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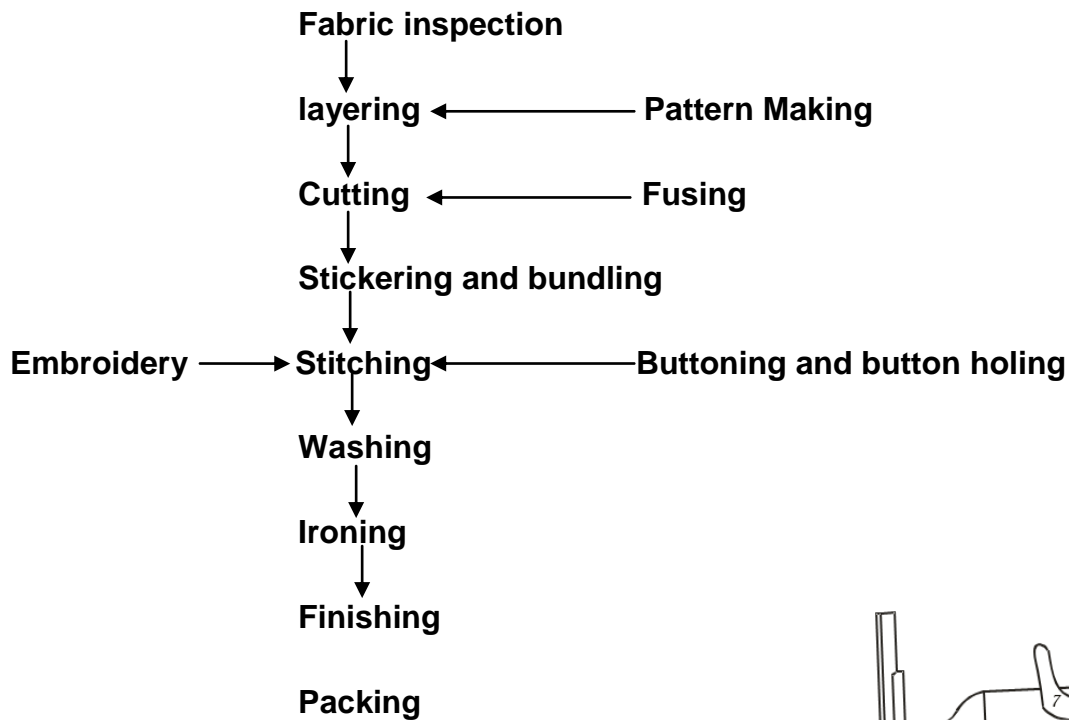
1. Basic Textiles terms

Yarn	Basic raw material for weaving/Knitting
Type of yarn	Single ply, double ply and multiply
Yarn count	Defines thickness of yarn. Higher the count, finer the yarn
Warp	Lengthwise yarn in the fabric.
Weft (filling)	Width wise yarn in the fabric.
Selvedge	Edges of the fabric running lengthwise
Woven Fabric	Woven fabrics are made by using two or more sets of yarn interlaced at right angles to each other.
Knitted Fabric	Knitted fabrics are formed by series of interlocking loops (example: knit wears)
Sewing Thread	Sewing Thread is a type of yarn used for sewing.

2. CUTTING

- CUTTING is the preproduction process of separating (sectioning, carving, severing) a spread into garment parts that are the precise size and shape of the pattern pieces on a marker.
- Cutting often is carried out in two stages: rough cutting (separating the individual pieces) and the final cutting (accurate cutting of the individual shapes).

➤ **Sequence of Operations In Garment production**



3. Different Types of Fabric Cutting Machine:

According to the operating process, the Cutting Machine can be classified into three types. Such as-

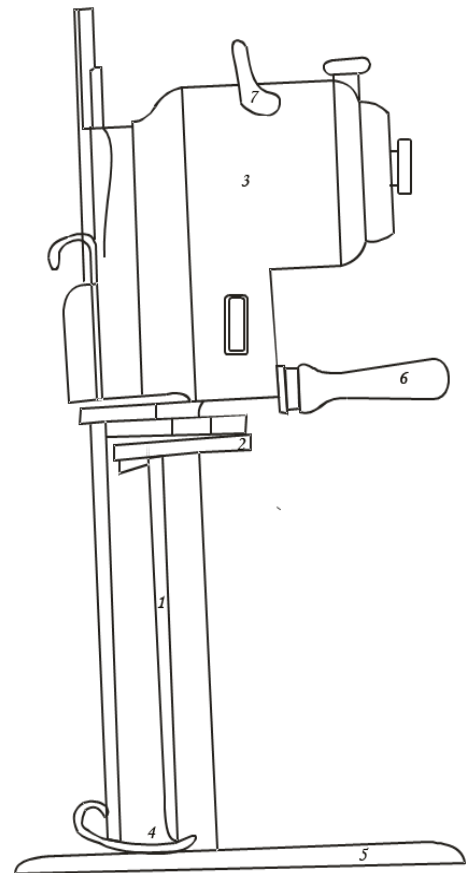
1. Manual
2. Semi- Automatic
3. Automatic / Computerized

1) Manual Cutting Machine:

- Hand Scissors.

