DEPARTMENT: - FASHION TECHNOLOGY AND DESIGN, MLSU, UDAIPUR

COURSE: - DIPLOMA IN FASHION DESIGN AND TECHNOLOGY

SUBJECT: - APPAREL CONSTRUCTION MANAGEMENT (DFDT1001T)

UNIT-1 SEWING COMMON TERMS

GRAINLINE-

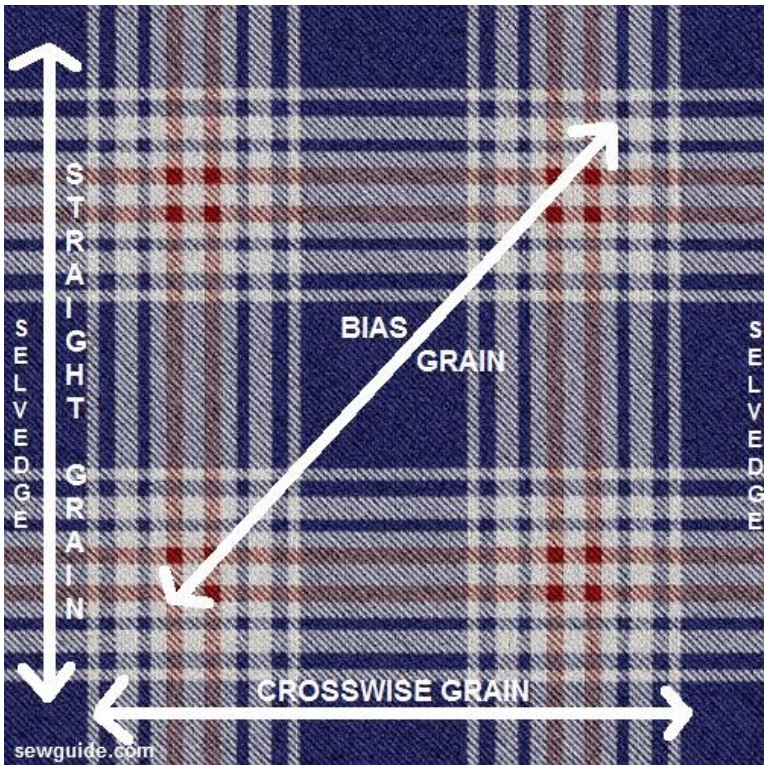
Grain line is essentially the weave of the fabric: which direction the threads are running. It's important to understand because how you cut out a garment will change how the finished garment behaves. More on that in another post.

There are three grains: straight grain, cross grain, and true bias.

Straight grain, or **lengthwise grain,** are the threads going parallel to the selvedge of the fabric - the uncut edges that are bound so that they do not unravel.

The **cross grain** are the threads running the width of the fabric - from one selvedge to the other. It is perpendicular to the straight grain. If you picture the straight grain being the longer threads that run in a straight line the entire length of the bolt of fabric and the cross grain being the shorter threads that run across the width of the fabric

All fabric will have a direction to its yarns (woven threads). The threads will run lengthwise as well as crosswise in a woven fabric in a parallel fashion, interlocking with each other forming the fabric. Lengthwise yarns are called warp – they form the skeleton of the fabric; crosswise yarns which lie perpendicular to the selvedges of the fabric are called weft, or filling or woof.



In **terms of sewing,** a reference to the grain of the fabric indicates how the fabric should be cut so that the **lengthwise yarns will be parallel to the length of the body** for better fit and drape; ie. The lengthwise grain is cut so that they run vertically on the garment/body, and the crosswise grain runs horizontally across the body.

Why is a grain line so important in sewing?

For one, the lengthwise yarns of a fabric are stronger than the crosswise yarns. They fall and drape better when they fall down the body. The lengthwise yarns stretch lesser than the crosswise yarns.

Bias grain stretches more than either of these grains, with the true bias grain having the most stretch. This helps in better fitting according to the shape of the body. So it is important that you know the grain of the fabric before you cut the fabric.

Sometimes it may make sense budget-wise to cut the garment crosswise rather than lengthwise but you should do it knowing fully well that it may slightly stretch, sag at places like armpits and hems and may feel uncomfortable generally. Sometimes you end up with a distorted garment. The horror of it.

bias grain has a better fit and drape but needs more fabric than either of the other grain directions. So you will need to allocate more money for the project for a bias grain cut garment. If you are thinking of the purse you know which direction to go, or rather cut.

BIAS BINDING

Bias binding is double-sided, folded long strips of fabric that can be cut into different lengths and used for finishing, edging or binding a sewing or fabric project. Raw edges of fabric can be tucked inside the bias binding and sewed securely in place.

CASING

A casing is a folded over edge of fabric or an application that is applied separately to the garment. The end result is used to enclose a drawstring tie or elastic. Casings can be used at the waist, ankle or wrist when constructing clothing, or at the opening of a bag or purse. Depending on the application, there are a multiple types of casing to choose from. A few types include: invisible, joined, topstitched, multiple rows of elastic casing, or a casing with a drawstring cord.

DART

Darts are folds (tucks coming to a point) and sewn into fabric to take in ease and provide shape to a garment, especially for a woman's bust. They are used frequently in all sorts of clothing to tailor the garment to the wearer's shape, or to make an innovative shape in the garment. Fabric may be thought of as flat, and a dart has the effect of removing a wedge shaped piece and pulling the edges of that wedge together to create a shallow cone. This effect can be seen quite easily with a paper pattern by pulling together the edges of a dart intake as it would be sewn. