basic bodice front side pattern.
- Mark the mid shoulder dart location.
- Label the waist dart legs as A and B.
- Draw slash line from mid shoulder dart location to bust point.
- Slash pattern from mid shoulder point to near bust point. (not through bust point)
- Close dart legs A and B. Tape.

- Place pattern on paper and retrace.
- Mark new dart point 5/8 inch from bust point.
- Draw dart legs to dart point.



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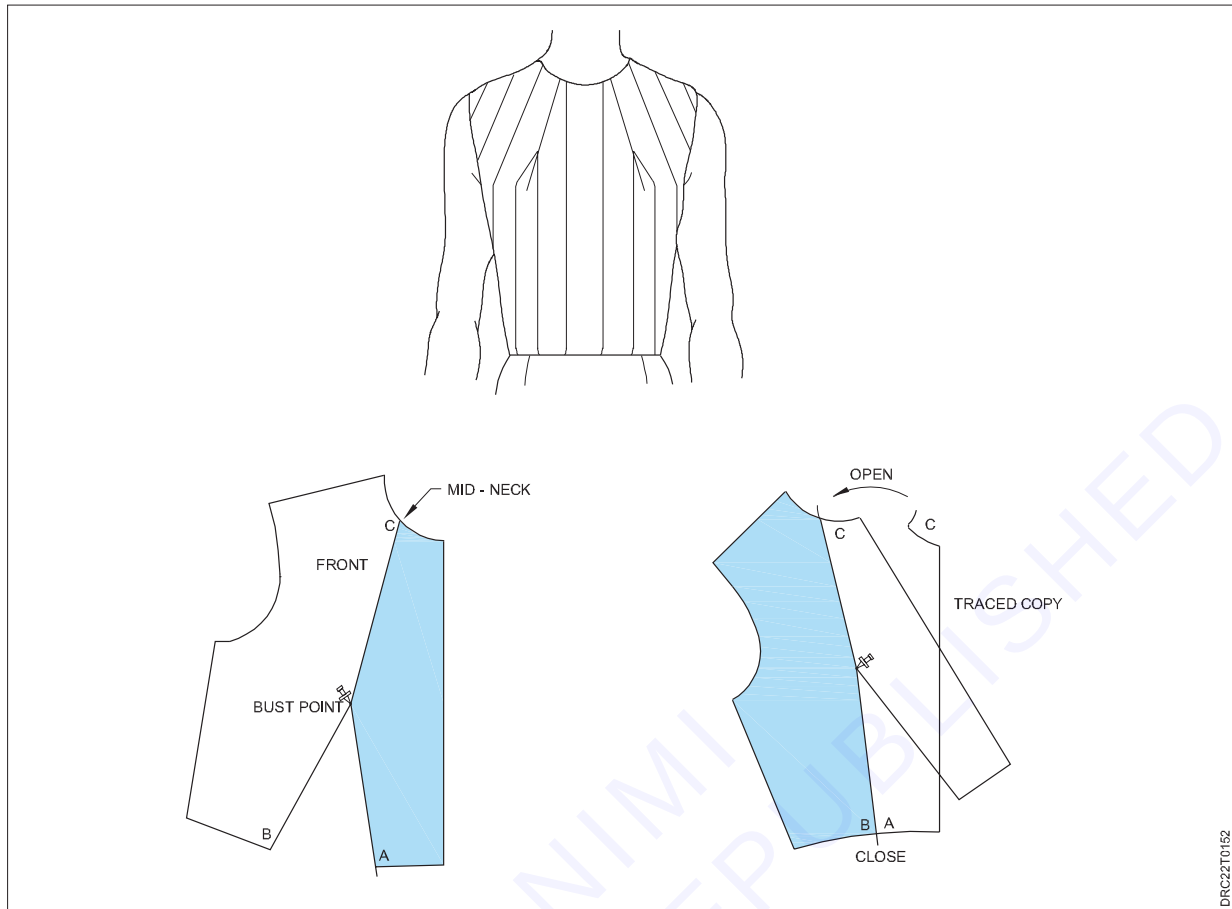
Single-Dart Series - Pivotal-Transfer Technique

Waist Dart shifted to Mid-Neck Dart

Manipulation steps:

- Place the working pattern on paper with a push pin through the bust point (pivotal point).
- Mark the mid-neck location (point C) and dart leg A on paper.
- Trace the section of pattern from dart leg A to C (shaded area).
- Pivot pattern until dart leg B touches A on paper (closes waist dart and opens space for the mid neck dart).
- Trace the remaining section of the pattern from dart leg B to point C on the pattern (blue line and shaded area). (Note: When the pattern is pivoted, it will overlay the previously traced pattern section. This is a natural occurrence. Remember, once a section of the pattern is traced, it is not traced again.)
- Remove the working pattern from paper.
- Draw dart legs to bust point.
- Center the dart point 5/8 inch from the bust point.
- Redraw dart legs to the dart point.
- Add 1/2-inch seams and 1/4 inch at neckline.

Two-Dart Series - A two-dart working pattern (waist and side dart) will be developed for the projects that follow. The two-dart pattern is used in industry more often than a one-dart pattern. There are advantages to dividing the dart excess into more than one location other than the creative aspects of the design.

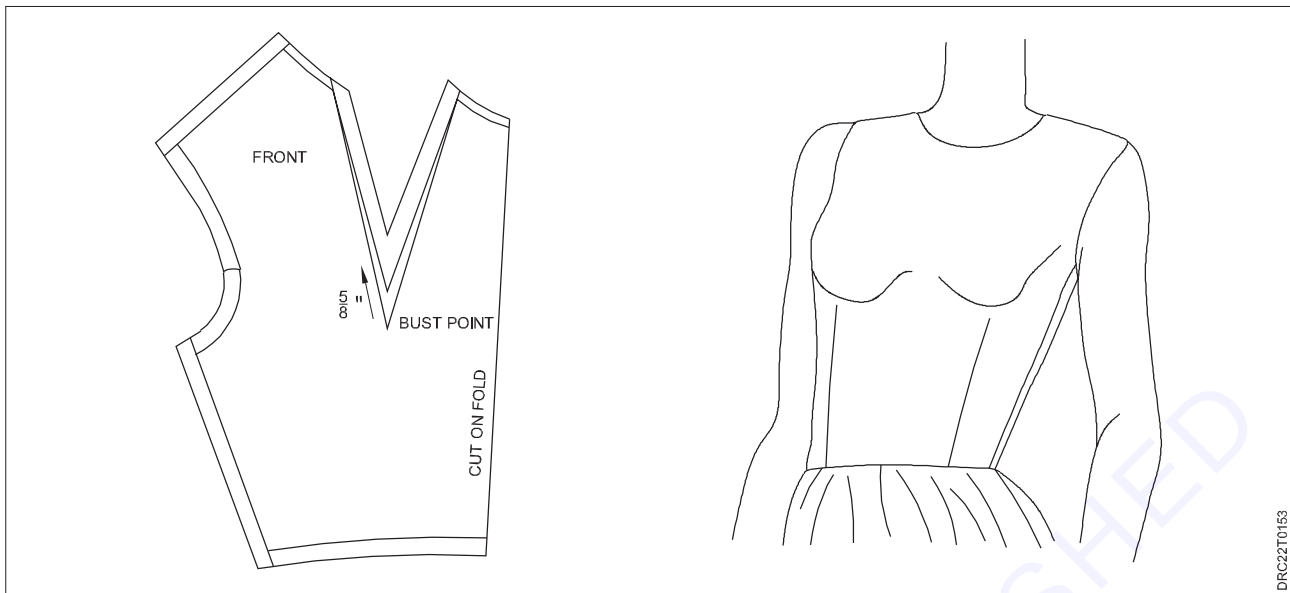


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- Pattern pieces fit the marker more economically.
- The natural bias of the fabric at side seam is less severe.
- Fit is improved by releasing ease around the bust mound from two dart points rather than from one.

The dart points of a two-dart pattern generally end $\frac{3}{4}$ to 1 inch from the bust point. However, the side dart variance depends on the size of the bust cup—for example, A cup, $\frac{3}{4}$ inch; B cup, 1 inch (standard measurement); C cup, 1 $\frac{1}{2}$ inches; D cup and larger, 1 $\frac{3}{4}$ inches from bust point.

The waist and side dart pattern should be completed on pattern paper as a seamed and seamless pattern. It will be used as a base for other designs and foundations.



DRC22T0153

Two-Dart Series –(Slash & Spread Technique)

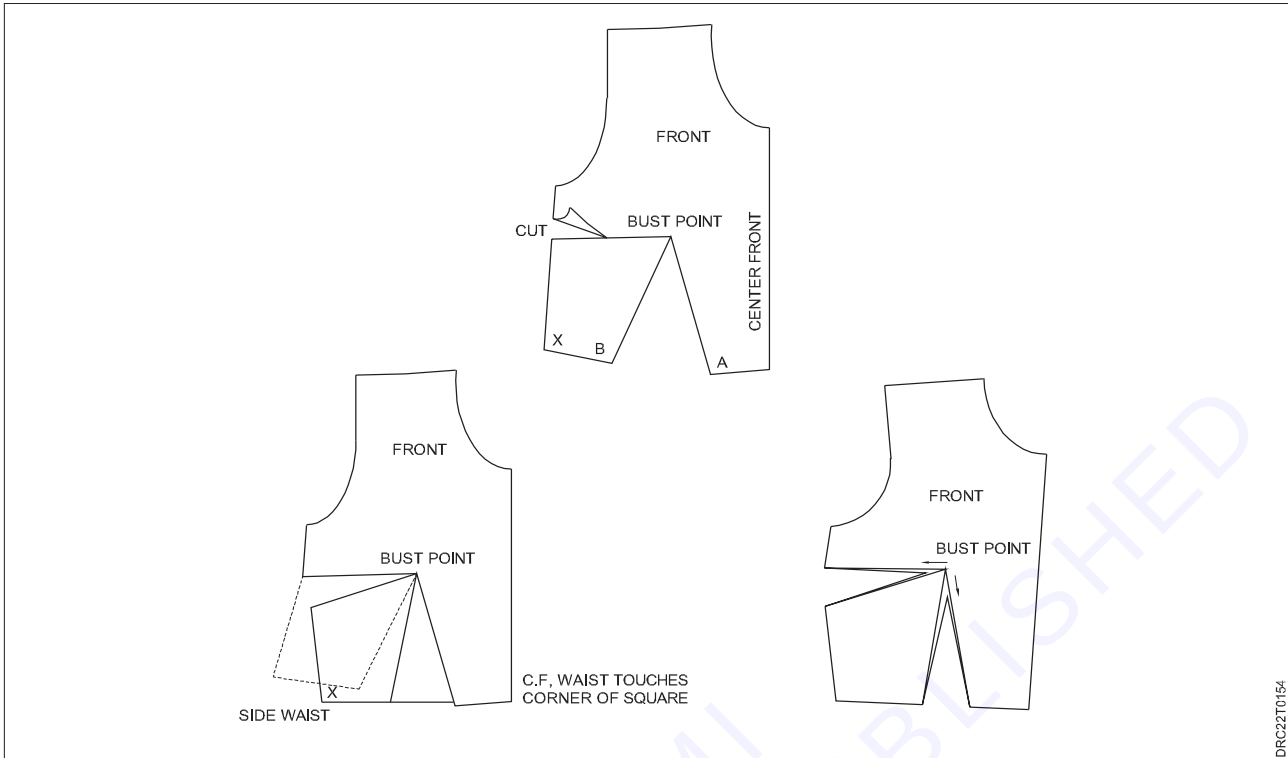
Waist and Side Dart (Waist dart shares excess with the side dart)

- Trace basic bodice front side pattern
- Cross mark side dart location.
- Draw slash line to bust point that is level with center front bust section.
- Label dart legs A and B and side waist X.
- Cut slash line to, not through, bust point (hinge)
- Draw a square line on paper.
- Place center front on square line, with center front waist touching corner, as shown. Secure.
- Close waist dart until point X touches the square line. (Broken line is original pattern.)
- Trace and mark bust point.
- Center the point of the waist dart 3/4 inch from bust and 3/4 inch to 1 1/4 inches from bust point of the side dart.
- Redraw dart legs to dart points.

Two-Dart Series Pivotal-Transfer Technique

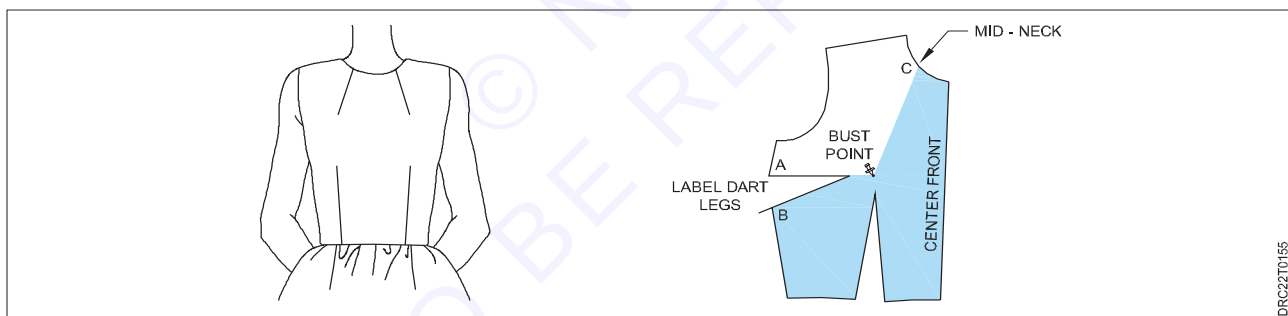
Mid-Neck and Waist Dart

- Place pattern on paper with push pin through the bust point. Mark mid-neck. Label C.
- Mark B and trace to point C (shaded area)



DRC22T0154

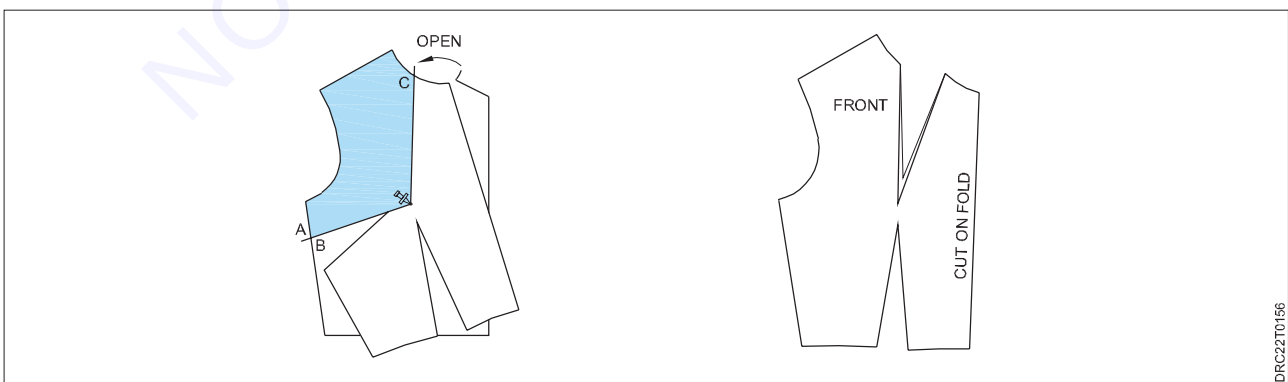
- Pivot pattern downward until dart leg A touches B on paper. (Pattern will overlap traced section.)
- Mark point C at mid-neck and trace to dart leg A.



DRC22T0155

(New Pattern Shape)

- Remove pattern and draw dart to bust point.
- Center dart point 1 inch from bust point.
- Redraw dart legs to dart point.

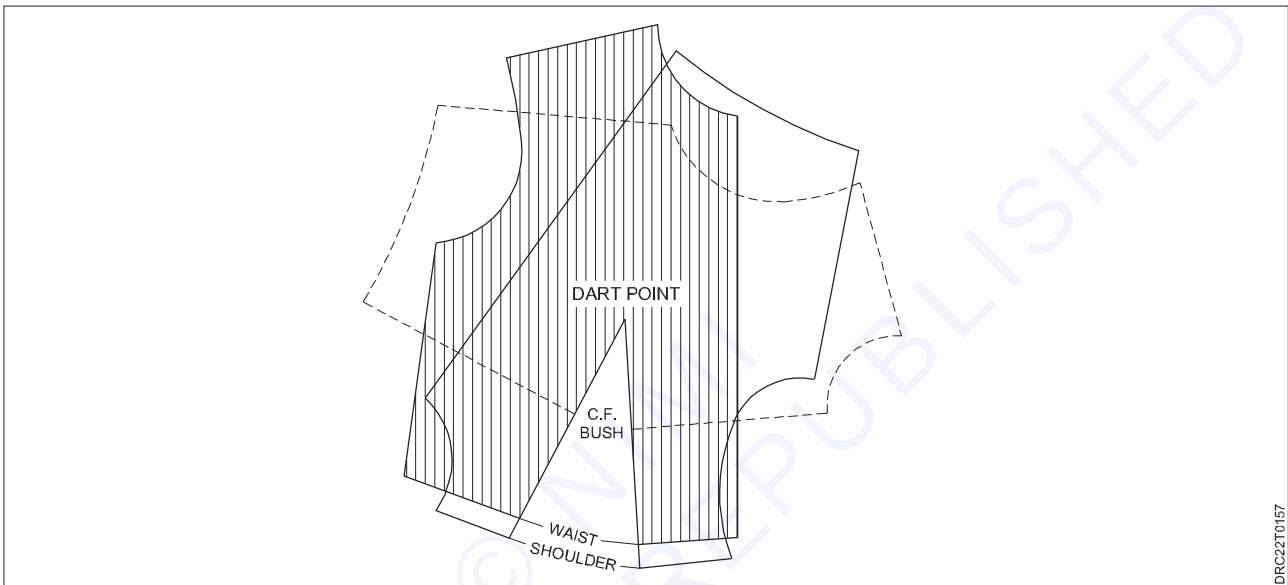


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Consistency of Dart Angle:

To prove that the angle of the dart legs remains constant without regard to its location around the pattern's outline, stack the following patterns in the sequence given:

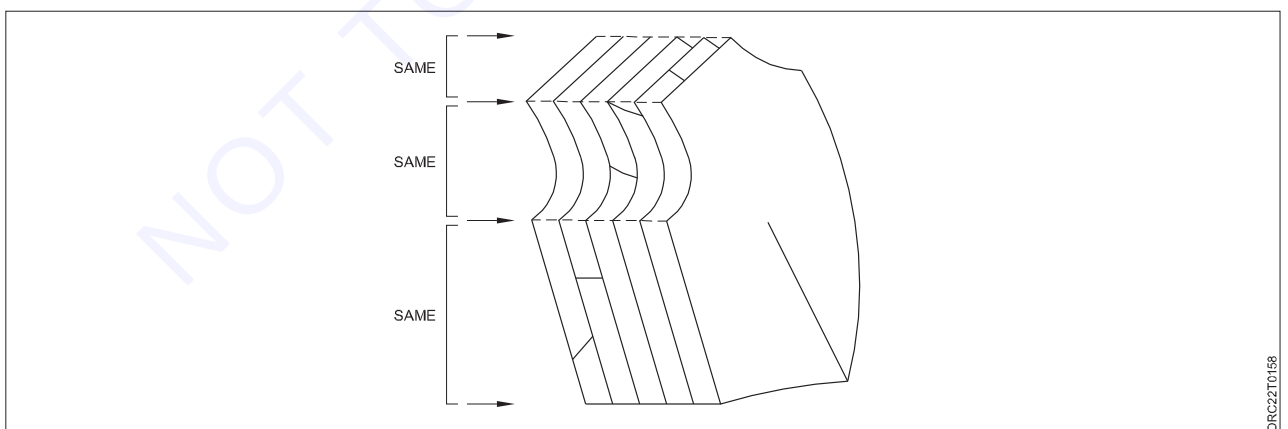
- The shoulder dart (longest dart—bold line), the waist dart (lined pattern), and the center front bust dart (shortest dart—broken line).
- Place a push pin through the bust points of all three patterns and align the dart legs.
- They all match and have the same degree of angle, from the shortest to the longest dart.
- The spaces between the ends of the dart legs of each pattern vary. The difference is directly related to the distance from the bust point (or any pivotal point) to the edge of the pattern where the dart is located. The closer a dart is to a pivotal point, the narrower the space between dart legs; the farther the distance, the wider the space between dart legs.



DRC22T0157

Proof of Principle

In the preceding patternmaking exercises, the dart excess was transferred to many different locations around the outline of the front bodice pattern. The shapes of these patterns vary from the original working pattern. When the dart legs are closed and taped, the patterns are the original size and shape. This can be proven by using the patterns previously developed. Bring the dart legs together, cupping the pattern, and tape securely. Stack the patterns, aligning the center fronts. Observe that the patterns coincide exactly.



DRC22T0158

MODULE 9 : Designing with Darts

Lesson 36 - 41(1): Dart Equivalent

Objectives

At the end of this lesson you shall be able to

- know about the importance of dart equivalent and their features.
- create designs through flat pattern method.
- understand about dart cluster, graduated, radiated, parallel & asymmetric darts.
- develop commercial paper pattern to meet industry standards.

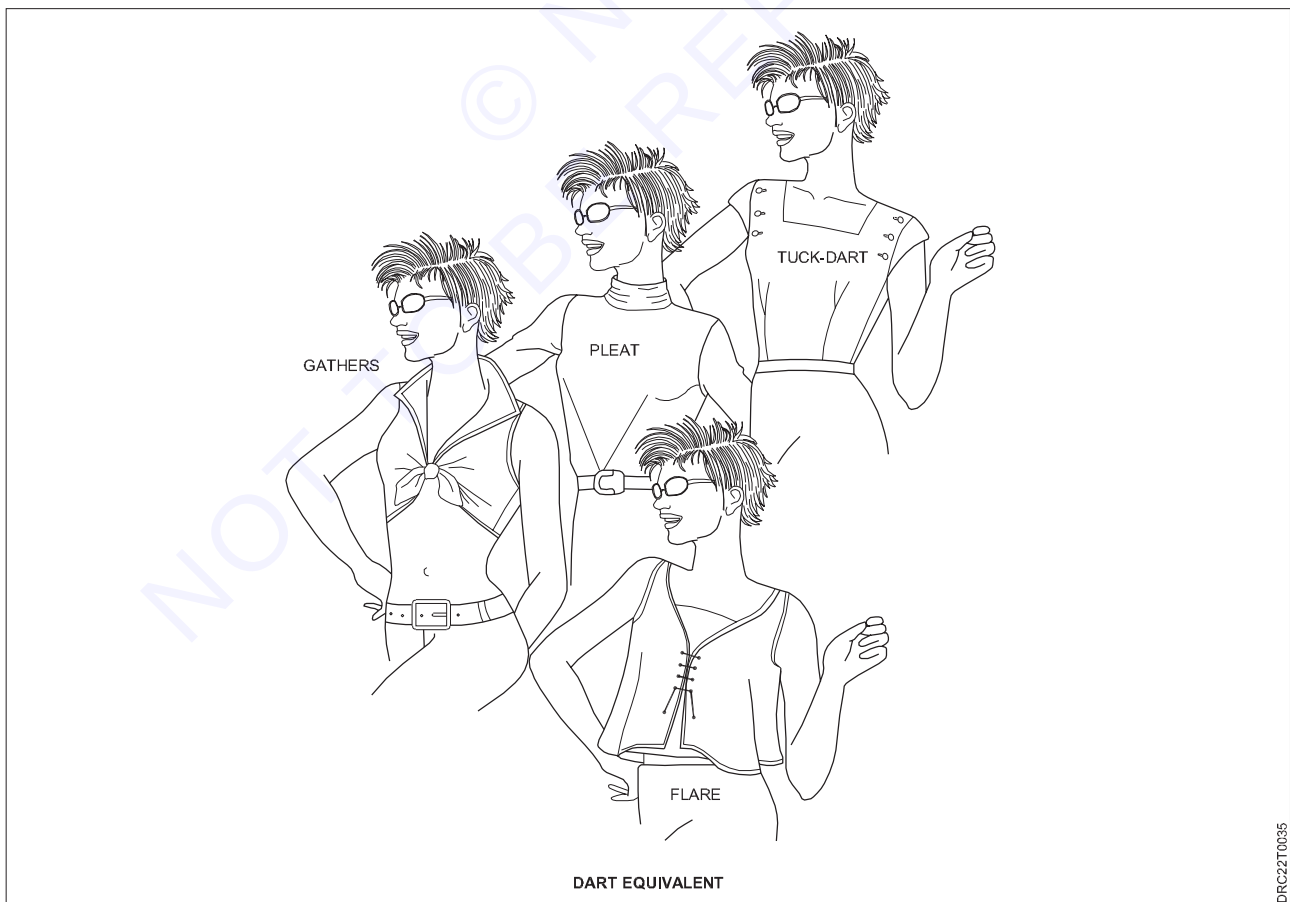
Dart Equivalent

1 Dart Equivalent

The dart is one of the most flexible and creative parts of the pattern. The space (excess) between the dart legs can be used in a variety of creative ways, limited only by the imagination of the designer. Dart excess used as design is referred to as dart equivalent.

Dart equivalents are illustrated as tuck-darts, pleats, flares, and gathers. Dart equivalents replace the dart as control and will always be directed to the pivotal point of a pattern (such as bust point).

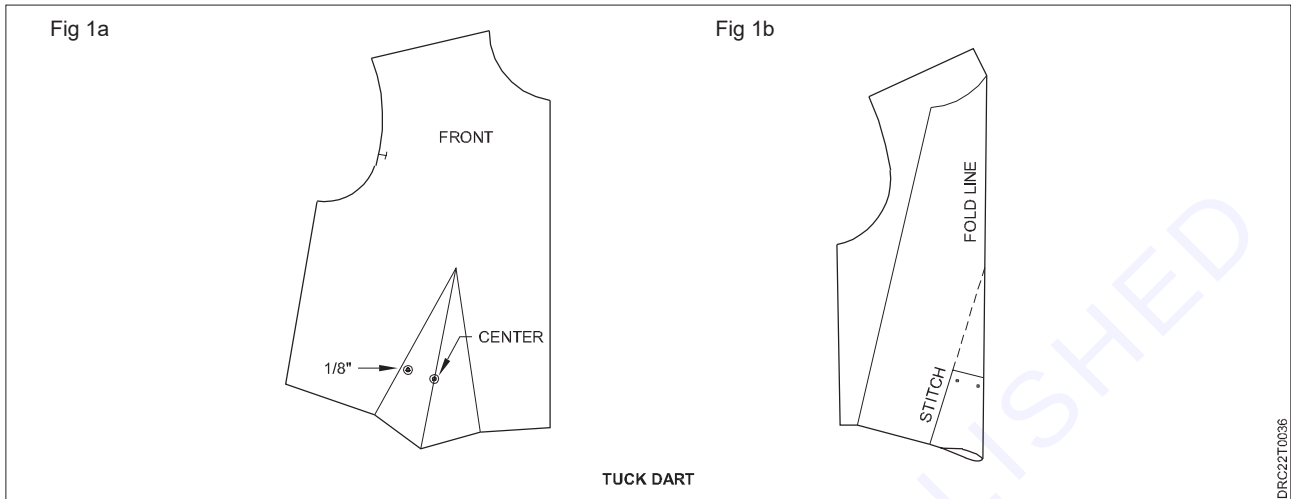
The difference between a dart and a dart equivalent is the manner in which each is marked (and subsequently stitched). Darts are stitched end to end, tuck-darts are partially stitched, pleats are folded, stitched across fold, and fullness is spread and gathered along the stitch line or flare when not stitched.



1.1 Tuck Dart

A tuck-dart is a partially stitched, inverted dart marked by a punch hole and circle along the centerfold and 1/8 inch inside the stitch line, 1/2 inch below the finished length to cover the damage (Fig 1a)

The underside of the dart illustrates the stitched area. Note that stitching is 1/2 inch beyond the punch holes. (Fig 1b)



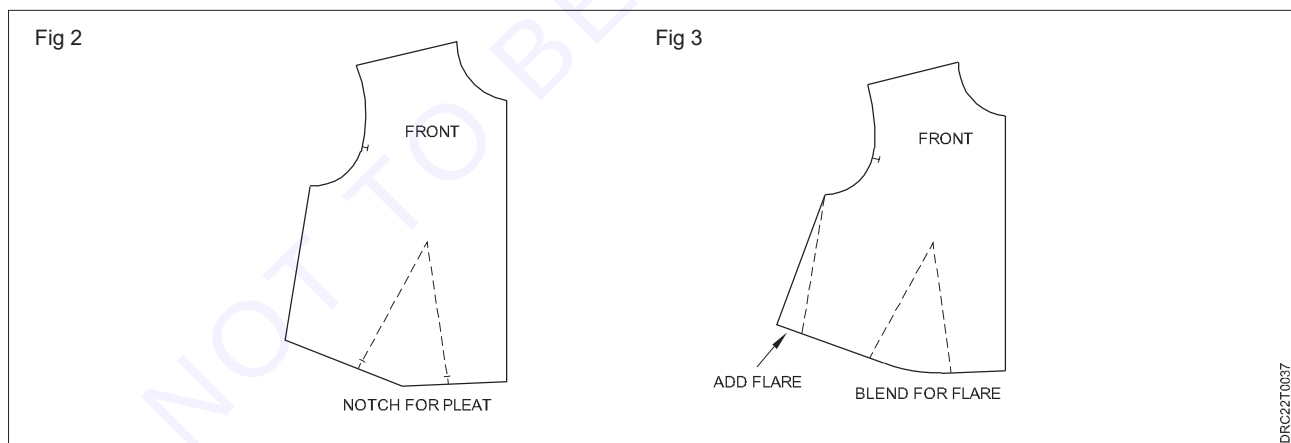
1.2 Pleat

A pleat is an unstitched, folded dart held securely along the joining seamline. It is developed as a dart on the pattern but does not include punch hole and circle for dart point. Dart legs are notched. (Broken lines indicate the original dart legs (Fig 2).

1.3 Flare

A flare is an open, unstitched dart. The open dart space is blended across the bottom. Punch holes, circles, and notches are not needed. (Broken lines indicate original dart legs)

Flare should be added to the side seam. (Fig 3)



1.4 Gathers

Gathers are illustrated using the slash-spread and pivotal-transfer techniques. Gathers change the look of the basic garment but do not affect the fit. The pivotal-transfer technique illustrates all of the dart excess transferred for gathers.

Pivotal-Transfer Technique

Fig 4

- Place the pattern on paper and a pushpin at bust point.
- Mark mid-shoulder and 1 inch out from each side of the mark. Label 1, 2, 3 and dart legs A, B.
- Divide waist dart into thirds. Label 4, 5, and 6.
- Trace from A to shoulder mark #1 and cross mark.

Fig 5

- Pivot dart leg B, covering space 4.
- Trace pattern from shoulder mark 1 to 2.

(Bold line indicates traced section.)

Fig 6

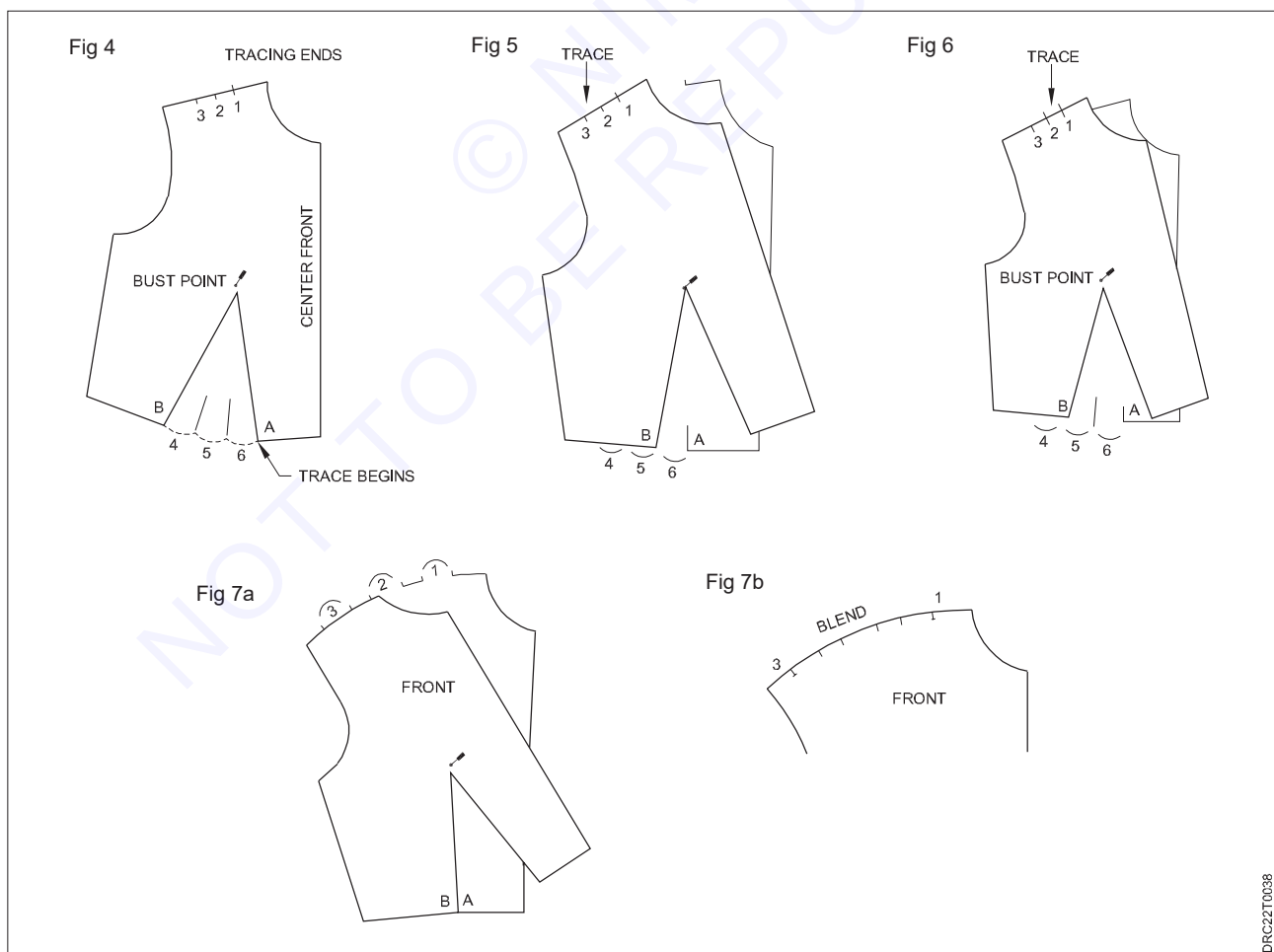
- Pivot dart leg B, covering space 5.
- Trace pattern from shoulder mark 2 to 3 and cross mark.

Fig 7a

- Pivot dart leg B, covering space 6 (dart closes).
- Trace pattern from shoulder mark 3 to dart leg B.

Fig 7b

- Blend shoulder line



2 Dart Clusters

The dart excess may be divided among multiple openings and treated as a single design unit. When used as a single design unit, the dart excess may be identified as a group of basic or stylized darts, tuck-darts, pleats, or a variation in any combination desired.

The following instructions apply to the development of dart, tuck-darts, and pleat clusters.



2.1 Waist Cluster

Pattern Plot and Development

Fig 1

- Trace basic bodice.
- Square a guideline out from each dart leg 1 inch below bust point.
- Draw parallel slash lines to the guideline 1 inch from dart legs.
- Darts may be tapered to 3/4 inch at waistline for a slimming effect.
- Connect to bust point.
- Cut the pattern from paper

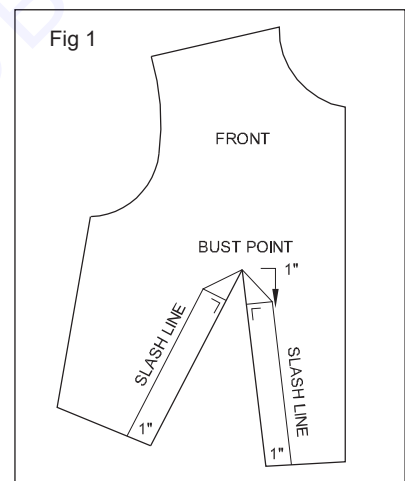


Fig 2

- Cut slash lines to, not through, bust point.
- Place on paper and spread equally, and secure.
- Draw dart legs as follows:
 - Middle dart—center dart point 1/2 inch below the guideline and draw legs to waist. (Measure the length of the dart leg)
 - Outer dart legs—mark dart points 1/2 inch below on one side of the slash line. Draw dart legs equal to length of the middle dart leg.
- Add seams, and allow excess of paper below waistline for shaping darts. Cut from paper.

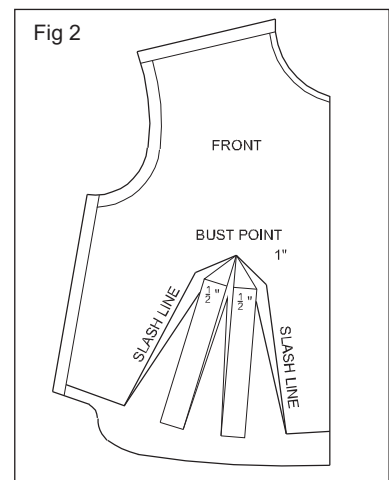
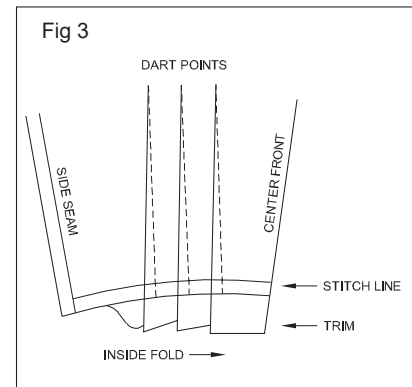


Fig 3

- Fold dart excess toward center front (allow pattern to cup). Waistline will be uneven.
- Draw blending line across waistline. Draw seam allowance, 1/2-inch line parallel with waistline.
- Cut excess while darts are folded, or trace (with tracing wheel) across seam allowance line.
- Unfold and pencil in perforated line

To complete the patterns, cut three copies for practice. Choose the dart equivalent desired (darts, tuck-darts, or pleats; see Fig 4, 5, or 6)]



Dart Cluster

Fig 4

- Center punch hole 1/2 inch from dart point and circle.
- Notch pattern, including dart legs.
- Draw grainline.

2.2 Tuck -Dart Cluster

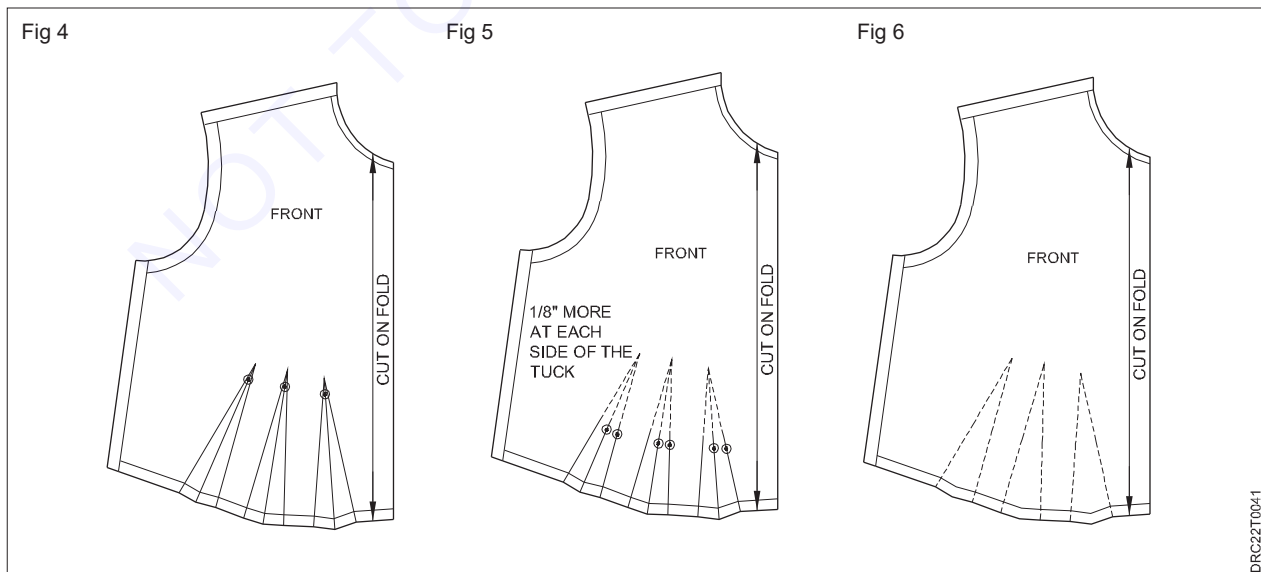
Fig 5

- Mark the center fold of each dart for punch holes one-half the distance to dart point (varies)
- Mark punch holes in center and 1/8 inch from dart legs.
- Circle all punch marks, notch seam allowance and dart legs.
- Draw grainline.
- (Unstitched dart indicated by broken lines).

2.3 Pleat Cluster

Fig 6

- Notch each dart leg (broken lines indicate original dart legs).
- Draw grainline.



3 Graduated and Radiating Darts

Graduated darts are darts of varying length within a group. Radiating darts spread out (radiate) from a focal point in a balanced arrangement and may be of the same or a graduated length.

To prevent bulging at the tip of the darts that are farthest from the bust mound, the dart intake is generally 1/2 inch, with all remaining excess being absorbed by the dart closest to the bust mound.

3.1 Graduated Darts

Design Analysis

- Design features graduating darts along the shoulder line.
- The longest dart ends at bust level.

Pattern Plot and Manipulation

Fig 1

- Trace bodice front and label darts legs A and B.
- Square a line from the center front to the side seam, passing through the dart point.
- Draw a slash line from center front to 1 inch past the dart point. Label C.
- Draw four slash lines equally spaced from shoulder to guideline.
- Cut from paper.

Fig 2 (New Pattern Shape)

- Cut from neck to C and from C to dart point.
- Close dart legs A and B. Tape.
- Cut slash lines to, not through, guideline.
- Place on paper, spread, and tape. (Corner at neck will not meet, and part of guideline overlaps.)
- Trace the pattern and blend neckline.
- Center dart point 1 inch up from slash lines.
- Draw dart legs, fold and blend shoulder.
- Complete 1/2 inch seams. Trim fullest dart legs to within 1/2 inch of seamline. Add 1/4 inch at neck.



Fig 1

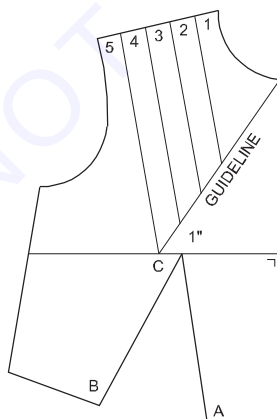
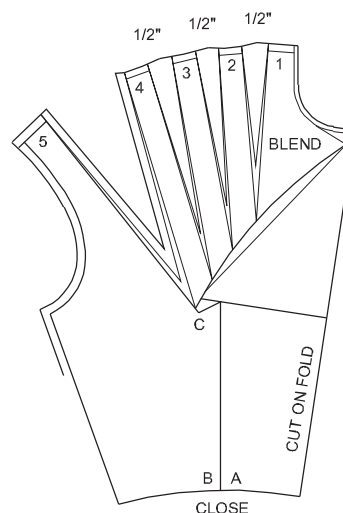


Fig 2



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3.2 Radiating Darts

Design Analysis

Design features radiating darts from neck, with the longest dart placed at mid-neckline and directed to bust point.

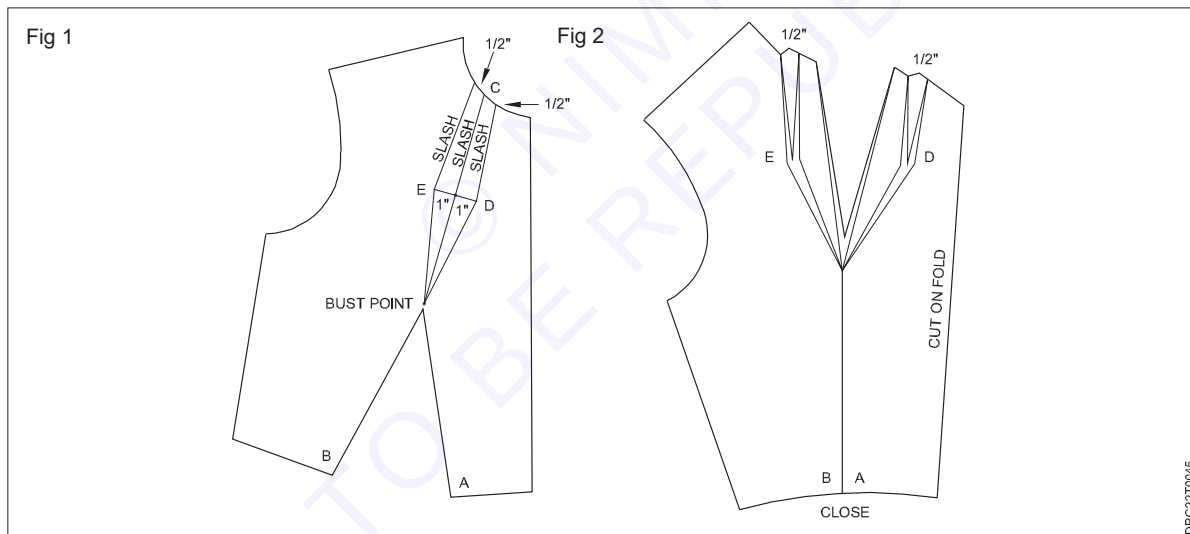
Pattern Plot and Manipulation

Fig 1

- Trace basic pattern. Label dart legs A and B.
- Draw a slash line from mid-neck to bust point. Label C.
- Locate mid-point on line C. Square out 1 inch on each side. Label D and E.
- Measure out 1/2 inch on each side of C. Mark and draw slash lines to D and E and to bust point.