2) Semi-Automatic Cutting Machine:

- Straight knife of Cutting Machine.



1. Knife/Blade

Knife height is 10 cm to 33 cm. Knife stroke is 2.5 cm to 4.5 cm.

2. Sharpener

It is small band with Grinder/sharpening material on it and its main function is to sharpen the blade.

3. Motor

Motor r.p.m. is 3000 to 4000 and its main function is to move the blade up and down and also slightly in front direction to create a stroke on fabric.

The Knife cuts the fabric very fast due to high speed of motor which increases the risk of fabric damage.

4. Fabric presser

It is a device in the machine which holds the layers of the fabric tight to make it easier for the cutter to cut the fabric.

5. Base plate

Wheels are under the base plate to move the machine smoothly as the weight of the Machine is around 12-15 kg.

6. Moving handle

This handle is to hold the machine as well to move in Predefined direction

7. Transport handle

A handle to transfer the whole assembly from one place to another

- **Round Knife Cutting Machine.**

Features of Round Knife Cutting Machine:

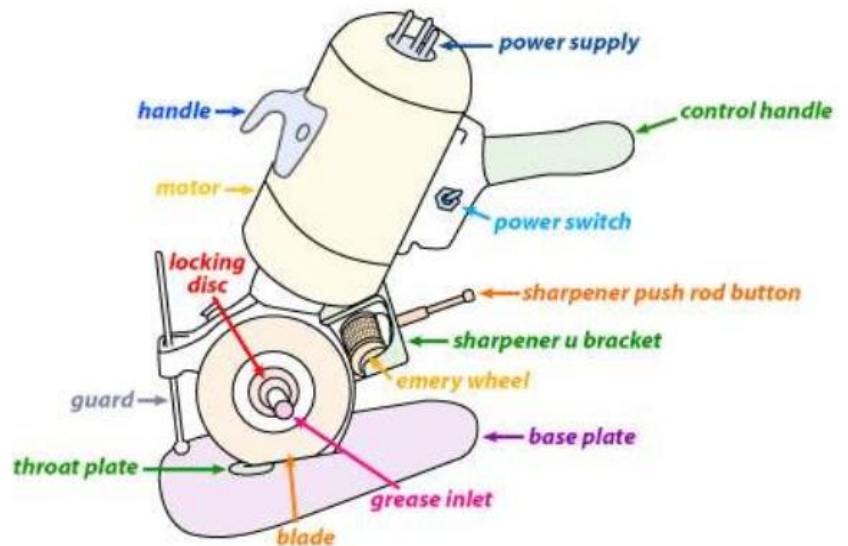
- It contains a round but slightly octagonal type knife with sharp edge.
- The other main parts of this machine are base plate, electric motor, handle & knife guard.
- Knife diameter varies from 6-20 cm.
- Manual grinder is used.
- Motor r.p.m. is 800-1600. It depends on machine.
- A handle for the cutter to direct the knife.
- Easy to handle & movement due to low weight.
- Knife is lubricating manually.
- Base plate gives support for fabric.
- Maximum 40% of the knife diameter can be used for fabric lay



- **Band Knife Cutting Machine.**

Main Features;

- This machine works based on saw mill technique.
- Fabric cannot be cut directly from lay.
- Block pieces of fabric required in bundle from to cut in this machine.



- Blade moves vertically through a flat working table.
- Machine remains stationary and fabric is moveable.
- It comprises a series of three or more pulleys, which provide the continuous rotating motion of the knife.
- An endless knife is used in this machine.
- The Knife is usually narrower than a straight knife.
- A large size of table is used to support the fabric & for cutting.
- Air blower blows the air to minimize the weight of fabric.
- Balls in air blower help to move the fabric in different direction.
- Automatic grinder is used.
- In this method, the machine is stationary but fabric is movable.
- High speed motor is used.
- Life time of Knife depends on fabric type & uses of machine.

- **Die Cutting Machine.**

1. Die cutting is a 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.
2. 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.
3. Die cutting is mainly used for cutting embroidery applique, shoulder pads, cap, shoe & backpack items to get high standard of accuracy. The only drawback is that it is appropriate to situations where large quantities of same pattern are cut.