Fig 2 (New Pattern Shape)

- Cut slash lines to, not through, bust point.
- Place on paper. Close dart legs A and B. Tape.
- Spread lines D and E 1/2 inch at neck. Remaining excess is taken up by middle dart.
- Locate dart points between guidelines as shown, with middle dart point 1 inch from bust point.
- Draw dart legs to dart point. Fold darts and blend neckline.



4 Parallel Darts

Parallel darts can be created by using the dart points, or the bust point and dart point of a two-darted pattern. Space between the parallel darts can be increased by moving the dart point of the side dart farther from bust point.

Parallel French Darts

Design Analysis: Design features curved and parallel French darts.

(Transfer waist and side dart to the curved dart lines)



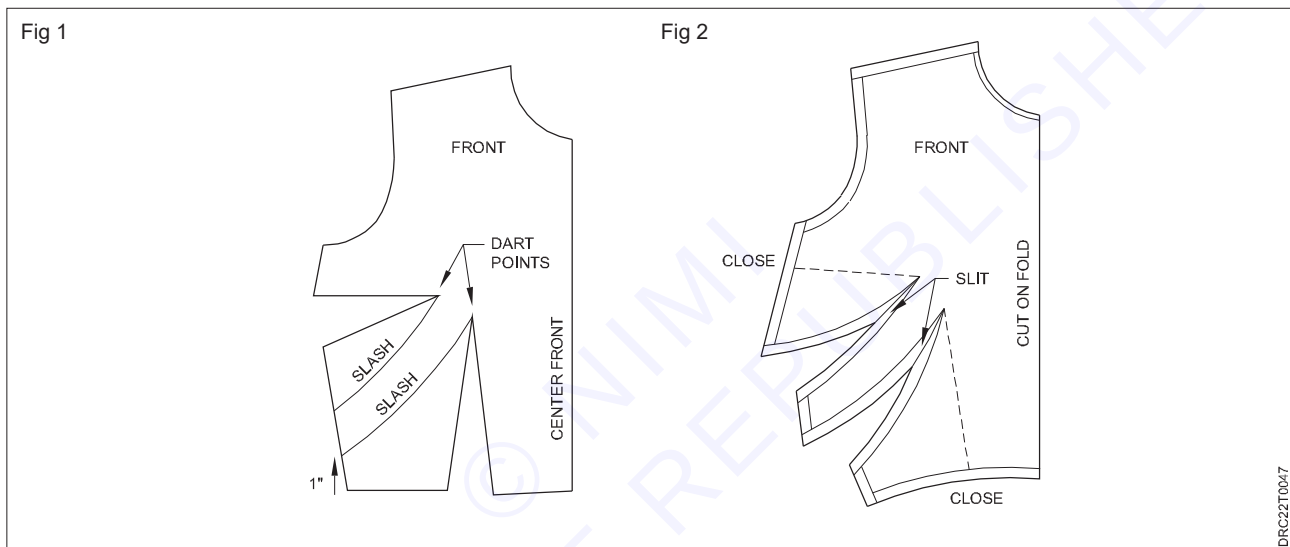
Pattern Plot and Manipulation

Fig 1

- Trace two-dart front bodice pattern.
- Draw curved parallel slash lines from dart points to side as shown.
- Cut pattern from paper.

New Pattern Shape (Fig 2)

- Cut slash lines to, not through, dart points.
- Close side and waist darts. Tape.
- Trace pattern on fold.
- Add seams and grainline.



Method for Finishing Darts

- Add 1/2-inch seam allowance to darts.
- Where dart seams come together, slash a line 1/16 inch wide to within 1/2 inch of dart point, following curve of dart. Slash curve.

5 Asymmetric Darts

- Asymmetric darts cross center front of the garment.
- Asymmetric darts require special pattern handling and identification, as do all designs that differ from side to side. Compare pattern shapes with each design.
- A full front pattern is required.
- Right-side-up instructions are necessary.

Asymmetric Curved Darts

Design Analysis: Design features curved darts that cross over center front. One dart ends at the armhole and the other at the waist. Before plotting the style darts, transfer waist darts to mid-armhole.



Pattern Plot and Manipulation (Fig 1)

- Trace front pattern on fold, transferring waist darts to mid-armhole location. Cut and unfold.
- Draw a curved line from bust point to waist.
- Draw a parallel line from bust point to armhole.

New Pattern Shape (Fig 2)

- Cut slash lines to, not through, bust points.
- Close dart legs. Tape and trace pattern.
- Center dart points 1 inch from bust point. Draw dart legs.
- Label right-side-up. Add seams and grainline.

Fig 1

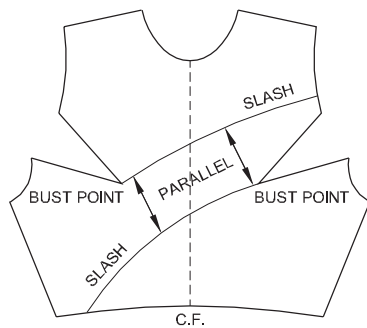
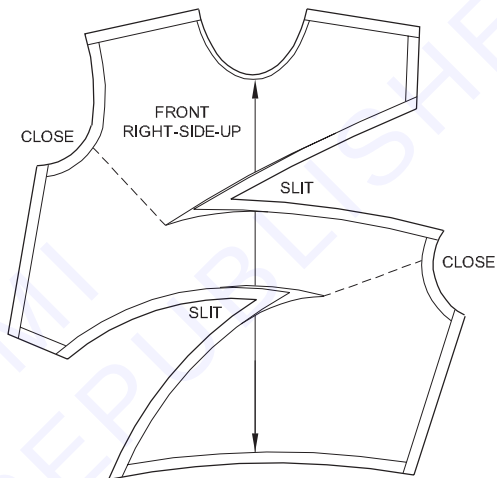


Fig 2



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Lesson 36 - 41 (2) : Style Lines

Objectives

At the end of this lesson you shall be able to

- know about the Style lines and their classification.
- complete a garment with different style lines.
- understand about classic princess line, armhole princess line & panel princess line..
- know about different style lines and their variations

Style lines

1 Style Lines

Style lines fall into two classifications

- Those that cross over the bust and those that do not.

Style lines that are crossing over the bust, replacing dart legs with style seams that absorb dart excess within stitch lines to control the fit of the garment are called Princess Line. These type style lines are dart equivalents.

Style lines not crossing bust point are not dart equivalents and called Panel style lines.

2 Classic Princess style Line

Design Analysis

The classic princess is distinguished by a style line that starts at the front and back waist darts, continues over bust points and shoulder blades, and ends at mid-shoulder dart of the back (position of dart point can vary to improve style line).

Style lines (dart equivalents) replace darts. The design can be based on the one- or two-dart pattern. (The two-dart pattern is illustrated)



Pattern Plot and Manipulation

Front Bodice (Fig 1)

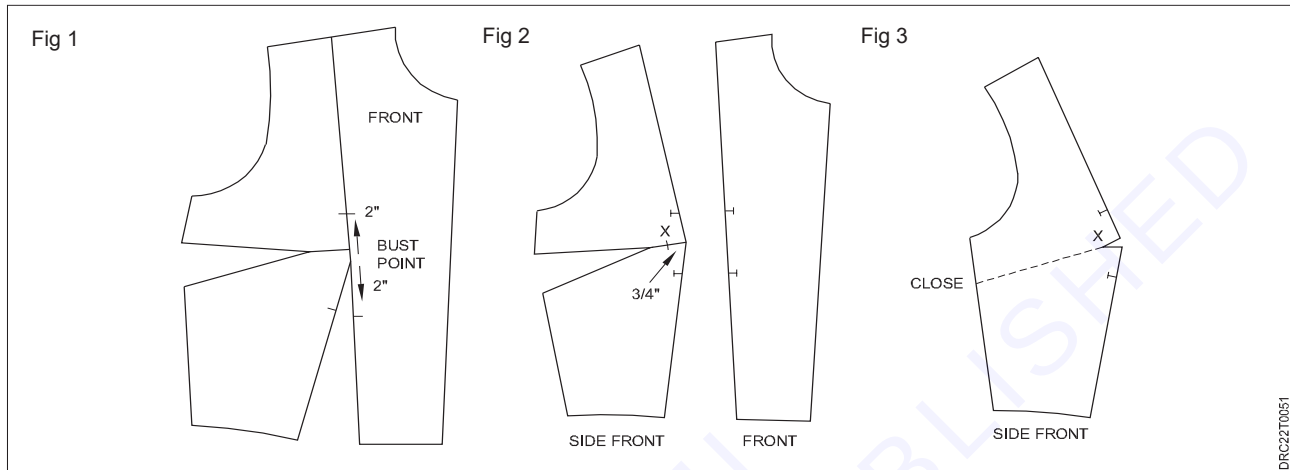
- Trace front of two-dart pattern.
- Draw style line from mid-shoulder (in line with back shoulder dart) to bust point and from bust point to dart leg at waist.
- Cross mark for ease control notches, 2 inches above and below bust point.
- Draw slash line from bust point to dart point of side dart.

Separate Pattern (Fig 2)

- Cross mark 3/4 inch from bust point (new pivot point). Label X.
- Cut and separate pattern along style line.

Side Bust Ease (Fig 3)

- Cut slash line from bust point and dart point to not through, point X.
- Close side dart legs. Tape. (This provides ease for the side bust.)

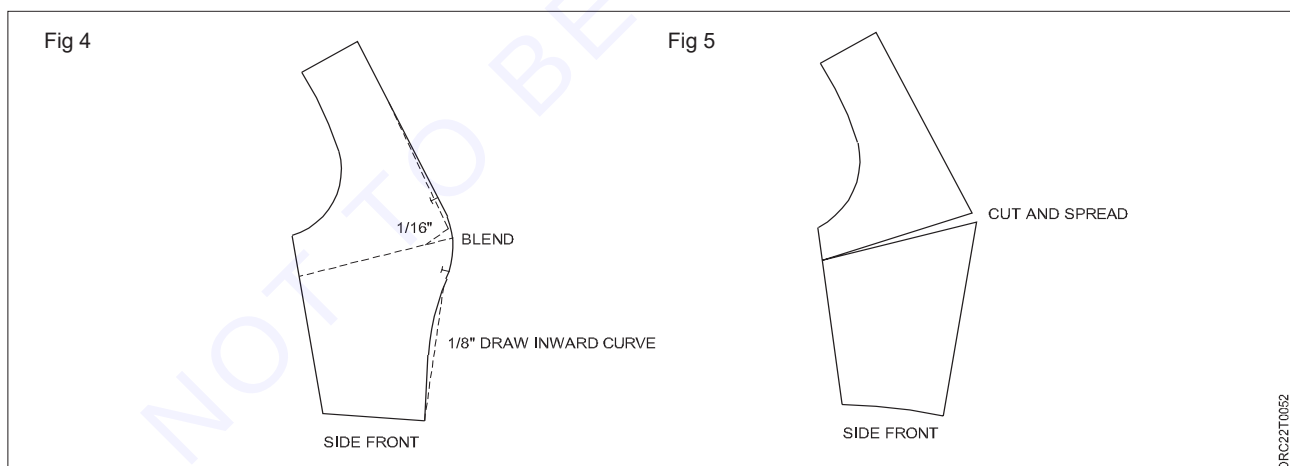


Shaping Style line (Fig 4)

- Retrace side front panel.
- Shape bust curve, as shown. (Broken lines represent original shape of panel.)

Adding Additional Ease (Fig 5)

- Developing designs from a one-dart pattern or if more ease is needed, slash from bust point to side seam and spread 1/4 inch or more. Retrace, blend, and shape. See Figure 4



Optional Front Panel Shaping (Fig 6)

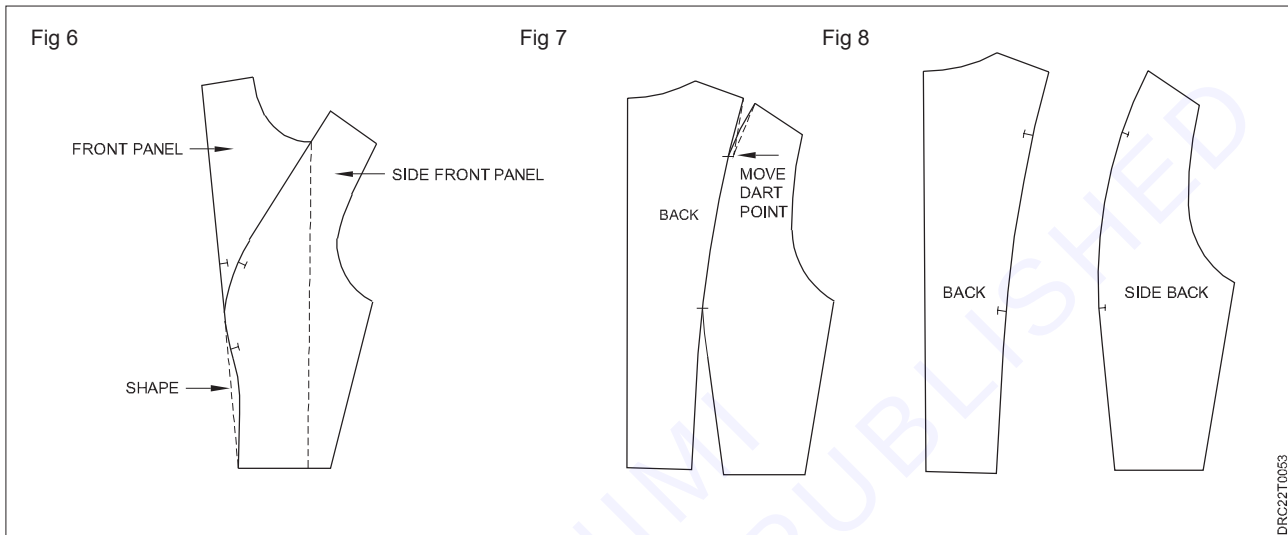
- To shape front panel, place side panel on top of front panel, matching waist and bust points.
- Trace side panel curve to front panel from waist to bust. Blend. (Broken line represents original shape of front panel and pattern underneath.)
- Adjust ease control notches on side front panel when walking the patterns.

Back Bodice (Fig 7)

- Trace back pattern.
- Place skirt curve on the shoulder dart leg and waist dart point and draw the princess line.
- Shift shoulder dart point to the style line and redraw dart legs. (Broken line indicates original dart)

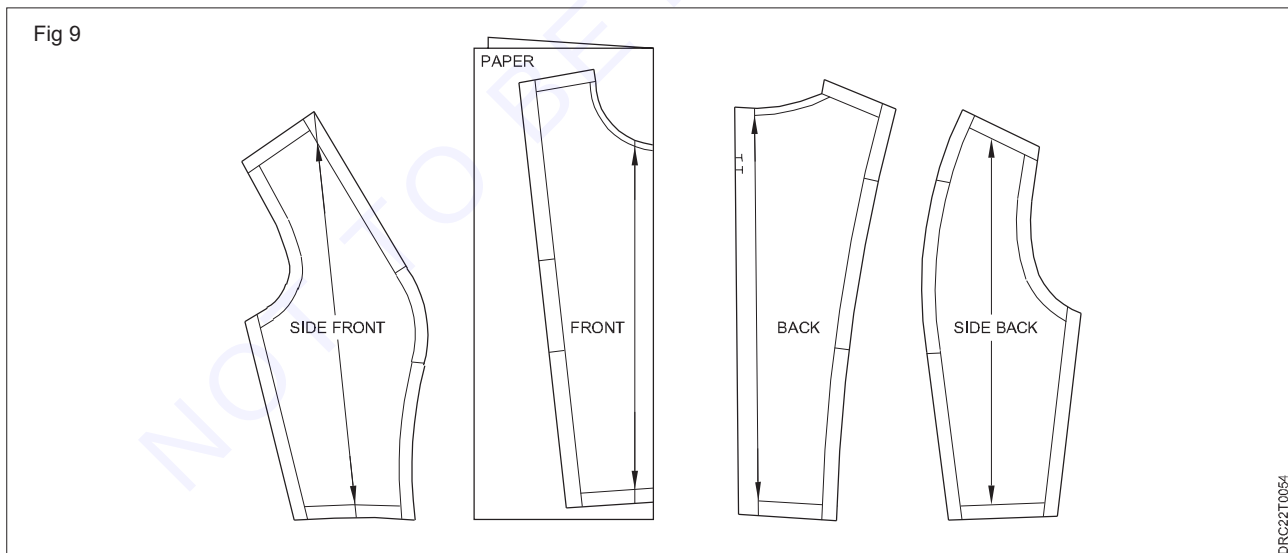
Fig 8

- Cut and separate pattern pieces.
- Front and back classic princess patterns are complete as seamless for use as a working pattern.



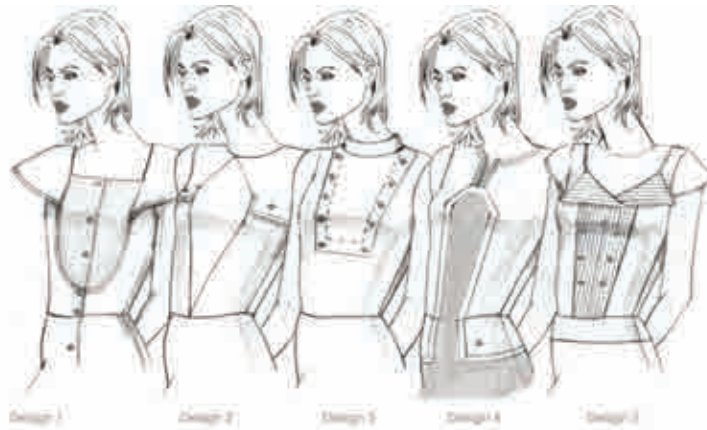
Completed Pattern (Fig 9)

- Complete the pattern, as shown.
- Center grainlines on side panels.



2.1 Classic Princess Style line Variations

The following designs are based on the classic princess. Generate patterns for these designs or create other variations for practice. Remember, draw style lines on the pattern exactly as they appear on the design. The finished pattern shapes should result in perfect representations of each design. If they do not, locate the problem and try again.



3 Armhole Princess Styleline

Design Analysis

The armhole princess design is a variation of the classic princess and features a style line that curves from the bust point in front and the shoulder blades in back to about mid-armhole. The design is developed from a two-dart pattern with side dart transferred to mid-armhole as a curved dart (style line).

Pattern Plot and Manipulation

Front (Fig 1)

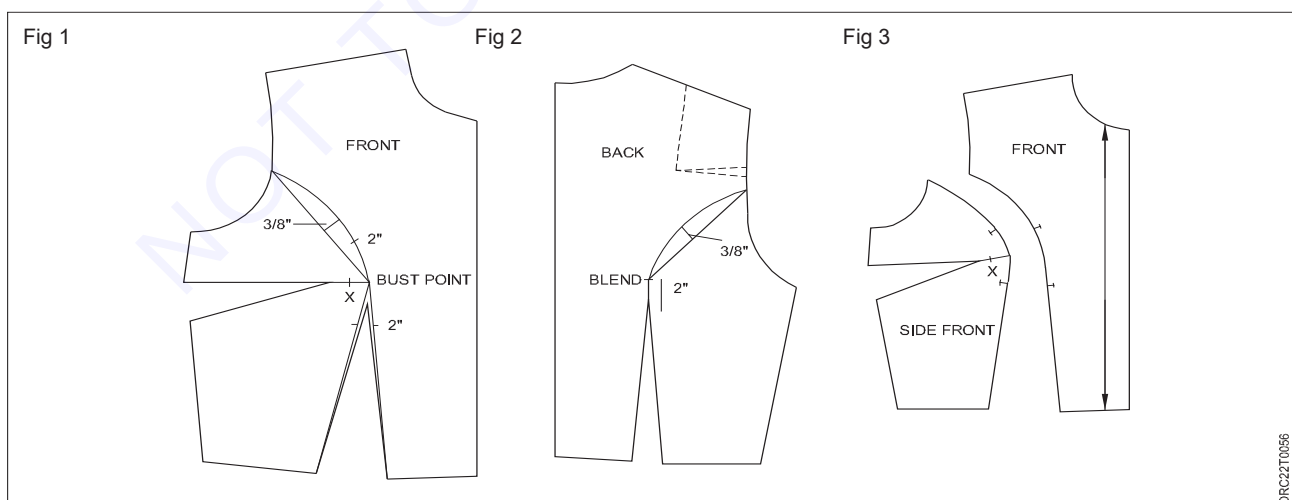
- Trace and cut front pattern.
- Draw line from waist and side dart points to bust. Cross mark $\frac{3}{4}$ inch from bust point. Label X.
- Draw a straight guideline from bust point to mid armhole. (Position can vary along armhole.)
- Mark $\frac{3}{8}$ inch up at mid-point of guideline.
- Draw curved style lines from mid-armhole to bust point. Extend dart legs from waist to bust point.
- Cross mark 2 inches above and below bust point for ease control notches.

Back (Fig 2)

- Trace and cut back pattern. Transfer the shoulder dart excess to mid-armhole. It will be absorbed into the style line.
- Draw a line 2 inches up from dart point of waist dart and cross mark for notch.
- Repeat style line instructions, placing guideline from cross mark to mid-armhole.

Front (Fig 3)

- Cut and separate pattern along style line.



Side Panel (Fig 4)

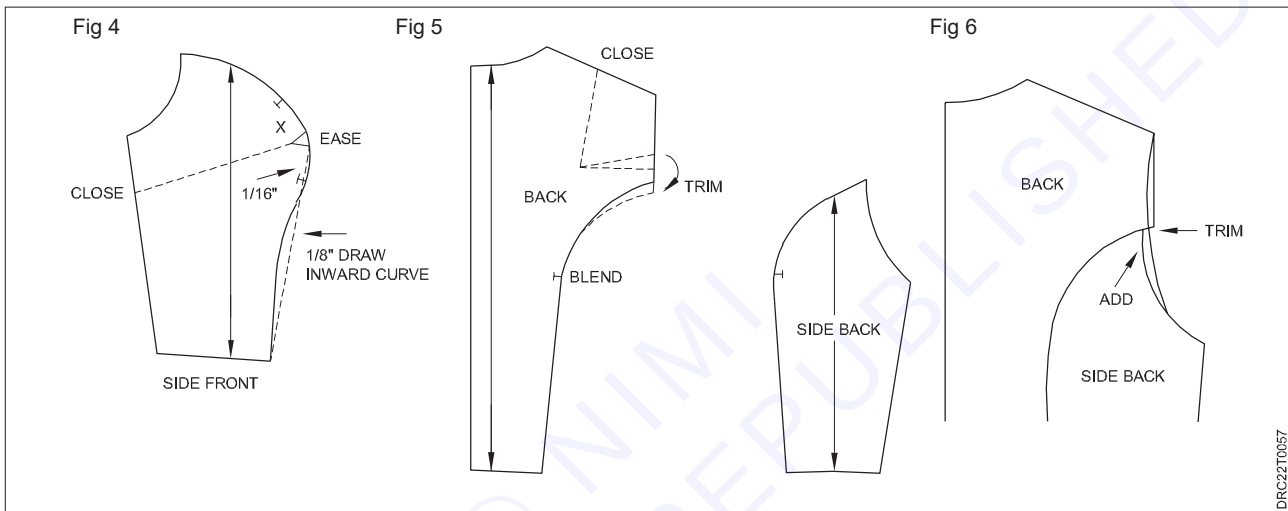
- Complete the side panel using the princess instruction for shaping style line.

Back (Fig 5)

- Cut and separate pattern along style line.
- To remove dart excess from mid-armhole, draw the dart's length and width along style line of back panel (broken line) and trim excess from the pattern.

Trueing and Blending (Fig 6)

- True pattern panels, starting from style line at waist and ending at armhole. If panels do not true at armhole, add paper to the shortened panel at armhole. Tape both sides securely.
- Blend armhole, adding to shorter side and trimming longer side equally, as shown.



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3.1 Armhole Princess Style line Variations



4.1 Pannel Styleline

The panel style line is not a dart equivalent because it does not pass through the bust point. The existing darts control fit of the garment.

Design Analysis

The panel style line extends from the waist to mid armhole of the front and back bodice without passing through bust point. A short side dart intercepts the panel style line. The panel style line can be varied to create other designs.

Pattern Plot and Manipulation

Figures 1 and 2

- Trace front and back two-dart patterns and all markings.
- Trace front and back patterns.
- Draw slash lines to bust point.
- Mark mid-armhole location.
- Draw panel style lines from waist and end 1/2 inch from front and back mid-armhole.
- Draw a curved line to the armholes.

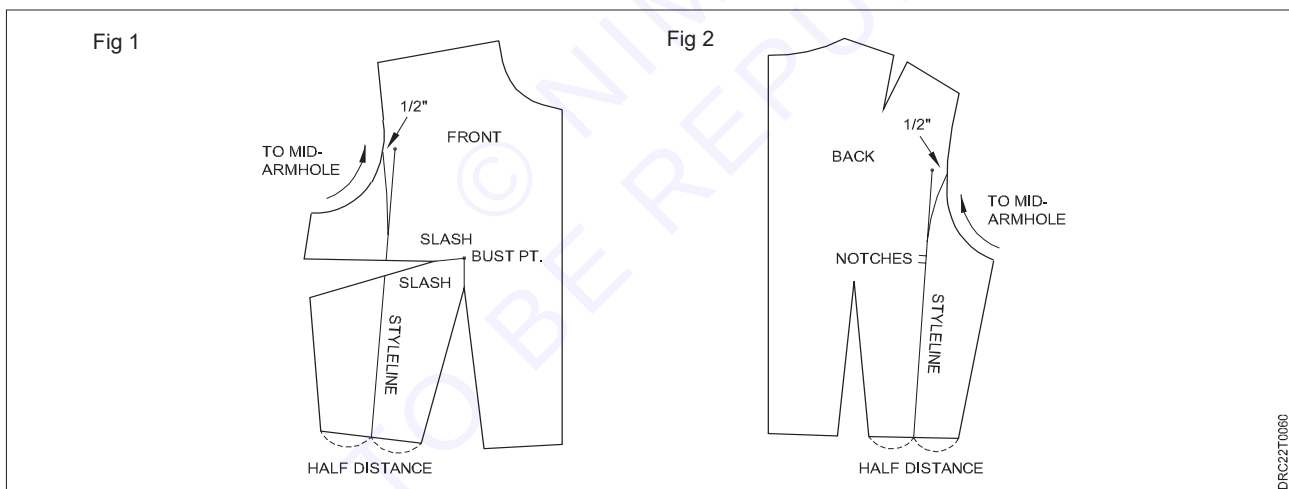


Fig 3

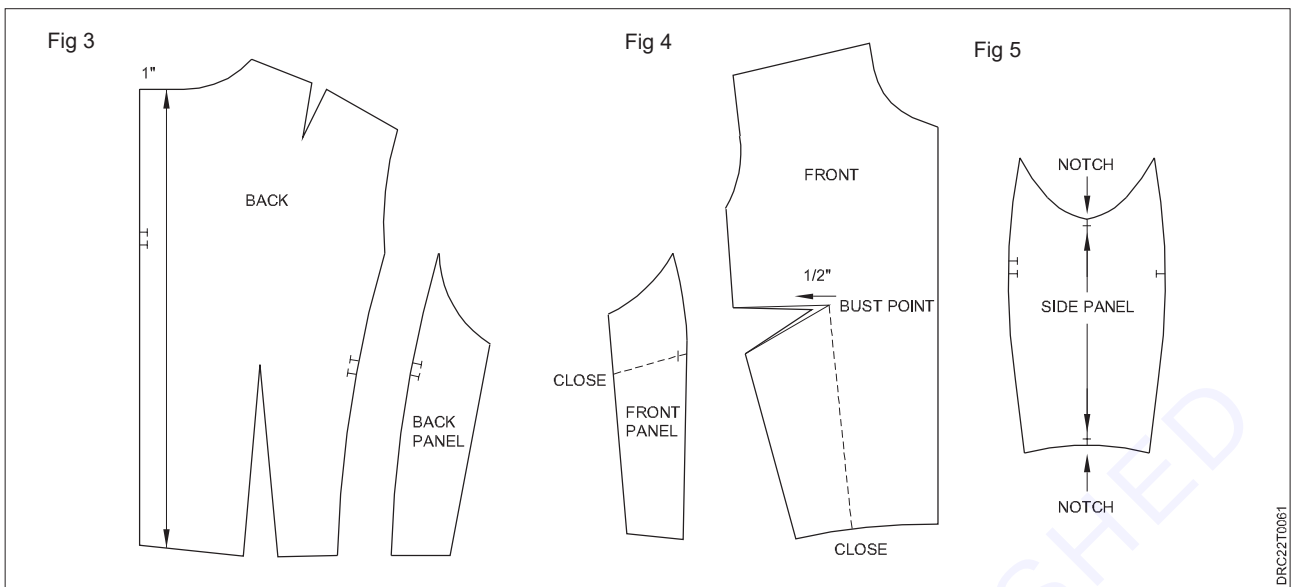
- Separate back pattern pieces along style line.
- Draw 1-inch extension at center back.

Fig 4

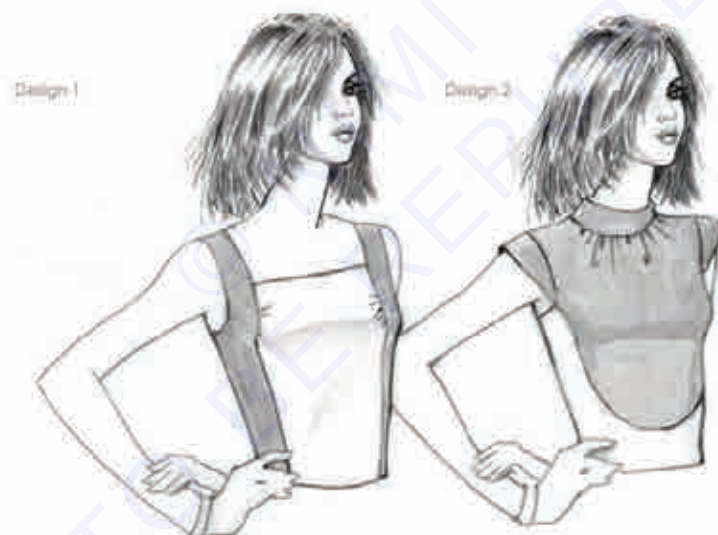
- Separate front pattern along style line.
- Close dart legs on front side panel and notch at the location.
- Close dart legs on front side panel. Complete dart leg, as shown.

Fig 5

- To eliminate the side seam, place the front and back panels together and tape.
- Extend the grainline through the center of the panels.
- Mark notches at waist and armhole.



4.1 Panel Style line Variations



Lesson 36 - 41 (3) : Added Fullness

Objectives

At the end of this lesson you shall be able to

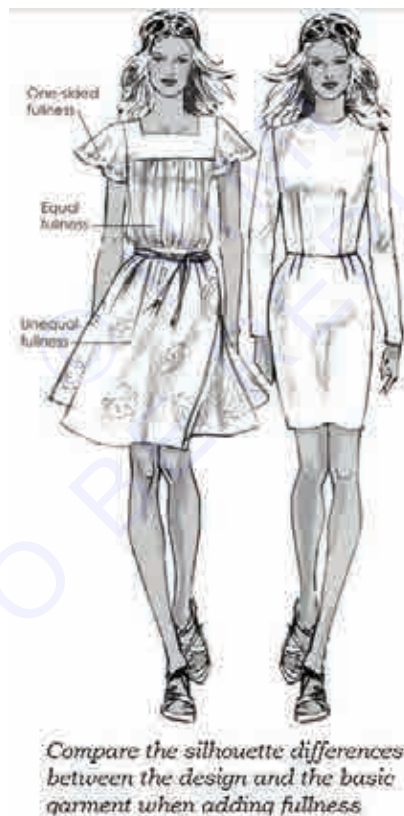
- Know about added fullness and their types.
- Add fullness along princess line, at yoke, neckline and dart leg as per the requirement of the garment.
- Convert fullness of garment with different techniques like dart, pleats etc

Added Fullness

1 Added Fullness

Principle

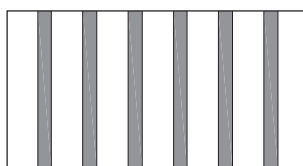
- To increase fullness in a garment to an amount greater than the dart excess provides, the length and/or width within the pattern's frame must be increased by slashing and spreading where fullness is needed.
- Adding to the outside of the pattern's frame increases the amount of fabric in a garment and can change the silhouette.



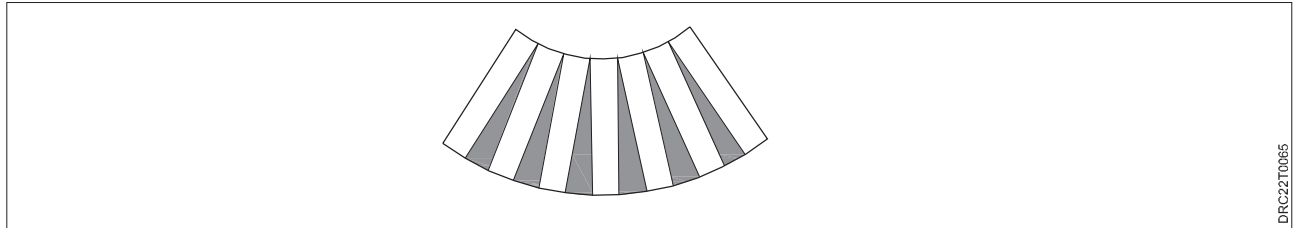
1.1 Three Types of Added Fullness

To add fullness, the working pattern is increased in one of three ways.

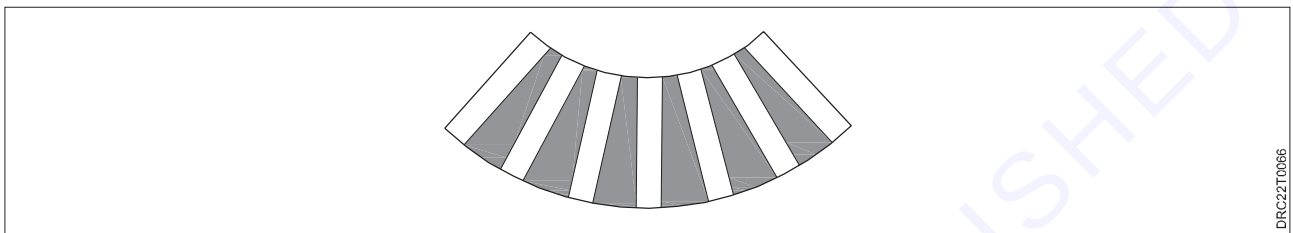
a Equal fullness: Opposite sides of a pattern are spread equally, increasing fullness to top and bottom.



- b One-sided fullness:** One side of a pattern is spread to increase fullness, forming an arc shape at the top and bottom.

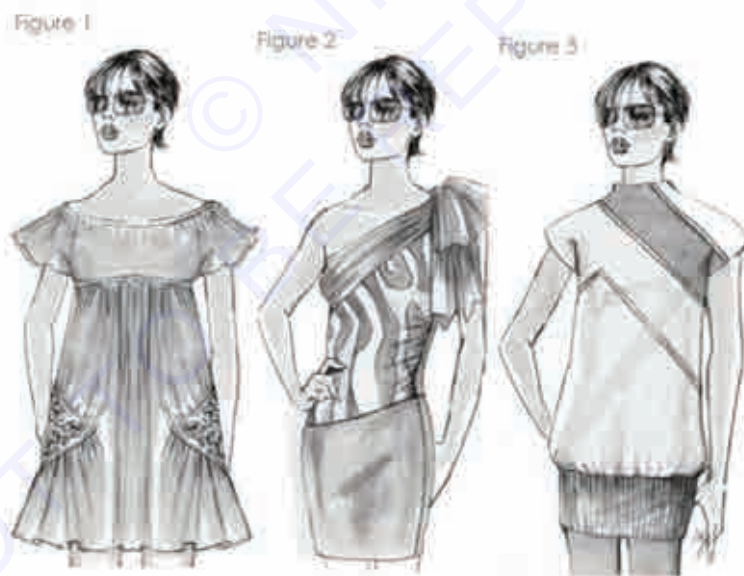


- c Unequal fullness:** One side of the pattern is spread more than the other, forming an arc shape at the top and bottom.



1.2 Identifying Added Fullness

Fullness from the basic dart is always directed to the bust. Therefore, designs can be identified as having added fullness if fullness passes through the length or width of the garment (Fig 1), when fullness is directed away from the bust (Fig 2), and when the garment extends beyond the outline of the figure (Fig 3).



Fullness may appear in the form of gathers, pleats, drape, cowls, or flares. Fullness can be on the horizontal or vertical, or at an angle, and can be developed as equal, unequal, or one-sided fullness. The dart may become part of added fullness when needed. Added fullness may be combined with Dart Manipulation and Contouring.

1.3 Method for Plotting the Pattern for Added Fullness

Added fullness is plotted as a series of straight slash lines drawn across the pattern in the direction the fullness appears on the design (horizontally, vertically, or on an angle). When preparing the pattern, the beginning and end of each slash line depend on where the fullness begins and ends on the design. The dart excess is often absorbed into the added fullness.

1.4 Formula for Adding Fullness

To determine the amount of added fullness desired, give consideration to the fabric type. Light-weight and loosely woven fabrics (cottons and chiffons, for example) may require more fullness than bulky, closely woven fabrics. Using a 26-inch waist as an example, added fullness may equal:

One and one-half times the measurement (26 inch + 13 inch = 39 inch)

Two times the measurement (26 inch + 26 inch = 52 inch)

Two and one-half times the measurement (26 inch + 26 inch + 13 inch = 65 inch)

To help train the eye in visualizing different amounts of fullness, make examples, using 10 inches as the measure to be increased. Follow the formula for each example. The finished length of each sample should be 10 inches. Save the examples for use when determining fullness.

2 Fullness on the Princess line

Design Analysis

The princess is gathered on each side of style line from waist to under bust and at front side seam, indicating parallel fullness.

Pattern Plot and Manipulation

Fig 1

- Trace front and side front princess panels. Include grainline.
- Draw slash lines where the gathers indicate.
- Number each section and cut from paper.

Fig 2, 3

- Draw grain guidelines on paper.
- Cut through slash lines separating patterns.
- Place cut pattern parts on paper with center front on fold. Match grainline of pattern with guideline. Spread equally using the ratio 1 1/2:1 or 2:1 (shaded area). Secure pattern parts.
- Trace outline of pattern and blend style line.



Fig 1

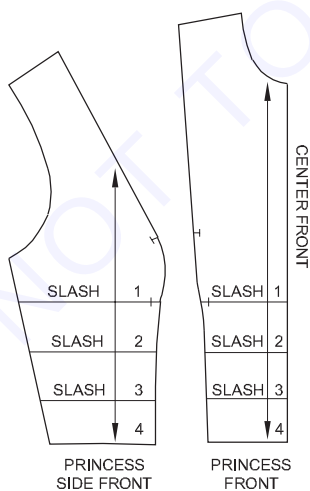


Fig 2

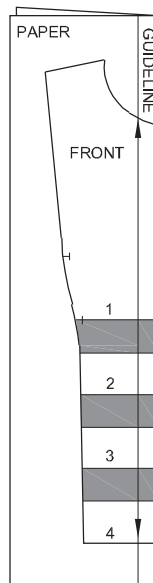
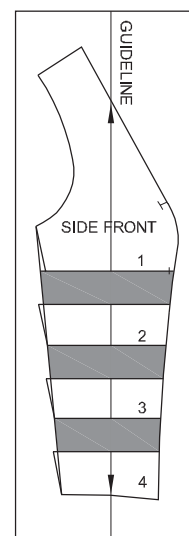


Fig 3



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3 Fullness at a Semi-yoke Above bust

Design Analysis

A short style line above the bust, controls gathers that end at mid-armhole.

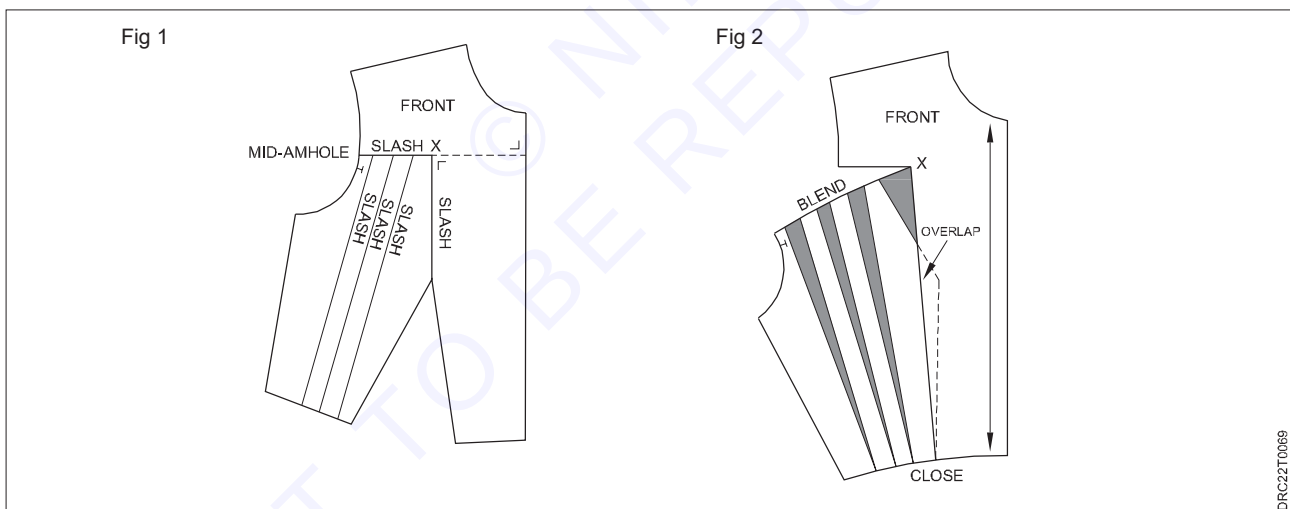
Pattern Plot and Manipulation

Fig 1

- Trace front bodice.
- Square from center front to mid-armhole.
- Square a slash line to dart point. Label X.
- Draw slash lines in the direction fullness falls and cut pattern from paper.

Fig 2 (Added Fullness and Dart Excess Interact)

- Cut from mid-armhole to point X and from bust point to point X, separating pattern.
- Close waist dart, overlapping dart point 3/4 inch.
- Fullness created by the spread areas next to bust compensates for any loss of measurement due to overlap.
- Cut remaining slash lines to, not through, waist.
- Place on paper and spread each slash 3/4 inch.
- Trace pattern's outline and blend.
- Draw grainline and complete for test fit using basic back pattern.



4 Added Fullness to a Dart Leg

Design Analysis: Analyze the design and plot of the patterns.

Pattern Plot and Manipulation: (Figures 1a, b)

- Remove dart excess from shoulder.
- Plot the front and back design as indicated.
- Trim excess. Back-trim shoulder.

Fig 2

- Slash dart legs to bust point. Close waist dart.
- Dart leg is shaped to contour the bust. Cut pattern from paper. Draw slash lines



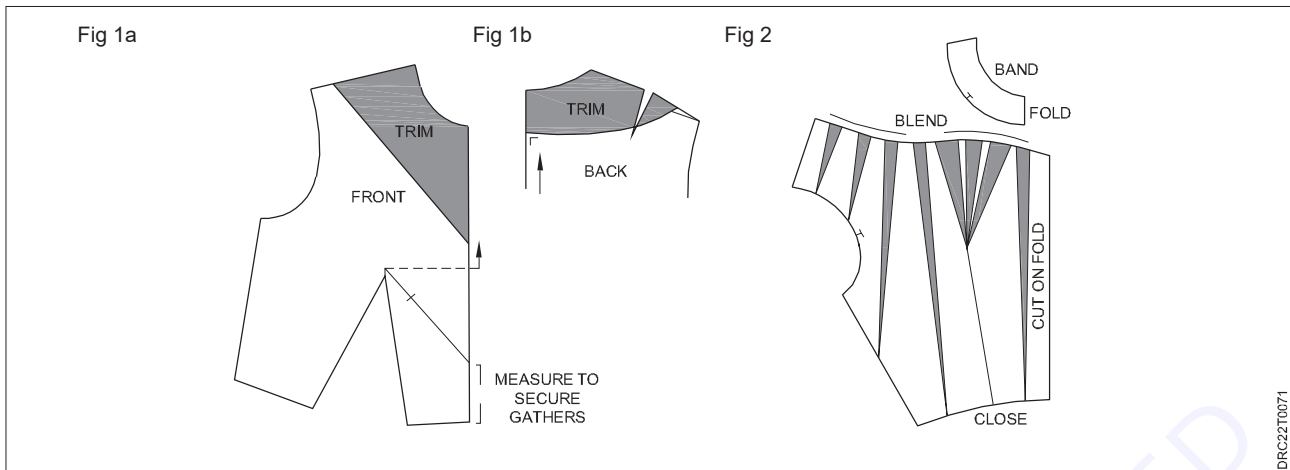


Fig 3a and b (Back)

- Trace back and draw inset band.
- Extend 1 inch at center back.
- Separate patterns, draw grainline, mark notches and complete the patterns for a test fit.

5 Fullness at Neck Band

Design Analysis: Gathers follow the edge of the inset band. Dart excess (gathers) is directed to bust level. The remaining gathers indicate one-sided added fullness.

Pattern Plot and Manipulation

Fig 1

- Trace front pattern.
- Draw inset band 1 1/2 inches wide.
- Draw three slash lines from bust to band 2 inches up from center front. Notch.
- Draw other slash lines as indicated.
- Cut pattern from paper.