- **Notcher Machine.**

Features of Notcher Machine

- A knife 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.
- An alternative machine, the hot notcher, incorporates a heating element to scorch the fibers adjacent to the notch in order to prevent fraying and disappearing. This cannot be used for thermoplastic fibers and certain unlined garments

NOTCHER CUTTING MACHINE



Hand Notcher



Notcher machine

- **Drill Machine.**

Features of Drill Machine:

- The drill mounting includes a motor, a base plate with a hole to allow the drill to pass through, and a spirit level to ensure that the base is horizontal and the drill is vertical.
- The momentum of drill is completed at 90° angle in the fabric lay by the level of sprit.
- On many fabrics the drill used is cold and the hole remains visible until the sewing operator starts to use it.
- For tightly woven fabric the hole is permanent for a long time.
- On looser weave fabrics, where the hole may close up, a hot drill is used, which will slightly scorch or fuse the edges of the hole to make it permanent for a long time.
- A hypodermic (or dye spot) drill may also be used which leaves a small deposit of paint on ply of fabric to find the mark place easily.
- All drill holes must eventually be concealed by the construction of the garments.



Rib Cutting Machine

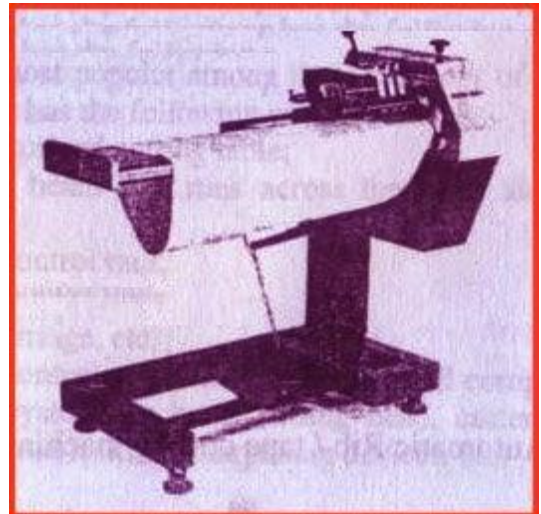
- These are specialized machines used to cut rib or rolls of strips from knitted tubular fabrics.
- They can also cut strips from woven, vinyl or other fabrics.
- Most of the factories use them for rib cutting in knit garment factories. There are machines which are quite simple. There are other types which are automatic and with computer control, with multiple speeds and are equipped with winding and tension control devices.

3) Computerized Cutting Machine:

- **Knife Cutting Machine.**

This methods provides the most accurate possible cutting , at high speed,.

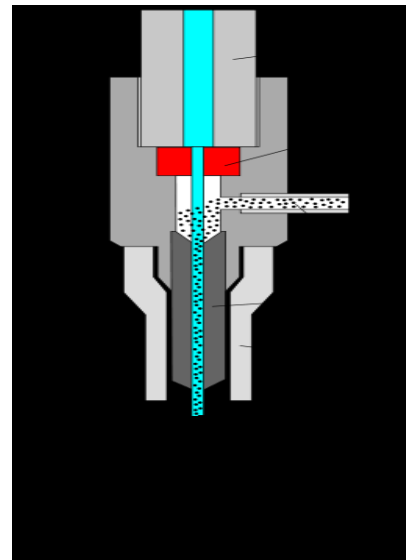
- A typical computer system has a table with a cutting surface consisting of nylon bristles which support the fabric lays but are flexible enough to permit penetration and movement of the knife blade which is supported only on the top.
- The bristles also allow the passage of air through the table to create a vacuum, reducing the height of the lay and holding it in place .
- It is ideal for placing notches in a lay and has a depth adjustment guide to stop you notching too deeply. It has a depth capacity of 200mm and selectable temperatures of 300, 400 or 500°C.
- Fast cutting by computer controlled system.
- Suitable for very large-scale production.
- Speed of cutting can be controlled.
- Cutting defects are less than other methods of Cutting.
- Less labor cost.
- It does not require marker paper.



- **Laser Cutting Machine.**

Laser cutting processing depends on its precise processing, faster, simple operation, high degree of automation has been widely used in the leather and textile garment industry.

Laser cutting machine is not only with low price, low consume, more over laser processing doesn't have mechanical stress to the work piece, so the precision and cutting speed of the cut products' result are very well.



- **Water Jet Cutting Machine.**

A water jet cutter, also known as a waterjet, is a tool capable of slicing into metal or other materials (such as granite) using a jet of water at high velocity and pressure, or a mixture of water and an abrasive substance. The process is essentially the same as water erosion found in nature but greatly accelerated and concentrated.