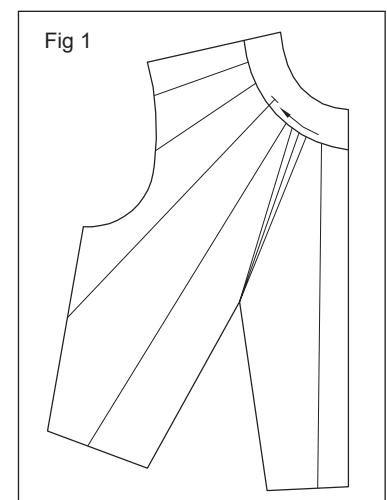


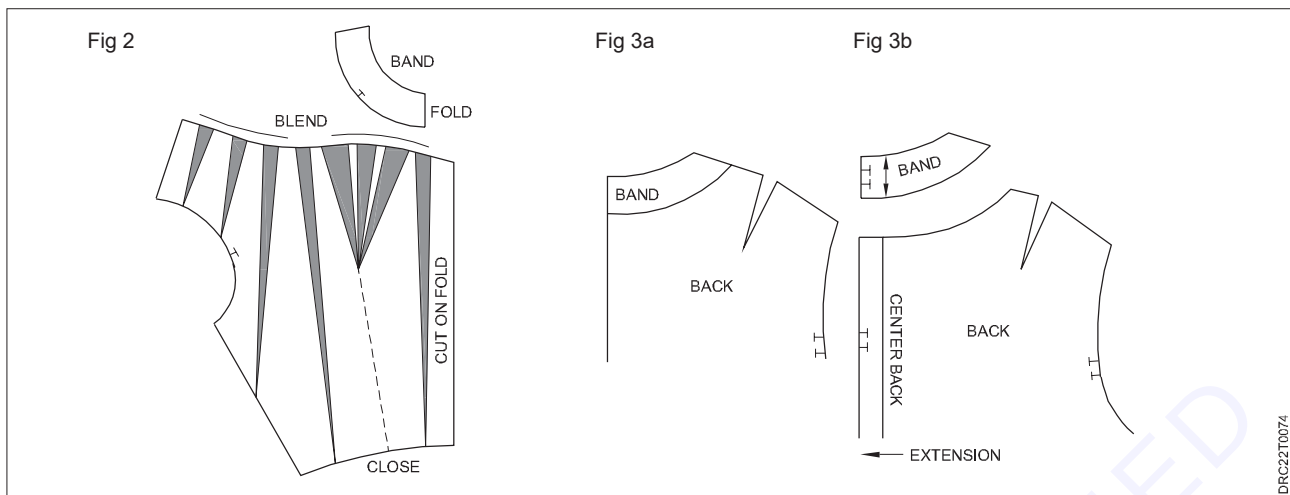
Fig 2

- Cut inset band from pattern.
- Cut slash lines to, not through, pattern's outline or bust point. Close dart legs.
- Spread added fullness as desired.
- Trace and blend the spread area.

Fig 3a and b (Back)

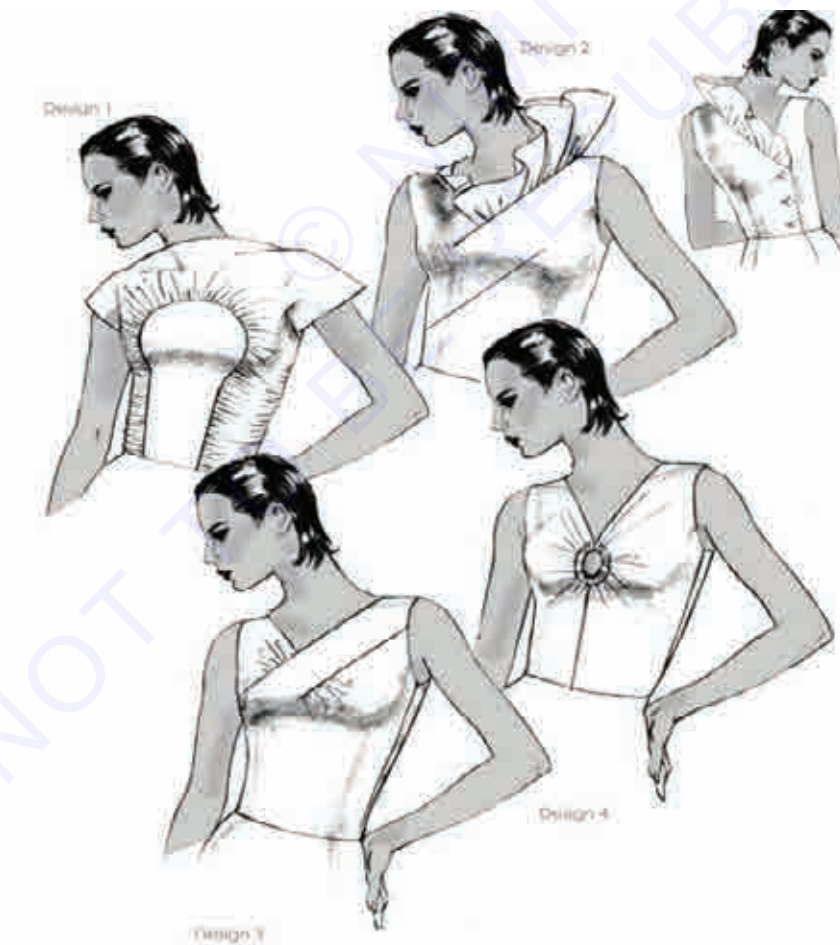
- Trace back and draw inset band.
- Extend 1 inch at center back.
- Separate patterns, draw grainline, mark notches and complete the patterns for a test fit.





6 Added Fullness Design Variations

The practice designs are based on added fullness. Develop patterns for each design, or design other variations for practice.



◆ MODULE 10 : Advance Pattern Making ◆

Lesson 42- 45 (1) : CONTOURING

Objectives

At the end of this lesson you shall be able to

- Know about Contouring and fitting problems
- Prepare the Contour Guide Patterns
- Deals with the methods used to circumvent fitting problems.

1 Contouring

Principle: To fit the contours of the upper torso closer than does the basic garment, the pattern must be reduced within its frame to fit the dimensions of the body above, below, and between the bust and shoulder blades.

To fit the upper torso closer than does the basic garment, the outline of the pattern is trimmed to fit the slope of the shoulder and the side seam ease is eliminated.

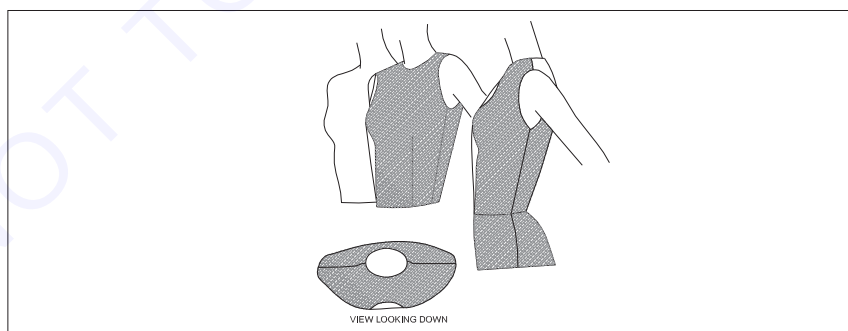
2 Contour Designs

Contour designs follow the contour of the body rather than bridging the hollow areas around the bust and shoulder blades. Contour designs include the empire style line (contouring under the bust), strapless bra top (contouring over, under, and at times between the bust), surplice (contouring over and under the bust), and cutout armholes and necklines (contouring above the bust).

To avoid fitting problems, patterns developed for contour designs are based on Contouring. Fitting problems occur if adjustments are not made to compensate for the differences between the pattern and the body's dimensions. The following information deals with the methods used to circumvent fitting problems through the use of the remarkable Contour Guide Patterns.

3 Figure Versus Basic Garment

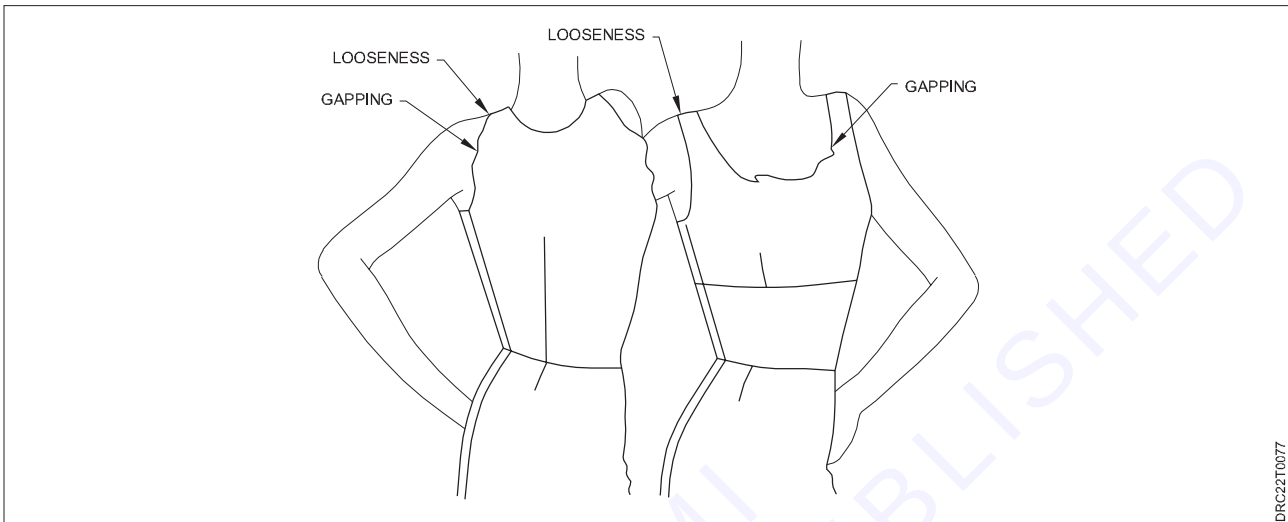
The contour of the figure is shown enclosed in a basic garment. (Visualize the garment as transparent.) The garment touches the outer limits of the figure and bridges the hollow areas. Study the relationship between the contours of the figure (shaded areas) and the garment. The hollow areas above, below, and in between the bust mounds do not come in contact with the garment. The figure's dimensions measure less in those areas than does the garment or pattern. The differences are measurable, and compensation can be made for them by using the Contour Guide Patterns.



4 Fitting Problems:

The following fitting problems will occur if the pattern is not adjusted for designs that contour the figure:

- When a portion of the neckline or armhole is cut out, the garment loses support of the shoulder and will fall to the hollow area over the bust, creating gapping.
- Empire, strapless, and bra designs have little or no bust definition. (That is, the designs will not fit closely under the bust to contour but hang loosely over the hollows of the figure)



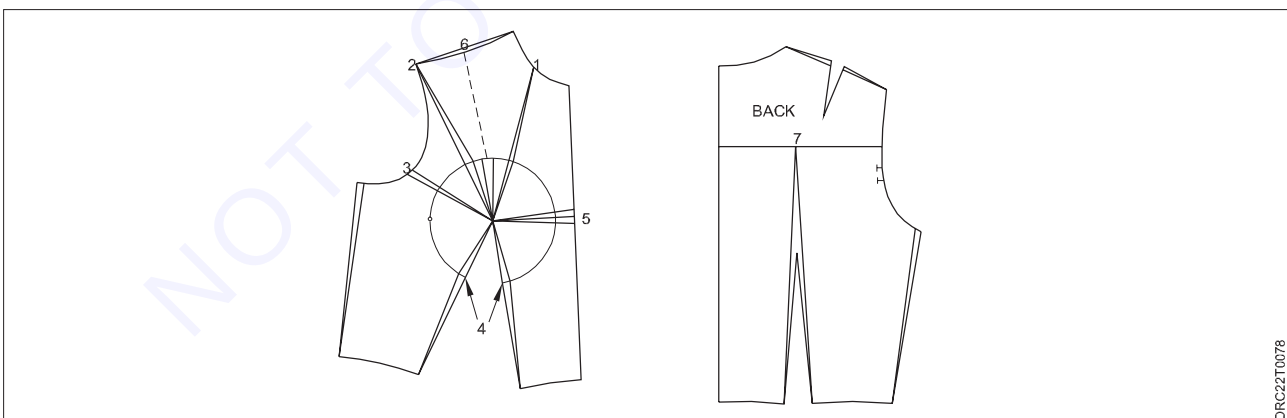
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5 The Contour Guide Patterns

The Contour Guide Patterns are tools that help the patternmaker circumvent fitting problems before they are incorporated into the design. The patterns are charted with guidelines that indicate the amount of excess to be removed from style lines or darts for a closer fit.

The guidelines are labeled by design types and represent the measurement between the garment and the hollow areas of the figure (above, below, and between the bust mounds), decreasing in both directions to the bust point and to the pattern's outline. The back bodice is charted for designs having low-cut necklines and for strapless garments.

Illustrated are the front and back Contour Guide Patterns after the guidelines have been charted. The development and use of these patterns are illustrated in the projects that follow.



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6 Preparing the Contour Guide Patterns

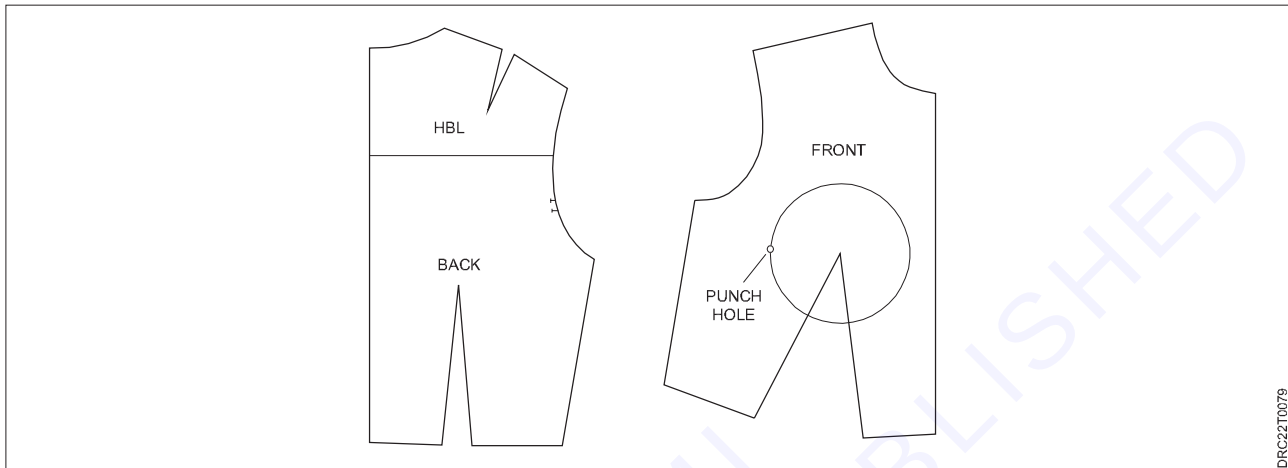
Measurement Needed: (9) Bust radius_____

Trace the front and back patterns, including all markings.

Place compass at bust point and draw a circle using the bust radius measurement.

The circle represents the hollow area between the figure and the basic garment.

Punch a hole (with the awl) for pencil insertion when transferring the circle to a traced pattern.



6.1. Guideline1- Cutout Necklines

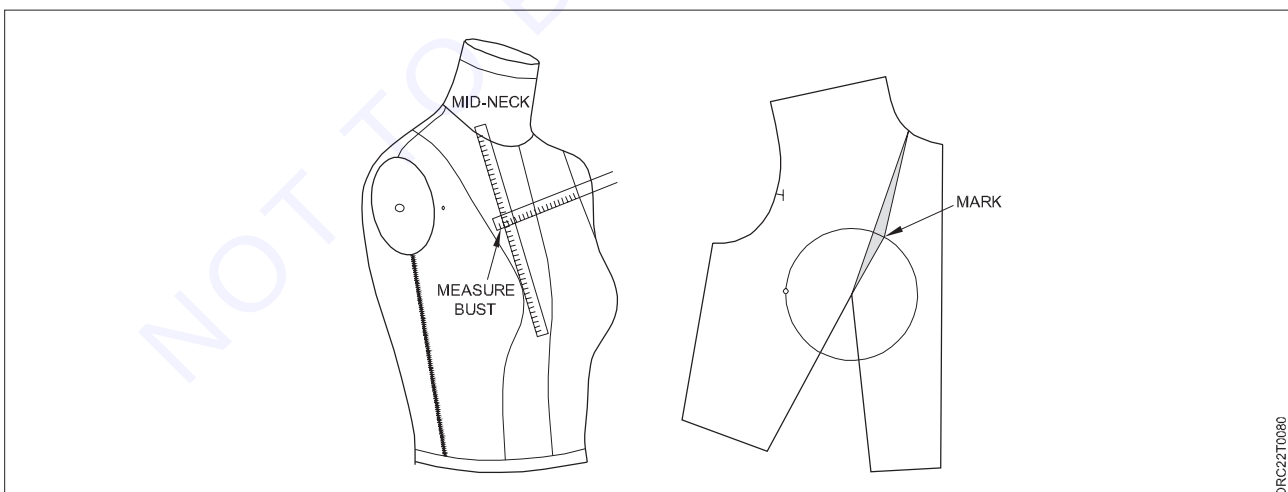
Eliminates excess (gapping) from the neckline.

Form:

- Place the end of the ruler at mid-neck and in the direction of the bust point.
- The other ruler measures the depth at the pin mark.

Pattern:

- Draw guideline 1 from bust point to mid-neck.
- Mark measurement out from circumference line and connect to neck and bust point. (**Standard Measurement = $\frac{1}{4}$ Inch**)



6.2 Guideline 2 - Cutout Armholes

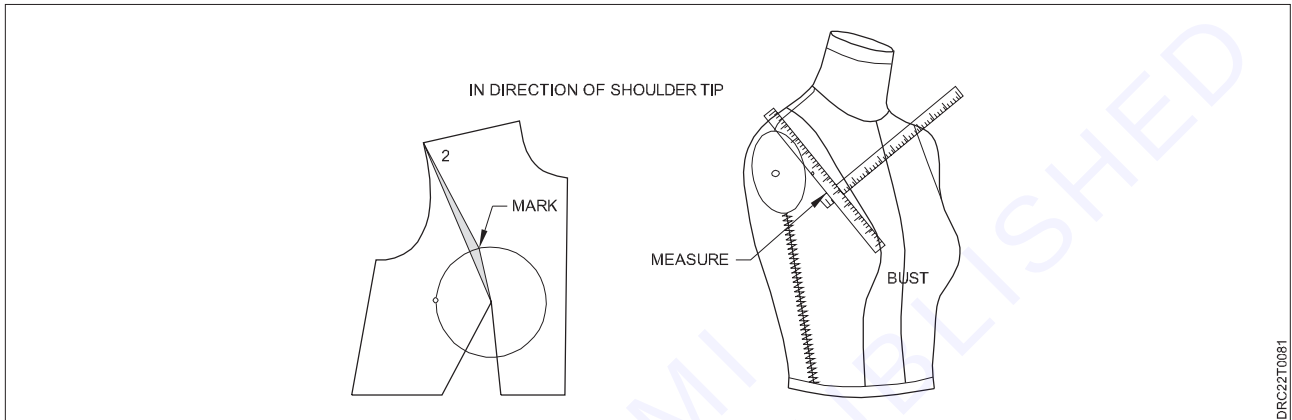
The excess (gapping) is eliminated from the armhole for a secure fit.

Form:

- Place the end of the ruler at the bust point and in the direction of the shoulder tip.
- The other ruler measures the depth at the level of the pin mark. Add 1/4 inch to the measurement to offset bias stretch.

Pattern:

- Draw guideline 2 from the bust point to the shoulder tip.
- Mark measurement out from the circumference line and connect to the shoulder tip and bust point. (**Standard Measurement = ½ inch**)

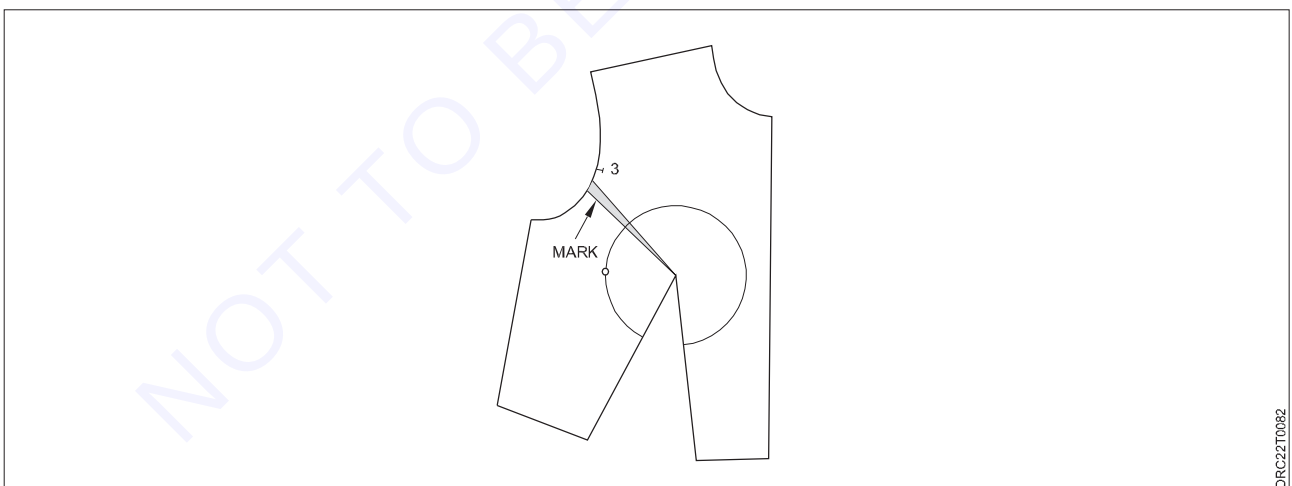


6.3 Guideline 3 - Armhole Ease

The armhole ease is eliminated for strapless garments and cutout armholes.

Pattern:

- Draw guideline 3 from the curve of the armhole to the bust point.
 - Mark 1/4 inch (standard) and draw a line to the bust point.
- (Include with cutout armhole designs.)



6.4 Guideline 4 - Empire Style line

An empire is any style line that crosses under the bust. To reveal the contour of the under bust, excess is eliminated.

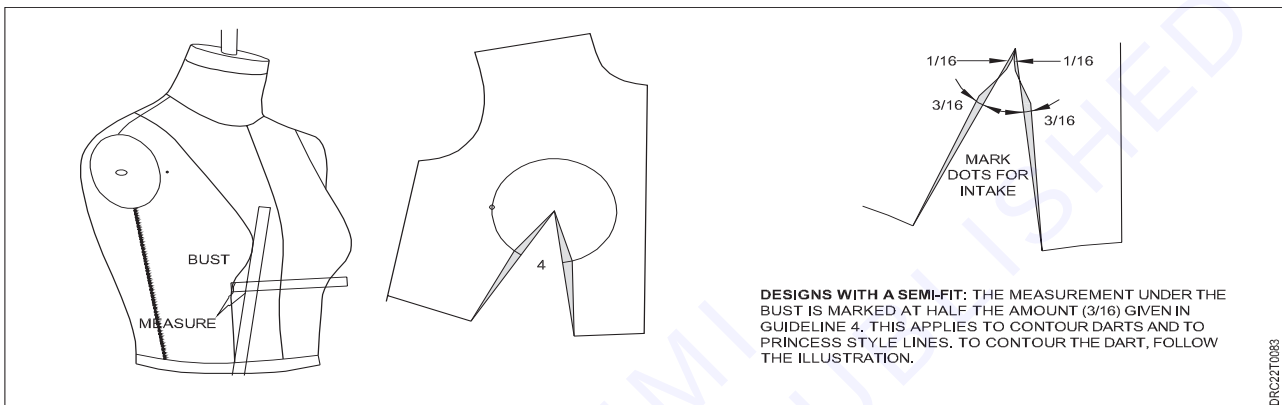
Form:

- Place the end of the ruler at the waist and in the direction of the bust point.
- The other ruler measures depth at the pin mark.

Pattern:

- The measurement is divided between the two dart legs at the circumference line of the circle.
- Mark the measurements and draw guideline 4 to the waist and bust point.

[Standard Measurement = $\frac{3}{4}$ " ($\frac{3}{8}$ " at each dart)]



6.5 Guideline 5 - Contour Between the Busts

This approach is intended to reveal cleavage between the busts. (Excess between the busts is eliminated.)

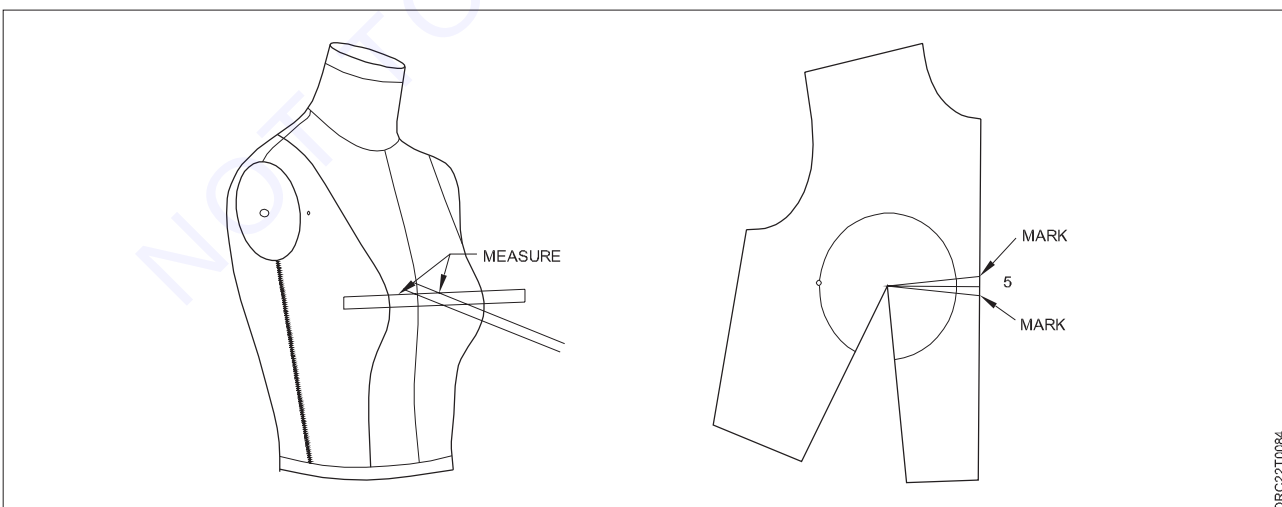
Form:

- Place the ruler across bust points.
- The other ruler measures depth at the center front between the busts.

Pattern:

- Square guideline 5 from center front to the bust point.
- Mark half the measurement on each side of the square line to bust point.

[Standard Measurement = $\frac{3}{4}$ " ($\frac{3}{8}$ " each dart leg)]



Lesson 42- 45 (2) : COWLS

Objectives

At the end of this lesson you shall be able to

- Know about Cowls and their types.
- Create patterns for Bias-Cut Cowls.
- Convert fullness of garment with different cowls like Mid depth, low, deep , back & armhole cowl etc.

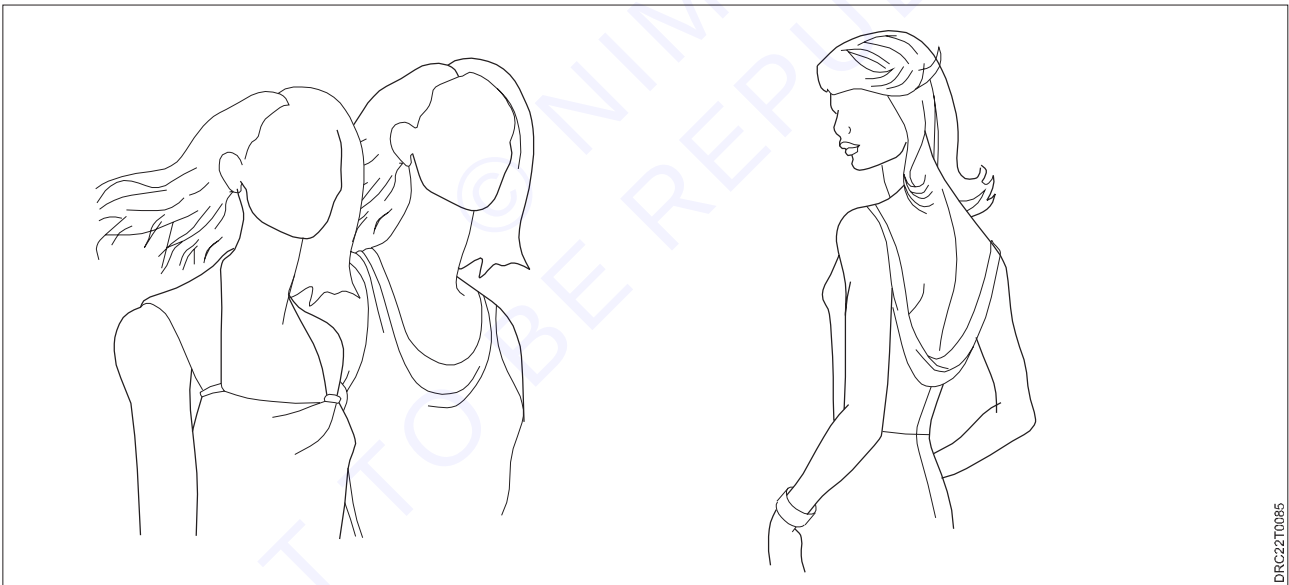
1 COWLS

Cowl folds are created by allowing fabric to fall to desired depths from secured ends of a bias triangle. Cowls drape best on true bias and when cut in soft, loosely woven fabrics like crepe, silk, gauze, rayon, satin, chiffon, and certain knits.

2 Types of Cowls

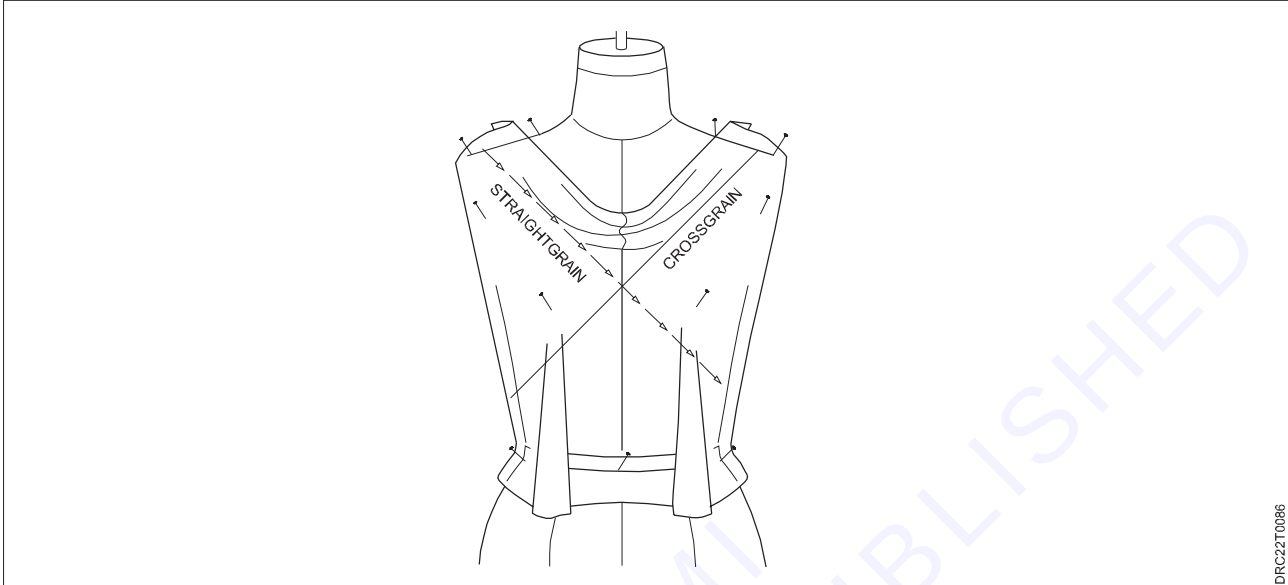
Cowls can be designed with or without pleats and/or gathers and with few or many folds. They fall at varying depths, creating a soft look to any garment. Cowls fall from the shoulder at necklines, at armholes, or from the waist of dresses, gowns, blouses, pants, jackets, and coats.

Cowls can also be designed to fall from the cap area of the sleeve. Cowls can be in-one with the garment or be set-in to save fabric. With the help of a broach or clip, the cowl can be pulled in any direction to create interesting effects.



Nature of the Bias Cut

The lengthwise grain and cross-grain run in opposite directions as the cowl hangs from the shoulder (or from any part of a garment). The fold of the cowl follows more closely to the lengthwise grain on one side, and on the other side the fold follows more closely to the cross-grain. The lengthwise grain, which is twisted more firmly than the cross-grain, may cause the fold of the cowls to roll differently and often is the reason for twisting.



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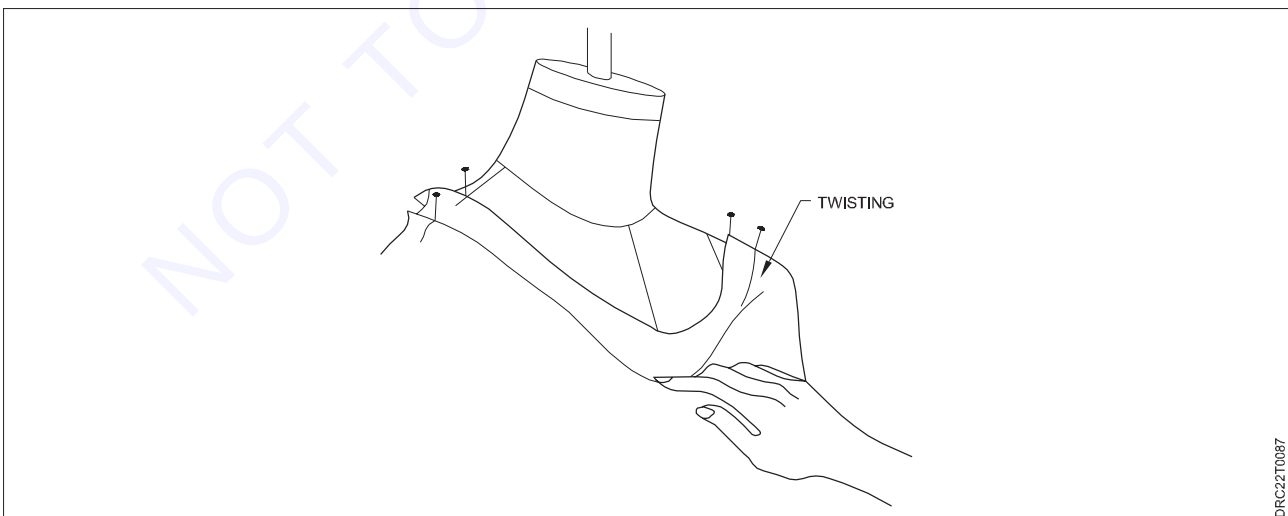
2.1 Twisting

Place a finger at the center of each fold of the cowl. Press downward gently. If the fold of the cowl(s) twists, re drape the cowl on the side of the twist until the fold falls smoothly. Correct the pattern (the sides may differ).

2.2 Making Patterns for Bias-Cut Cowls

Basic patterns are generally developed for garments cut on the straight grain of woven fabrics, not for those cut on the bias. The cowl patterns require adjustments if the garment is to fit. The cowl is cut on perfect bias and draped on the form for a first fitting to determine the stretch of the bias.

The amount that the cowl bodice stretches when fit on the form is marked and trimmed or added to the original pattern. The adjustments cause the pattern to be reduced in size to the amount that it will stretch. When recut, it should fit in the final test.



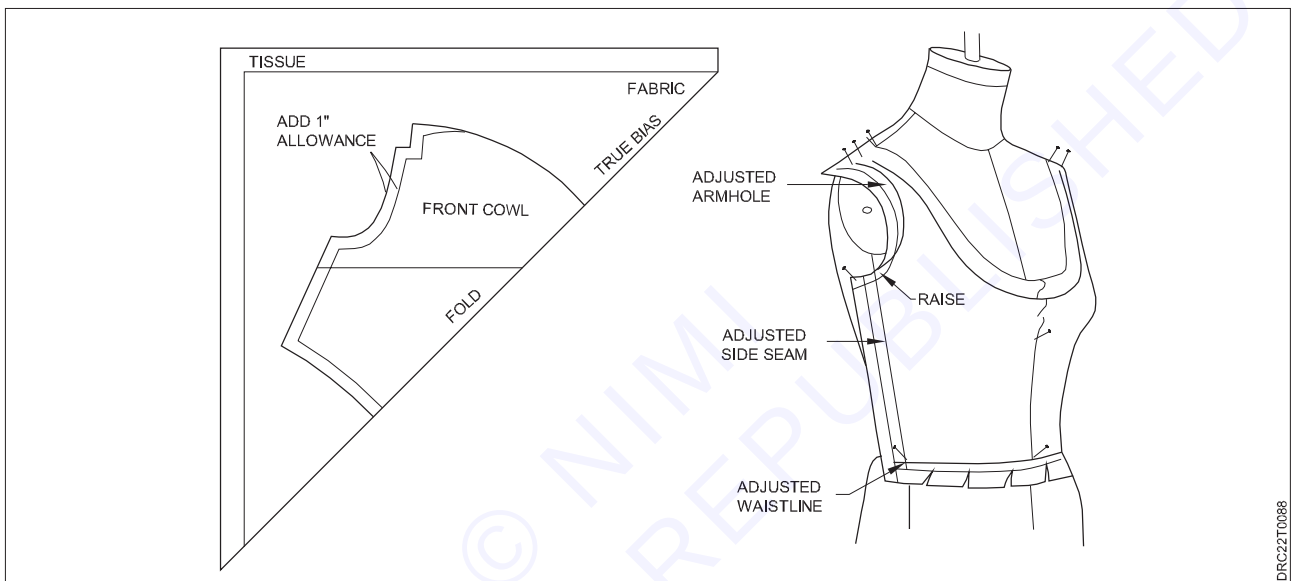
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2.3 Finding True Bias

- To find true bias, fold the cross-grain to the lengthwise grain - or parallel to it.
- Smooth the fabric and pin along the edges to hold.
- Mark the fold line with chalk or thread line loosely to indicate true bias.
- The cowl pattern should be traced on marking paper first and then pinned to the fold of the fabric. (Place tissue underneath the fabric to prevent slippage when cutting)

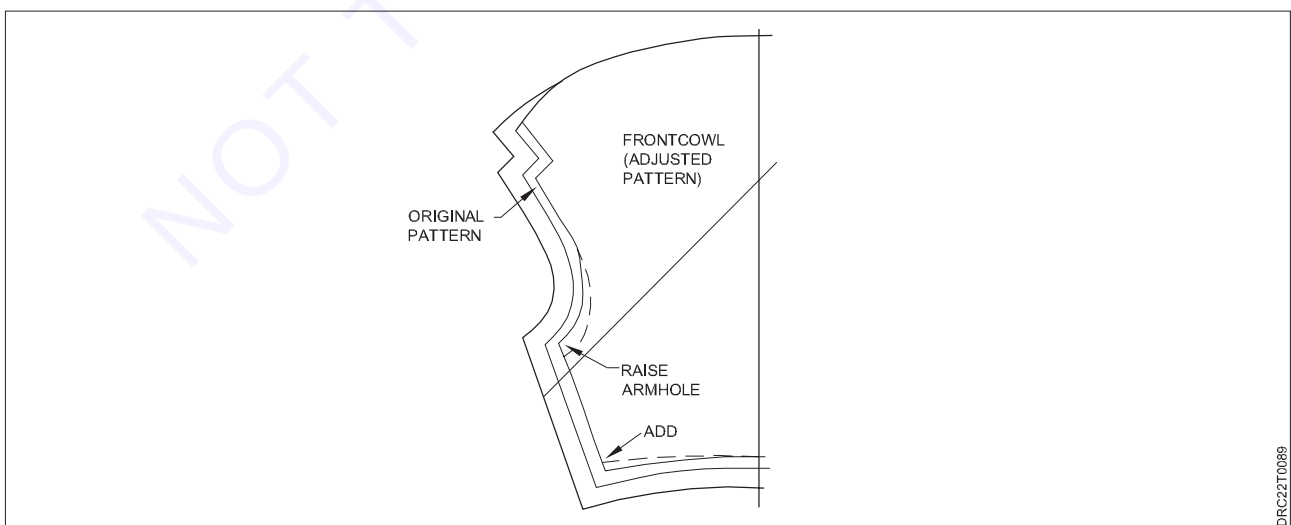
2.4 Fitting the Cowl Drape

If there is a dart (preferably a French dart), pin or baste first. Pin cowl to the shoulder line with center lines matching. Allow the bias fabric to fall and stretch. Smooth fabric past side seams and waistline. Pin where indicated. With sharpened chalk, mark the outline of the form on the drape (right side only unless the design is asymmetric).



2.5. Correcting the Pattern

- Remove drape from the form.
- Measure the difference between the original pattern and the marked outline.
- Mark the original pattern at the chalk-marked outline and draw blending lines. Adjust the pattern (under the armhole). Recut and check the fit.



3. Design 1 - Mid-Depth Cowl

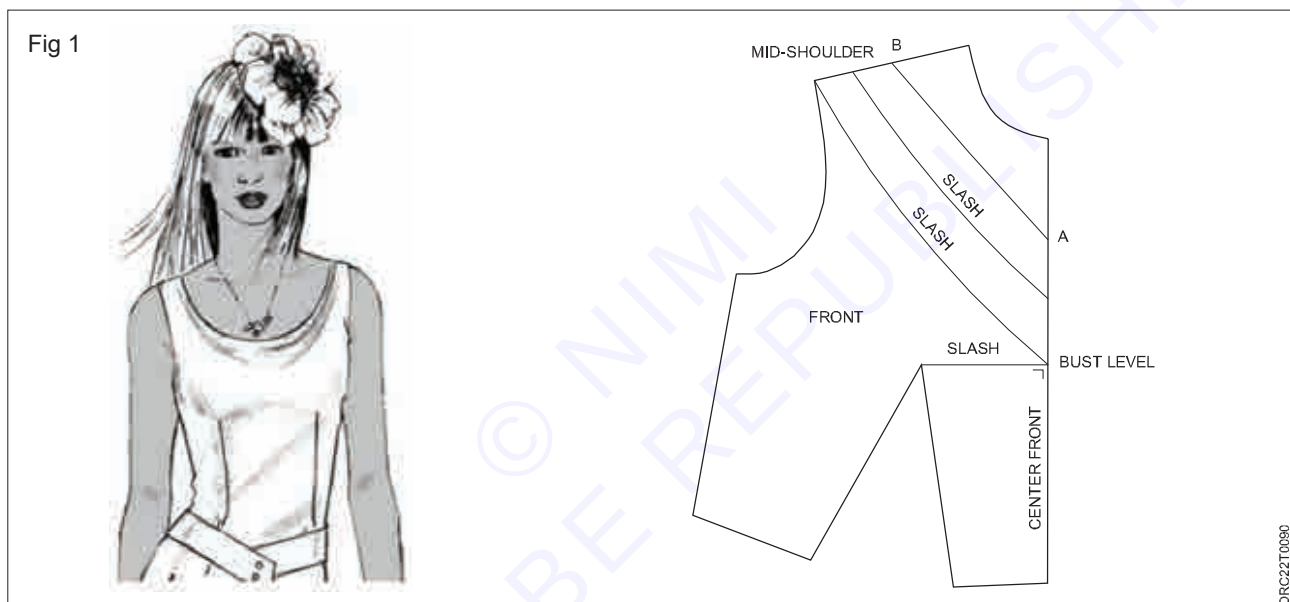
Design Analysis: Design 1

The cowl falls from mid-shoulder to a depth between the neck and bust level. The depth of the cowl takes up one-half of the waist dart excess. The fold back facing is rounded.

Pattern Plot and Manipulation

Fig 1 (Front)

- Trace the front bodice and square a slash line from center front to the bust point (bust level).
- Mark A between the center front neck and bust level.
- Mark B at mid-shoulder and draw a line to A.
- Draw a slash line from shoulder tip to bust level and another in between.
- Cut the pattern from paper.
- Cut slash lines to, not through, the shoulder and bust point.



(Fig 2)

- Fold the paper and square a guideline 5 inches down from paper's edge.
- Place the pattern on paper so that A-B line touches the guideline and point A touches fold of the paper.
- The center front pattern is placed on the fold below bust level.
- Trace the pattern, starting from B and ending at center front waist.
- Mark C 4 inches up from A for fold-back facing.

(Fig 3)

- Fold on the A-B line and trace the shoulder.
- Blend the shoulder (broken line is the original shoulder).
- Draw and trace the facing (1 1/4 inches wide at shoulder).

Fig 2

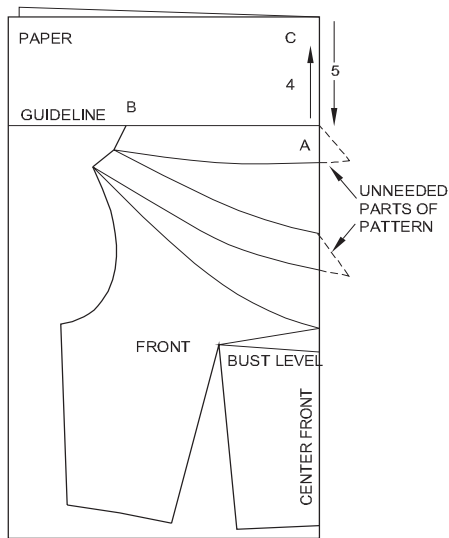
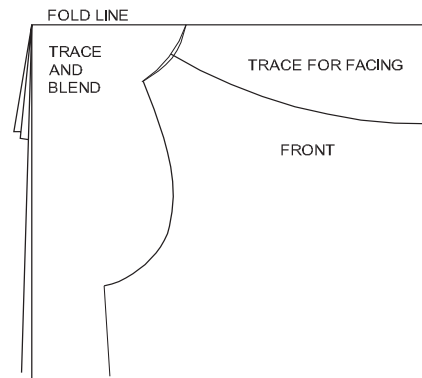


Fig 3



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(Fig 4)

- Unfold and draw the traced facing.
- Draw a 45° grainline for bias and cut from the paper.