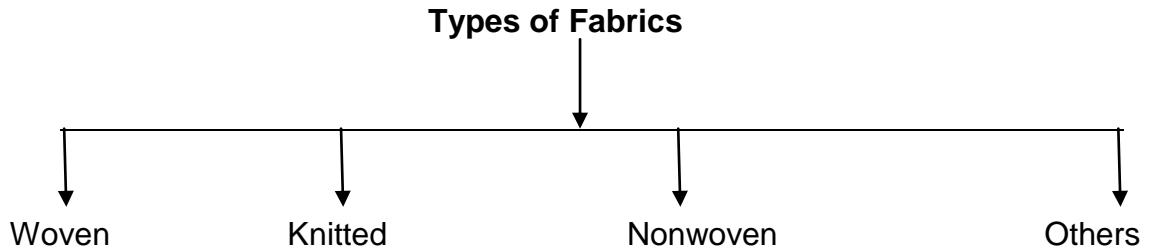


Some Other Computerised Cutting machines are as follows

- Airjet Cutting Machine.
- Ultrasonic Cutting Machine.
- Plasma Torch cutting Machine

4. Various types of fabric

Fabrics:- Sets of yarns are used for formation of fabric, Fabrics are produced in number of ways which are detailed below:



- Woven Fabric: A woven fabric is composed of two basic series of yarn called warp and weft.
- Knitted Fabric: Fabric which are constructed by interlocking a series of loop of one or more yarns by hand or by machine are called knitted Fabrics.
- Non Woven Fabric: It is produced by mixing fibers and making into the form of a thick layer of web of width corresponding to desired width of the fabric.
- Other Fabrics: Braids, Lace, Netting, Felt etc

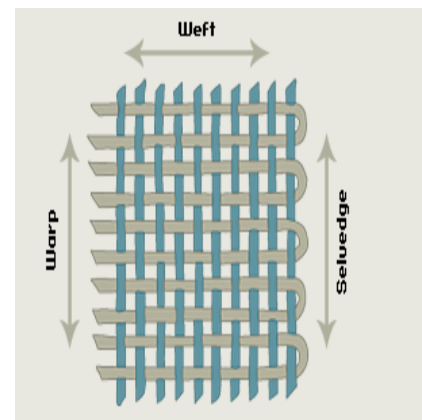
Parts of Woven fabrics:

Body: It is the main portion of the fabric containing the intended fabric design.

Selvedge: It is the narrow woven edge portion of the fabric parallel to the warp, made with special strong yarns in a closer construction than the body to prevent unraveling.

Face: It is the intended front side of the fabric.

Back: It is the intended back side of the fabric.



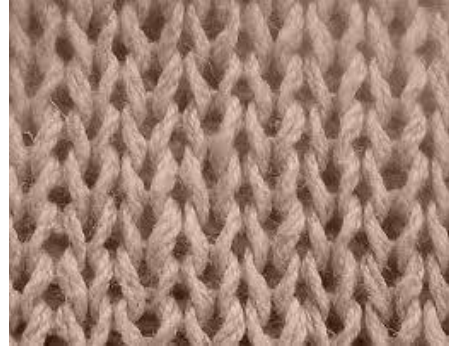
Two base knitted fabric structures

Weft Knitting :

In Weft knitting loops are made in a horizontal way from single yarn

Intermeshing of loops takes place on a course-wise.

Type of weft knit: Plain Jersey Knit , Purl Knit, Rib Knit , Patterned Knits & Double Knits.



Warp Knitting:

In warp knitting loops are made in a vertical way along the length of the fabric from each warp yarn

Intermeshing of loops takes place on a Wale-wise.

Type of warp knit: Tri-cot , Rachel knits .



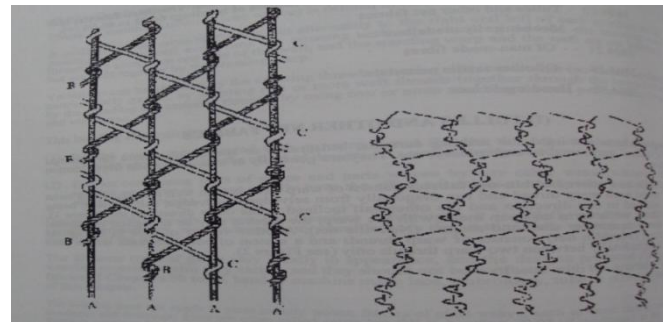
Lace Fabric

Lace is an ornamental or decorative openwork fabric in which design elements formed by the inter twisting of threads are joined either by meshes, usually of regular size & shape, forming an apparent openwork fabric.



Net fabric

It consists of warp threads with weft threads which twist around each warp thread & run diagonally from selvedge to selvedge. Net fabrics have three series of threads parallel warp threads, mesh threads & binding threads.



Categorization of the fabric based on Processing:

- Grey Fabric
- Bleached Fabrics
- Dyed Fabrics
- Yarn Dyed Fabrics
- Tie and Dye Fabrics
- Printed Fabrics
- Printed warp Fabrics

Categorization of the fabric based on Pattern:

- Plain Fabric
- Strips Fabric
- Checks Fabric
- Figured- Dobby & jacquard Fabric
- Embroidered Fabric

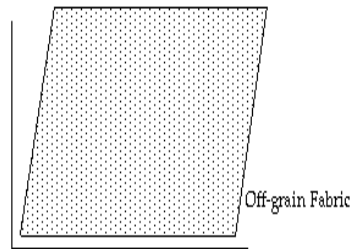
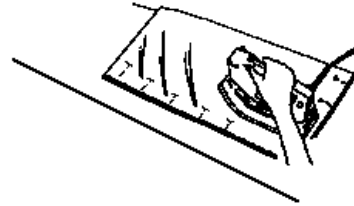
Some Of the common market terms of the fabric used in Garment Industry

2x2	Fabric in which two fold yarn is used in both directions.
2x1	Fabric having two fold yarn in one direction and single yarn in other direction.
Brocade	Rich heavy fabrics woven on jacquard looms having floral or figured patterns emphasized by contrasting surfaces or colors.
Cambric	A light weight closely woven plain weave fabric usually with a stiff finish for giving weight and appearance.
Canvas	Heavy durable cotton fabric made from coarse, hard twisted yarns.
Chiffon	A transparent sheer fabric of plain weave. Yarns used are highly twisted. Usually has a soft finish.
China Silk	A very soft, extremely light weight silk made in a plain weave. Used mainly for linings. Irregularities of threads, caused by extreme lightness and softness of china silk are the characteristics of the fabric.
Corduroy	A ribbed pile fabric with a high, soft luster. Made with extra warp or weft threads. During weaving, the extra filling yarns form loops or floats over the ground threads. After weaving, the loop threads are cut. Threads are then brushed forming a pile.
Crepe	Wide range of fabrics come under this name like crepe de chine, crepe charmeuse, crepe-back satin etc., they have pebbly texture and made with high twist yarn.
Denim	Traditionally a 3/1 warp – faced twill fabric made from yarn-dyed warp and undyed weft yarn.
Drill	A twill fabric of similar construction to denim but usually piece dyed.
Georgette	A fine light weight, open texture fabric usually in plain weave made from crepe yarns usually two 's' twisted and two 'z' twisted yarns are used in warp and weft.

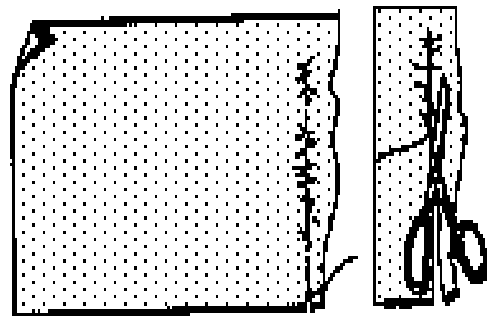
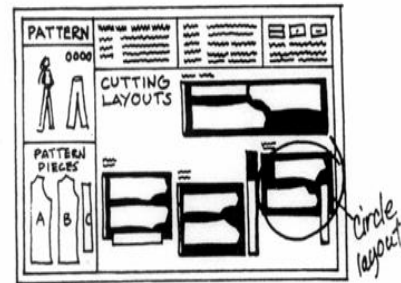
Flannel	An all wool fabric of woolen type woven in plain weave or single twill. During finishing, surface fibre is developed so that the weave is partially or completely hidden. They are produced in white or in wool dyed mixtures and is soft.
Flannelette	It is a raised cotton fabric made to imitate true flannel.
Long cloth	A fine plain weave closely woven high count fabric.
Muslin	A lightweight, open cloth of plain weave or simple leno weave.
Organdie	A thin, open and translucent fabric with stiff handle made from cotton, woven in plain weave and given special stiff translucent permanent finish.
Poplin	A durable plain weave class of fabrics having warp yarns that are considerably finer than the weft yarns with about or three times as many ends per inch as picks.
Spun Spun	x Fabric in which spun yarns are used in both the direction.
Tafetta	Crisp fabrics with fine, smooth surface usually made in the plain weave, sometimes with a small crosswise rib. Originally made in silk now made in man-made fibres also.
Texturised yarn	Any yarn modified in such a way that its physical and surface properties have been changed.
Voile	A light weight, sheer fabric of plain weave made from fine yarns of substantially more twist.