(Fig 5)

Fig 4

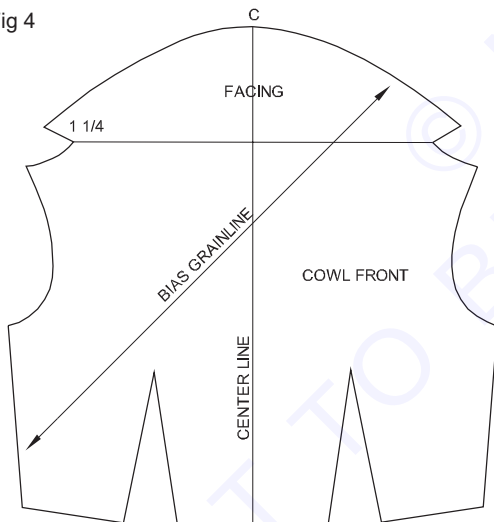
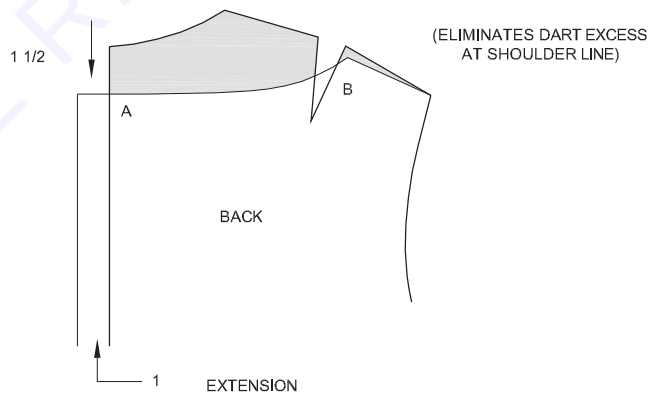


Fig 5



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- Trace the basic back pattern.
- Mark A 1 1/2 inches below center back.
- Mark B 1/4 inch down from mid-shoulder.
- Draw the neckline from A, curving the line to B.
- Draw a parallel line 1 inch from center back.
- Draw a straight grainline.
- Cut and stitch to the front cowl after the first fitting.

4 Design 2 - Low Cowl

Design Analysis: Design 2

The low cowl drapes at or slightly below bust level. All of the waist dart excess is transferred to the neckline for a cowl of this depth.

Pattern Plot and Manipulation Fig 1

- Trace front bodice.
- Square a line from center front to the bust point. Label A (bust level).
- Mark B 1 1/2 inches from shoulder tip. Draw a line from A to B.
- Draw a slash line between the shoulder tip and point B, ending at point A.
- Cut from paper.
- Cut slash lines to, not through, the shoulder and bust point.
- Close dart leg. Tape

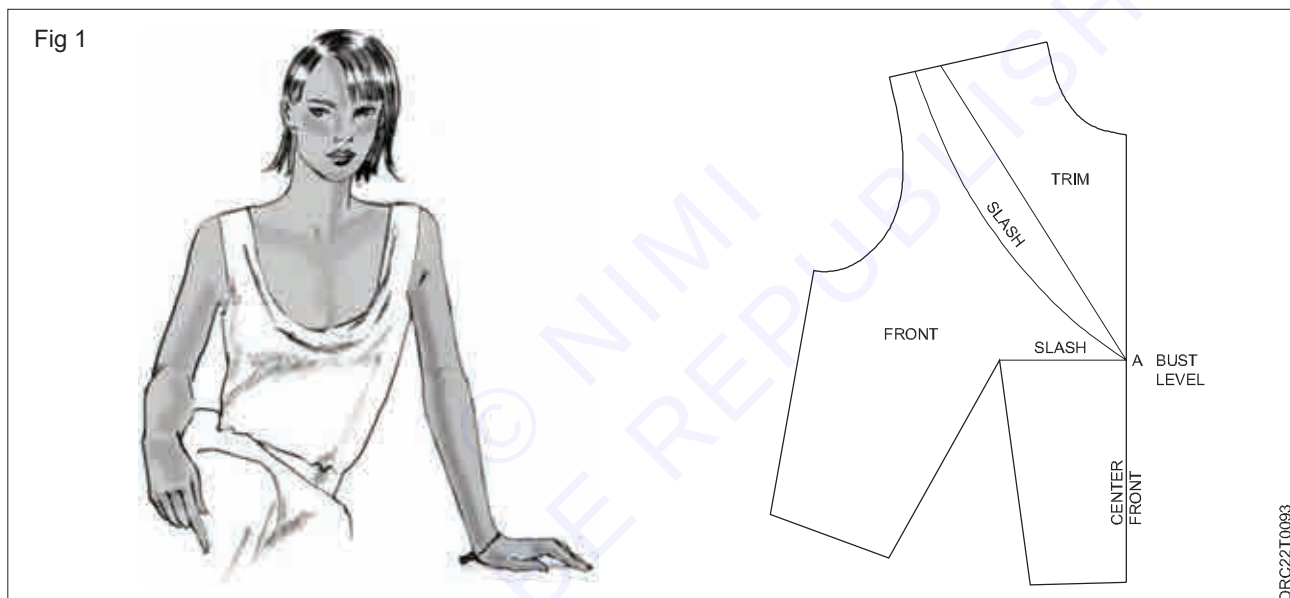
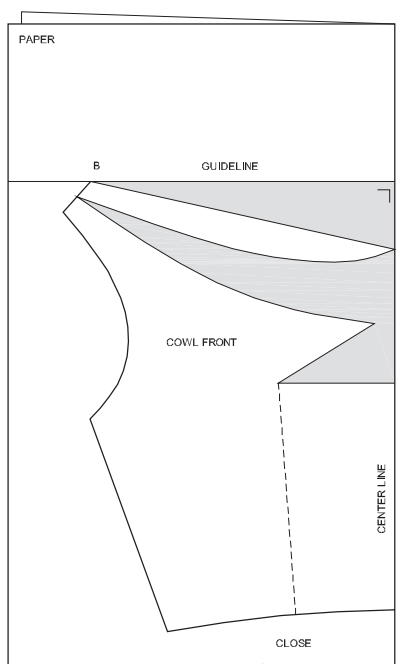


Fig 2

- Fold the paper and square a guideline 5 inches down from paper's edge at fold.
- Place the pattern with center front on fold and point B on the guideline. Spread sections until point A touches center front fold.
- Secure and trace from B to center front waist.
- Draw fold-back facing. See Figure 3 within the Deep Cowl section, two pages ahead.
- Develop the back pattern using instructions in Figure 4 with the Deep Cowl section, two pages ahead, as a guide.
- Complete the pattern for test fit.

Fig 2



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Design 3 - DEEP COWL

Design Analysis: Design 3

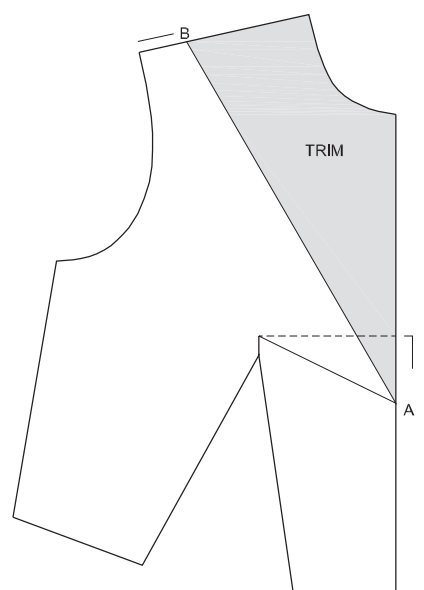
Deep cowls are usually designed with a strapless top. They can be stitched into the side seam of the cowl bodice (as illustrated) or continued around to the back. Cowls that fall below bust level indicate that fullness has been added to the center front.

Pattern Plot and Manipulation

If you are not using the Contour Guide Patterns, use the measurements given.

(Fig 1) Cowl Pattern

Fig 1



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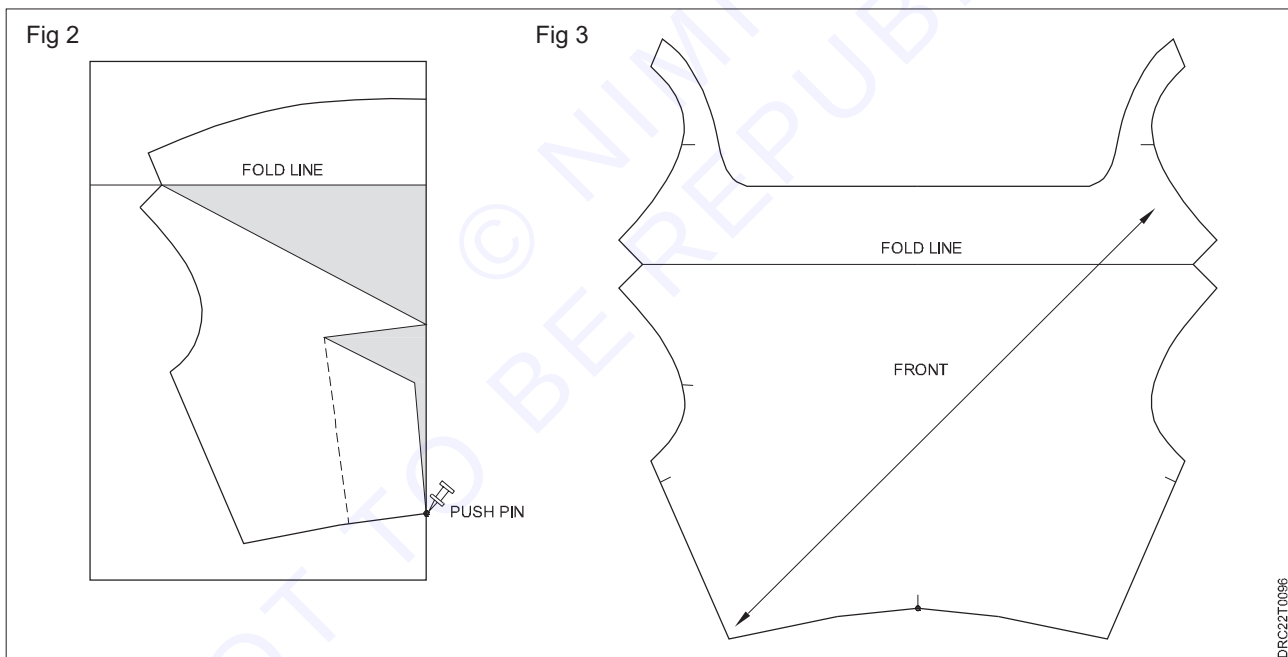
- Mark cowl depth 2 inches down from bust level. Label A.
- Mark B 1 1/2 inches from shoulder tip.
- Draw a line from B to A and from A to bust point.
- Trim neckline (shaded area).
- Cut slash lines A from, not through, the bust point.
- Close the dart legs.

Fig 2

- Fold paper.
- Place waist at fold. With a pushpin, pivot the pattern until point A touches the fold.
- Trace the pattern from B to center front waist.
- Square a line from the fold, touching B.
- Draw the facing as illustrated (uneven broken lines).
- Follow the instructions given for the first fitting in Figures 3, 4, and 5 starting with the finding True Bias section earlier in this chapter.

Fig 3

- Unfold, mark notches, draw bias grainline, add seams, and cut from the paper.



Back Pattern

- Trace the back pattern. Draw neckline using the measurements given.
- Draw the facing (uneven dash lines).
- Add seams and extension. Cut from the paper.
- Mark notches and grainline.
- Trace facing.

Design 4 - Back Bowl

Design Analysis: Design 4

Back cowl is developed with the use of a square ruler.

Design 4 illustrate a high cowl.

High-Back Cowl

Pattern Plot and Manipulation (Fig 1)

- Paper Needed
- Cut a 36-inch square of paper and fold.

Back Set Aside

- Mark A 4 inches down from back neck.
- Mark B at the dart leg and at mid-shoulder.
- Measure from A to B (includes dart excess).Record.
- Mark C from center back waist equal to the width between the dart legs.

(Fig 2)

- Square a line 4 inches down from the fold that equals the A-B measurement. Label.
- Place the pattern on the paper so that point B of the pattern and the paper touch and point C touches the fold.
- Secure and trace the pattern indicated by the blue line, omitting the part indicated by the broken lines, and remove the pattern.
- Draw a slightly curved line from B to shoulder tip.



Fig 1

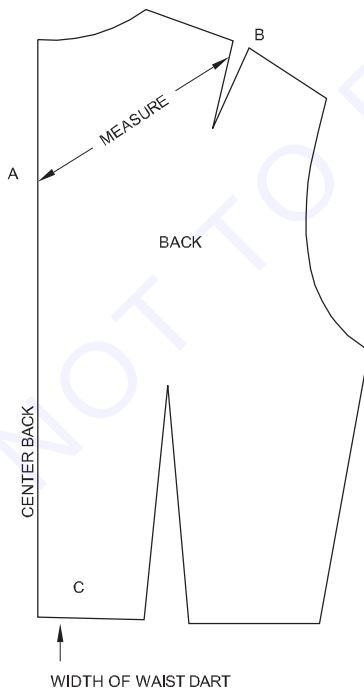
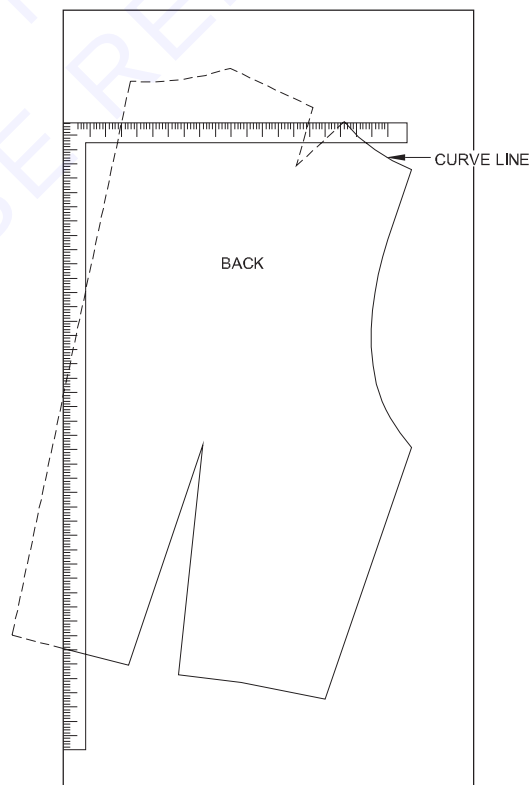


Fig 2



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(Fig 3)

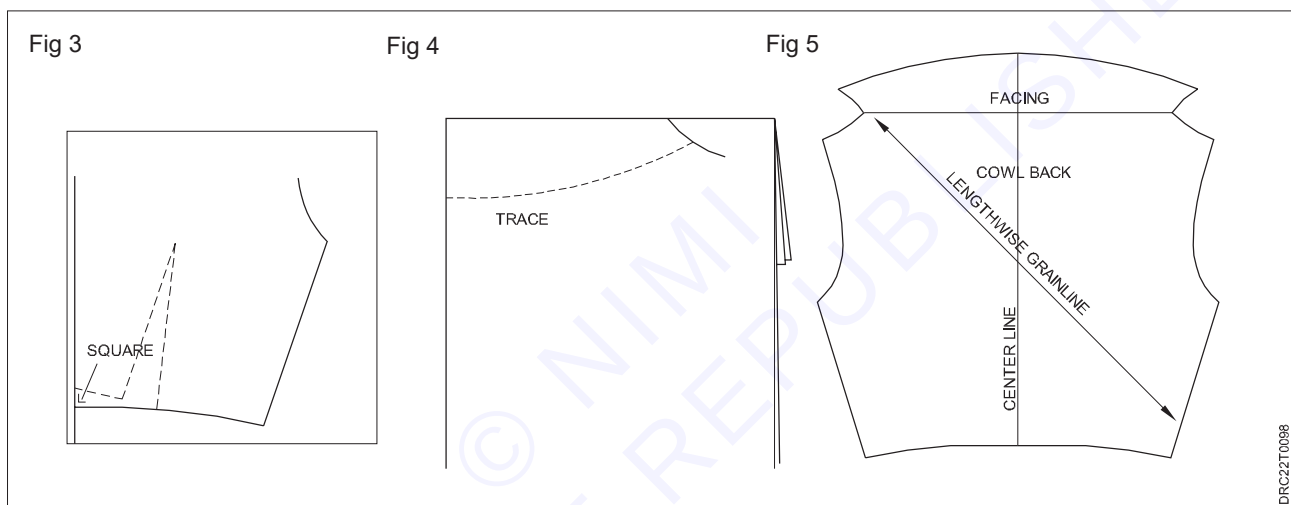
- Square a line from the fold, touching the dart leg, and blend the hemline, as shown.

(Fig 4)

- Crease-fold paper on the A-B line. Trace shoulder.
- Draw a curved line 3 inches down from center front on fold and end 1 1/4 inches from B on the shoulder line. Trace.

(Fig 5)

- Unfold pattern and pencil perforated marks.
- Draw a 45° grainline for bias.
- Add seams and notches and cut for test fit.
- After the front pattern is draped and the pattern corrected, adjust shoulder line of the basic back to complete the garment.



Design 5 - One Piece Armhole Cowls

Design Analysis: Design 5 (OVER –Shoulder Cowl)

Cowl drapes under armhole, replacing side seams.



Fig 1

Use front and back basic two-dart bodice, with shoulder dart transferred to the armhole.

Draw a square line on paper. Label A, B, and C.

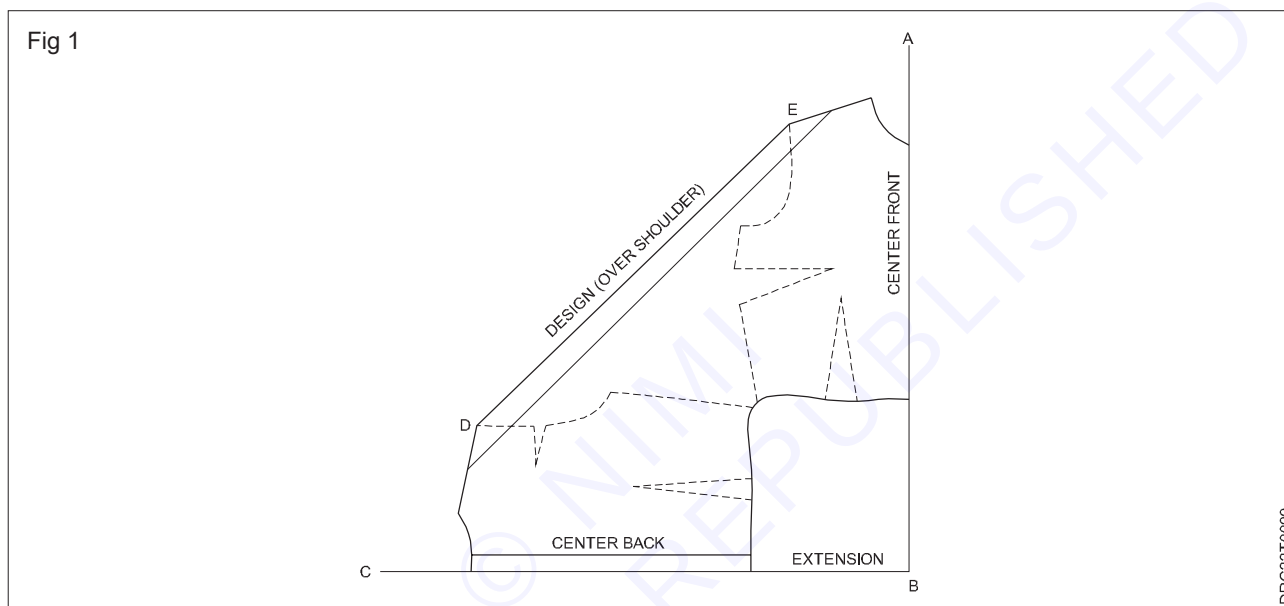
Place front bodice on A-B line. Place back bodice 1 inch in from B-C line (for extension), with a 1-inch space between the front and back side waists for ease.

Secure and trace the front and back pattern, omitting sections indicated by the broken lines. Remove patterns.

- Blend a curved line between front and back waist.

Over-Shoulder Cowl

- Stitch shoulder and continue 3 inches more.



Lesson 42- 45 (3) : Sleeves

Objectives

At the end of this lesson you shall be able to

- know about Sleeve and their classification.
- complete a garment with different sleeve styles
- understand about kimono, raglan, drop shoulder & dolman sleeve.
- create variety of patterns regard to sleeve bodice combinations

1 INTRODUCTION

Sleeves have been used as a device for changing the silhouette of garments throughout the history of fashion.

There are two major classifications of sleeves:

The set-in sleeve cut separately and stitched into the armhole of the bodice and the sleeve combined with part or all of the bodice.

1.1 SET-IN SLEEVE

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.



1.2 SLEEVE-BODICE COMBINATIONS

The sleeve and top of any garment (blouse, dress, jacket, or coat) can be combined in a variety of ways, categorized as follows:

- **Kimono designs:** The sleeve is all-in-one with the top garment.
- **Deep-cut armhole:** The armhole section of the garment combines with the sleeve.
- **Raglan designs:** The sleeve combines with part of an armhole and shoulder area of the garment.
- **Drop shoulder designs:** Part of the sleeve cap combines with the garment. The garment can be developed with or without the lower sleeve, or the lower sleeve can be attached to the garment.

Each of the foundation patterns can be used to develop other design variations by exaggerating their special characteristics or by changing the style line position.



2 Kimono sleeve

The kimono is developed by combining the sleeve length with the bodice or top. The kimono can be adapted and modified for a variety of other designs. The kimono under seam can end anywhere along the side, even extending to the hemline for the “batwing” dress. Kimono blocks can be used for designs that vary from close fitting shapes to easier fitting shaped garments.

The basic ‘form’ kimono block [Metric System]

Trace round back and front sections of the easy fitting bodice block or over garment block as required. Trace sleeve block, narrow underarm seam at wrist if required.

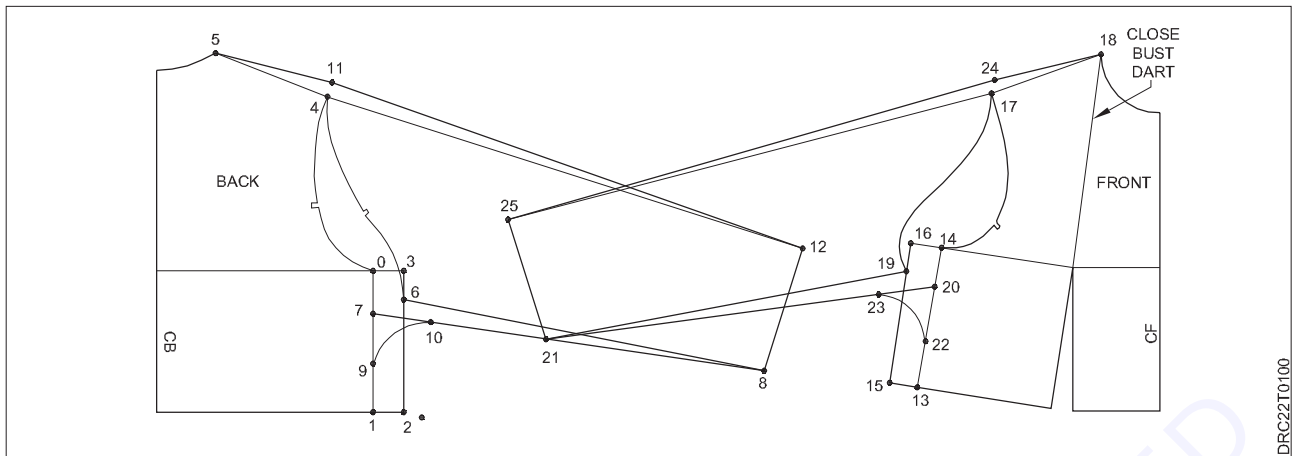
Back

- Mark points 0 and 1 on side seam; square out.
- 1–2: 3.5cm; square up to 3.
- Mark 4 at shoulder point, 5 at neck point.
- Divide the sleeve block down the center line.
- Place back sleeve head to touch shoulder point 4 and underarm of sleeve to touch line 2–3. Mark point 6.
- 0–7: one third the measurement 0–1 minus 0.5cm.
- Join 7 to wrist point 8.
- 7–9: 6cm.
- 7–10: 6cm; join 9–10 with curve.
- 4–11: 1.5cm; join 5–11 and 11–12 at wrist point.

Front

Transfer bust dart from shoulder to waistline.

- Mark points 13 and 14 on the side seam.
- 13–15: 3.5cm.
- 14–16: 3.5cm; join 15–16
- Mark point 17 at shoulder point, 18 at neck point.
- 16–19: the measurement 3–6 on back section.
- Place the underarm of front sleeve to point 19 and the sleeve head to the shoulder (it will rise above shoulder point).
- 14–20: the measurement 0–7; join 20 to wrist point 21.
- 20–22: 6cm.
- 20–23: 6cm; join 22–23 with a curve.
- 17–24: 1.5cm; join 18–24 and 24–25 at wrist point.
- Transfer bust dart to position required.



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3 'Form' kimono sleeve – raglan adaptation

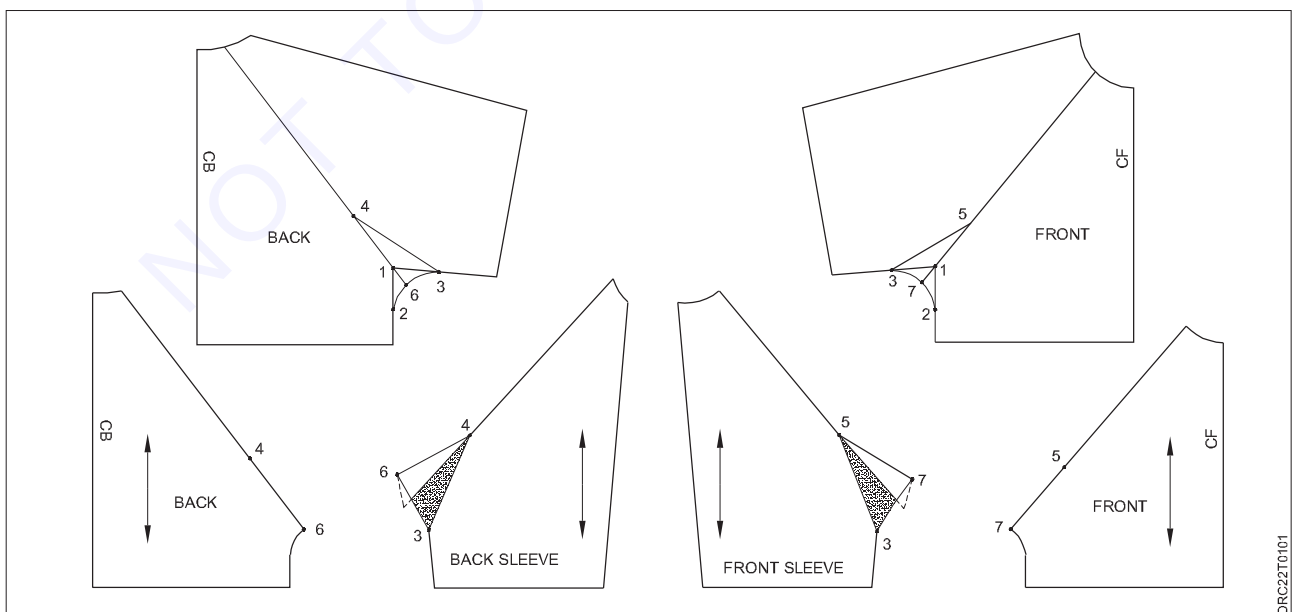
- Trace required 'flat' kimono block.
- Body sections Extend to the required length. Mark points 1 at the underarm.
- 1–2: is 6cm; 1–3: is 6cm. join 2–3 with a curve.
- Mirror the front section.
- Draw in raglan lines from the centre of the necklines to centre of the underarm curves.
- Mark points 4 and 5 ($\frac{1}{3}$ of the length of raglan seams).
- Join 4–3 and 5–3. Mark points 6 and 7.
- Draw gusset lines from front and back point 3 to points 4 and 5.
- Trace body sections.

Sleeves

- Trace sleeve sections.
- Cut up gusset lines; open approx. 4cm.
- Trace round sleeve sections with smooth curves.

Note: This simple raglan adaptation is very useful for very easy fitting designs and jersey fabrics. More shaping can be applied by drawing curved raglan seams and removing shaping from the sleeve sections.

4 DROP SHOULDER



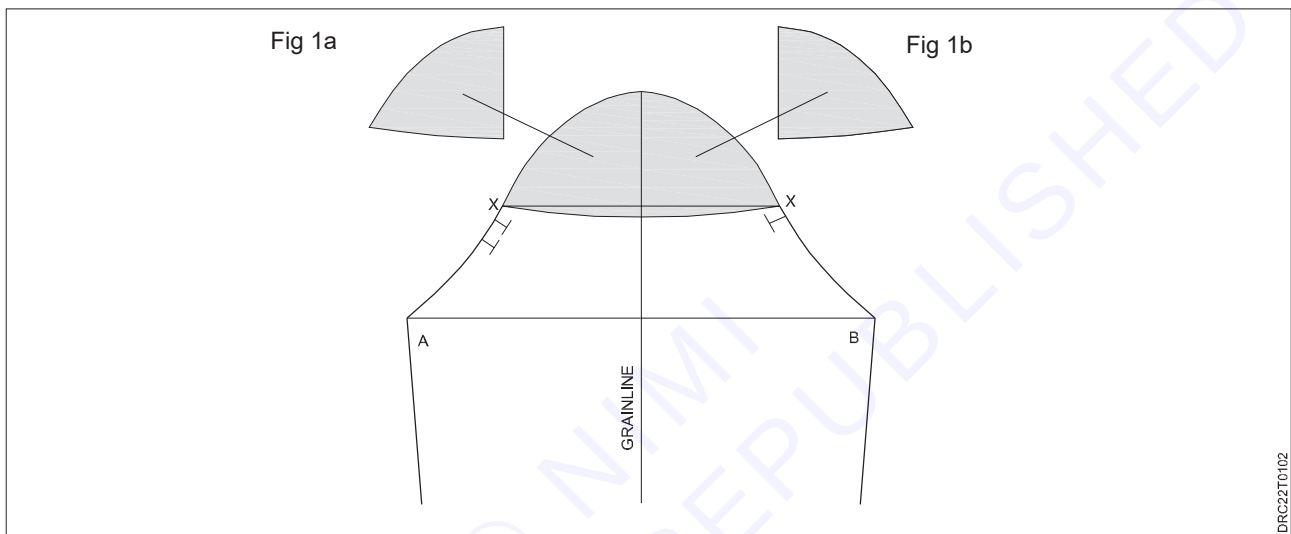
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The drop shoulder pattern is developed by attaching a portion of the upper sleeve cap to the bodice. The dropped shoulder extends beyond the shoulder tip and covers part of the upper arm at varying lengths. It may be developed without the lower sleeve (Design 1) or with the lower sleeve (Design 2).

Pattern Plot and Manipulation

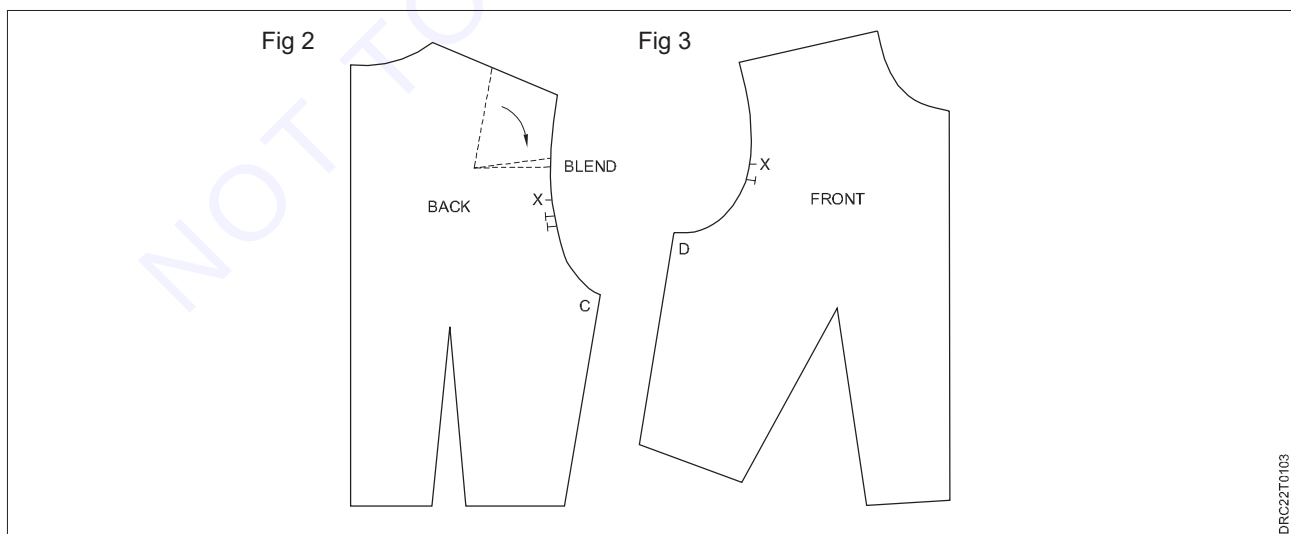
Fig 1a, b Sleeve Preparation

- Mark the center between the cap and biceps.
- Square a line across the sleeve cap from this mark.
- Mark 1/2 inch down from the center grainline, and draw a curved style line. Label X.
- Measure armhole curves A to X and B to X. Record (Fig 1a). Separate cap from lower sleeve (shaded area). Cut through grainline to separate the cap (Fig 1b).



Figs 2, 3

- Trace patterns, allowing room for the sleeve cap.
- Trace back bodice, transferring shoulder dart to armhole. Trace front bodice.
- C to X = A to X
- D to X = B to X



Figs 4, 5 Sleeve Cap to Bodice

- Place cap sections on front and back bodice, with X-points touching and curve of the cap 1/4 inch away from the shoulder tips.
- Mark 1/4 inch up from the shoulder tips and draw, blending curve over the cap and ending at mid-shoulder, as shown. When trueing, blend the curve of the shoulders.

Fig 6 (Lower Sleeve Section)

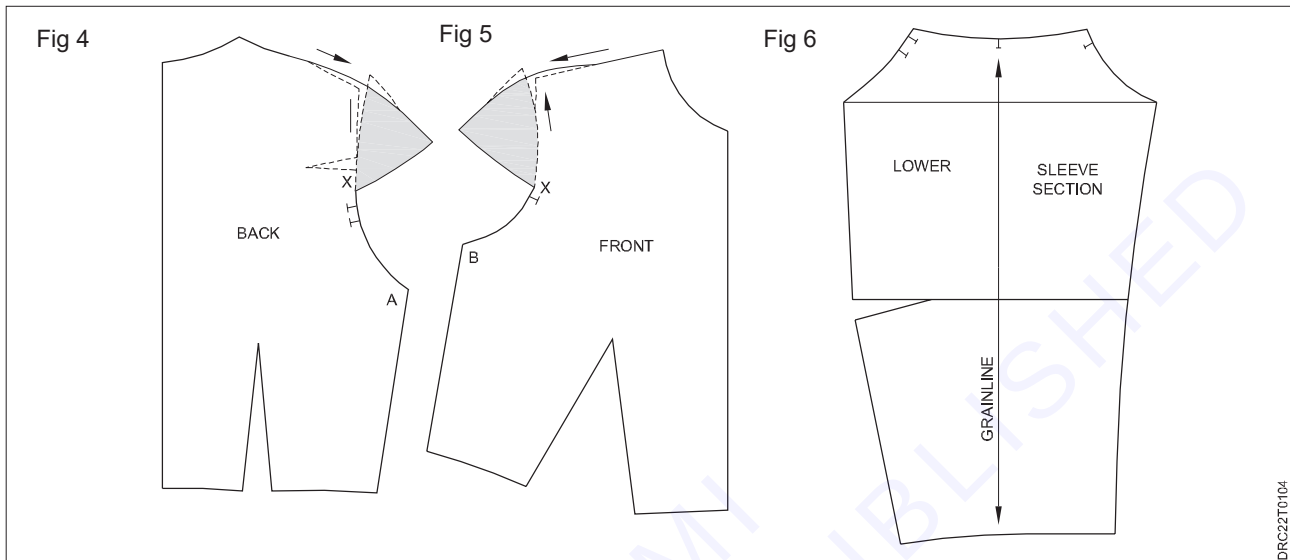
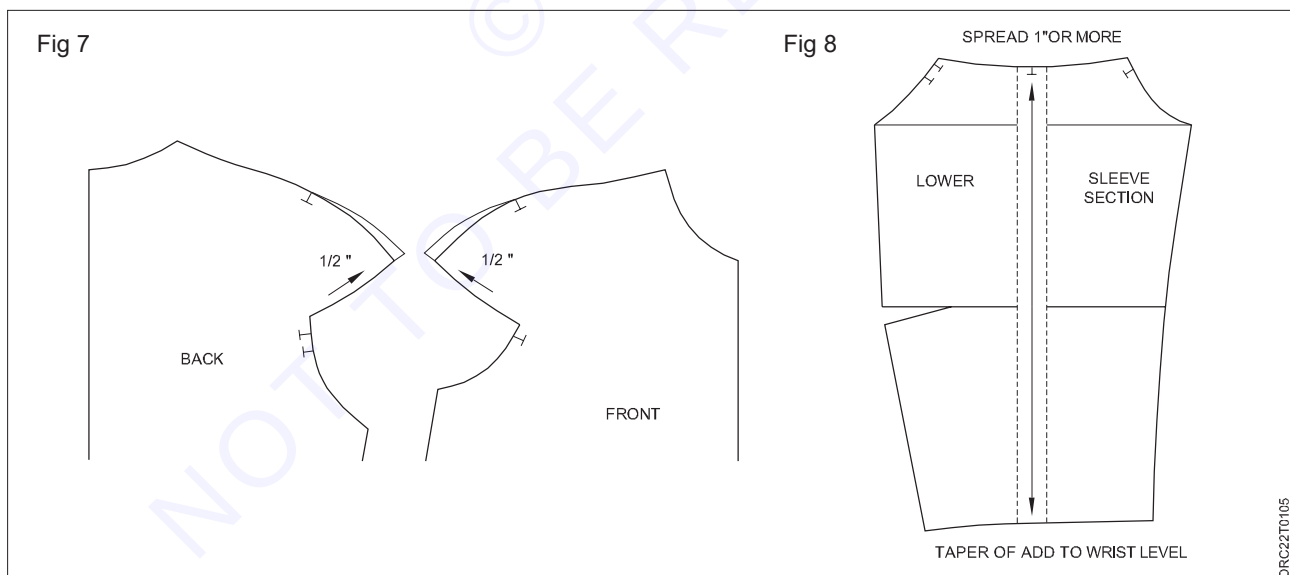


Fig 7 (Casual Drop Shoulder)

Bodice - mark 1/2 inch to the cap and draw a blending line to the shoulder tip.

Fig 8



Sleeve - split sleeve on grainline, spread 1 inch, and blend at top and bottom.

The drop shoulder line and/or hemline can be spread for gathers or pleats.

Drop Shoulder Variations



5 DOLMAN SLEEVE

Design Analysis: The dolman has lowered under seams with exaggerated folds under the arms, providing for a high arm lift. It is developed from the basic kimono. (Originally a dolman was a lowered armhole with a set-in sleeve.)

Pattern Plot and Manipulation

Figs 1, 2

- Trace front and back kimono foundation.
- Draw slash lines from the shoulder tips, ending 3 to 4 inches up from side waist.

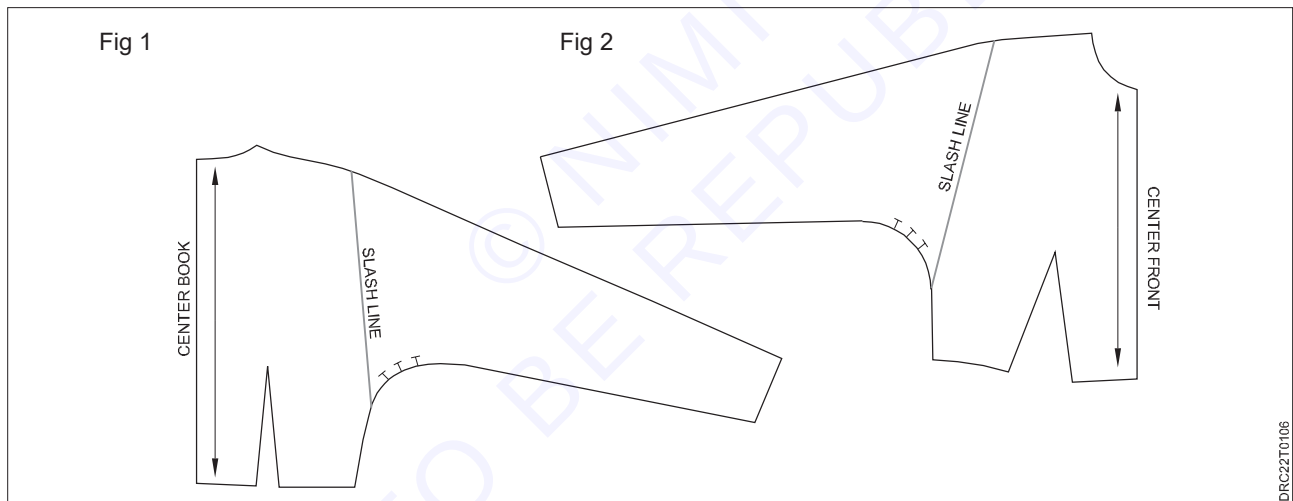
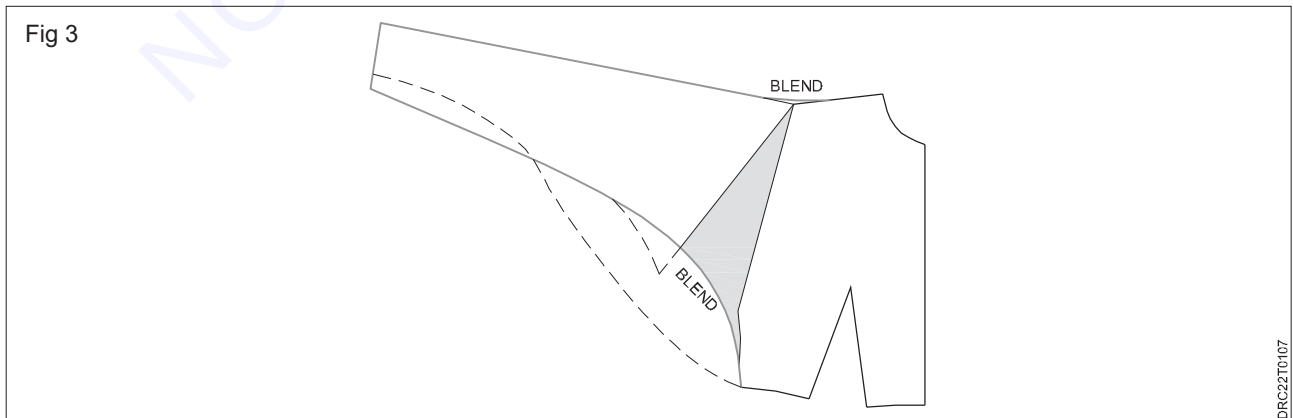


Fig 3

- Slash or pivot to spread underarm sleeve, giving as much lift as desired. Blend the under seam. Bold and uneven broken lines indicate possible dolman sleeve style lines. For practice, explore other design variations.
- Repeat for back and true under seams.



Lesson 42- 45 (4) : Sleeve Cuffs

Objectives

At the end of this lesson you shall be able to

- Know about Sleeve Cuffs and its variations
- Develop different patterns regard to sleeve cuffs.

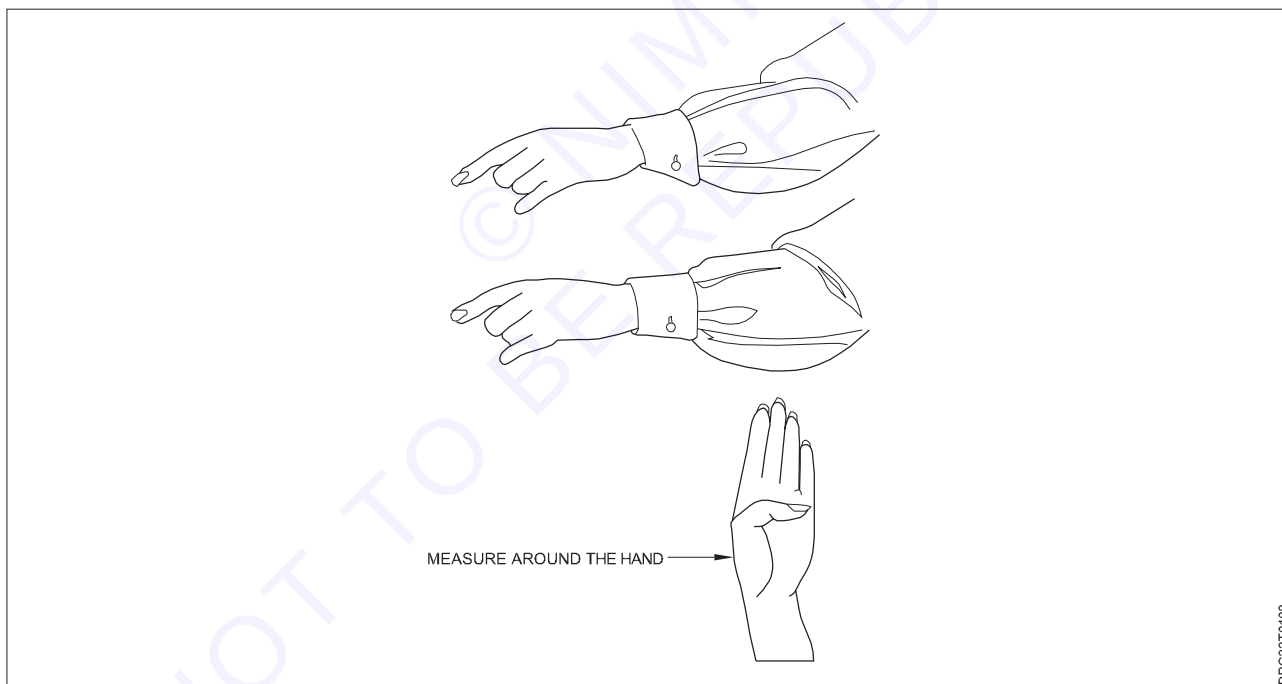
1.1 SLEEVE CUFFS:

Sleeve cuffs are developed in a variety of widths and styled in a number of ways (curved, pointed, and so on). The most common are the basic shirt cuff; the French cuff; the closed cuff; the roll-up cuff; and the wide, contoured cuff.

The grainline can be altered to accommodate lengthwise grain, bias, or cross grain as appropriate for the marker or fabric design (plaids and stripes).

Measurements Needed:

- Around hand _____, plus 1/2- to 1-inch ease.
- Cuff width as desired.
- Example: 8 1/2-inch (including ease) for a basic cuff 2 inches wide.



Style:1 BASIC SHIRT CUFF

Fig 1

- Fold paper lengthwise.
- Square a 2-inch line from fold. Draw a parallel line 8 1/2 inches long. Mark.
- Add 1 inch for extension

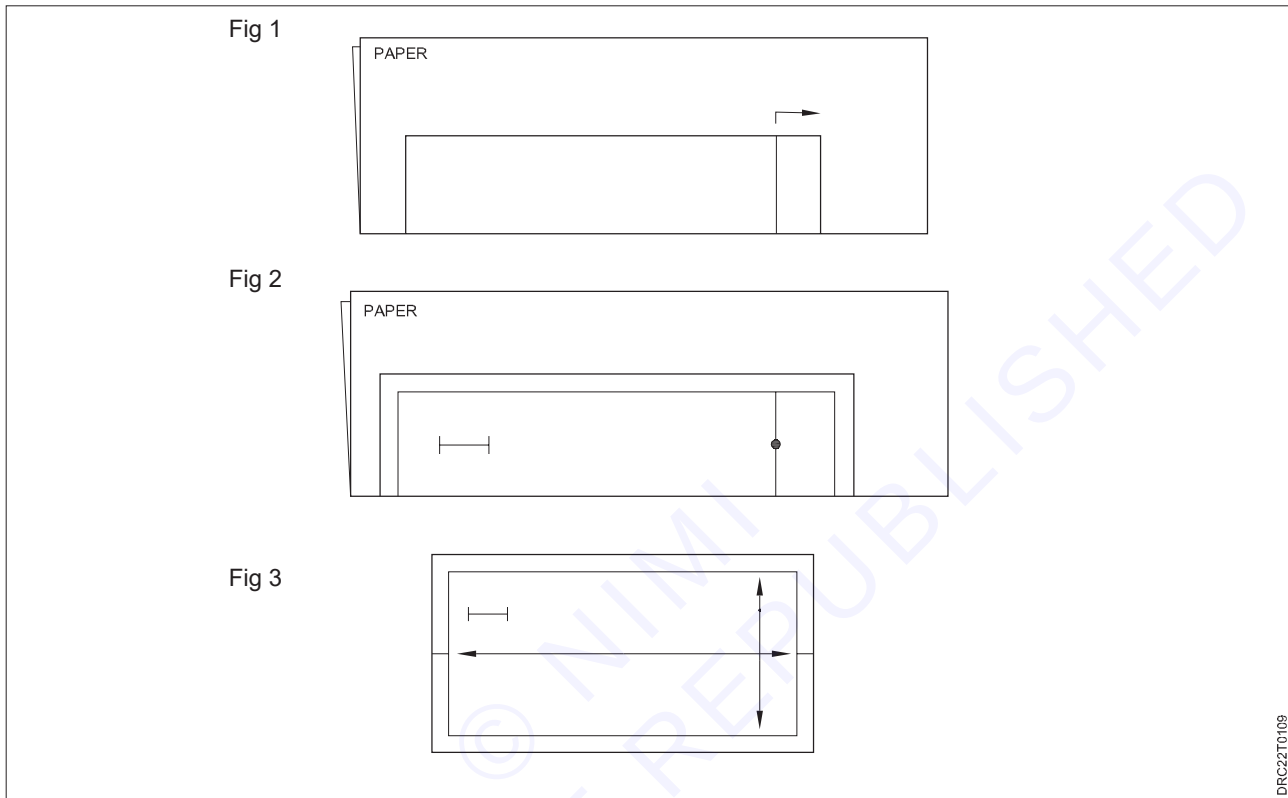
Fig 2

- Add 1/2-inch seams.
- Mark button placement in center of extension.

- Center buttonhole 3/4 inches from edge.
- Cut from the paper.

Fig 3

- Unfold cuff pattern.
- Add grainline, straight or crosswise.



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Style – 2: SELF-FACED CUFF

Fig 4

- Develop cuff using general instructions.
- Cuff can be designed with square corners or curves (broken lines).
- Cut four pieces to complete the set.

Style-3: FRENCH CUFF (Used with Cufflinks)

One-Piece Cuff

Fig 5

- Fold paper lengthwise.
- Square a 4-inch line from fold equal to twice the cuff's width.
- Draw parallel line 8 1/2 inches long. Mark for notch and add 1-inch extension to both ends of the cuff. Connect ends.
- Mark for buttonholes.
- Add seams and grainline.
- Cut from the paper.

Style-4: Two-Piece Pointed Cuff

Fig 6

- Develop cuff on open paper, using instructions for one-piece French cuff (Figure 5).
- Extend length to the upper ends of the cuff from 1/2 to 1 1/2 inches. (The amount is determined by the style of the garment.) Label X.
- Add seams to all sides of the pattern.
- Draw the grainline.
- Cut from the paper.

Fig 4

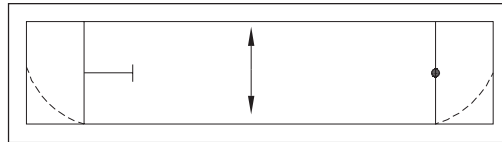


Fig 5

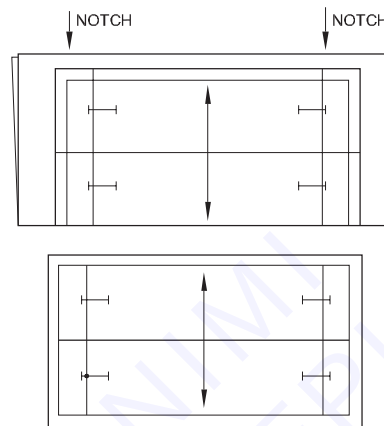
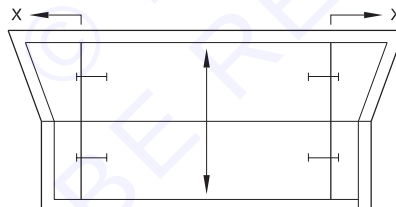


Fig 6



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Style-5: CONTOURED CUFF

Design Analysis: Contoured sleeve cuffs follow the shape of the arm and can be as wide as desired, ranging from the wrist to the elbow. The designs of the cuff and upper sleeve have the same shape—straight, rounded, pointed, or asymmetric.

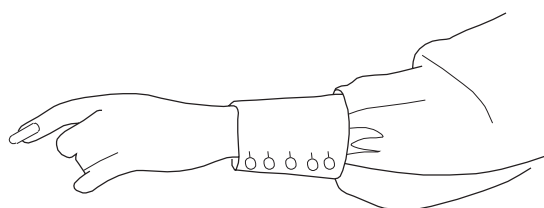
Measurement Needed

Wrist measurement, plus 3/4 inch.

Subtract this measurement from the sleeve entry measurement and record the difference.

Drafting the Cuff

The complete sleeve is illustrated.



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Fig 1

- Trace the basic sleeve.
- Draw desired cuff line (shaded area).
- Draw a guideline from the dart point to the back sleeve.
- Divide the recorded difference equally and draw lines parallel to the under seam of the pattern to the cuff line.

Fig 2

- Cut the cuff from the sleeve, trace, add 3/4-inch extensions (X) on both ends, and add seams.

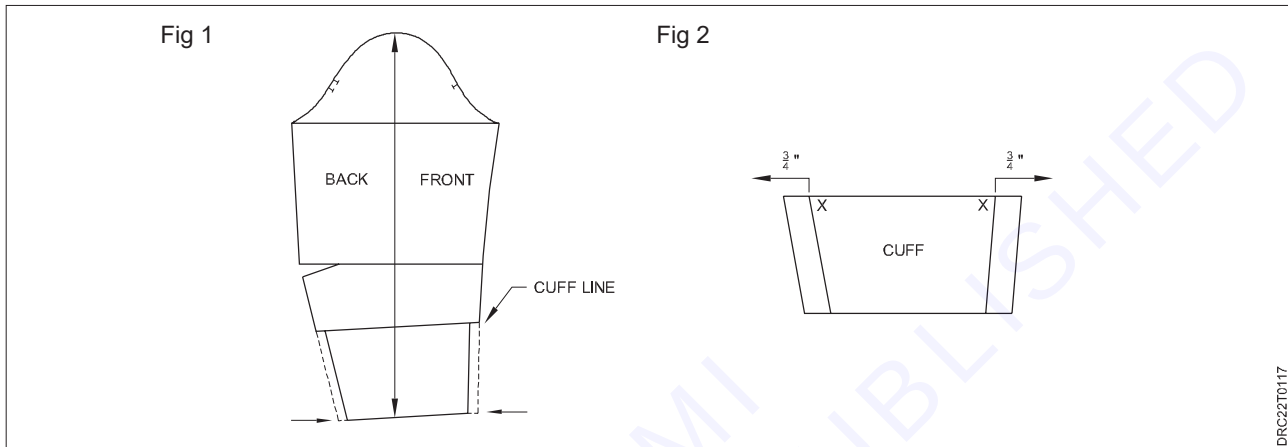
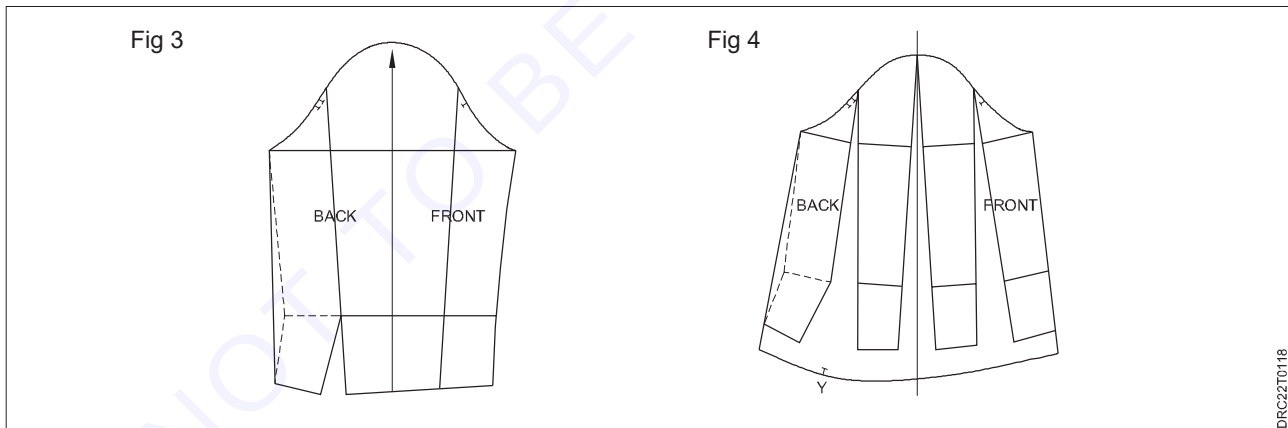


Fig 3

- Divide sleeve into quarters, close elbow dart, and draw a straight under seam line.

Fig 4

- Slash/spread to desired fullness, add length for blousing, and mark center Y, where X points of the cuff extensions overlap.



Style-6: ROLL-UP CUFF

Design Analysis: 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).

All-in-One Cuff with Sleeve

Fig 1

- Trace sleeve to finished length desired. Label A–B.
- Draw three parallel lines spaced 1 1/2 inches apart below hem (A–B line). Label Sections 1, 2, and 3.

Fig 2

- Fold so that Section 1 is up, Section 2 down, and Section 3 underneath.
- Draw the under seams with a ruler on both sides of fold as guides and cut from the paper while folded. Unfold.

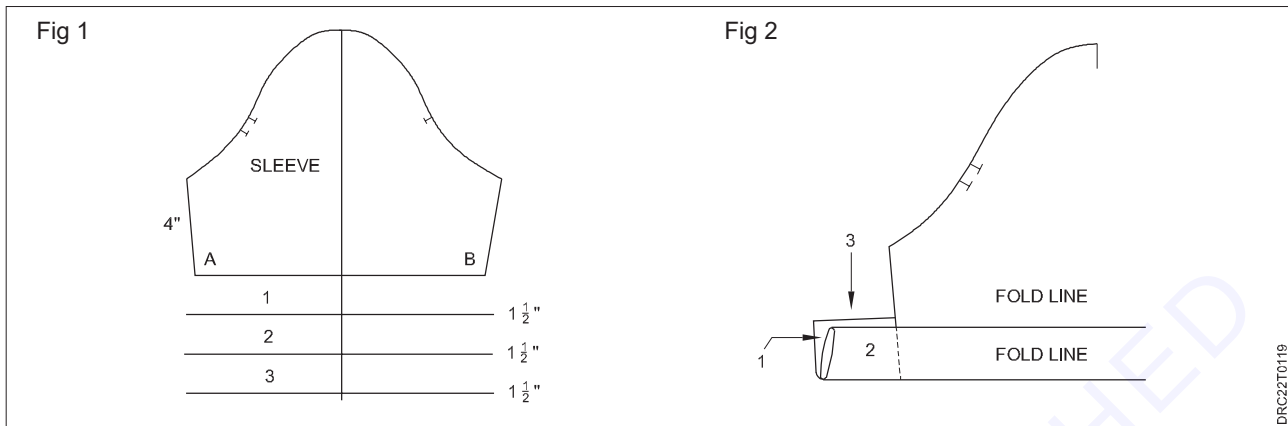


Fig 3

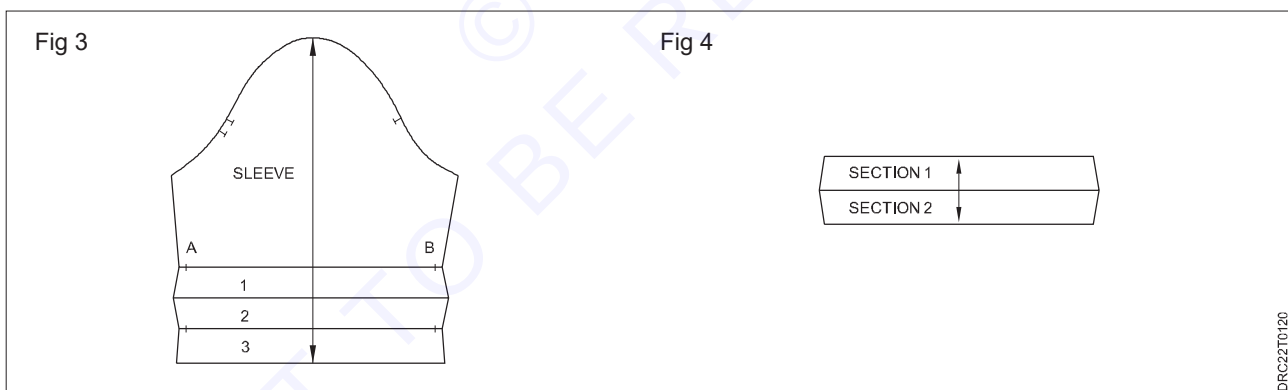
The completed pattern shape for the sleeve.

Separated Cuff

Fig 4

Follow the previous instructions for an all-in-one cuff, with the following exceptions:

- Omit third section.
- Cut along A-B line, separating cuff from sleeve.
- Add seams.



Lesson 42- 45 (5) : Skirts

Objectives

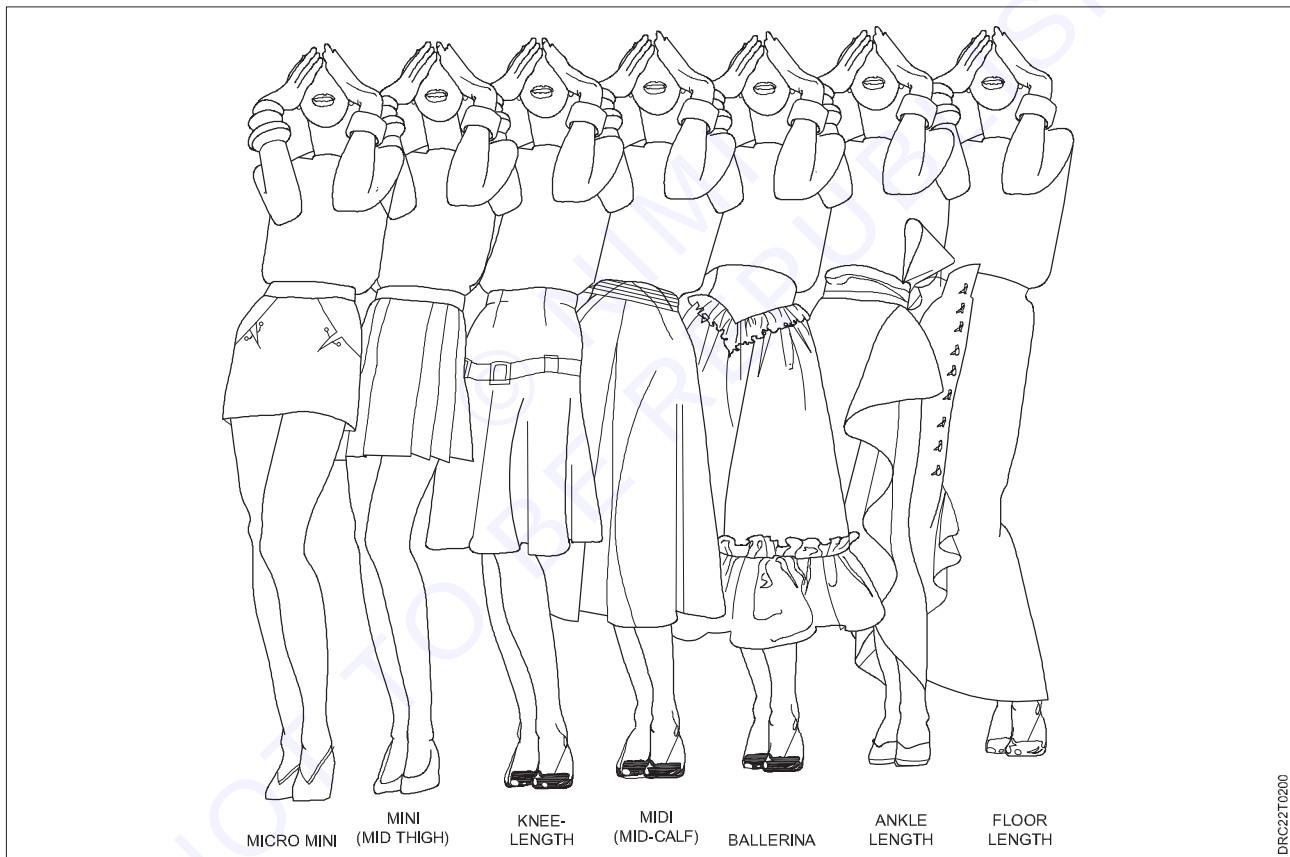
At the end of this lesson you shall be able to

- know about Skirt lengths & its foundations
- apply patternmaking principles to create Skirt design variations and construct garments
- understand different skirts such as gored, pegged, cascade wrap, tiers and godet etc.

1 INTRODUCTION

Changing the silhouette of a skirt (its outer shape) is one of the focal points for designers who wish to change the look and direction of fashion. A skirt whose basic shape hangs straight from the hipline to the hem is radically changed by increasing or decreasing the sweep of the hemline, moving the skirt away from or closer to the figure, or raising and lowering the waistline.

2 SKIRT LENGTHS



3 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.

a Straight, or Rectangular, Shape (Basic Skirt)

The skirt hangs straight from hipline to hemline.

b 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)

c 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.

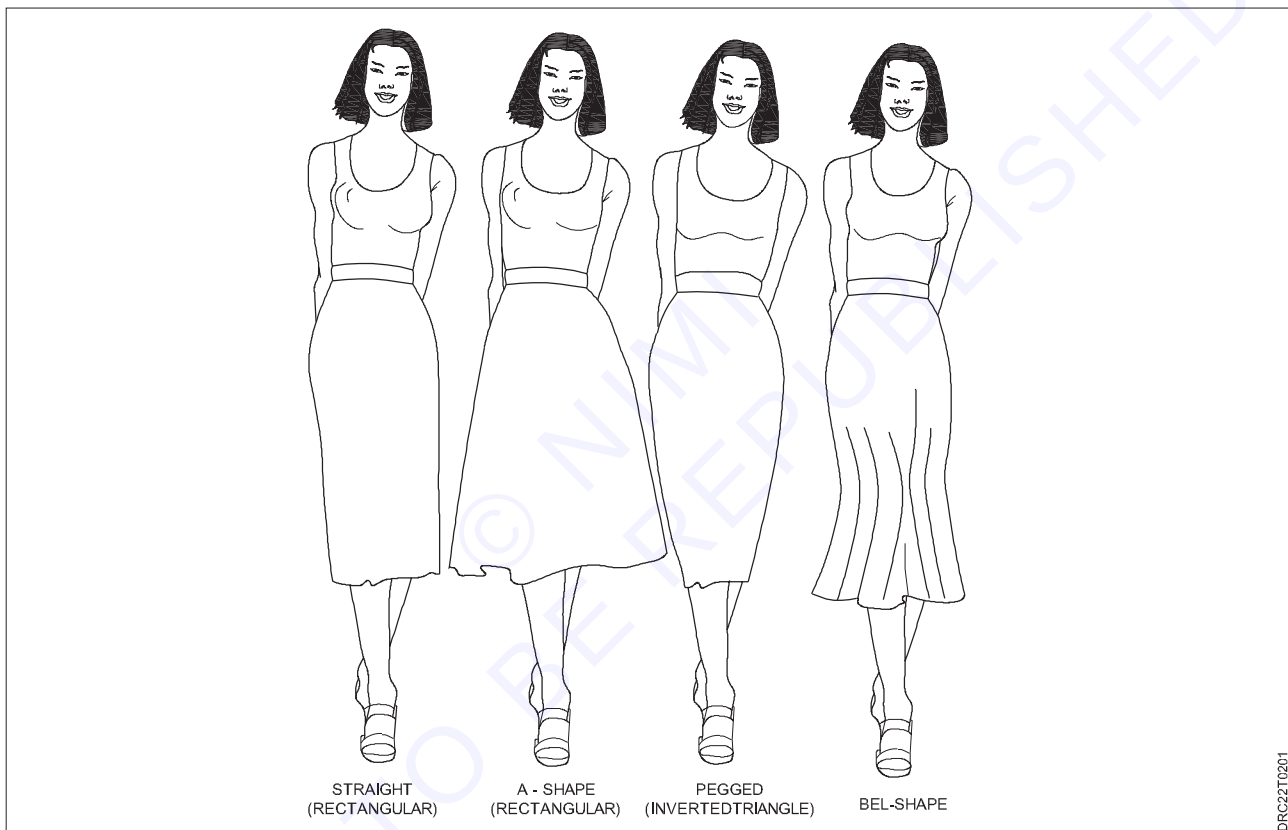
d Bell-Shape

The skirt clings to the figure's curves at, above, or below the hip and breaks into fluid movement along the hemline.

4 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.



5. SKIRT VARIATIONS

SKIRT VARIATION-1 : GORED SKIRT

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, and may break away at any point along the seamline of the gore.

4-Gore Flared Skirt

Design Analysis

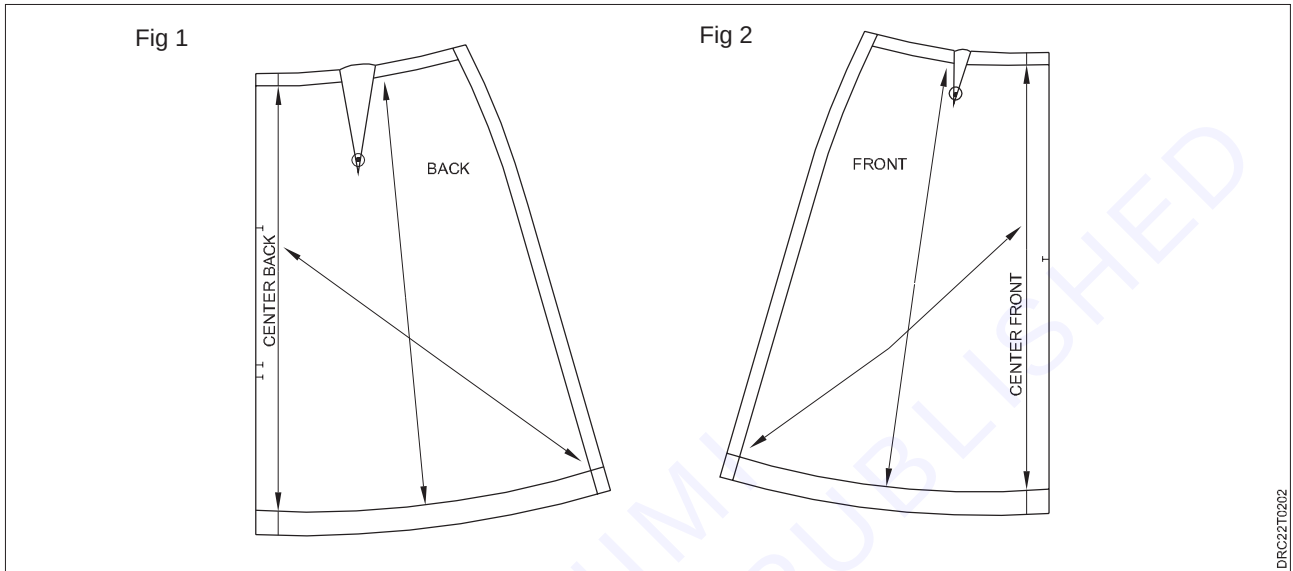
The basic 4-gore skirt is developed from the basic A-line skirt and has an attached basic waistband. (The belt is separate and not part of the waistband.)



Pattern Plot and Manipulation

Figs 1 & 2

- Trace front and back basic A-line skirt.
- Add seam allowance to center front and back of a 4-gore skirt.
- Cut patterns from the paper and draw straight, bias, and center grainlines (options for future designs).
- Complete pattern for test fit.



SKIRT VARIATION-2 : PEGGED SKIRT WITH PLEATS

Design Analysis

The side seams are tapered to create a basic peg skirt. Pleats along the waistline radiate toward side seam. The stylized waistband points at center front. The basic back skirt is tapered with a slit at back seam.

Pattern Plot and Manipulation

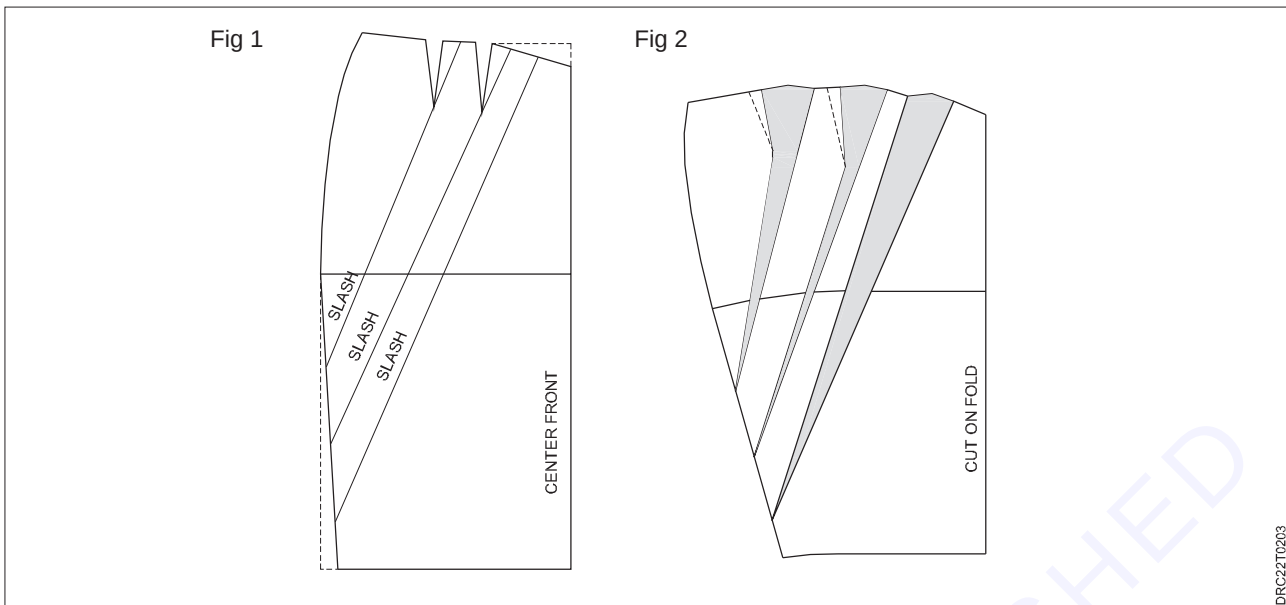
Fig 1

- Trace front skirt.
- Draw a line from 1 inch below center front to dart leg at waist.
- Mark 1 inch in at side hem and draw line to hip for pegged effect.
- Draw slash lines for pleats as shown.
- Cut pattern from paper. Trim broken line areas. Save wedge for waistband.

Fig 2

- Cut slash lines from waist to, not through, side seam and hem.
- Close waist darts (broken line).
- Spread each section 2 inches or more. Secure.
- Trace around pattern, marking pleat opening.





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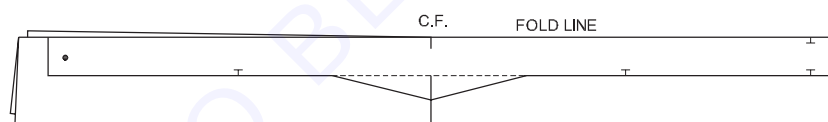
Skirt Pleats

- Fold the paper between openings (pleats).
- With tracing wheel, cross over folded pleats at waistline. Open pattern and pencil in perforated marks at waist.
- Notch for pleats.
- Trace back, taper side seam, and notch for slit (example: 7 inches up from hem; not illustrated).

Fig 3 Belt Construction

- Trace basic belt on fold of paper. (See the Basic Waistband section earlier in this chapter for belt development, if needed)
- Place wedge section to bottom of belt at center front and trace.
- Draw grainline and complete pattern for test fit.

Fig 3



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SKIRT VARIATION-3: DRAPED WRAP SKIRT WITH A CASCADE

Design Analysis:

Five drapery pleats emanate 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, if preferred. Length can be added for variation.

The drapery pleats and their placement can be varied by following the same instruction. The fold of the radiating pleats can be made to fold up or down by changing the shape of the pleat underlay.

To complete the wrap patterns, a full front and back basic pattern are needed.

Pattern Plot and Manipulation: Trace a full front basic skirt pattern.



Fig 1

- A–B: 1 1/2 inches. Mark.
- B–C: Draw a line from B, touching the first dart point and ending at the side seam. Draw a line from second dart point to the slash line.
- C–D: Mark four equally spaced slash marks. Vary locations, if desired.
- B–E: Ignore dart when marking four equally spaced slash marks.
- E–E': Combines dart intake.

Cascade

Extend a straight line from E' passing the side seam about 5 inches to allow for gathers.

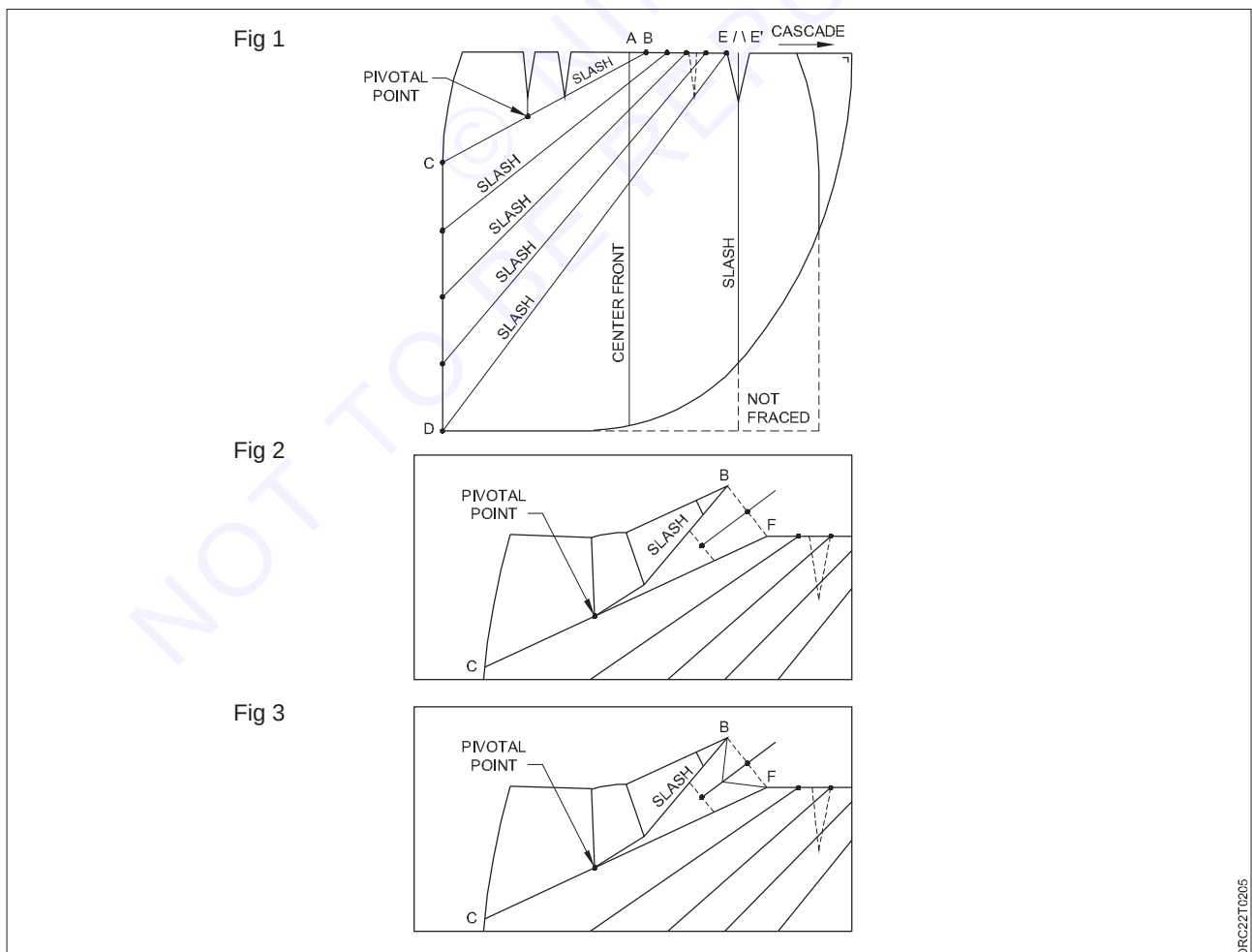
- Draw curved hemline.
- Cut from the paper, discarding broken line area.

Fig 2

- Slash from B to pivotal point of the second dart.
- Close both darts and tape.
- Draw a line through the exact center of the B–F open space.

Fig 3

- Extend a line from F (at the same angle of the waistline) until it intersects at the centered line. Label G.
- Connect a line from G to B. Both lines should be of equal length.



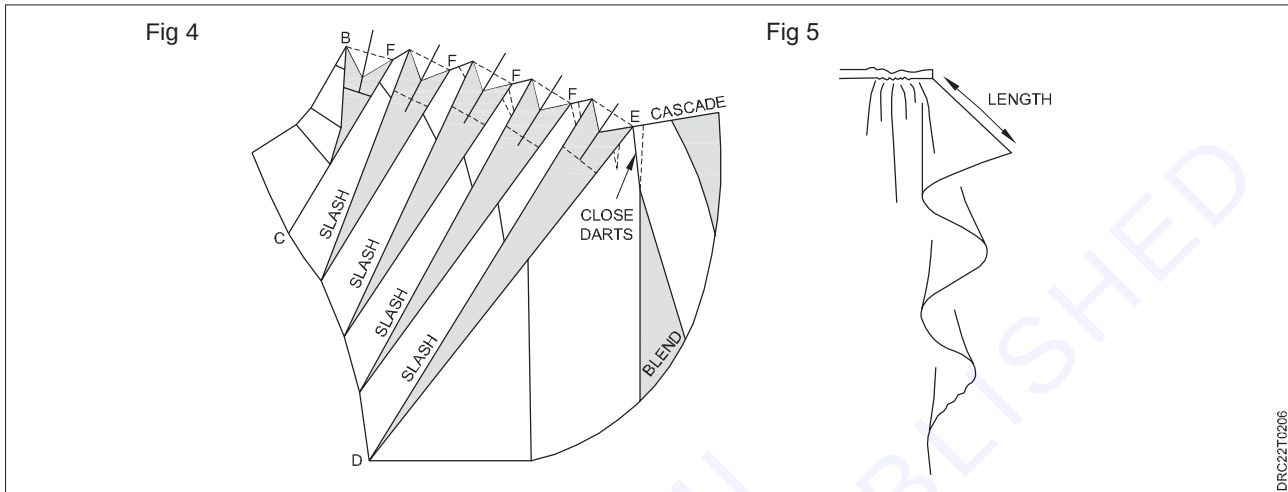
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Fig 4

- Cut all slash lines and spread equal to the B–F measurement.
- Follow Figure 3 instructions to complete each drapery pleat.

Fig 5 (Cascade)

- Slash a line from hem to dart point. Close the dart and trace. Blend a curved hemline.
- Decide length of the cascade and notch. The distance between the notch and E is for gathers.



SKIRT VARIATION-4: TIERS

Tiered designs are those featuring rows or layers of fabric attached to each other (as in Designs 1) or separated and attached to a frame underneath (Designs 2, 5, and 6). 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.

Terms

- Fabric width: The distance from selvage to selvage.
- One-half of fabric's width: The distance from selvage to center of fabric's width.
- Three-fourths of fabric's width: The distance from selvage to a point three-quarters of the way across the fabric's width.

Pattern Plot and Manipulation for Design 1

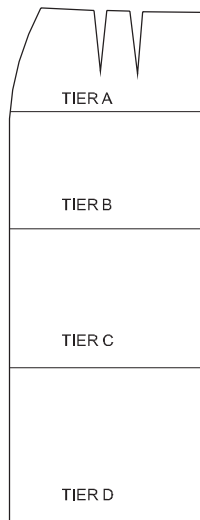
Figure 1 Tiers

Plot skirt as illustrated.

- Length: 29 inches
- Tier A: 6 1/4 inches
- Tier B: 6 3/4 inches
- Tier C: 7 1/4 inches
- Tier D: 8 3/4 inches



Fig 1

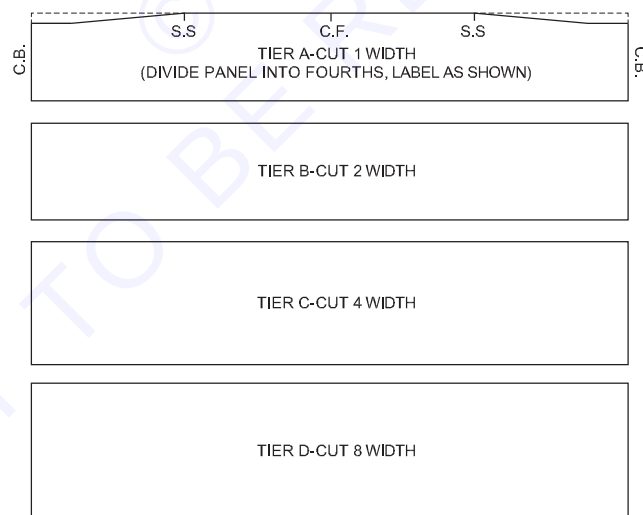


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Fig 2 Skirt Panels

- Develop patterns for each tier (A, B, C, and D), using the tier length and fabric width as a guide.
- Tier A: Cut 1 width. Adjust back skirt by measuring down $\frac{3}{8}$ inch at center back, blending to side seam.
- Tier B: Cut 2 widths.
- Tier C: Cut 4 widths.
- Tier D: Cut 8 widths.
- If more fullness is desired, add one-half width or more to each panel.

Fig 2



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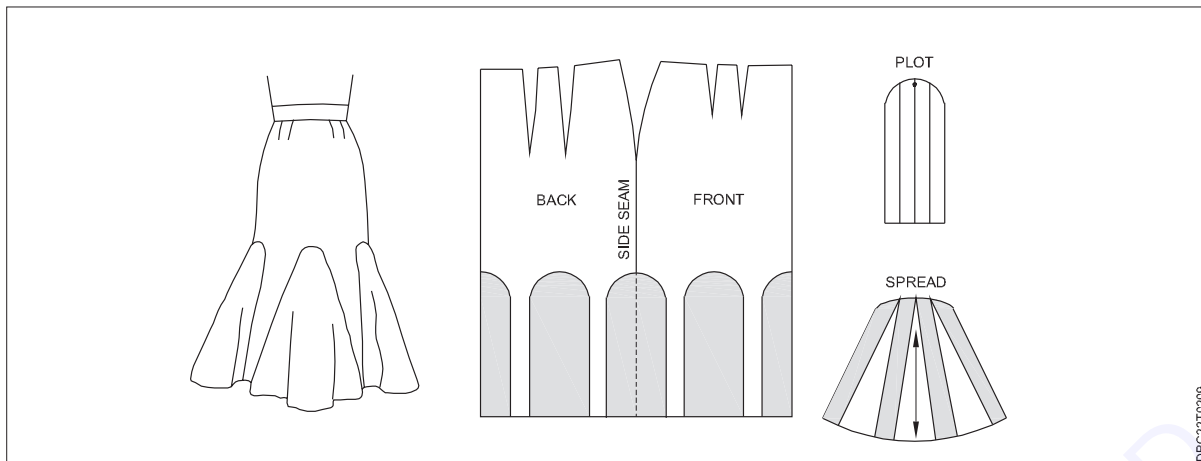
SKIRT VARIATION-5: GODETS

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 stride room 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 placed on a bodice, jacket, blouse, sleeve, and dress.

Godets may be curved, squared, or pointed as a half circle, a three-quarter circle, or a full circle.

Pattern Plot and Manipulation

- Plot pattern for cut-out design.
- Cut from paper.



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- Use cut-out section for spreading.
- Draw slash lines.
- Cut slash lines to, not through, the top of the section. Spread for flare. Retrace

SKIRT VARIATION-6: SKIRTS WITH UNEVEN HEMLINE

A number of hemline variations can be achieved by curving or pointing the outer circle and by placing the inner circle off-center.

Circular Skirt with Handkerchief Hem

Design Analysis

The design is a circular skirt with a handkerchief hemline (squared or pointed hemline). Waistline may be with or without gathers.

Pattern Plot and Manipulation

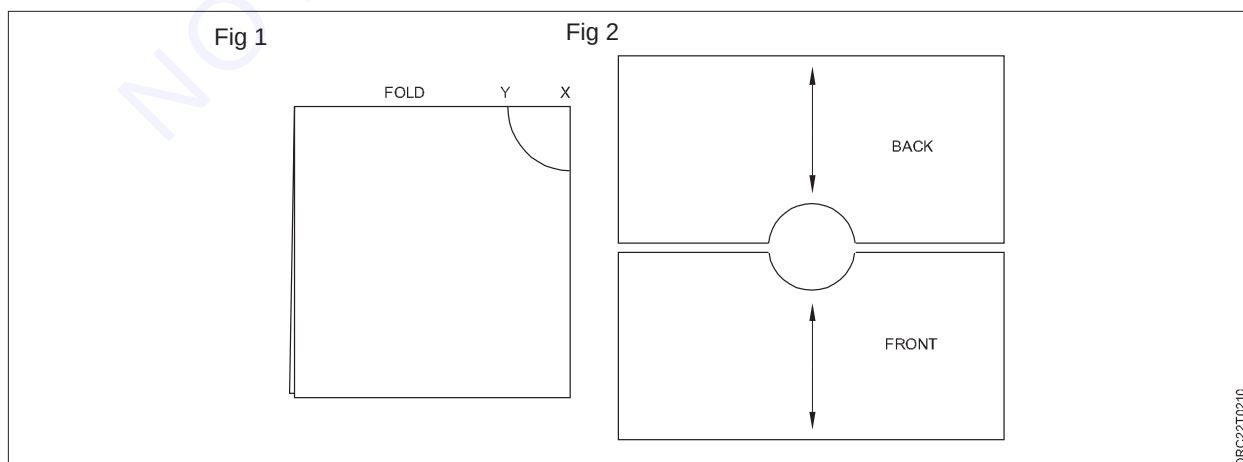
Paper Needed: Length, plus radius x 2 (2 pieces)

Fig 1

- For a gathered waist, increase the waistline measurement.
- Suggestion: 8 inches more or less. Example: 24 inches + 8 inches = 32 inches.
- Locate radius for full-circle in Column 5 of the Radius Chart.
- Fold paper in half. Label corner of fold X. X-Y = radius measurement, minus 1/2 inch for waistline seam. Mark Y on fold.
- Circle Tool—Draw a circle at the waist only.
- Repeat for back skirt.
- To adjust front and back waist, see Figure 2.
- Cut the waistline from pattern.

Fig 2

- Unfold patterns. Draw the grainline and complete for a test fit.



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Radius Chart for Circle Skirts and Cascades

Purpose of the Radius Measurement

The chart provides a quick method for finding the radius of the inner circle for the skirt or cascade.