5. PREPARING THE FABRIC FOR CUTTING

- Preshrink all fabric and notions (with the exception of thread and closures) before cutting.
- Notions such as trim, zippers, and some interfacings should also be pre-shrunk. Straighten fabric ends to coincide with the crosswise threads by snipping close to the selvage and pulling a crosswise thread until it puckers across the width of the fabric.
- Cut along the puckered line, this gives a straight grain to begin working from.
- Some sturdy fabrics may be ripped across the width to find the crosswise grain. This ripping process must be a quick, smooth motion, or the fabric will rip down the lengthwise grain as well.
- Not all fabrics will tear, so the most accurate, albeit the most time consuming method, is to pull a thread.



- Fabric is on grain when the crosswise and lengthwise threads are at a perfect right (90 degree) angle to each other. To determine if your fabric is on grain lay it out on a cutting table aligning a large corner of the fabric with the corner of the table. If the corners do not match, the fabric must be realigned. If the fabric is only slightly off grain fold the fabric in half, pinning the selvages together every two or three inches and steam press threads into proper alignment.
- If your fabric is very off grain, it can be straightened by stretching and pulling the fabric in the opposite direction from the way the ends slant until a perfect right angle corner is formed.
- Lightly press the fabric to remove the bolt fold line and any wrinkles present.



6. LAYERING OR SPREADING PROCESS

- A layout is a plan for the placement of pattern pieces on the fabric.
- These are based on pattern size, fabric width, and type of fabric (napped, one-way design, etc.).
- After deciding on a layout view for the pattern size and fabric width, circle it so it is easy to see.
- Then, look carefully at the layout to find if the fabric is folded, is it lengthwise or crosswise or a combination of the two.

Spreading of fabric Step 1



Spreading of fabric Step 2

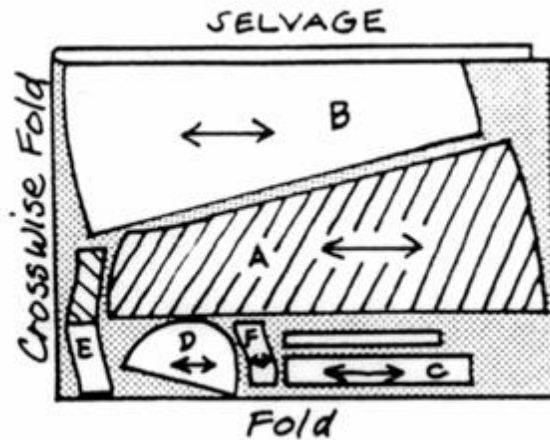


Spreading of fabric Step 3

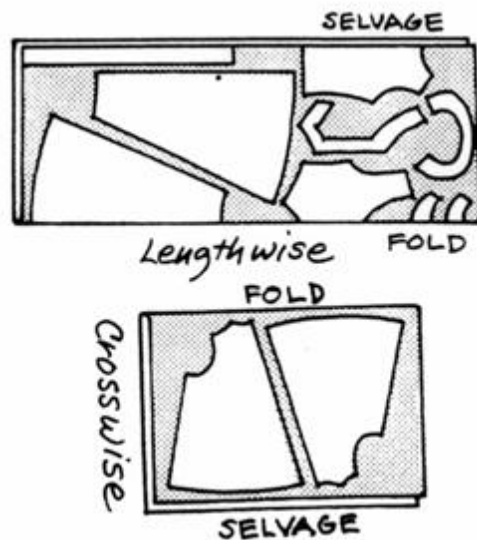


Laying out the pattern pieces in preparation for cutting the garment.:

- Lay out all pattern pieces before cutting. Commercial patterns have a lay out guide for each view and size. Consult this before beginning. Before Cutting Lay out all pieces correctly otherwise it may result in shortage of fabric.



- Place pattern pieces printed side UP unless otherwise indicated.
- Pin first the lengthwise and crosswise grainlines and foldline. Each grain line must be checked by measuring from the grainline to the selvage edge of the fabric at top and bottom of the grain line.
- Place the pins perpendicular to and about 1/4" inside the cutting line. At corners, place the pins diagonally. Space the pins two to three inches apart and in case of very slippery or sheer fabrics make it closer.



- As often as possible, cut directionally with the grain.
- Never lift the fabric from the table. Keep one hand flat on the pattern piece while cutting.
- Cut the garments out with long, steady strokes.
- Cut each pattern piece the correct number of times. Pockets, facings, cuffs, welts, etc. may need to be cut multiple times.

- Save fabric scraps from cutting, these pieces may be necessary for plackets, buttonholes, etc. or can be used to test tension, press-ability, etc.
- Fold the cut pieces softly and lay on a flat surface. Do not bunch the pattern and fabric pieces up, as the pattern may come off before all markings have been transferred.