The total measurement created by the selected radius will equal the length of the seam to which it is stitched.

How to Use the Circle/Cascade Chart

Column 1—Length Measurements

Measure the length of the seam to which the inner circle is stitched. For measurements in between, select the closest whole number.

Columns 2, 3, 4, 5—the Radius Measurements for the Circle Skirt of Choice

Using the length measurement from column 1, go across the chart to the column of the chosen skirt for the radius measurement. Subtract 1/2 or 1/4 inch for seam allowance.

The minus (–) and plus (+) symbols represent 1/16 inch added to or subtracted from the measurement.

Length of the Skirt (or Width of a Cascade), as Desired

Other Methods for Developing Circularity

- To find the radius, divide the measurement from Column 1 by the fractions given.

1/6—full-circle skirt

1/5—three-quarter circle skirt

3/4—half-circle skirt

2/3—quarter-circle skirt

- Slash and spread the basic skirt.

The use of the Radius Chart and the circle tool is illustrated in the development of the following circle skirts.

Column 1 Length	Column 2 1/4-Circle	Column 3 1/2-Circle	Column 4 3/4-Circle	Column 5 Full-Circle
1	0 5/8	0 1/4	0 1/4	0 1/8
2	1 1/4	0 5/8	0 1/2	0 3/8
3	1 7/8	0 7/8	0 5/8	0 1/2
4	2 1/2	1 1/4	0 7/8	0 5/8
5	3 1/8	1 5/8	1 1/8	0 3/4
6	3 3/4	1 7/8	1 1/4	0 7/8
7	4 1/2	2 1/4	1 1/2	1 1/8
8	5 1/8	2 1/2	1 5/8	1 1/4
9	5 3/4	2 7/8	1 7/8	1 3/8
10	6 3/8	3 1/8	2 1/8	1 5/8
11	7	3 1/2	2 3/8	1 3/4
12	7 5/8	3 3/4	2 1/2	1 7/8
13	8 1/4	4 1/8	2 3/4	2 1/8
14	8 7/8	4 1/2	2 7/8	2 1/4
15	9 1/2	4 3/4	3 1/8	2 3/8
16	10 1/8	5 1/8	3 3/8	2 1/2
17	10 3/4	5 3/4	3 5/8	2 3/4
18	11 1/2	5 3/4	3 3/4	2 7/8
19	12 1/8	6 1/8	4 1/8	3
20	12 3/4	6 3/8	4 1/4	3 1/8
21	13 3/8	6 5/8	4 1/2	3 3/8
22	14	7	4 5/8	3 1/2
23	14 5/8	7 1/4	4 7/8	3 5/8
24	15 1/4	7 5/8	5 1/8	3 3/4
25	15 7/8	7 7/8	5 1/4	3 7/8
26	16 1/2	8 1/4	5 1/2	4 1/8
27	17 1/8	8 5/8	5 3/4	4 3/8
28	17 3/4	8 7/8	5 7/8	4 1/2
29	18 1/2	9 1/4	6 1/8	4 5/8
30	19 1/8	9 1/2	6 3/8	4 3/4
31	19 3/4	9 7/8	6 5/8	4 7/8
32	20 3/8	10 7/8	6 3/4	5 1/8
33	21	10 1/2	7	5 1/4
34	21 5/8	10 3/4	7 1/4	5 3/8
35	22 1/4	11 1/8	7 1/2	5 1/2
36	22 7/8	11 1/2	7 5/8	5 3/4
37	23 1/2	11 3/4	7 7/8	5 7/8
38	24 1/8	12 1/8	8 1/8	6 1/8
39	24 7/8	12 3/8	8 1/4	6 1/4
40	25 1/2	12 3/4	8 1/2	6 3/8
41	26 1/8	13 1/8	8 5/8	6 1/2
42	26 3/4	13 3/8	8 7/8	6 5/8
43	27 3/8	13 5/8	9 1/8	6 7/8
44	28	14	9 3/8	7
45	28 5/8	14 1/4	9 1/2	7 1/8
46	29 1/4	14 5/8	9 3/4	7 3/8
47	29 7/8	14 7/8	9 7/8	7 1/2
48	30 1/2	15 1/4	10 1/8	7 5/8
49	31 1/8	15 5/8	10 3/8	7 3/4
50	31 7/8	15 7/8	10 5/8	7 7/8

Lesson 42- 45 (6) : Pants

Objectives

At the end of this lesson you shall be able to

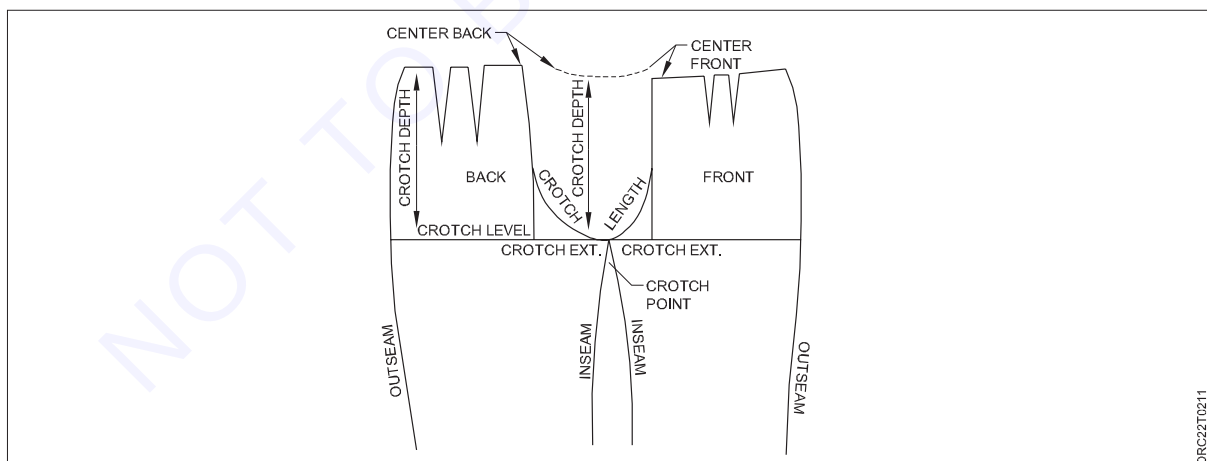
- know about PANT Terminology & its foundations.
- identify various pant derivatives
- find and solve different fitting problems in Pant.

Thank heavens Mrs. Bloomer knew! She was immortalized for creating the bloomer, the first divided (bifurcated) pant for ladies.

1 PANT TERMINOLOGY

The following terms relate to the pant draft, the human figure, and the pant garment. The illustration links terms and locations.

- **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 leg line 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.



2 ANALYSIS OF THE PANT FOUNDATIONS

The Principle

Pant foundations are determined by the length of the crotch extensions. Long extensions fit loosely around the crotch level and short extensions fit closer. See Figures 1, 2, 3, and 4. The foundation part of the pant covers the waist to crotch level, and the pant styles (silhouettes) start at crotch level and end at the hem.

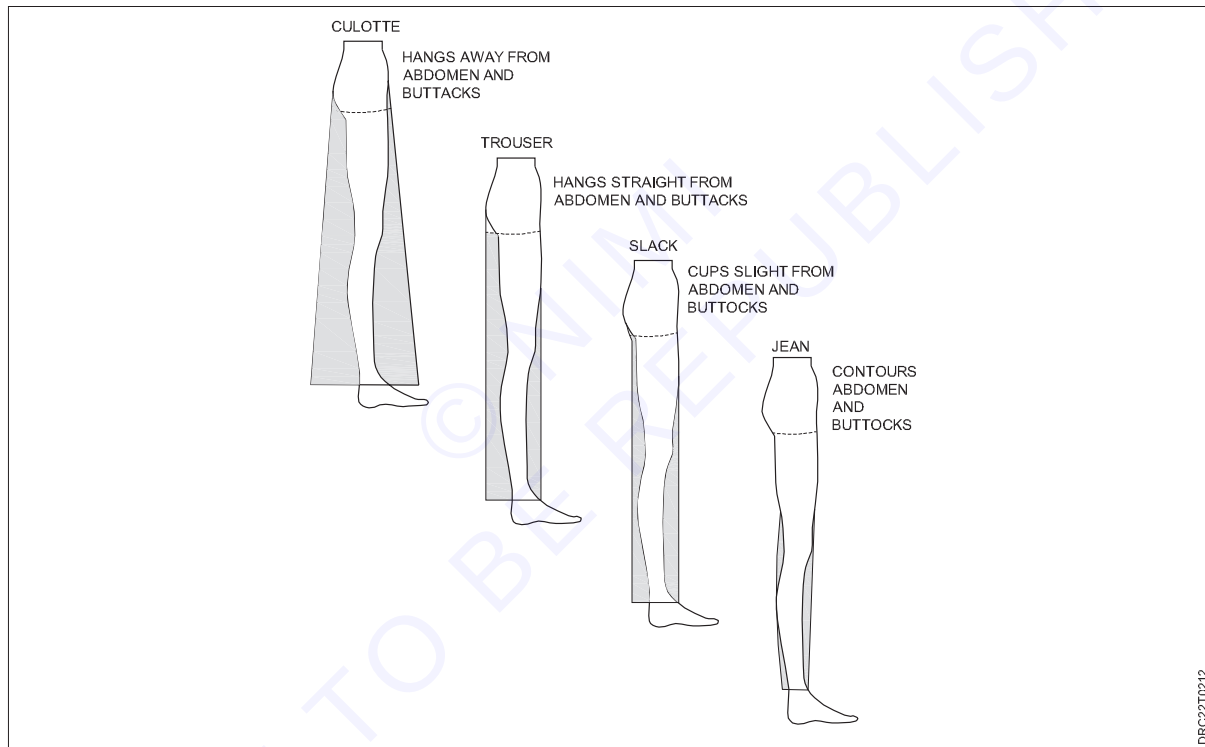
Crotch extensions provide the portion of the pant that covers the inside part of the leg. The length of the extension is determined by:

- (1) The foundation desired.
- (2) The percentage of the front and back hip measurement.
- (3) The upper thigh measurement.

Analyze and compare the following four pant foundations. Each pant foundation fits the abdomen and buttocks in a special way.

2.1. SUMMARY OF THE PANT FOUNDATIONS

A pant has two identities: its foundation (the part above crotch level) and its legline (the style below the crotch level). There are four major pant foundations, characterized by the hang of the pant from the abdomen and buttocks: The culotte hangs away, the trouser hangs straight, the slack cups, and the jean contours the abdomen and buttocks areas. The foundation of a pant is controlled by the length of the front and back crotch extensions. The extensions are based on a percentage of the front and back hip measurements, with consideration of the upper thigh measurement.



FORMULA FOR CROTCH EXTENSION

- **Culotte:**
 - Back - one-half of back hip, plus 3/4 inch
 - Front - one-half of front hip, minus 3/4 inch
- **Trouser:**
 - Back - one-half of back hip
 - Front - one-fourth of front hip
- **Slack:**
 - Back - one-half of back hip, minus 3/4 inch
 - Front - one-fourth of front hip

- **Jean:**

Back - one-fourth of back hip for contour fit, one-third of back hip, minus 1/2 inch for close fit

Front - 2 inches (subtract 1/8 inch for sizes under 10 and add 1/8 inch for each size over 14)

Crotch level: The distance from the front crotch point to the side seam and from back crotch point to side seam should measure greater than the upper thigh measurement at least by the amounts that follow:

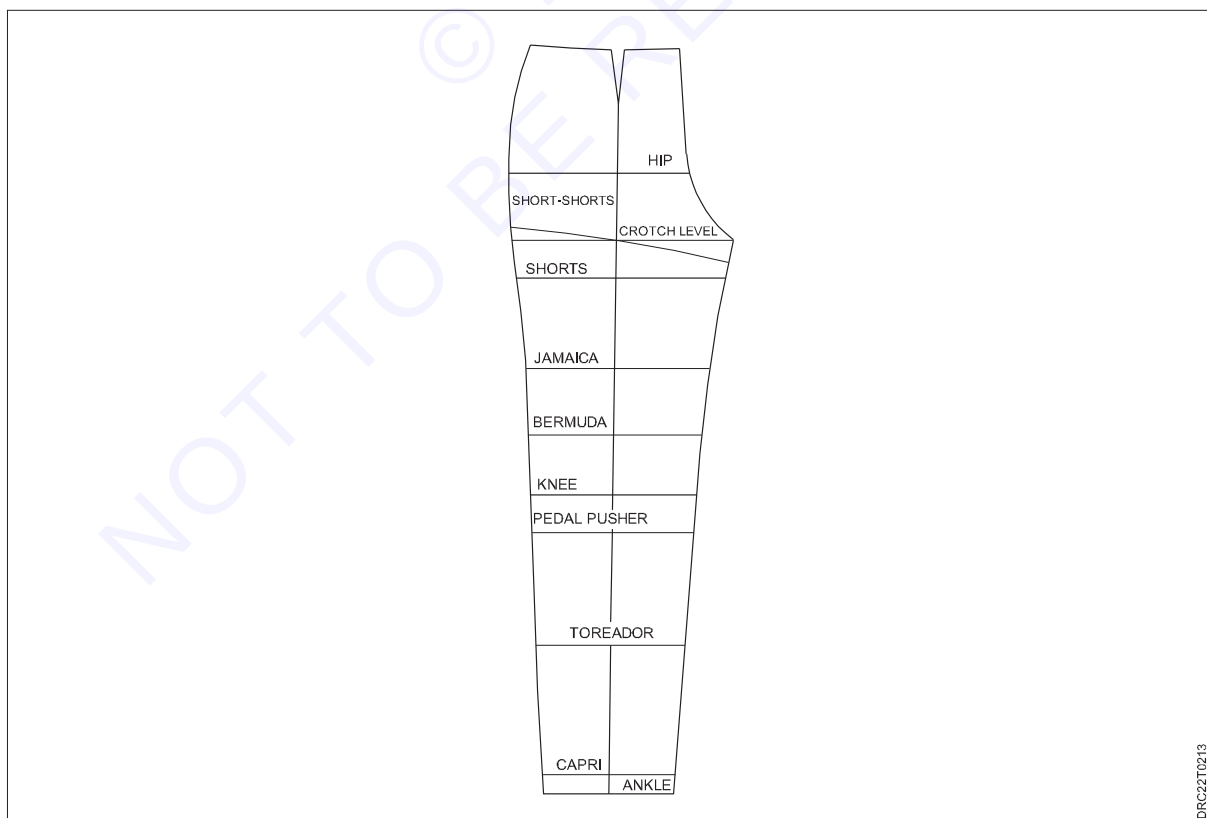
- Trouser: 3 1/2 inches more
- Slack: 2 1/4 inches more
- Jean: 1 to 1 1/2 inches for contour fit and about 2 inches for a relaxed fit

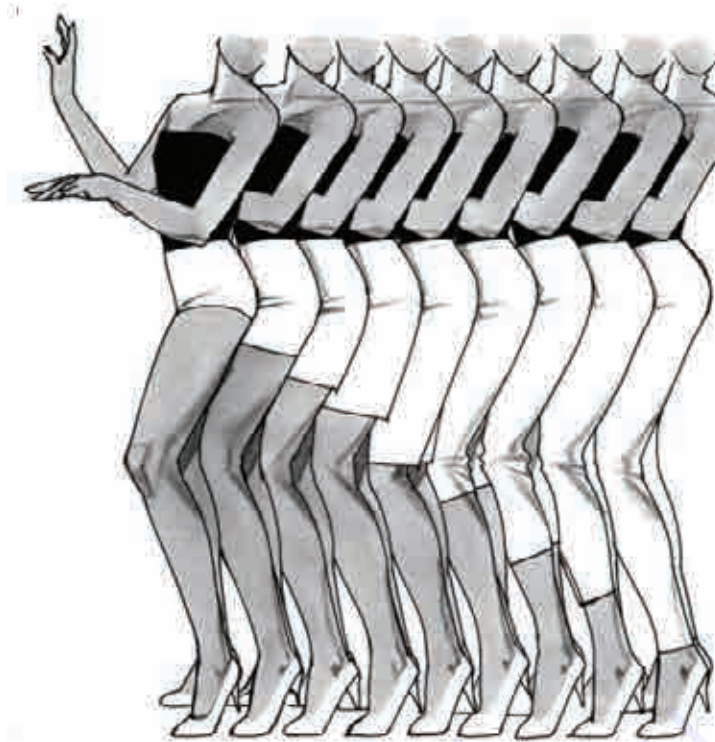
3 PANT DERIVATIVES

The name derivatives, when associated with pants, describes the various pant lengths that differ from the original source. The following pant lengths have changed little over time. The given names for traditional pant lengths still apply. Pant lengths depend largely on fashion trends, the type of activity, and the four seasons.

Names and Terms

- 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





4 PANT FIT PROBLEMS/CORRECTIONS

Pants having fit problems are not comfortable and tend to interfere with freedom of movement. Stress lines and excess folds distort the appearance of the pant. There are a number of reasons for fit problems—figure deviations, incorrect measurements, and pants cut off-grain, to name a few.

Model #1 Proper Stance

The model should

- 1 Stand relaxed
- 2 Stand with weight equally distributed
- 3 Place legs 5 inches apart
- 4 Keep head forward
- 5 Place arms at the side

After analyzing the fit of the pant, the model should walk, bend, and sit to determine the comfort and fit of the pant in motion.

Model #2 Fit Problems

What to look for:

- 6 Stress lines (two-ended fold; directs fitter to problem area)
- 7 Tightness (horizontal stress lines)
- 8 Looseness (vertical folds)
- 9 Creaseline at hem that is not in alignment with the center of the shoe.

Analyzing the Fit of the Pant

Problem 1: Pant is too tight

Solutions: Release the side seams and waist band, if necessary. Re-pin to allow fullness. Mark and measure between stitch line and pins.

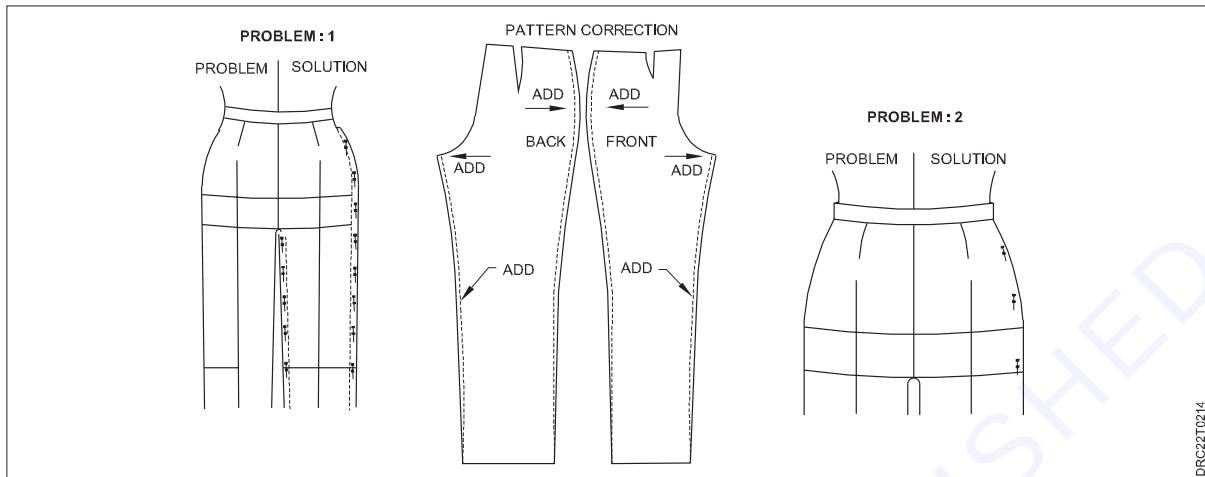
Pattern corrections: Add the measured amount to the front and back side seams. Correct the waist band, if necessary.



Problem 2: Pant is too loose

Solution: Pin excess fabric from the side seams and/or inseams. Include the waist band, if necessary. (Do not pull the crease line off-center when pinning.) Mark and measure between pins and seam.

Pattern corrections: Subtract measured amount from front and back pant.



Problem 3: Pulling at crotch point (insufficient crotch extension)

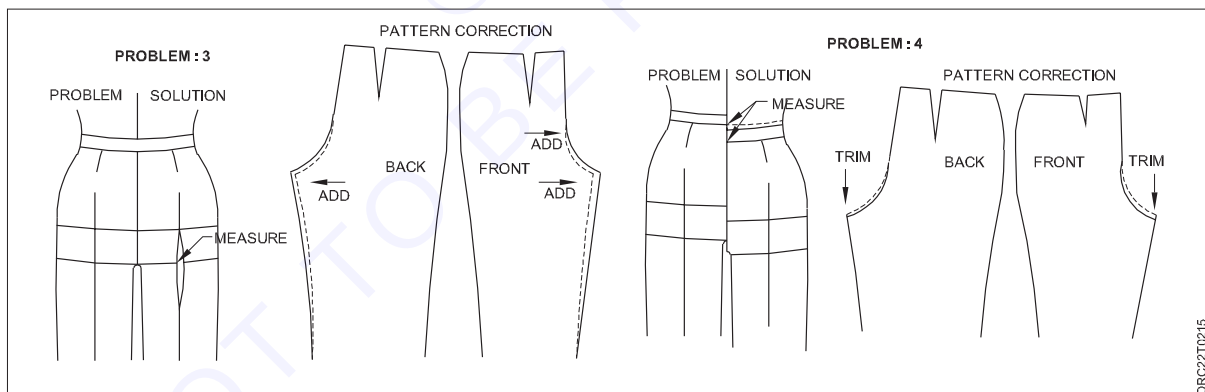
Solution: Fitting under the crotch is difficult. Slash pant along crease line at the upper thigh area. Gently tug pant leg to allow the slash to open. Measure the open space.

Pattern correction: Add half of the measured amount to each inseam. Blend to the knee.

Problem 4 : Crotch too high (stress folds directed to crotch point)

Solution: Unbutton waist band and unzip. Gently tug pant downward to a comfortable crotch level. Measure from the waist to waist band.

Pattern correction: Lower the crotch point of the front and back to the measured amount. Blend to center line.



Problem 5: Crotch too low

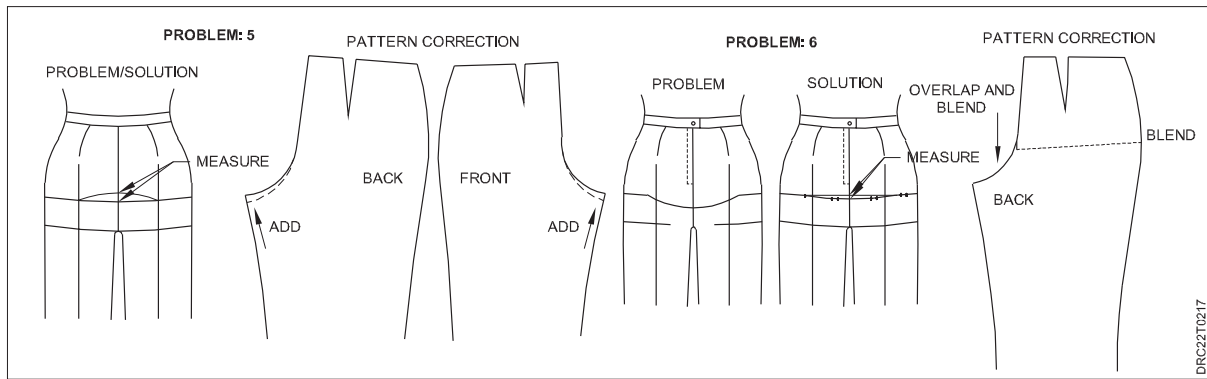
Solution: Pin a fold at the center front to lift the pant to a comfortable level. Measure the pin fold.

Pattern correction: Raise the crotch point to the measured amount.

Problem 6: Back crotch droops (caused by flat buttocks)

Solution: Pin unneeded excess across the back. Measure this amount.

Pattern corrections: Slash to, but not through, the center back. Overlap the measured amount. Blend with the center back.



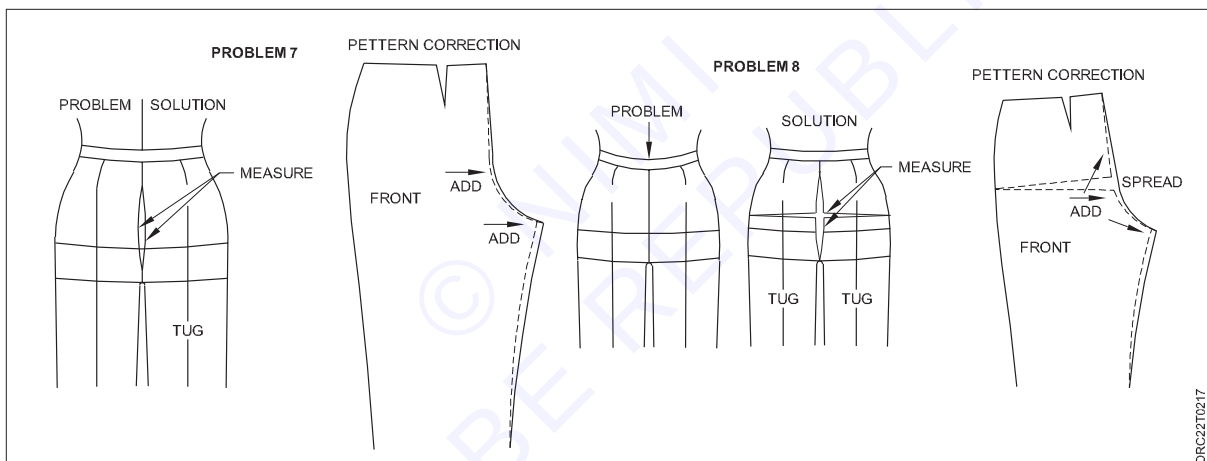
Problem 7 : Stress at center front (insufficient room at the pubic area)

Solution: Release the center line and gently tug at the pant leg to allow the needed room at the center line. Measure the space.

Pattern correction: Add to the center line half the measured amount. Add an equal amount to the crotch point.

Problem 8: Stress from the abdomen (waist band pulled downward)

Solution: Release the center line and slash to side seams. Tug and measure the width and length of the open space at the intersection.



Pattern corrections: Slash to, but not through, the side seam and spread the measured amount. Add to the center line and crotch point half the measured amount. Draw the adjusted center line, blending with crotch curve.

Problem 9: Vertical fold at center front and or back

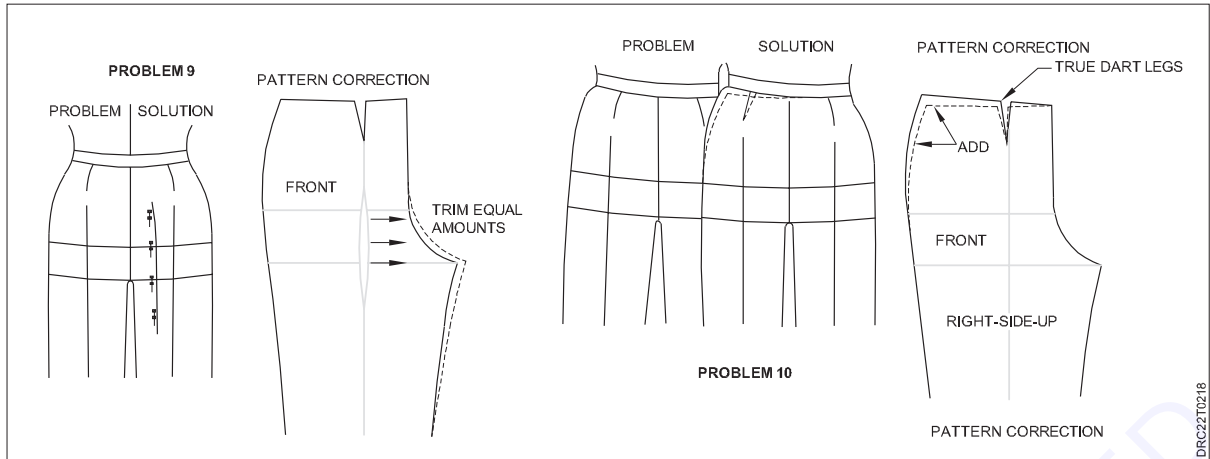
Solution: Pin at the fullest part of the excess and allow to vanish at each end. (Do not pull the crease line off-center when pinning excess.) Pencil mark the pins before removal and measure widest part of the opening.

Pattern corrections: Use the marked pinned section to draw the shape on the pattern. Mark equal amounts at the center line. Draw a blending line to the crotch curve. Trim the excess. Adjust the grainline and leg line

Problem 10 : Hemline out of alignment (indicates a high/low waistline or dominant bulge). The crease line does not align with the center of the foot or shoe.

Solution: Release the side seam to the hip level of the front and back pant. Release the darts. Gently tug the pant leg until the crease line is in the center of the shoe. Re-pin the side seams and darts, allowing the necessary ease for a good fit.

Pattern correction: Add needed amount to the front pant, as shown. Repeat on the back pant.



Lesson 42- 45 (7) : Culottes

Objectives

At the end of this lesson you shall be able to

- know about the Culotte foundations
- take all the measurements required for a Pant draft
- develop culotte drafting from any skirt design pattern.

1 CULOTTES:

When it first became fashionable for women to ride bicycles, it was unfashionable (even improper) for them to wear pants. A garment was needed that was both functional and ladylike. This led to the development of the culotte (then known as the divided skirt), which provided the wearer with maximum mobility. The skirt like pant was acceptable for the mores of that period. So successful and practical was the culotte that it became a fashion item as a style for both casual and dressy garments. It continues to be an important fashion item.



2 MEASURING FOR THE PANT DRAFT

To draft a pant for a personal fit, use the instructions that follow. If the waist, hip, abdominal, and hip depth measurements have already been taken and recorded on the measurement chart, use them. Otherwise, take the circumference measurement of the waist and hip. Divide each measurement by 4 and modify as follows:

Example:

Waist $26 / 4 = 6 \frac{1}{2}$ inch

Add $\frac{1}{4}$ inch = $6\frac{3}{4}$ inch front waist

Subtract $\frac{1}{4}$ inch = $6\frac{1}{4}$ inch back waist

Hip 38 inch / 4 = $9\frac{1}{2}$ inch

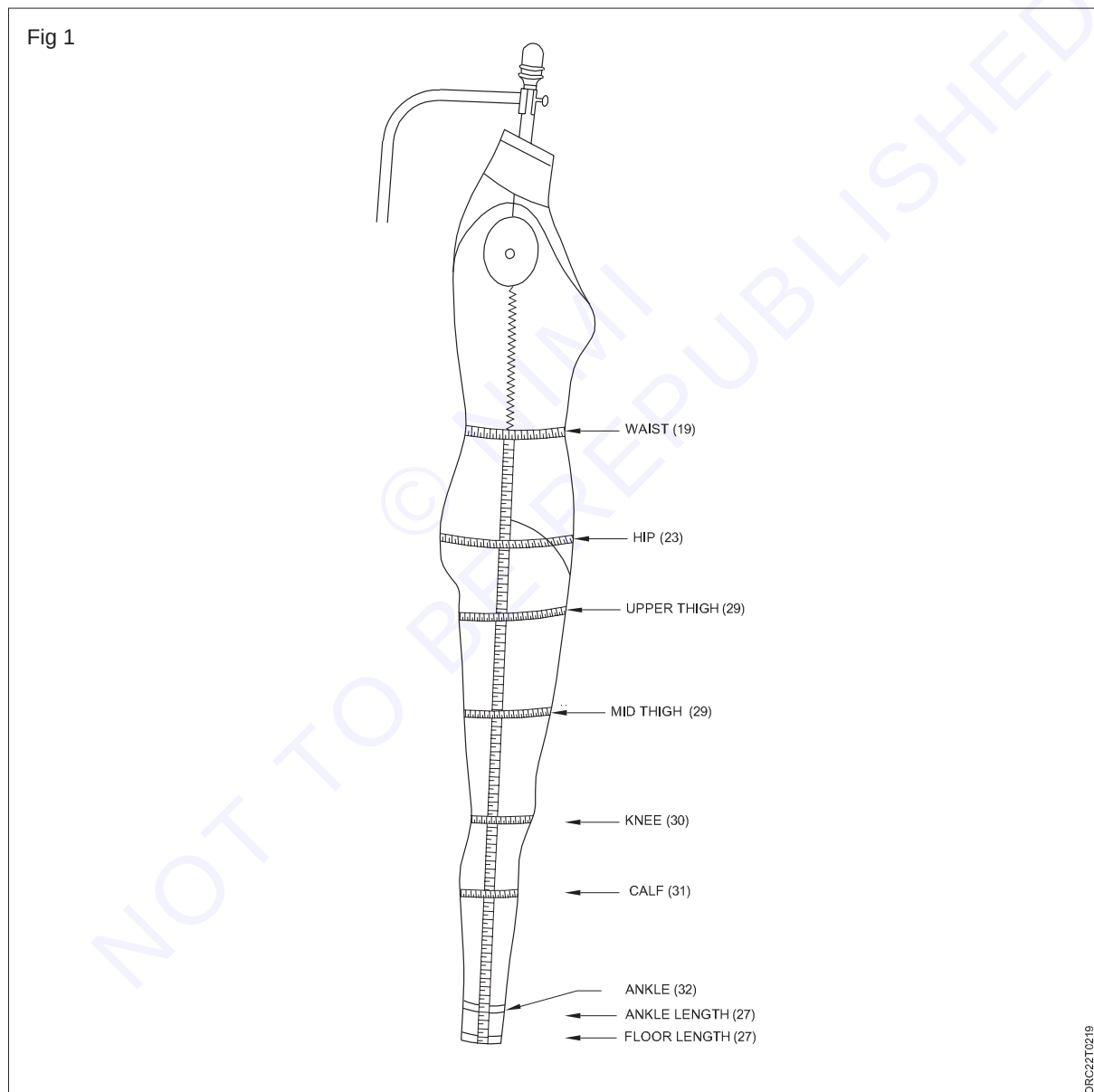
Subtract $\frac{1}{4}$ inch = $9\frac{1}{4}$ inch front hip

Add $\frac{1}{4}$ inch = $9\frac{3}{4}$ inch back hip

- To determine dart intake, subtract waist from hip circumference measurement.
- Record all measurements.

Vertical Length Measurements (Personal or Form)

Fig 1



With the metal-tipped end of the tape placed below waist tape at side, measure the following length locations:

- To ankle length (27)
- To floor (27)
- To mid-knee (27)

Circumference Measurements

Waist arc (19) : Center front to side seam.

: Center back to side seam.

Hip arc (23) : Pin mark 9 inch below waist at center front or widest part of the hip. Measure at this level.
(Center front to side seam / Center back to side seam)

Upper thigh (29): Near crotch base.

Mid-thigh (29) : Between crotch and knee.

Knee (30) : Mid-knee level.

Calf (31) : Widest part below knee.

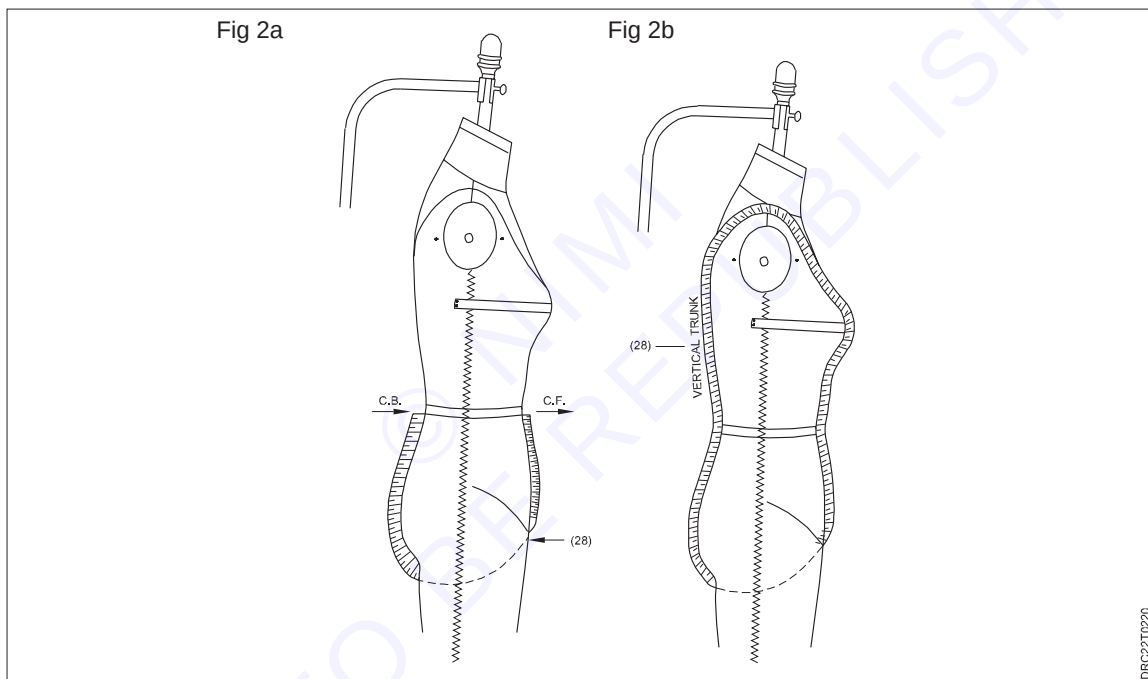
Ankle (32)

Figs 2a, b

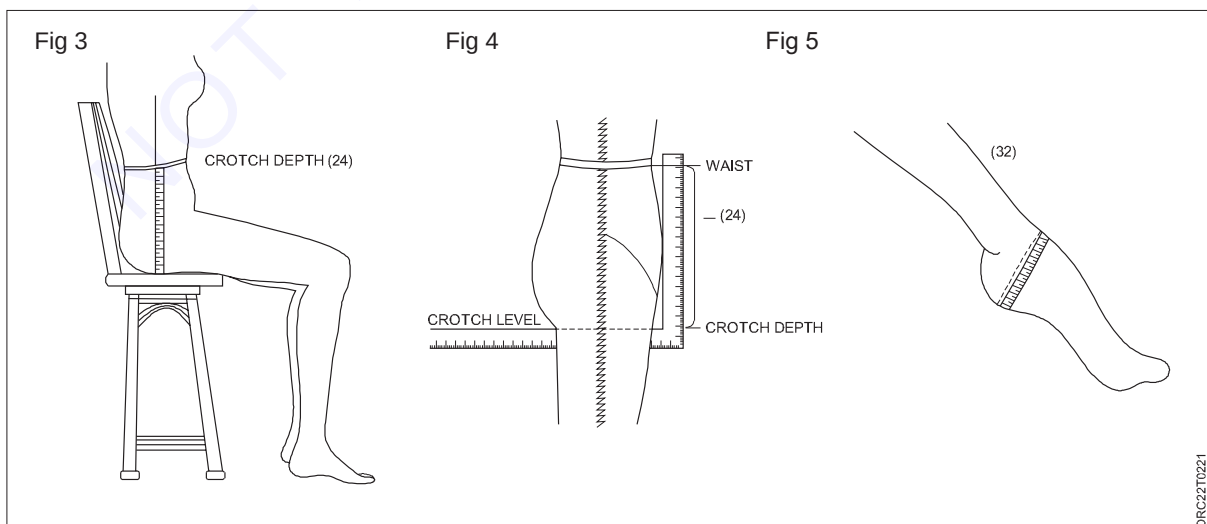
Crotch length (28): Center front under crotch to center back.

Figure 2b

Vertical trunk (28) : Front to back at shoulder/neck passing under the crotch.



Figs 3, 4 Crotch Depth (24)



Form : With square ruler in place, measure from waist level to crotch level (not to the end of the ruler).

Personal : Place belt, elastic, or tie around the waist.

Measure below the belt to base of the chair.

Fig 5

Foot Entry (32) Measure around heel and instep of the foot.

2 CULOTTE FOUNDATION:

The culotte foundation is developed from a basic A-line skirt; however, any skirt design can be adapted into a skirt like pant by following the instructions given:

Measurements Needed

- Crotch depth _____ plus 3/4 inch (varies to 1 1/4 inches)

Culotte Draft

One-half of the front and back culotte are drafted.

- Patterns needed: Front and back A-line skirt and waist band.

Fig 1 Front

To allow for crotch extensions, place patterns atleast 8 inches from paper's edge. Trace front and back skirt. Include all markings.

A-B = crotch depth plus 3/4 (or more) inch (24).

A-X = one-half of A-B less 1/2 inch. Mark.

B-C = one-half of basic front hip, less 3/4 inch, squared from B.

D-E = B-C, squared from D. Connect C with E.

B-b = 1 1/2-inch diagonal line.

Draw the crotch with a curve, touching C and b and ending at or near X-point. Modify the curve if you are unable to touch b.

Fig 2 Back

F-G = D-B (of front pattern).

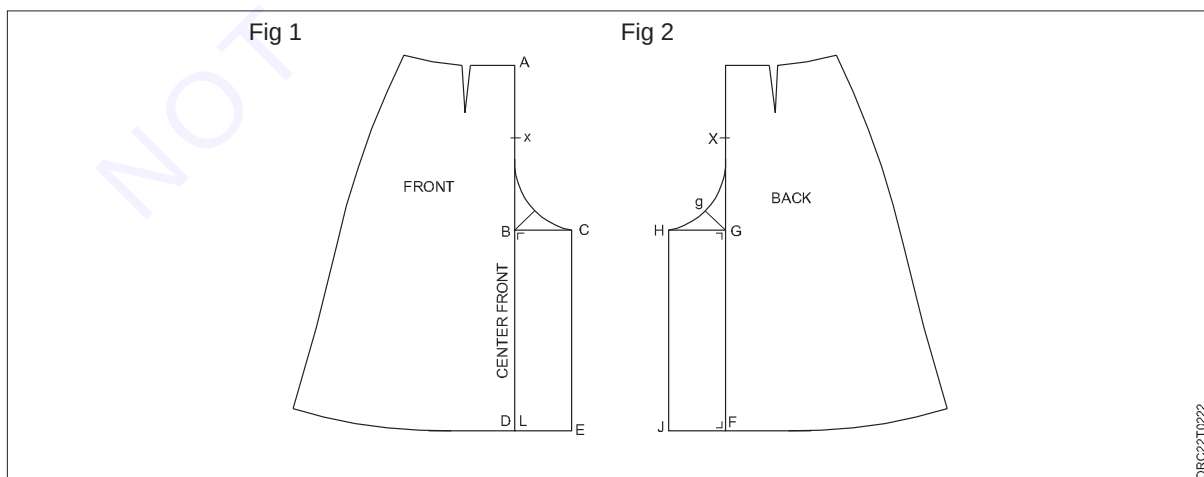
G-H = one-half of back basic hip plus 3/4 inch, squared from G.

F-J = G-H, squared from F. Connect J with H.

G-X = B-X (of front pattern). Mark.

G-g = 1 3/4-inch diagonal line. Draw the crotch curve beginning near H to g and ending at or near the X-point.

- Cut for a test fit.



Lesson 42- 45 (8) : Designing in Collars

Objectives

At the end of this lesson you shall be able to

- explain about Designing in 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.

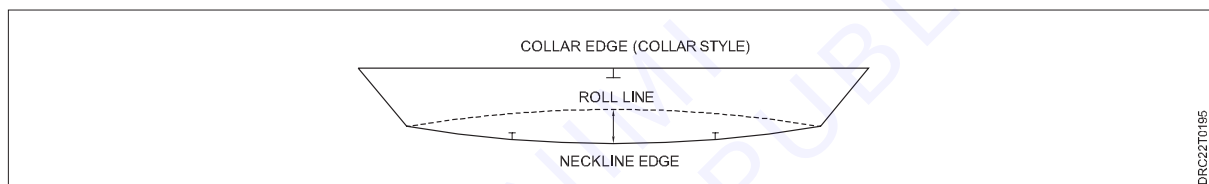
Collar Terms

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.

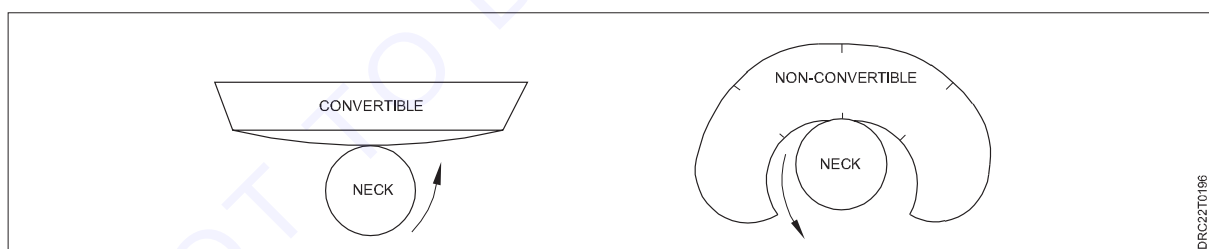


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Collar Classifications

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).

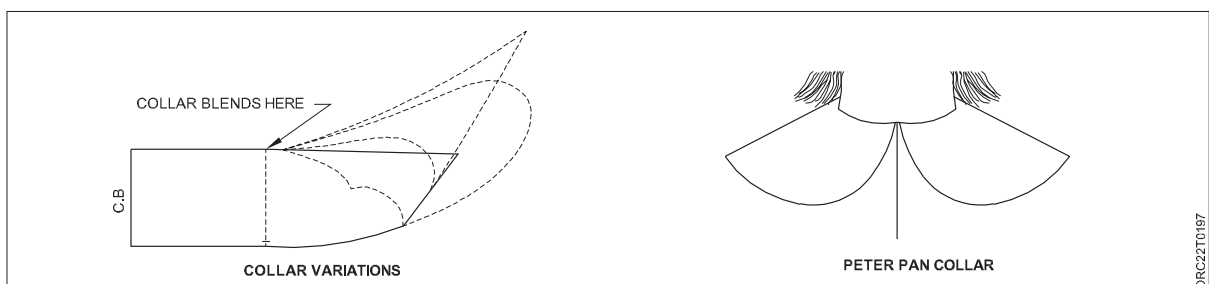


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Collar Variations

Peter Pan collar

A Peter Pan collar is a style of clothing collar, flat in design with rounded corners.



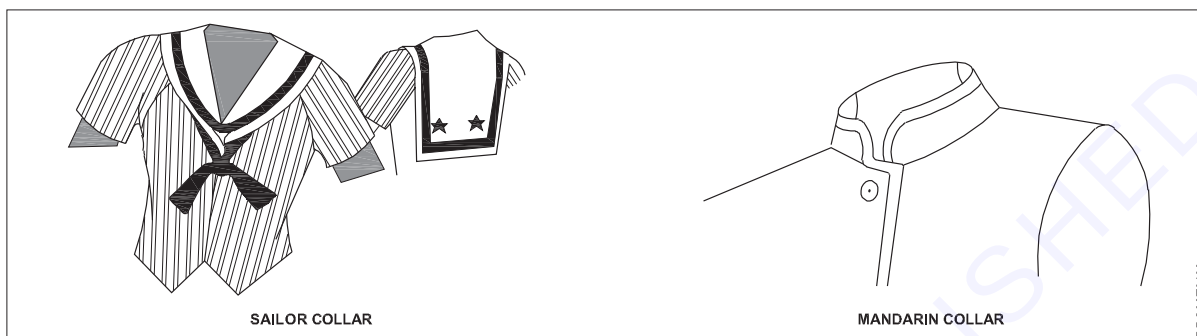
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Sailor Collar

The sailor collar was inspired by the sailor's uniform and is based on instructions of the nonconvertible 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.



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).

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.



◆ MODULE 11 : Clothing Construction Techniques ◆

Lesson 46-50 (1) : Introduction Of Marker

Objectives

At the end of this lesson you shall be able to

- understand the Marker and its types used for mass production
- know about different marker making methods as per the fabric types
- gain knowledge regarding good marker & marker efficiency
- understand the essential precautions while making marker.

1 Marker

The drawn or marked pattern layout in a paper or fabric is known as marker. The marker is mainly used to save the time and carryout the cutting process quickly to increase the production.

2 Different procedures of marker making

There are two different methods usually used for marker making in the apparel industry.

- Manual method.
- Computerized method.

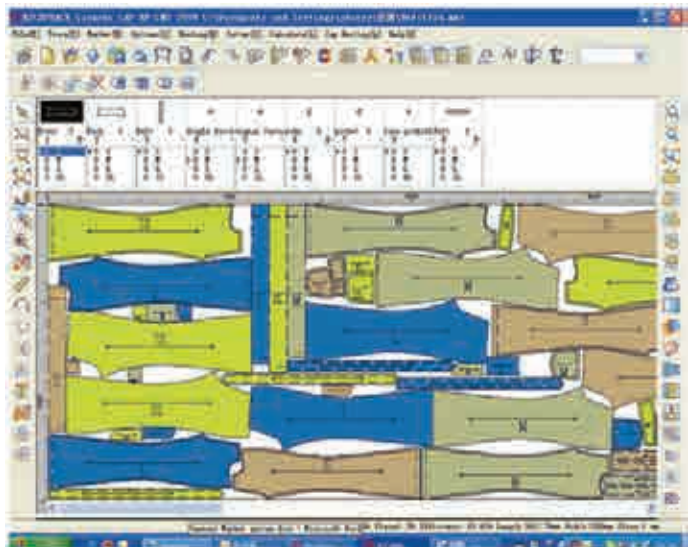
(i) Manual method:

It is one of the oldest, traditional and typical method used for marker making in the garments industry. In these processes, all pattern pieces made by pattern maker manually.

This process needs more time, practice and experience but efficiency and accuracy are not satisfactory.

(ii) Computerized method:

It is one of the easiest and efficient processes of marker making. Several integrated software's are useful to make a computerized marker. Just only need two minutes to make an automatic marker. The computer makes the marker itself according to the command given by the operator. It is more competent and useful than interactive marker making method.



3 Types of Marker

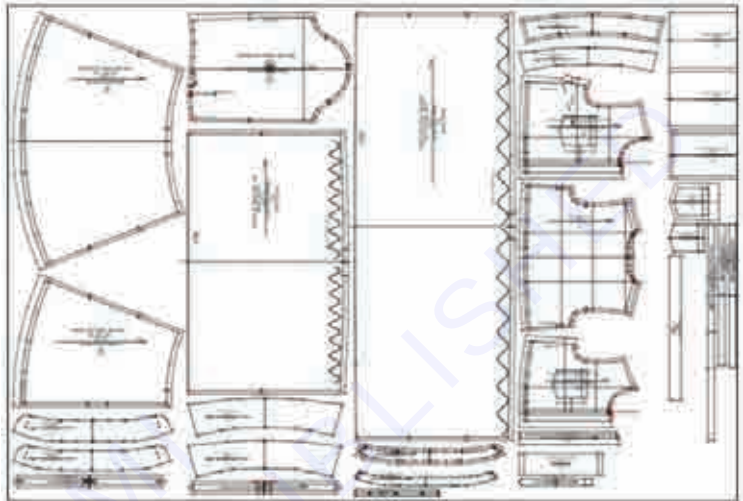
While preparing the marker, we should consider the details like, No. of garments per lay, sizes and fabric width. Normally, there are two types of Markers are being used in Garment Industries. They are,

- 1 Paper Marker
- 2 Fabric Marker.

3.1 Paper Marker.

If a marker is prepared by using paper, then it is called as "Paper marker". This is mainly suitable for Plain fabrics.

For this a long roll of paper should be used which should have the required fabric width and length depending upon the lay length. Long carbon sheet rolls can also be used for duplicating the marker. One paper and one Carbon are alternatively placed one above the other and the Patterns are placed over, and after achieving the minimum lay length, the outlines of the pattern are marked by using ordinary Ball point pen for getting best impression for duplicating. For this method, we can easily make 4 to 5 markers simultaneously. By this marker duplicating, we are saving the maximum precious time of Industry. Then the paper marker is placed over the top of the fabric lay, and fabric lay is being cut along with the paper marker.



Advantages:

- 1 We can quickly prepare the maximum no. of markers in a single process. By this, we can save the precious time.
- 2 We can preserve the markers for our future reference.

Disadvantage:

It is suitable for plain fabric only.

3.2 Fabric Marker:

A marker is prepared in the actual fabric to be used for cutting, it is known as "Fabric Marker". For striped, checked and printed fabrics, it is not possible to prepare a paper marker due to the requirement of lines and design matching. Hence, for the above-mentioned fabrics, we have to prepare fabric marker.

Advantages

- 1 By this marker, we can follow the line and design matching.
- 2 It is used for emergency cutting process.

Disadvantages

- 1 We can't duplicate the marker as like in paper marker.
- 2 It consumes the actual time, as like in the normal process, i.e., there is no time saving by this marker.
- 3 We can't preserve the marker for future reference.
- 4 We have to place the fabric marker on the top of the lay by following proper line matching in the case of striped and checked fabric. Otherwise, the entire cutting process will be wasted out.



4 Points to be considered while preparing Markers.

The following important points to be kept in mind while preparing markers.

- 1 Before marking, we have to make different pattern layouts and out of them we have to select the best one, which gives the minimum fabric consumption or lay length.
- 2 In the case of fabric marker, the used fabric should be pressed neatly and free from wrinkles.

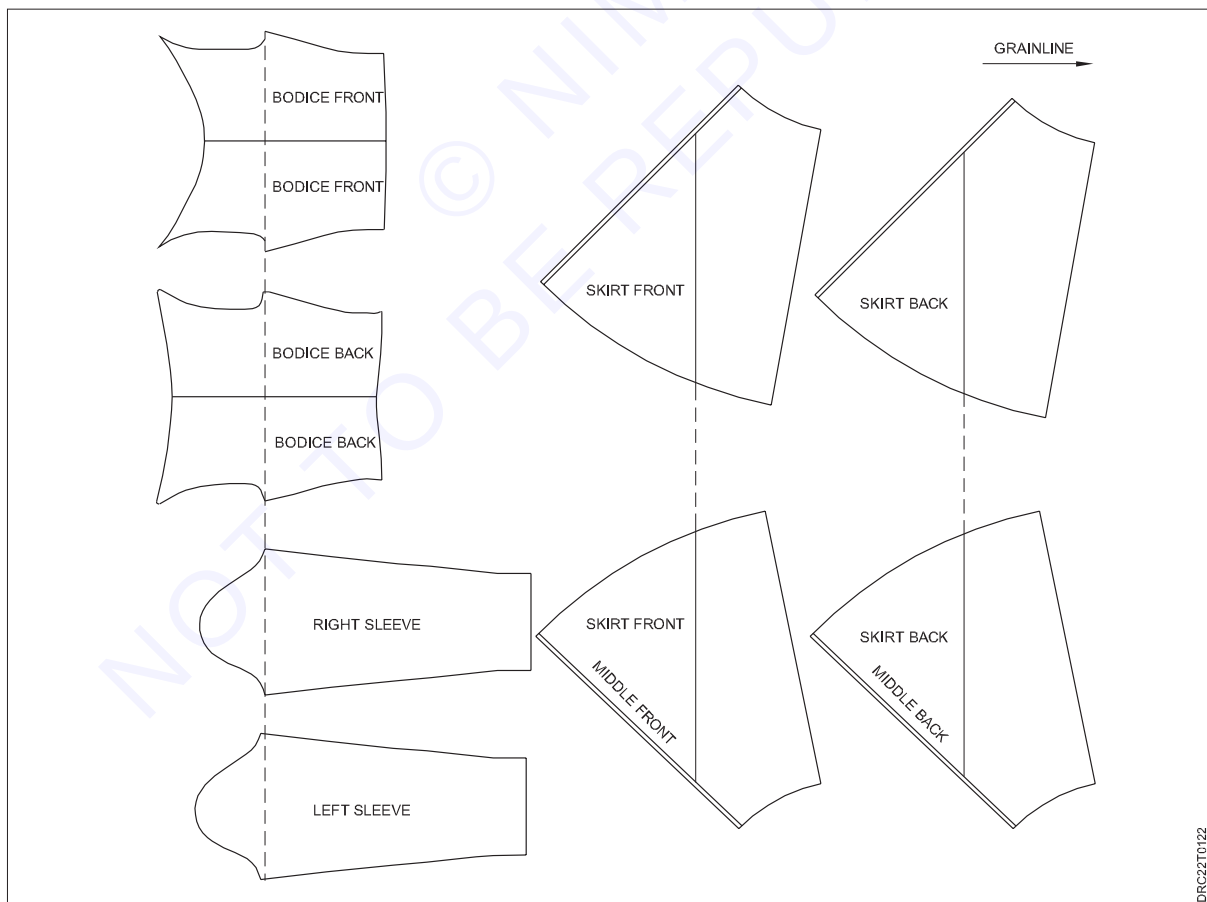
- 3 If the fabric has right and wrong side difference, then the layout should be made on the right side of the fabric.
- 4 While placing the patterns on a fabric, the grain line marked on the pattern should be kept parallel to the selvedge of the fabric by measuring from each end of the grain line to the selvedge.
- 5 All the patterns should be laid closely to achieve economical layout.
- 6 It is better to place the large patterns at one end of the fabric or both the ends.
- 7 Small pattern pieces should be placed between larger ones.
- 8 The wider end of the large patterns may be placed at the cut end of the material.
- 9 Also, the wider end of one pattern may be placed near the narrow end of another pattern.
- 10 It is better to use duplicate patterns for pieces, which have to be used twice.

5 Care and precaution while making Marker for different fabrics.

We have to take extra care while preparing marker for different fabrics like, Striped, Plaid (Checks), one way and floral prints.

5.1 Striped Fabrics:

While handling the striped fabrics, consideration must be given to where the stripes will look best on the finished garment. Select a prominent stripe and make it to align along straight seam. The front patterns should be laid in opposite direction and we can get the same stripe line alignment on both fronts equally. Also, we can lay the other parts like back, yoke, sleeves, Collars and cuffs in way that the prominent line run along the center portion of the above. If Possible, the pocket should be laid next to the Front to get perfect pocket matching. In these types of fabrics, there is no need of considering the direction of the patterns (top or bottom direction of the patterns).



5.2 Plaid Fabrics (Checked Designs)

For preparing markers for Plaid fabrics (Checked Design fabrics), we have to consider horizontal lines, which are running from one selvedge to other instead of vertical lines. For example the center front line of the Front pattern is aligned with prominent vertical line or bar and the two Fronts are laid nearby to get the horizontal line matching. The Centre Back line of the back pattern and Yoke center is also aligned with the same vertical line or bar followed for Front, to get perfection. At the same time, the checks are matched at seams for both front and back patterns. The pocket can be laid near the Front to get the perfect horizontal line matching, if possible. It is better to align the Sleeve center with the selected prominent vertical line for line matching with the yoke. Also, the collar and Cuffs can be laid with the same line matching if possible.



5.3 One Way Designs, Napped fabrics & Floral Prints

Napped fabrics like Velvet and Corduroy have a visible color difference on one side when they are held upside down. Also the one-way designs and floral designs are appearing differently depending on the direction from which they are viewed. While preparing markers for Napped fabrics, Floral prints or one way designs, all the patterns must be laid out in one direction. Decide on the "top" of the fabric, and follow this direction when placing the pattern pieces, so that the nap or design will on in one direction.



6 Qualities of a good Marker

The following are the important qualities of a good marker.

- 1 The marker should have the proper fabric width and it should be fixed by considering the fabric width variation.
- 2 All the parts and components of all sizes should be properly drawn in the marker.
- 3 The marked lines should be clear and without any corrections.
- 4 The direction of the marker to be placed on the fabric lay should clearly indicated.
- 5 Each part should have all the pattern details like grain line, name of the style, size, nos. of parts to be cut, name of the part etc.
- 6 The duplicate copy of the paper marker should have clear impressions by using proper carbon sheet.
- 7 The marker should have more efficiency without wasting the materials.
- 8 The notches, pleat marks, drill marks of the patterns should be clearly transferred.
- 9 There should be no fabric defect like bowing in the case of fabric marker.

7 Marker efficiency:

It may be defined as the ratio of the total area of all the pattern pieces in the marker to the total area of the marker plan. It is expressed in percentage (%).

$$\text{Marker efficiency} = \frac{\text{Area of the pattern in the marker plan}}{\text{The total area of the marker plan}} \times 100$$

The higher the marker efficiency, the lower will be the fabric wastage i.e. least fabric will be required to make a definite number of garments. So increase in marker efficiency is very important.

Assignment:

- 1 Using paper, prepare Markers manually for Plain, Striped, Plaid and One-Way fabrics.
- 2 Collect different types of woven design fabric swatches, analysis the design and give tips for preparing Markers for the same.

Questions:

- 1 Define Marker and explain its types and advantages.
- 2 What are the important points will you consider while preparing Markers?
- 3 Explain the method of preparing markers for Striped, Plaid and One-Way fabrics with Layouts.
- 4 What are the qualities of a good marker?

Lesson 46-50 (2) : 3D Software

Objectives

At the end of this lesson you shall be able to

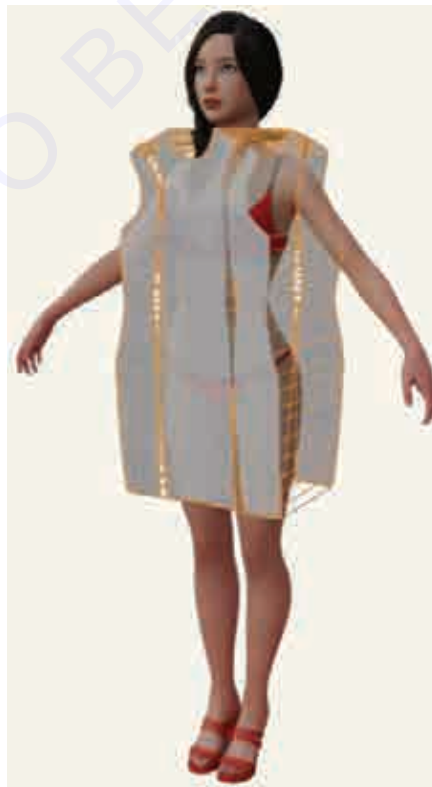
- understand the 3D software along with the uses.

INTRODUCTION

3D Software refers to three-dimensional software used for creating garment designs. This technology allows designers to construct and visualize clothes in a digital environment, offering several transformative impacts on the fashion industry.

1.2. USES OF 3D SOFTWARE:

- 1.2.1 **Sustainability:** 3D fashion design can significantly reduce waste. Traditional fashion design often involves creating multiple physical prototypes, leading to material waste. With 3D design, adjustments, and iterations are made digitally, eliminating the need for physical samples until later stages.
- 1.2.2 **Efficiency and Cost-Effectiveness:** Designers can quickly make changes to their designs without producing physical samples. This speeds up the design process and reduces costs associated with materials and labor.
- 1.2.3 **Innovative Design Possibilities:** 3D software enables designers to experiment with complex structures and materials that might be difficult or impossible to manipulate physically. This opens up new avenues for creativity and innovation.
- 1.2.4 **Customization and Personalization:** 3D design technology allows for easily customized garments to fit individual body shapes and preferences. This could lead to more personalized fashion experiences for consumers.
- 1.2.5 **Realistic Visualization and Prototyping:** 3D software offers highly realistic 3D garment visualization. This allows designers to see how fabrics will drape, fit, and look on virtual models, reducing the need for physical samples and thus contributing to sustainability.



Lesson 46-50 (3) : Introduction of Digitizer (Digitize pattern)

Objectives

At the end of this lesson you shall be able to

- acquired knowledge about the Digitizer and their uses in Garment Industry
- understand the whole digitizing process
- understand the importance of digital pattern.

Any apparel manufacturers, designers, merchandising organizations and others in the apparel sector have physical patterns made of cardboard, paper, fabric or other materials.

Such physical patterns suffer from a number of limitations.

They can get worn out, torn, cannot easily be shared, cannot easily be changed to create new patterns and often take up a lot of space.

Digital patterns do not have these limitations.

A Digitizer provides the fastest and easiest way to convert physical patterns to digital patterns.

A Digitizer comprises of the following:

1. A Digitizing Magnetic Board
2. A Digitizing Software
3. Camera

A Digitizing Magnetic Board can be fixed on a wall. Physical patterns that need to be converted into digital patterns are then placed on the Digitizing Magnetic Board. The physical patterns are held on to their places using magnets provided (When using traditional digitizing boards, physical patterns are pasted to the digitizing board using cello tape)

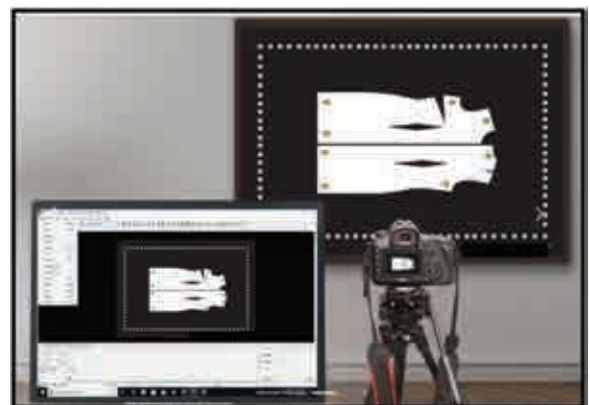
Once the physical patterns are held on to their places on the Digitizing Magnetic Board, a camera is used to click the image of the physical patterns.

This image gets transferred from the camera to Digitizing Software on a computer. Digitizing Software automatically creates digital patterns that are similar to the physical patterns.

Digitizer (also called Digitizing System') uses the latest Artificial Intelligence (AI) tools to make this process of conversion from physical patterns to digital patterns fast, easy and hassle free.

Benefits of using Digitizer:

- Automatically convert physical patterns to digital patterns.
- Edit the newly created digital patterns as required.
- Create new patterns using digital patterns as a reference.
- Save space and time.



Lesson 46-50 (4) : Introduction of Plotter (Print pattern)

Objectives

At the end of this lesson you shall be able to

- gain knowledge about plotters and their uses in apparel & fashion Industry
- understand different types of plotter and their printing process
- understand the importance of plotter.

Plotter is a computer output device used to produce high-quality, large-scale graphics and drawings. It works by precisely positioning a pen or other drawing tool to create lines, curves, and shapes on paper or other media.

Plotters play a crucial role in CAD systems, enabling designers to transform digital designs into physical drawings. It generate vector-based output for the special purpose of computerized pattern making, grading and lay-planning.

Types of plotters

There are commonly two types of plotter used in Apparel Industries:

- 1 Drum Plotters
- 2 Flatbed Plotters

1 Drum Plotters

In this plotter the pen moves in the horizontally and the drum rolls on the other axis. Generally it is a graphical output device, used to plot drawings. The width of the plot is limited by the length of the drum. It is the first graphical output device produced to print large scaled engineering drawings. Colored prints can be made if you use colored ink. It is very good for line drawings but it is very slow. Here the pen is held in gantry and it moves in x-axis and the paper moves on y-axis. These plotters are known for their accuracy and the ability to produce detailed drawings.



2 Flatbed Plotters

This is a plotter where the paper is fixed on a flat surface and pens are moved to draw the image. This plotter can use several different colour pens to draw with. The size of the plot is limited only by the size of the plotter's bed.

Some Flatbed cutting plotters are relatively inexpensive, that uses a knife or laser to cut intricate, precise designs and shapes as they are able to accurately follow a variety of pre-designed patterns.



Advantages of using a plotter

Using a plotter offers several advantages over other printing methods:

- **Precision:** Plotters can produce highly accurate and detailed drawings with precise line weights, making them ideal for pattern drafting and grading.
- **Large-format capability:** Plotters are designed to handle large paper sizes, allowing you to create drawings and graphics on a larger scale.
- **Versatility:** Plotters can work with various media types, including paper, vellum, film, and even fabrics, providing flexibility for different design requirements.
- **Longevity:** Plotters typically use high-quality pens or toner that can withstand fading and maintain their integrity over time, ensuring the longevity of your drawings.
- **Vector-based output:** Plotters generate vector-based output, which means that the drawings can be scaled without loss of resolution or quality, making them suitable for computerized pattern making, grading and lay-planning

Lesson 46-50 (5) : Various Seams and its Purposes

Objectives

At the end of this lesson you shall be able to

- know about various classes of seams
- produce the seams on fabric by sewing machines
- know the formation & construction process of various seams
- use different seams as per the requirement of the garment.

A seam is the join where two or more layers of fabric or other materials are held together with stitches.

In garment construction, seams are classified by their type (plain, lapped, bound, flat) and position in the finished garment (center back seam, inseam, side seam). Seams are finished with a variety of techniques to prevent raveling of raw fabric edges and to neaten the inside of garments.

It is important to be familiar with various seam types, their applications and variations available so that you can choose the right seam to suit your sewing needs.

Seam Classification

Seams are classified according to the type/number of components used. There are six basic types of seam classes which are explained below with their descriptions:

Seam Classes

Class 1 - Superimposed seam

Class 2 - Lapped seam

Class 3 - Bound seams

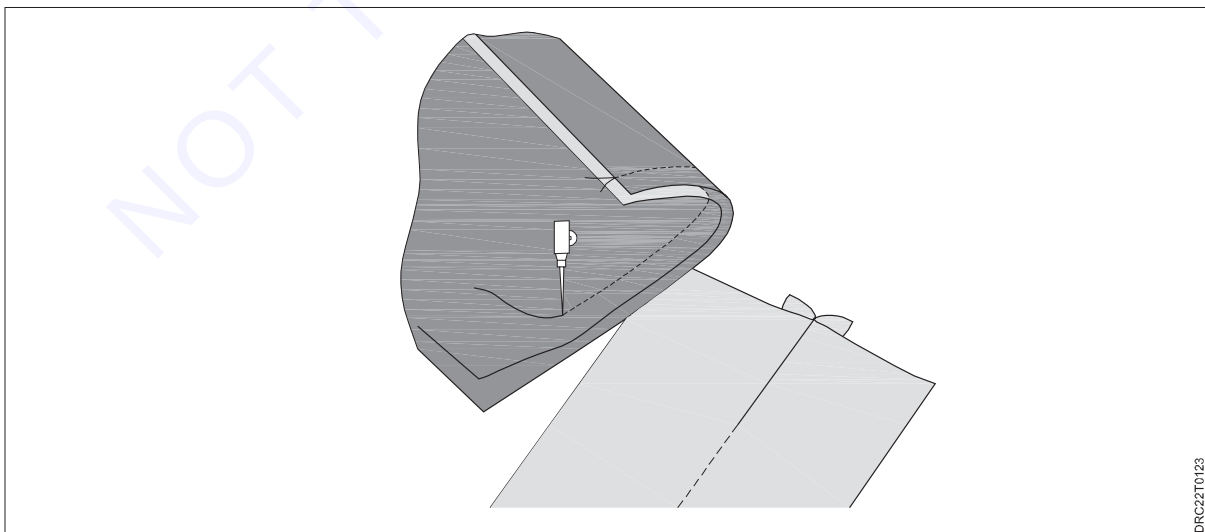
Class 4 - Flat seams

Class 5 - Decorative/Ornamental stitching

Class 6 - Edge finishing/neatening

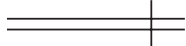
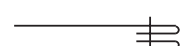
Class 1 - Superimposed seam(s)

The seam of class-1 is called superimposed seam. This is the most common & mostly used seam for joining fabrics. In this seam, two plies of fabric are placed on one another perfectly & then the fabrics are sewn. The sewn edges of the fabrics remain in the same side. There are various types of seams within this class.



Uses:

In side seams of shirts, trouser, children wear etc. Piped & French seam are used for decorative purposes.

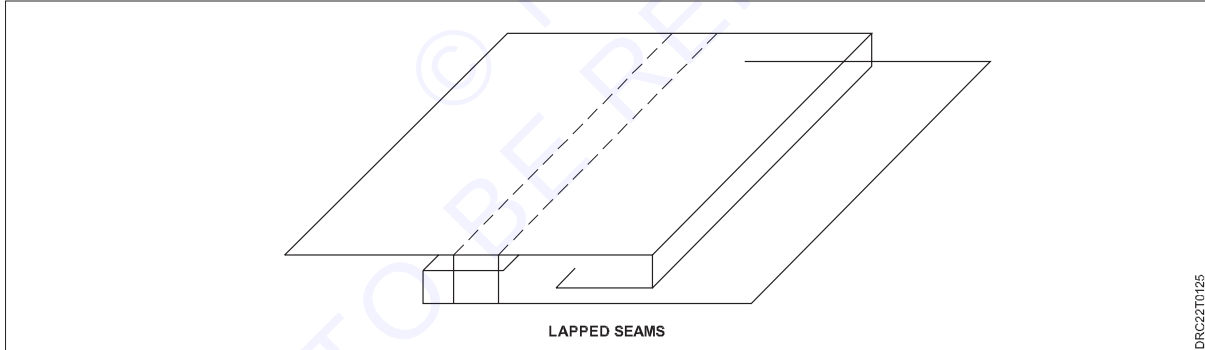
Superimposed Seam (SS)		
Nation	Appearance	Application
SSa		Side seam of skirt, dress slacks, inseam or side seam of jeans
SSb		Finishing belt ends; attaching elastic to waistband.
SSc		Ends of waistbands on jeans
SSd		Seaming, but not widely used
Sse		Collar or cuffs seamed and topstitched.

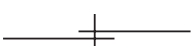
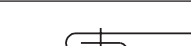
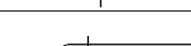
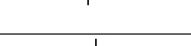
Class 2 - Lapped seam

The seam of class-2 is called lapped seam. In this class of seam, two or more piles of material are lapped (i.e., with edges overlaid, plain or folded) and joined with one or more rows of stitches. The two Sewn edges remain in two opposite sides of the sewing line/seam line.

Uses:

Lapped seams are common when sewing side seams on jeans and dress shirts. This class of seaming has the largest number of variations.



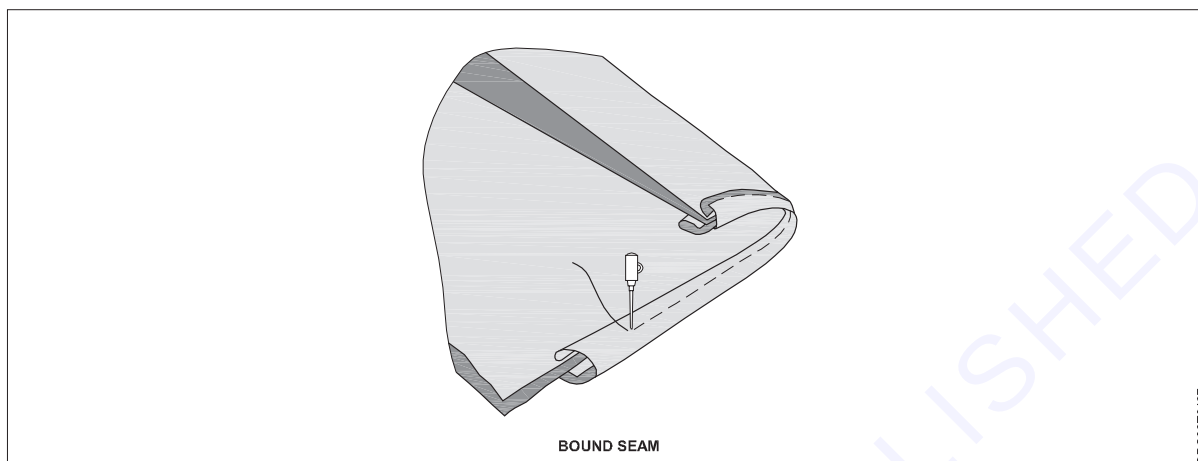
Lapped Seam (LS)		
Nation	Appearance	Application
LSa		Vinyl and leathers
LSb		Attaching curtain to waistband of men's dress slacks
LSc		Side seams of dress skirts and jeans.
LSd		Attaching patch pockets and overlay yoke
LSe		Attaching yoke

Class 3 - Bound seam:

The seam of class-3 is called bound seam. For producing bound seam at least two plies of fabric are required. The edge of one ply of fabric is bounded by the other. Folder is used in sewing machine for producing bound seam.

Uses:

Used in sewing Necklines of t-shirts, sleeping suits etc.



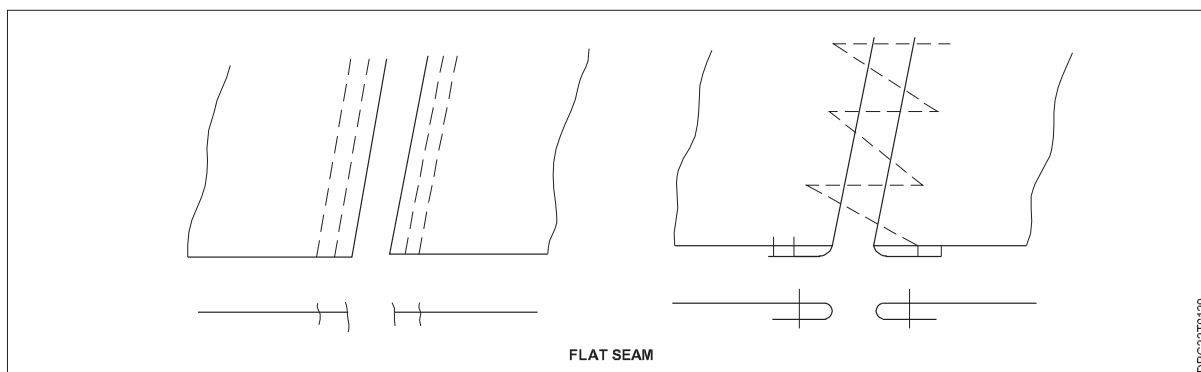
Bound Seam (BS)		
Nation	Appearance	Application
BSa		Edges bound with ribbon or braids
BSb		T-Shirt necklines or sleeve edges with knot trim
BSc		Neckline or front edges bound with bias woven material
BSd		Seaming and binding
BSe		Seaming and binding

Class 4 - Flat seam:

The seam of class -4 is called flat seam where zigzag stitches are used by 2-needle sewing machine. In this seam two plies of fabric are placed side by side & then they are sewn together by zigzag stitching. (Sometimes called Butt seams)

Uses:

This seam is widely used in under garments & in knitted items.



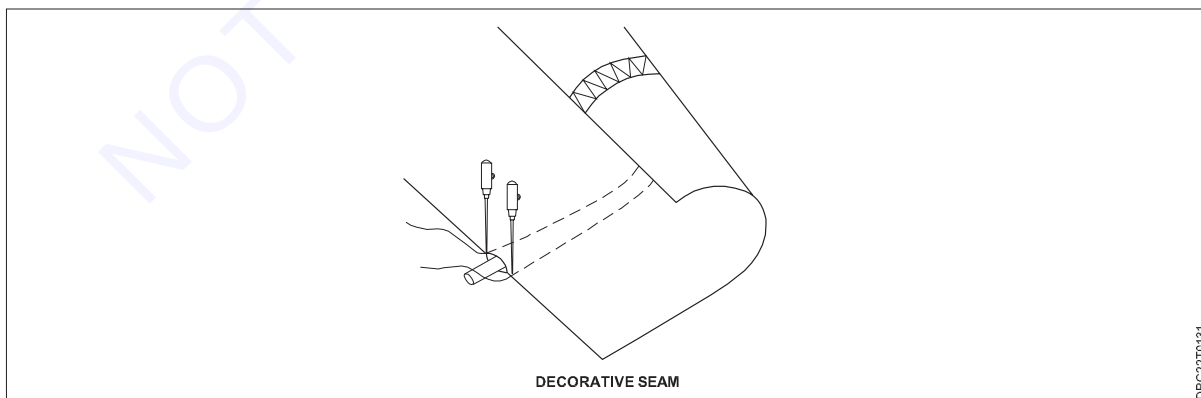
Flat Seam (BS)		
Nation	Appearance	Application
FSa		Raglan seams of sweat shirts
FSb		Sweat shirt under wear
FSc		Seams of support garments
FSd		Sweat shirts and underwear
FSe		Sweat shirts and underwear

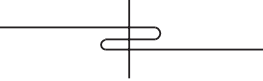
Class 5 - Decorative / Ornamental Seam:

The seam of class-5 is called decorative seam. This seam is used in order to decorative purpose. The fabric which we used that would be folded in several times and then according to the under side of the folded part of the fabric stitch can be produced.

Uses:

Curtains, Table cloths, Furniture wears, Decorative ladies wears etc.



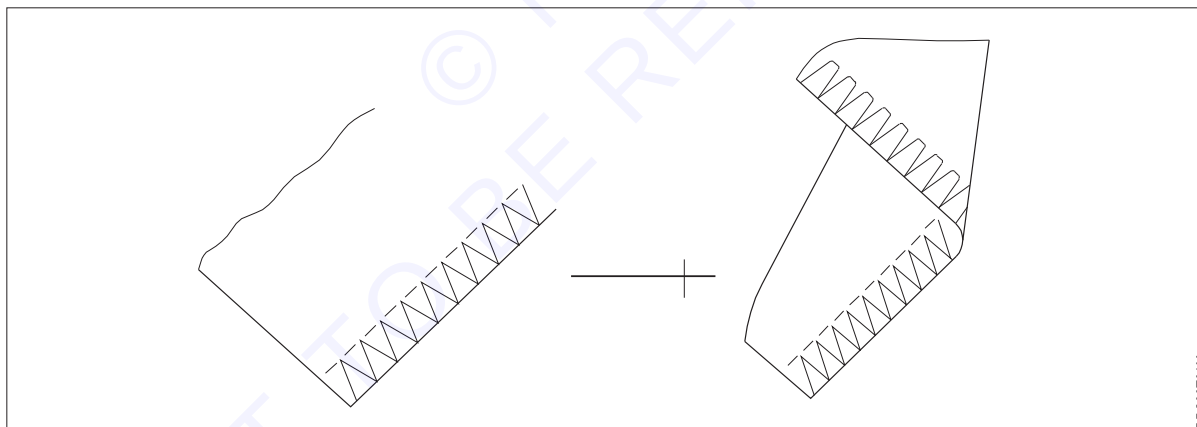
Ornamental Stitching (OS)		
Nation	Appearance	Application
OSa		Raglan seams of sweat shirts
OSb		Sweat shirt under wear
OSc		Seams of support garments
OSd		Sweat shirts and underwear
OSe		Sweat shirts and underwear

Class 6 - Edge Finishing/Neatening:

The seam of class-6- is called edge neatening which is used to prevent the edges of the fabric from rolling or curling. The simplest is the fabric edge inside a garment which has been neatened with an over edge stitch. This includes other popular methods of producing a neat edge like hemming and blind stitch hemming.

Uses:

To neaten and prevent fraying like Serging trouser panels, flys, facings, etc.

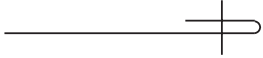
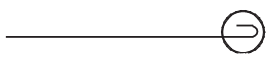


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Seam Quality

Though the stitch types chosen for a seam depend on the functional or aesthetic requirements of the seam, seam quality can be measured based on the following parameters:

- **Seam size** - It is measured with seam depth, seam length and seam width.
- **Seam slippage strength** - It is the amount of force required to pull out a total of $\frac{1}{4}$ " of the opposing sets of yarns perpendicular to the seam line.
- **Seam strength** - It is the force required to break open the seam either by breaking the thread or by breaking the sewn material.

Edge Finishing		
Nation	Appearance	Application
EFa		Single - Fold hem
EFb		Double - Fold hem
EFc		T-Shirt hem
EFd		Edge Finish, Serging
EFe		Ornamental edge finish

Lesson 46-50 (6) : Various Trims and accessories

Objectives

At the end of this lesson you shall be able to

- know about various trims & accessories used in garment industry
- explore and design different trims & accessories to give a complete look to the garment
- conceptualize their ideas of different trims & accessories with the garments.

Trimmings and Accessories Used in Apparel Industry

In garments manufacturing, fabrics are not the only material to make garments. Several types of materials are used here for both decorative and functional purposes. Where some are called trimmings and others are called accessories.

Trims are the materials which attached with the garments by sewing, gluing, pressing or heat setting. Trimmings have both functional and aesthetic properties. Sewing thread, zipper, button etc. are some examples of trimming.

Accessories are the materials which are used to give a finishing touch to your clothing products. The materials which are used to make a garment attractive for selling and packing other than fabric and trims is called accessories. Accessories don't have the functional properties but have the aesthetic properties. Hanger, polybag, carton etc. are some examples of accessories.

Key differences between trimmings and accessories

- 1 Trimmings are readily attached with your clothing products but accessories are not readily attached with your clothing products.
- 2 Trimmings have both functional and non-functional properties but accessories have only non-functional properties.
- 3 Trimmings are used to complete your clothing products and accessories are used to finish and pack your clothing products.
- 4 Button, zipper, rivet, lining, lace etc. are some examples of trimmings and polybag, safety pin, belts, scotch tape, carton etc. are some examples of accessories.

List of common trims used in clothing items.

1 Sewing Thread

It is the most important trim of any garment industry. Garments cannot be stitched without a sewing thread. Even though sewing thread typically makes up a small portion of the cost of clothing, it has a huge impact on the final item's appearance and durability. Natural and synthetic fibres can both be used to make sewing thread.

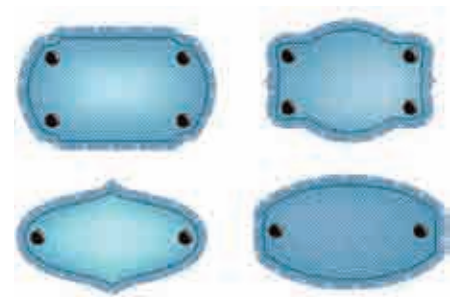


2 Buttons

Buttons are the one item that can be used with any outfit and serve as both a functional and decorative element. It is a tiny, can be made of plastic, wood, metal, horn, shell or glass etc. It is typically a fastener that is inserted into a loop of thread or a buttonhole.

3 Rivets

Rivets are positioned on the parts of the jeans that are most likely to be torn apart by pressure or movement and work to keep the fabric together, extending the life of the garment. A “washer” or “disc” is pressed or hammered onto a metal stud that come through the fabric to create a rivet.



4 Zipper

A zipper is a slide fastener that is used to open or close parts of clothing or other articles. It consists of a slider with a tab, facilitating the opening or closing of two interlocking teeth or coil connected to a fabric tape strip. There are several types of zips available, enabling the designer to select a zip that is the most suitable for a particular garment or end-use.

5 Lining

Linings are typically useful components of a garment. The inner side of the garment has linings to offer comfort and protection. Linings are attached to the main garment by sewing.



6 Interlining

Interlining also called interfacing, are generally nonwoven fabrics may be fusible or sew-on between the outer fabric and lining. Generally, interlining is used to support and warm the fabric .It mainly affects the overall shape of clothing. It add more structure to garment components like collars, button plackets, waistbands, and cuffs.

7 Hook and loop fastener

This item was created by a Swiss inventor, who proposed the brand name “Velcro” for it. This product is made of two woven poly-amide tapes that can be pulled apart and cling together when pressed around each other. One of the tapes is covered in extremely tiny hooks, and the other in extremely tiny loops. Only a small number of clothing items, such as shoes, belts, sportswear, children’s clothing, medical textiles, etc., use it.



8 Hook and eye closure

A hook-and-eye closure is a type of clothing fastener that consists of two parts: one has a small, blunt hook, and the other has an eye. Both parts are sewn to the appropriate pieces of fabric. The hook is inserted into the loop to secure the garment. Usually used in groups, hook-and-eye closures are strong enough to withstand the forces involved in everyday wear.

9 Label

Labels are an integral part of clothing that are sewn or printed with significant information about the item. It enables customers to be conscious of what they are wearing. The buyer's name, the country of origin, the fabric and yarn types, the fabric composition, the size of the garment, any special care instructions, and other information are all included on a garment's label.



10 Patch

A patch is a type of trim made from fabric, leather, or other materials that is sewn or heated to the garment.

11 Shoulder pad

For both men's and women's tailored clothing, shoulder pads are a standard component. Both the top and bottom of the shoulder pad are lined. The appearance consequently improves in attractiveness, comfort, and longevity.



12 Snap fastener

A pair of interlocking discs known as a snap fastener, also known as a snap, popper, or press stud, is frequently used to secure clothing instead of buttons. Up until a certain amount of force is applied, a circular lip under one disc fits into a groove on top of the other, holding them fast. By using a particular punch and die set, hammering, plying, or sewing, snaps can be attached to fabric.

13 Hasps and Slider

A metal fastening system known as a "Hasp and Slider" is used on the shoulder strap to adjust the length of the strap by sliding it, and the hasp is connected by the slider to a button fastened to the bib of the overalls. The Hasp and Slider pattern is most frequently seen on infant clothing.

Slide release buckle	Cord adjuster	Belt slide fastener	Cam buckle	Strap adjuster
D ring	Prong buckle	Ring and slider	Brace clip	Shirt sleeve arm bands

14 Beads

A tiny piece of plastic or another similar material that is usually rounded and perforated so that it can be woven into a necklace or sewn to fabric. They come in a variety of shapes, including drum, round and cubic etc.



15 Sequins

A sequin is a tiny, shiny plate that is used as an ornament, especially on clothing. Sequins can be found in a variety of hues. The sequin trim is the most striking of all the trims.

16 Ribbon

A ribbon, is a flexible band of material, usually made of cloth that is primarily used for tying and binding.



17 Drawstring

It is a string, cord, or tape inserted into hems or casings or laced through eyelets used to control the fullness of garments.

18 Lace

Lace is an openwork fabric produced by a network of threads, twisted together and sometimes knotted, to form patterns. It is made by hand, with needles, with hooks or by machinery.



19 Fringe

A fringe is a decoration attached to clothes or other stitched articles, consisting of a row of hanging strips or threads.

20 Tassel

A group of threads that are tied together at one end and hang from garments, cushions, curtains & clothes, etc. as a decoration is called Tassel.



Different Types of Garments Accessories

1 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.



2 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.

3 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.



4 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.

5 Scotch Tape:

Scotch Tape is used to describe certain pressure sensitive tapes used for wrapping the cartons.



6 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.

7 Clothes Hanger:

There are two basic types of clothes hangers. 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 and another type of hanger is with Clamp for the hanging of trousers or skirts.



Lesson 46-50 (7) : Specification Sheet

Objectives

At the end of this lesson you shall be able to

- understand the details contain of sepecification sheet
- learn the key points of a garment specification sheet
- know about different types of sheets used in a Apparel industry.

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.

5 Stich Instruction

Stitch instruction contains various info about the stitch required for the item. Stich 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, pattern 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 including 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.