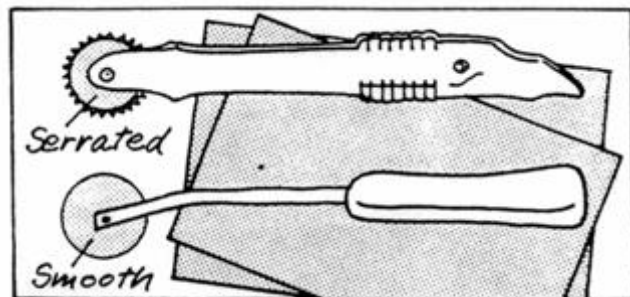
7. MARKING ON FABRIC

- Marking should be done as soon as the garment sections have been cut and before the pattern pieces have been removed.
- Pattern symbols to be marked include ***darts, pleats, tucks, and matching circles***. Beginners should also mark seam lines.
- In some situations, marking a seam line is important to even the most experienced sewer.
- Always test the marking method on a fabric scrap before using it.

Tracing wheel and dressmakers TRACING PAPER MARKING METHOD

It is suitable only for firmly woven fabrics. It is especially good for woven linings and interfacing. It is not appropriate for:

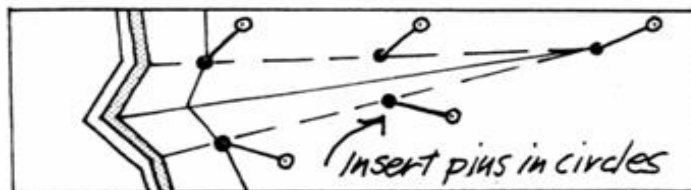
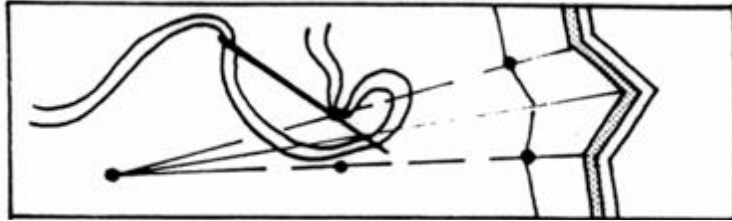
- Sheers or light colors as marking may show through to the right side.
- Knits or stretch fabrics as marking will not be accurate because of the stretchiness of the fabric.
- Woollens may be too thick for tracing to transfer well.
- Silk/silk-like or napped fabrics because the teeth from the wheel may pick or mar the fabric.



Tailor's tacks marking method

IT takes a lot of time but is the best choice for delicate fabrics. Tailor's tacks are used to mark circles on high quality fabrics and fabrics that are loosely constructed. To make it:

- Use a hand needle with double thread (unknotted).
- At each circle (dot on pattern) take a stitch through both fabric layers forming a 1-inch loop, leaving about 2 inches of thread at the beginning and at the end.
- Gently pull off the pattern piece, being careful not to disturb loops.
- Pull the two fabric layers apart.
- Clip the thread between the two layers of fabric, so each layer has a marking.

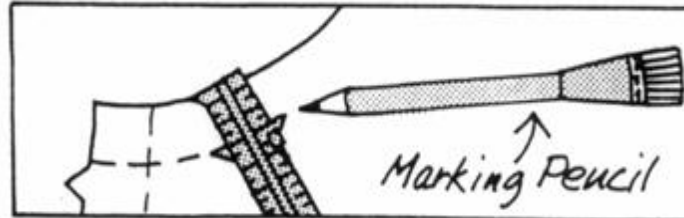
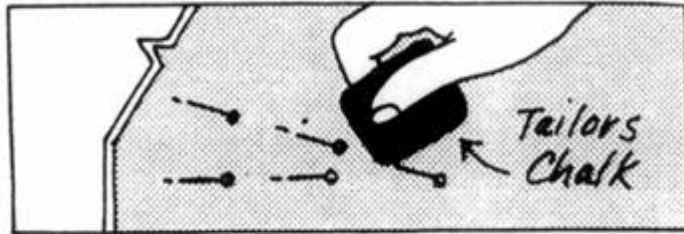


PIN MARKING METHOD

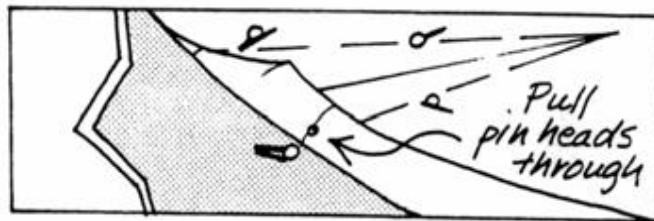
- Insert pins into all circle markings on the pattern.
- Turn garment piece over and insert another pin where the first pin is. This marks both garment pieces when pattern has been cut on double-thickness.
- Unpin pattern pieces from the fabric and pattern.
- Pull garment sections apart. Insert pins into fabric while stay stitching, or immediately fold to form dart, matching pins.

Tailor's Chalk, Dressmaker's Pencils, Soap Slivers Marking Method

- Tailor's chalk, dressmaker's pencils, and soap slivers are primarily used for marking widths, such as hems and seams since they only mark one layer at a time. Each of these easily rubs off.
- Soap slivers can be used in place of tailor's chalk or dressmaker's pencil.



- Marking pens should be washable. Pens are used the same way as tailor's chalk, marking pencils and soap slivers. Fabric marking pens may or may not wash out and are accurate. Soap slivers are ideal, especially for washable fabrics



8. Operation Process for Computerized knife machine:

1. Set up the Machine

- Inspect the work area is free from hazards as per the safety norm of the organization functions
- Obtain and check the data on the job card and carry out in line with the responsibilities of the job role.
- Calculate the number of components needed for production
- Agree and review the agreed upon work targets with the supervisor
- Set up the machine



Putting Cut pieces as per style and grading

2. Operate the machine as per the requirement and Load the fabric for cutting

Ensure no defects on the material before going ahead for cutting

Determine the mechanisms of the machine and make sure that the motors along with the cutting knife functions well, before the actual bulk cutting takes place. Meet company usage tolerances for efficient pattern interlocking

Check with others when unsure of new product details

Make sure when cutting the material
Avoid damaging self and others also
Avoid damage to the knife and other equipments



Cutting operation by Computerized cutting machine

3. Put cut components off the table and bundle in groups

- Identify the cut parts, count tickets and then group them well to pass on to the next department
- Ensure the bundled tickets have all the necessary information
- Dispose of waste materials safely and return reusable materials

- Report defects in the machine one does not have the authority to repair
- Report risks/problems likely to affect services to the relevant person promptly and accurately
- Complete forms, records and other documentation.



Set up the Cut plan to the machine

9. SPREADING AND CUTTING DEFECTS

Spreading defects

1. Uneven Spreading:-Front edge of lay is not even, resulting in front or back edge of marker not catching all ply.
2. Narrow Material:-Bolts or rolls of material too narrow to cover marker width.
3. Missed Sectional Breaks:-Sectional marker breaks too long or too short. Parts in lay will be short or material wasted.
4. Improper Tension:-Cloth spread too tight or too loose, causing parts not to fit in sewing or distorting dimensions of garments.
5. Mismatching Plaids:-Material spread too loose or too tight causing plaid lines to run diagonally or bow.
6. Misdirected Napping:-Air pockets not removed. Napped material reversed in spreading.
7. Improper Matching of Face of Material:-Not spread face down, face up or face to face as required.

Cutting Defects

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

10. Maintenance of Cutting machines

- Handle materials, machinery, equipment and tools safely and correctly
- Use correct lifting and handling procedures
- Use materials to minimize waste
- Maintain a clean and hazard free working area
- Maintain tools and equipment properly
- Carry out running maintenance within agreed schedules
- Carryout maintenance and/or cleaning within one's responsibility
- Report unsafe equipment and other dangerous occurrences
- Ensure that the correct machine guards are in place
- Work in a comfortable position with the correct posture
- Use cleaning equipment and methods appropriate for the work to be carried out
- Dispose of waste safely in the designated location
- Store cleaning equipment safely after use
- Carryout cleaning according to schedules and limits of responsibility.

11. Safety Measures

Danger areas should be clearly marked and access restricted by barriers, especially at cutting tables.

- Warning signals should be fitted to indicate when blade is in motion on motorised and automatic cutting tables.
- Trip guards or other devices in operation should be used to prevent access where layup machines are in use.
- Machines should be fitted with automatic adjustable guards to fully cover the exposed part of the cutting blade.
- Make sure that electrical conductors are in good condition



- Five-finger chain mail gloves should be available for use that fit all operators and worn at all times during cutting work and when handling blades
- Regularly check the condition of the light, guard and table fittings
- Put an effective cleaning system in operation that prevents build up of fluff, fly and off cuts
- Document a safe system of work for changing and disposing of cutter blades
- Old blades should be disposed of in a safe manner that precludes their use as DIY hand knives etc
- Report hazards and potential risks/ threats to supervisors or other authorized personnel
- Participate in mock drills/ evacuation procedures organized at the workplace
- Undertake first aid, fire-fighting and emergency response training, if asked to do so
- Take action based on instructions in the event of fire, emergencies or accidents
- Follow organization procedures for shutdown and evacuation when required