First Page of Tech Pack – Basic details

Brand Name

Style Summary		Revision #	PRODUCTION
QTY	352356	Missy	Chambray Popover w/ Collar + 1 Pocket
Season	Fall 2014	Product Office	
Women Top	1	10/10/14	
Fit	Standard		
Fit Lifetime Type	Fit Lifetime-Standard		
Seaming Sew Method	Alpha		
Print Pattern			
Ref Pattern #			
Can Type	Standard (2-Way)		
Label			
Corresponding Style(s)	53 352472.P		
Primary Raw Material			
Raw Material ID	141181		
Description	Heavy Chambray		
Finishes: RM Color	100% Cotton		
Construction	P		
Construction			
SPEC COMMENTS:		INDENT:	FROM:
S-16-14			
2nd fit sample is approved w/ corrections.			
SPEC Overlaid From: ES2356-000		By: J. Mac Millan	On: 04/11/14 10:32:33 AM
Form Updated: 05/20/14		Revised Time: 05/20/14 2:21:34 PM	Page: 1 of 11

Construction detail Page - Full details of garment construction

Construction		Revision #	PRODUCTION
QTY	352356	Missy	Chambray Popover w/ Collar + 1 Pocket
Season	Fall 2014	Product Office	
Women Top	1	10/10/14	
Fit	Standard		
Fit Lifetime Type	Fit Lifetime-Standard		
Seaming Sew Method	Alpha		
Print Pattern			
Ref Pattern #			
Can Type	Standard (2-Way)		
Label			
Corresponding Style(s)	53 352472.P		
Primary Raw Material			
Raw Material ID	141181		
Description	Heavy Chambray		
Finishes: RM Color	100% Cotton		
Construction	P		
Construction			
SPEC COMMENTS:		INDENT:	FROM:
S-16-14			
2nd fit sample is approved w/ corrections.			
SPEC Overlaid From: ES2356-000		By: J. Mac Millan	On: 04/11/14 10:32:33 AM
Form Updated: 05/20/14		Revised Time: 05/20/14 2:21:34 PM	Page: 1 of 11

Bill of material Sheet – It has all Trims details

[illegible]

Graded Spec Sheet

Graded Measurements (Page 1 of 2)		Season	Revision #	8	PRODUCTION
Date	352356 Missy	Description Chamberlay Popover w/ Collar & 1 Pocket	Fall 2014	FINAL	
	Shirred Trim	Topstitching	Waistline	05/20/14	

POM	Description	Toll Level: 2									
		Toll (-)	Toll (+)	XXS	XS	S	M	L	XL	XXL	
1206 *	Dr. Lgh. fr. dr. rls seam	1/2	1/2	27 1/2	29 3/4	30 3/4	30 3/4	30 3/4	30 3/4	30 3/4	
1270	Shld Seam post-Fwd at Nline	1/8	1/8	1	1	1	1	1	1	1	
1271	Shld Seam post-Fwd at MLPS	1/8	1/8	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	
1215	X WRK	1/2	1/2	16 3/8	26 3/4	17 1/8	17 3/8	18 1/2	19 3/8	19 7/8	
1300 *	9 Pl. 3" S Seam	3/8	3/8	13 1/2	13 7/8	14 3/8	14 7/8	15 3/8	16 1/2	17	
1290	X Bl. 4" CB Nk	3/8	3/8	15 3/8	15 3/4	16 1/8	16 3/4	17 1/2	18 3/8	18 7/8	
1009 *	Clav. cut. 1" below Armhole -CB not plot. closed	5/8	5/8	37	38 1/2	40 1/2	42 1/2	45 1/2	49	51	
1340	Waist placket fr. CB Nk	0	0	13 1/4	13 1/2	14	14 1/2	15	15 1/2	16	
1060 *	Waist cut	3/8	3/8	37	37 3/4	38 1/2	41 1/2	43	46	51	
1090 *	Seam cut -muscle Arm & under gusset	5/8	5/8	46	45 1/2	47 1/8	48 1/2	49 1/2	52	54	
1104 *	Armhole cut w/ble	3/8	3/8	16 3/8	17	18	19	20 1/4	21 5/8	22 5/8	
1185 *	Sk. lgh. fr. shld	1/2	1/2	22 7/8	23	23 1/8	23 1/2	23 3/4	24	24 1/4	
1585	Upper Arm Cut(muscle) 1" ble Arm	1/2	1/2	12 5/8	13	13 1/2	14	14 3/4	15 5/8	16 1/8	
1618 *	Sk. app. 100% Cuff	3/8	3/8	7 1/4	7 1/2	8	8 1/2	9	9 1/2	10	
1640	Cuff 90-100% Cuff	1/8	1/8	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	
1825	Plkt/Sk. lgh. Sk. fr. cuff seam	1/8	1/8	4 3/4	4 3/8	4 3/4	4 3/8	4 3/4	4 3/8	4 3/8	
	Seam Tab Str. Plotted from SHld Str	REF	1/4	1/4	12 5/8	13 1/2	11 3/4	11	18 1/4	12 1/2	12 3/4
	Seam Tab Width	REF	1/8	1/8	1	1	1	1	1	1	1
	Seam Tab Length to point	REF	1/4	1/4	7 3/4	7 3/4	7 3/4	7 3/4	7 3/4	7 3/4	7 3/4
1288	Notch Ht. Bl. at center	1/8	1/8	4	4	4	4	4	4	4	
1740	Collar Stand Ht. at CB	1/8	1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	
1746	Collar Ht. at CB - fr. stand seam	1/8	1/8	1 3/8	1 3/8	1 3/4	1 3/8	1 3/4	1 3/8	1 3/4	
1750	Collar point	1/8	1/8	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	
1670	Fit Nk Drop SHPS to Nk seam	1/4	1/4	3 3/8	3 1/4	3 1/8	3 1/2	3 3/8	3 3/4	3 7/8	
1700	Bl. Nk Drop SHPS to Nk seam	1/4	1/4	3 1/2	3/8	1/2	5/8	3/4	3/8	1	
1630	Nk width SHPS to Nk seam	1/4	1/4	5 3/4	5 7/8	6 1/8	6 3/8	6 5/8	6 7/8	7 1/8	
1830	Bl. Nk width - front	1/8	1/8	1 1/8	1 1/4	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	
1838	Apk app. CB Fit TOTAL LENGTH TO POINT	1/8	1/8	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	13 1/2	

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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.

Sample Evaluation				Revision # 3				PRODUCTION	
Dept	24	352356	Missy	Style Description	Chambray Popover w/ Collar + 1 Pocket	Season	Fall 2014	FINAL	
				Supplier		Production Office		05/20/14	
				Woven Top		Fit Office		Sample # 2	
				Tech Designer					
Sample Made By: Ambattur Clothing International W.L.L.				Rec'd Date:	05/12/14	Fit Date:	05/15/14	Evaluation Result:	Approved
POH	Description	Tol(-)	Tol(+)	Requested	Sample	Delta	Revise	Comments	
1180	* Bk lgh fr ctr nk seam	1/2	1/2	28	27 3/4	- 1/4	28 3/4	Lengthen	
1270	Shldr Seam post-Fwd at Nkline	1/8	1/8	1	1				
1271	Shldr Seam post-Fwd at NLPS	1/8	1/8	1 1/4	1 1/4				
1215	X shldr	1/2	1/2	17 3/4	17 1/4	- 1/2		BTS	
1300	X Frt 5" fr NHPS	3/8	3/8	14 3/4	14 1/2	- 1/4	14 7/8	Revise	
1290	X Bk 4" fr CB Nk	3/8	3/8	16 3/4	16 3/4				
1005	* Chest circ 1" below Armhole -CB box pivot closed	5/8	5/8	42 1/2	42 1/4	- 1/4		BTS	
1340	Waist pivotnt fr CB Nk	0	0	14 1/2	14 1/2				
1060	* Waist circ	5/8	5/8	42	41 1/2	- 1/2	41 1/2	OK	
1090	Sweep circ -measrd frm IL under gusset	5/8	5/8	46	46		45 1/2	Reduce	
1104	* Armhole circ w/slv	3/8	3/8	19	18 7/8	- 1/8		BTS	
1165	* Slv lgh fr shldr	1/2	1/2	23	22 1/2	- 1/2	23 1/2	Add	
1585	Upper Arm Circ(muscle) 1" b/w AH	1/2	1/2	14	14				
1615	* Slv opp-btm Cuff	3/8	3/8	8 3/4	8 7/8	- 1/8	8 1/2	Reduce	
1640	Cuff Ht-btm Cuff	1/8	1/8	2 1/4	2 1/4				
1825	Pickt/Slt lgh-Slv fr cuff seam	1/8	1/8	4 3/4	4 3/4				
	Sleeve Tab Btn Pkment from Shldr Sm	REF	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	1				
	Sleeve Tab Length to point	REF	1/4	7 1/4	7 1/8	- 1/8	7 3/4	revise as camp shirt s/327270-M	
1280	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				
1746	Collar Ht at CB - fr stand seam	1/8	1/8	1 3/4	1 3/4				
1750	Collar point	1/8	1/8	2 1/4	2 1/4				
1670	Frt Nk Drop NHPS to Nk seam	1/4	1/4	3 1/2	3 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 3/8	OK	
1830	Pickt width - front	1/8	1/8	1 1/8	1 1/8				
1810	Pickt opp-ctr Frt TOTAL LENGTH TO POINT	1/8	1/8	13 1/2	13 5/8	- 1/8		BTS	
1794	Top btm pivotnt - fr Nk seam/edge			2 1/4	2 1/4				
	3rd APEX Button Pkment from Nk Seam	REF		7 1/2			7 1/2	OK	
	Button Space			2 3/4			2 3/4	OK	
1045	Pkt pivotnt fr HPSS to opp-patch	1/4	1/4	8 1/4	8 1/2	1/4	8 3/4	Lower	
1060	Pkt pivotnt fr ctr Patch	1/8	1/8	2	1 7/8	- 1/8	2 1/8	Move out	
1065	Pkt Ht-Patch at ctr of Pkt	1/8	1/8	5 3/8	5 1/4	- 1/8	5	Reduce	
	Pkt HT @ side-REF	1/8	1/8	4 1/2	4 1/2		4	Reduce	
1080	Pkt opp-Patch at top edge	1/8	1/8	4 1/2	4 1/2				
1525	Shirt Tail Ht-Frt fr IL at S.S./btm hem from bottom of gusset	1/8	1/8	4 1/4	4 1/2	1/4	5 1/8	Revise	
1526	Shirt Tail Ht-Bk fr IL at S.S./btm hem from bottom of gusset	1/8	1/8	5 1/2	5 1/2		6 1/2	Revise	
1545	Hem Ht Topstitched - sweep	1/8	1/8	1/4	1/4				
	pkt flap width at widest point								
1201	* Frt lgh fr NHPS disregard	1/2	1/2						

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Buyer Fit comments given based on the Fit sample sent to the buyer.

Sample Comments (Page 1 of 3)
 24 352356 - Hony - Chambray Popover w/ Collar + 1 Pocket - Fall 2014 - 09/20/14
 Women Top - Final 09/20/14
 Sample # 2

Date of Fit Comments: 9/16/14 Author of Fit Comments: Model:

Attendee: 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 ARM seems too scooped. Pls fit in front ARM @ x-front & front ARM curve. Pls use following pattern corrections:
- Slv curve in way too short. Pls lengthen as requested spec.
- Slv tab placement looks high. Pls follow requested specs, which is from camo shirt #327270-M
- Pocket is not straight. Pls make sure pocket placement is to heights on live model
- Lower plst by 1/4" by reducing plst HT. Then top and lower val plst 1/4" by reducing plst width from inside
- Reduce plst HT @ side seam as requested spec.
- 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 spec.
- Sweep is too big. Pls reduce sweep by 1/2".
- Pls follow all requested specs for bulk.

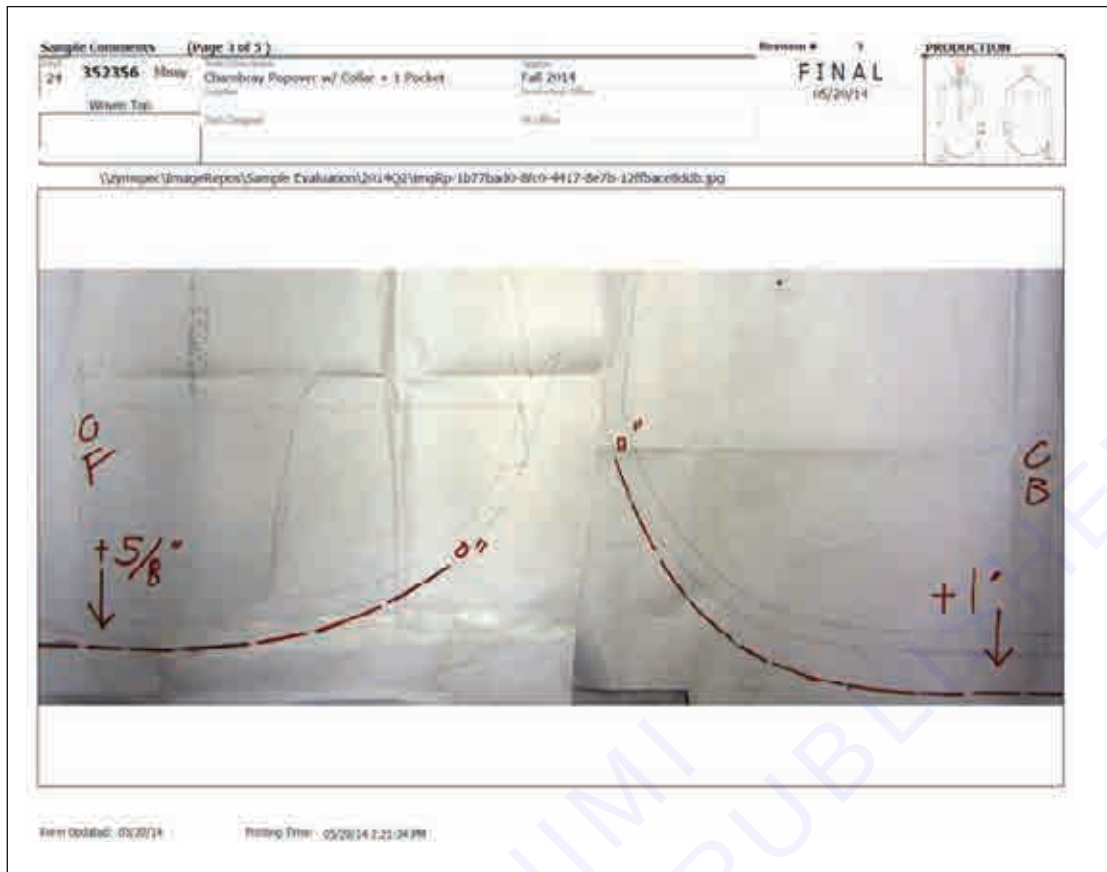
Construction/Workmanship:

- Pls lower stitch @ CF placket as following photos.

Photo Updated: 09/20/14 Printing Time: 09/20/14 2:21:34 PM

Front, Side and Back view of Model's wore the fit Sample for the fitting reference to the factory.





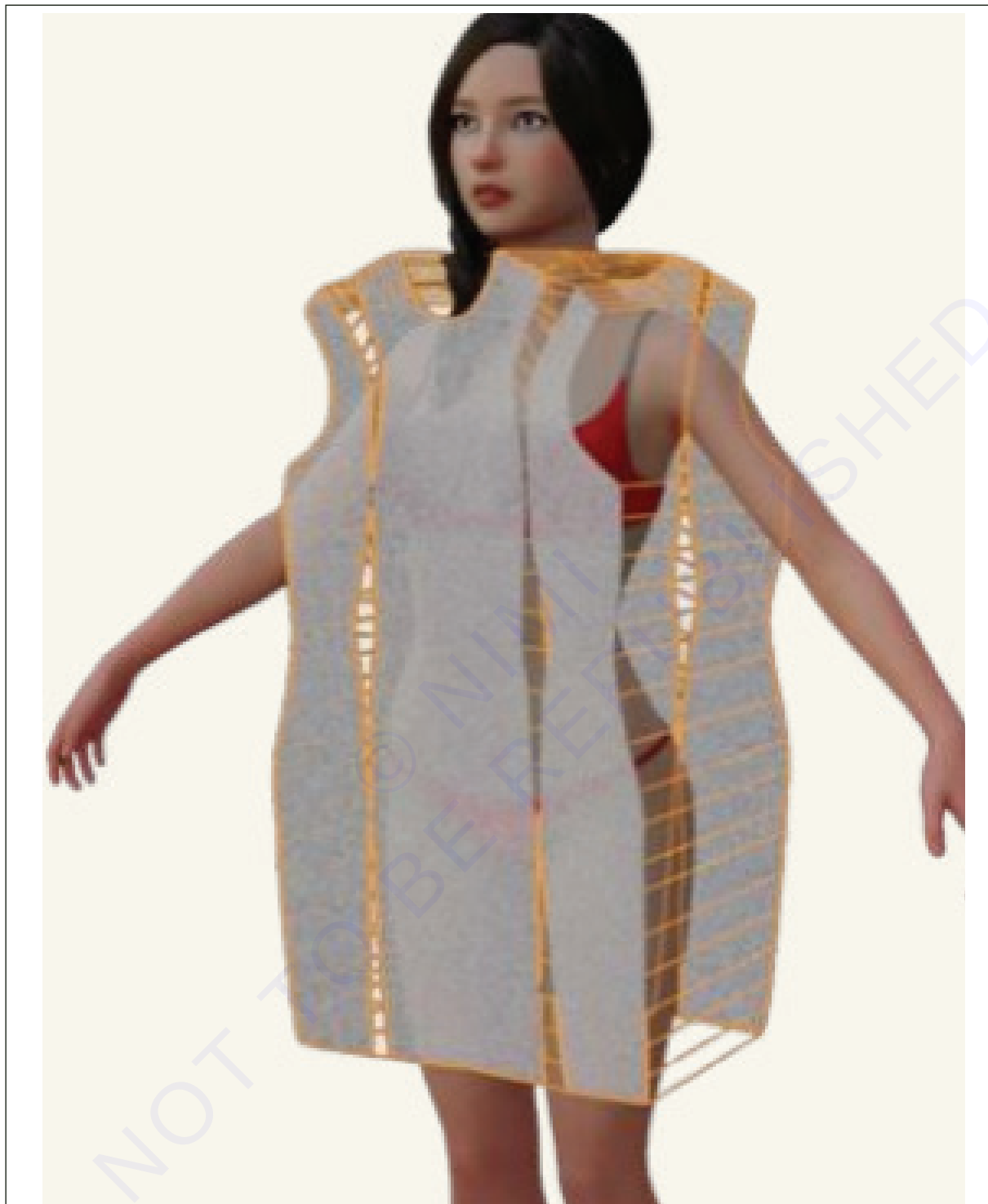
The Paper pattern send along with Fit sample to the buyer. Buyer marked the correction in the pattern for factory reference.



In the garment, some correction marked for the future correction in the pattern as well as sample.



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.

Lesson 46-50 (8) : Spreading & Material Handling

Objectives

At the end of this lesson you shall be able to

- know the importance of Spreading in garment Industry
- understand the various methods and forms of spreading as per the fabric types
- identify different types of lay used in fabric spreading
- gain practical knowledge about material handling.

Spreading and Material Handling

Spreading:

Spreading is the process of unwinding large rolls of fabric onto long, wide tables in preparation for cutting each piece of garment. Generally, the spreading process can be done manually or by computer controlled machines. It is a preparatory operation for cutting. Marker paper is laid on top of the fabric layers. The number of layers of fabric depends on the number of garments desired and the fabric thickness. Spreading can be done by hand or machine. Depending upon the fabric and cutting technology, up to 200 layers of fabric may be cut at one time. Fabrics that are more difficult to handle are generally cut in thinner stacks.

Importance of Spreading

In mass production, it is difficult to cut each and every single piece for stitching process. For that, the fabrics are arranged layer by layer, one above the other, the patterns are laid on it, and the outlines of the patterns are marked by marking chalk and finally cut by using a cutting machine. This method is used to save the precious time and used to follow the uniformity in all the cut components. Also, by this method, the fabric consumption per garment is minimized and fabric waste is reduced a lot.

This process of arranging the fabric one above the other, layer by layer, is called as "Laying" or "Spreading" Process. The arrangement of the fabric one above the other for mass cutting is called as "Lap". The arrangement of the patterns on the fabric lay is known as "Lay out" or "Pattern Layout". The marked pattern layout on the fabric lay is called as "Marker". The length of the lay is known as "Lay length".

Methods of Spreading:

Different types of methods and machines used in fabric spreading process. Basically, they can be classified in three categories. They are:

- (I) Manual Spreading method
- (II) Spreading carriage method or Semi-automatic method
- (III) Automatic Spreading Method

(I) Manual Spreading Method:

Procedure: Two person may be used for manual spreading unless the spread is very short. One person may work each side of the table to keep the fabric flat, smooth and tension free.

Advantages:

- Easy working
- Low investment
- Suitable for small scale industries

Disadvantage:

- Speed limitation
- Skilled labor required
- Small roll size
- Chances for improper fabric edge alignment

(II) Spreading carriage method or Semi-automatic method:

Operating Procedure: The cloth is unwound and spread through semi-automatic method. The spreading head or carriage is moved to and fro and spread fabric over the table. Movement along the table and fabric pulling can be controlled by the buttons.

Advantages:

- Fast and economical
- Proper selvedge alignment
- Ease to operate with electronic clutch

Disadvantages:

- Fabric roll loading, cutting is still manual
- No suitable for larger scale industry
- Small role size

(III) Automatic Spreading Method:

Operating Procedure: Automatic spreading machines are used to handle the spreading process from start to finish, eliminating the need for several people. With automated speed control, the fabric travels smoothly through the machine, minimizing human errors and ensuring consistent results.

Advantages:

- Automatic loading/unloading device for fabric rolls
- Automatic roll turning arrangement for face to back lay
- Automatic leveling device for edge alignment
- Automatic cutting device at the end of a run
- Automatic tensioning device to control fabric tension
- Automatic lay height sensor
- Programmable lay length, ply height
- Spreading speed up to 140 m/min

Disadvantages:

- It is very expensive so that capital investment is high.
- A skillful operator is needed to operate these types of machines.

Types/Forms / modes of Spreading

The mode of fabric spreading is the way fabric plies are laid out for cutting.

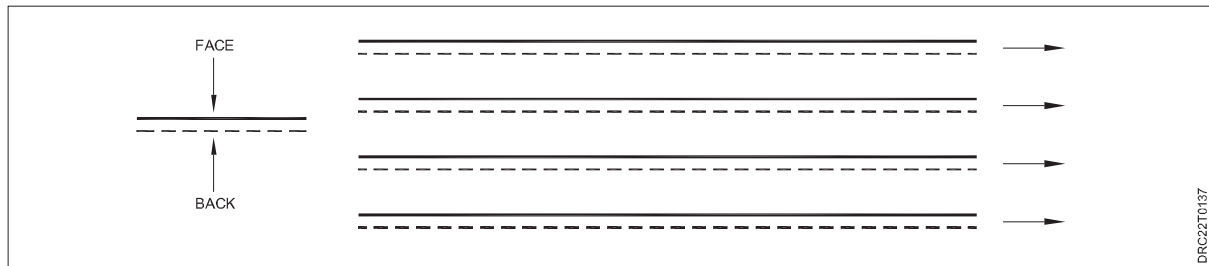
The spreading mode is determined by the properties of the fabric, the company's quality standards, and the equipment available.

Two fabric characteristics that decide the mode of spreading are fabric direction and fabric nap direction.

There are some modes or forms of spreading used in apparel manufacturing units. We can choose the suitable type according to the fabric type.

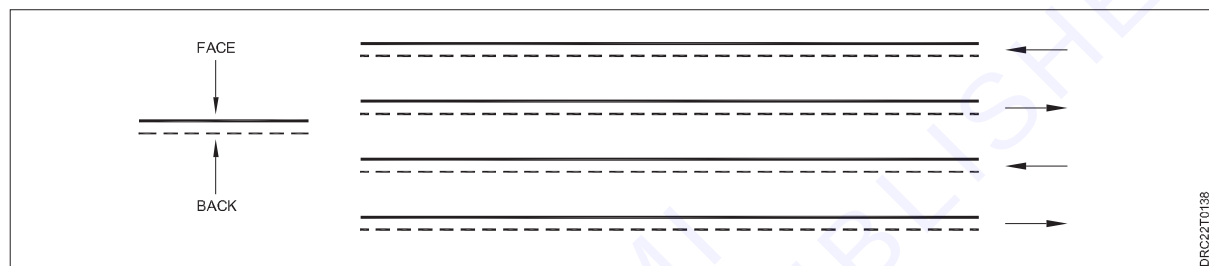
(a) Face up in a single direction:

All the plies are spread in one direction, with their faces side up. After a ply is laid it is cut across its width from the roll of cloth. This process is repeated until all the plies needed are spread. This method of spreading is the most widely used.



(b) Face up in both direction:

In this method, the fabric can be spread without cutting from one end to the other, in one continuous motion based on the marker length. By this method, we can arrange or spread the fabric in a zig zag manner with folding at the both ends. In this type, the right side and the wrong side of the fabric layers are facing the right side and wrong side respectively. This is suitable for the fabrics which are not having the tight and wrong side difference and also for double side printed fabric.

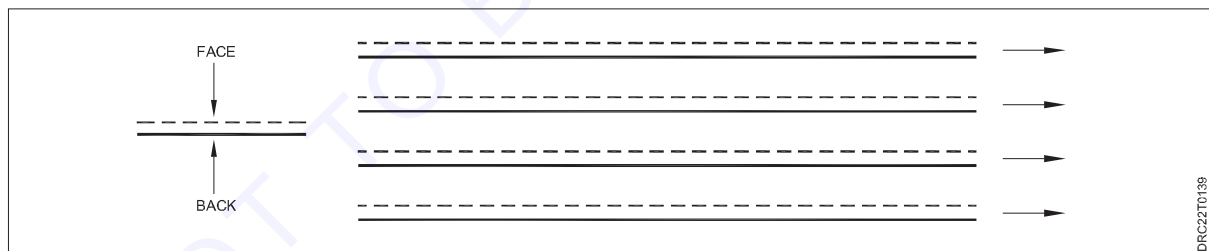


(C) Face down in a single direction

All the plies are placed in a single direction with their facial side down. After a ply is laid it is cut across its width from the roll of cloth. This method of spreading is used in knitted fabrics where the cut edges roll. When the face side up spreading is used, it is difficult to fix the ply ends.

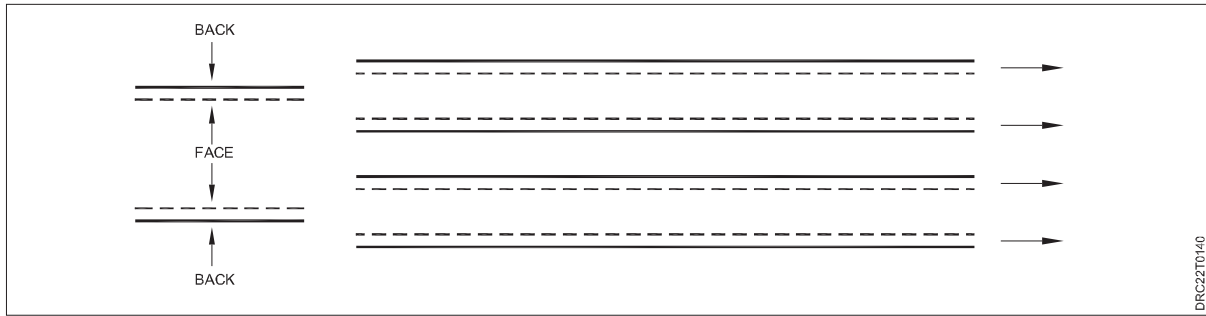
This spreading mode cannot be used in the following situations:

- Where a design has asymmetric components and the pattern pieces in a marker is positioned side-up with their face;
- Where fabric faults have to be rejected during spreading.



(d) Face to face in a single direction' spreading mode:

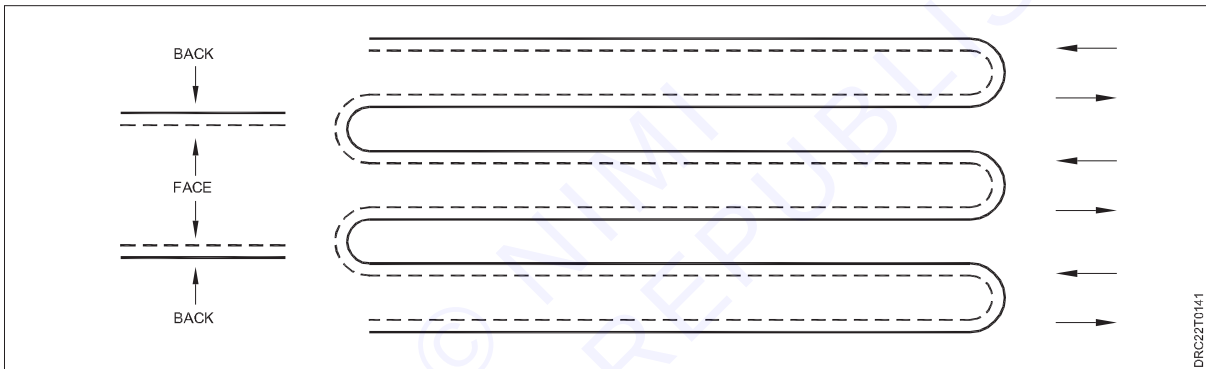
The first ply of material is stretched side-up with its face. The ply is laid and then cut across its width from the roll of cloth. The fabric roll is rotated around 180 ° after or during the ' dead-heading ' process and the next ply is spread in the same direction with its face side down wards. The tissue is distributed in both directions. The fabric is folded at the end of each ply, and the spread proceeds in the opposite direction. So, the first ply has its face up, the second ply has its face down and the third ply is face-up again.



(e) Face to face in both directions / 'zig-zag' spreading:

The spreading of 'Zig-zag' may be used for different fabrics. It does not require cutting of the fabric plies and therefore saves time. The material can also be saved, as there is no need for security allowances at the end of a spread. This spreading mode cannot be used in the following situations:

- Where fabric rejection during spreading has to be performed;
- Where a style has asymmetric components;
- Where a fabric has an asymmetric pattern and its type of position is strictly defined.



Fabric Lay

Fabric lay in the shape of fabric plies that are spread during fabric spreading in the readymade garments sector. There are different types of fabric lays which are vastly used in the cutting section of the clothing industry.

Different Types of Lay Used in Fabric Spreading:

In bulk cutting, a number of fabric plies are laid on the cutting table. The whole number of fabric plies that is spread on the table and cut at a time is called as lay

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.

To get more efficiency and reduce production cost perfect lay plan selection is the big challenges for cutting section. Computer software can be used to do this plan easily.

Importance of lay planning:

- To get a clear managing process of cutting room.
- To reduce production cost.
- To save the fabric wastage.
- To finish the cutting process in schedule time.

- To achieve optimal efficiency.
- Lay plan is used to cut stripes, checks, border prints, and placement prints easily.

Different Types of Lay

The following are the different types of Lay:

- Single Pick Lay
- Double Pick Lay
- Deficient Lay
- Multiple Lay
- Stepped Lay

1 Single Pick Lay:

When each and every component are picked up individually from the cut blocks is called Single Pick Lay. Single picks are carried out when the fabrics have right & wrong side and when left and right side components are different.

2 Double Pick Lay:

In this system, the fabric is laid in folded condition and the cut components are picked up in double. Since the fabric is laid in folded condition, there will be no disturbance in the left or right side, when pick up.

3 Deficient Lay:

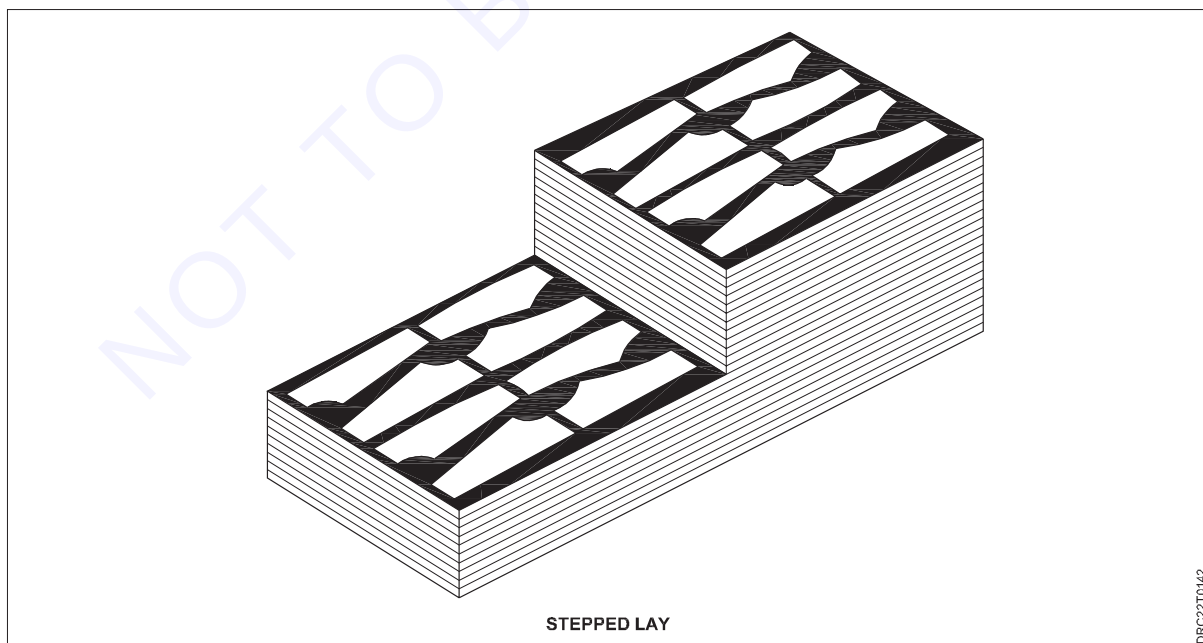
In order to make the optimum use of end pieces of the fabric in mass cutting, lays are prepared with a few components deficient. For instance, in case of shirt, the main lay is prepared with leaving few components such as Cuff, Collar etc. Such a lay set with deficient components is called as "Deficient Lay". A separate lay is made for the deficient parts using end pieces or lay balance of the fabric. Normally the inside parts of the garment are cut using deficient lay.

4 Multiple Lay:

Lays are called as "Multiple Lays" when the same are set for more than one unit. In order to effect economy, lays of two garments or three garments are set to effect optimum utilization. When we increase the unit of garments per lay length, the fabric consumption per garment is gradually reduced.

5 Stepped Lay.

According to the size quantities we can lay different length lays one by one for quick cutting. These types of lays are called as "Stepped Lay" because they form in a stepped manner. But, when using stepped lays, we have to consider the size quantities because, we are cutting all the lays at the same time.



Assignment

- 1 Collect different types of fabric swatches, analyze the fabrics and justify the suitable type of spread for the same.
- 2 With miniature patterns with different sizes and fabrics, prepare a multiple lay and analyze how the fabric consumption is reducing by increasing the no. of garments.
- 3 Collect a Checked Design fabric and form the double pick lay for a Gent's Shirt Front part.
- 4 With Miniature models, prepare a stepped lay and analyze its merits and demerits.

Questions

- 1 Define Spreading and explain the importance of Spreading in mass cutting.
- 2 Differentiate Lay, Laying, Lay out and Lay length.
- 3 Explain the methods of Spreading Process.
- 4 With neat sketches, explain the different types of Spreads.
- 5 Explain the different types of Lays followed in Mass Production.

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◆ MODULE 12 : Essential for Workplace ◆

LESSON 51 (1) : Safety Precautions in garment Industry

Objectives

At the end of this lesson you shall be able to

- understand the responsibilities, duties and rights regarding safety and health in apparel sectors
- prevent or reduce occupational accidents, diseases and dangerous occurrences
- promote a preventative safety and health culture in the garment industries
- quickly understand the exact meaning of the sign (even without reading the words).

The garments industry plays a significant role in the global economy, employing millions of workers worldwide. It is crucial to prioritize the health and safety of the workforce. 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.

Key health and safety requirements that should be upheld in the garments industry, includes:

Workplace layout and design

Industry is a place where some of products are produced by various machinery and worker. Because of too many workers do their work in a place, so they need to follow some rules and regulation to keep them healthy and safety.

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.

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

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.

Safety signs

Safety signs are important in the workplace because they

- Provide clear and concise instructions and warnings to employees and visitors
- Help to ensure that all personnel are aware of potential hazards and how to avoid them
- Play a crucial role in maintaining a safe work environment by alerting individuals to risks
- Enforce specific actions or behaviours
- Provide guidance on escape routes and emergency facilities

In essence, safety signs act as a visual reminder of the safety rules and regulations that must be adhered to in the workplace to prevent accidents and injuries.

There are 5 health and safety signs, and they all mean different things. Through shape and colour combinations, they can send their message through just a picture or icon.

- 1 Prohibition signs:** Prohibitions signs are there to tell you not to do something. They are a danger sign, telling you that it is not safe to proceed. Usually, these signs have a black image on a white and red background. For prohibition signs, a red circle with a strike-through line indicates which action must be stopped.



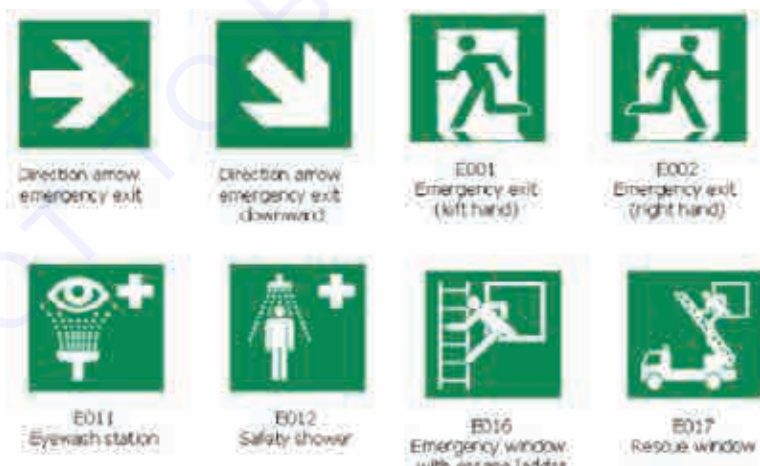
- 2 Mandatory signs:** Mandatory signs are there to tell you to do something. Consider these the opposite of prohibition signs. These signs are round in shape. The pictogram is white on a blue background. The circle usually has a white border. They are commonly seen at the entrance and tell employees that they must follow a certain action, such as wearing the appropriate mask.



- 3 Warning signs:** Warning signs are there to warn you of dangers. Unlike the two previous signs, they don't tell you not to do something, or to do something. They simply aim to make you aware of a danger, so you can protect yourself. These signs are triangular in shape. The pictogram is black on a yellow background, the triangle has a black border.



- 4 Safe condition signs:** Safe condition signs can usually be followed to safety. These signs are rectangular or square in shape. The pictogram is white on a green background, and will often have a white border.



- 5 **Fire equipment signs:** Fire equipment/fighting signs show you where fire equipment is. These signs are square or rectangular in shape. The pictogram is white on a red background, and will often have a white border.



LESSON 51 (2) : Needle guard policy

Objectives

At the end of this lesson you shall be able to

- know about needle guard policy
- understand the procedures of needle policy in garment industry.

Needle guard policy

Safety is the top priority to all the leading apparel brands. To eliminate the accident to the wearer due to the sharp items remaining in a garment, like a broken needle part, brands provide needle policy to their suppliers.

It is therefore mandatory that a Needle Control Procedure is adopted by all apparel manufacturers. It is not only for infant wear and kids wear manufacturers who need to follow the needle policy and each garment need to pass through the needle detector machine prior to packing the garment. Now, this becomes a discipline of the garment factory and a major component of the factory compliance checklist

Procedure

- No sewing machine operator is permitted to keep any spare needles at their Machine
- All stock and spare needles must be kept by the Concerned Production In- Charge.
- When there is a needle breakage, all remaining parts must be found. Operators must submit every piece of the needle before a replacement needle is issue.
- All broken needles must be replaced by the Concerned Production In-Charge. Sewing operators are not permitted to make the needle replacement themselves.
- If any part of the broken needle is not found, the sewn rolls must be pulled out for full examination with a hand held needle detection device. If the missing part still cannot be located, the sewn rolls must be destroyed.
- A record of all broken needles must be kept in the form of a "Broken Needle Record" It should indicate date, time, machine type, operation, and Shift and Product name. All broken needle parts of the needle must be attached to the Log as well. Production In-Charge must sign and indicate what action they have taken when the Log shows a portion of the needle was not found.

LESSON 51 (3) : Labour laws

Objectives

At the end of this lesson you shall be able to

- know about Labour laws and its categories
- understand the importance & objectives employment law.

Introduction

Labour law also known as employment law is the body of laws, administrative rulings, and precedents which address the legal rights of, and restrictions on, working people and their organizations. As such, it mediates many aspects of the relationship between trade unions, employers and employees.

In other words, Labour law defines the rights and obligations as workers, union members and employers in the workplace. Generally, labour law covers:

- **Industrial relations** – certification of unions, labour-management relations, collective bargaining and unfair labour practices.
- **Workplace health and safety**
- **Employment standards**, including general holidays, annual leave, working hours, unfair dismissals, minimum wage, layoff procedures and severance pay.

There are two broad categories of labour law.

First, collective labour law relates to the three way relationship between employee, employer and union.

Second, individual labour law concerns employees' rights at work and through the contract for work.

Labour laws in india

The law relating to labour and employment in India is primarily known under the broad category of "Industrial Law". The prevailing social and economic conditions have been largely influential in shaping the Indian labour legislation, which regulate various aspects of work such as the number of hours of work, wages, social security and facilities provided.

The legislations can be categorized as follows:

- 1 Labour laws enacted by the Central Government, where the Central Government has the sole responsibility for enforcement.
- 2 Labour laws enacted by Central Government and enforced both by Central and State Governments.
- 3 Labour laws enacted by Central Government and enforced by the State Governments.
- 4 Labour laws enacted and enforced by the various State Governments which apply to respective States.

Some of the important objectives of labour laws are as follows-

- Establishment of all kinds of justice for the working people – social, economic, and political.
- The availability of equal opportunities to all workers, irrespective of caste, creed, religion and beliefs for their overall personality development.
- Protection of weaker sections of workers who are not financially well off to protect themselves.
- Maintenance of industrial peace.
- Protection and improvement of living standards of the labourers.
- Protection of workers from all sorts of exploitation – mentally or physically and creating a better working environment.
- Grant rights to workmen to unite and form their unions so that they could bargain collectively with their owners for the betterment of their livelihood.

- Keep checks on the government about their active participation in the working areas for social well-being.
- Ensures human rights and human dignity.

Child labour (prohibition and regulation) act, 1986 & the child labour (prohibition and regulation) rules, 1988

The Child Labour (Prohibition & Regulation) Act, 1986 was enacted to prohibit the engagement of children below the age of fourteen years in factories, mines and hazardous employments and to regulate their conditions of work in certain other employments. According to the Act, no child shall be employed or permitted to work in any of the occupations set forth in Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule is carried on, provided that nothing in this Act shall apply to any workshop wherein any process is carried on by the occupier with the aid of his family or to any school established by, or receiving assistance or recognition from the Government. Also, the Central Government may, by notification in the official Gazette, constitute 'the Child Labour Technical Advisory Committee' to advise the Central Government for the purpose of additions of occupations and processes to the Schedule of the Act.

LESSON 51 (4) : Ergonomics

Objectives

At the end of this lesson you shall be able to

- know about ergonomics and its aspects
- understand the importance of ergonomics in garment industry.

Definition of ergonomics

Ergonomics (Greek: Ergon = work + Nomos = custom, law) is an interdisciplinary scientific approach to problems of adjusting work to humans, aiming to increase productivity, i.e. working efficiency, work safety, and humanization of human labor.

The goal of ergonomics is to be studied and adapted to conditions of work, means of work, work process, and the product as a result of human work from the psychological, physiological and anatomical aspects, instead of adjusting a worker to the needs of a job.

Adaptation of work to humans has the following three aspects:

- Adjustment of machines and tools, which should be designed, constructed and shaped, thus respecting human anatomical, physiological, psycho-physiological, and psychosocial characteristics, i.e. capabilities and limitations.
- Adjustment of working methods with respect to body positions and movements, allocation of work, i.e. work operations and their arrangement, organization of resources for work (work objects and tools) and, work organization (machine layout and synchronization of transport) so that the selected method of work with the least stress and fatigue should give the maximum effect.
- Adjustment of working environment, with regard to objective physical conditions, using their optimum arrangement, to provide a sense of comfort while performing work that affects the work efficiency.

Ergonomic design of workplace in garment industry

If the work environments in the garment manufacturing industry are unhealthy and unsafe for workers, it might result in several health problems. Therefore, it is important to analyze each workplace in the production of garments and find a way on how to reduce the health problems of workers to a minimum with maximum increase of productivity.

Ergonomics in the storage of textile materials

Warehouse is the space for the storage of textile materials where they can be taken in and saved from various physical and atmospheric influences until they are delivered into production or a cutting room. The storage of textile materials is a very responsible operation because improper storage, weather conditions, negligence or improper manipulation all lead to ruining and destroying supplies. Textile materials are large investments for garment manufacturers and bad storage might result in big losses.

Ergonomic workplaces in garment manufacture preparation

The task of preparing the production is to determine all the circumstances of production so the process can be carried out normally, with no improvisation. Preparation of production includes constructional, technological and operational preparation.

Technological preparation includes determining the technological process, the selection of machines, tools and determining the material quality.

Operational preparations include developing plans for individual production facilities, determining the amount of material, determining the time of manufacture, the production of necessary documents and so on.

Ergonomics in cutting room

In the technological process of clothes cutting, lifting, transferring and putting of textile bundles on the cutting tables or on the machine for laying of cutting layers are considered to be the most difficult physical tasks.

Lifting and carrying loads are among the most difficult works that burden the body; hence, textile materials must be transported by trolleys into the cutting room.

Safe operating on cutter machines requires electrical cords to be intact and the correct power switch. Electrical cords should not be conducted along the places where employees move, or, if it is not possible, the places where cables are set should be secured and marked so as not to be a threat for the employees when moving. When cutting, workers are required to wear a protective metal glove.

Ergonomics in sewing room

Sewing involves repeated movements of the shoulder and arm, a static position of the spine and lower extremities, as well as the inclination forward while the job is done throughout the working hours. Proper ergonomic design of each workplace, along with finding suitable methods of work with the appropriate time standards, ensures better structure of technological operations with the increased efficiency of sewing machines. Working posture at sewing machines should allow mobility of the limbs, an ergonomically favorable arrangement of working and visible zones and a stable, balanced state when performing the work process. Technological processes of sewing clothes are performed on production lines with a large number of technological operations where each technological operation does not last long and has a significant psychological, physical workload for each worker.

Ergonomics in finishing room

Finishing and pressing are two processes that have the greatest influence on the finished look of a garment. Fusing creates the foundation and pressing puts the final seal of quality on the garment. This process includes checking of garment, measurement checking, ironing, and spotting. After sewing of the garments, all pieces are checked by a quality checker to ensure that garments are being made as per buyer quality standard. Checking normally is done for visual appearance and measurements. Spotting is required to remove stain in the pieces. In the quality section, there is a lot of stress on the eyes, leading to headache and visual discomfort. Therefore, it is necessary to work use protective equipment to maximum safety of workers.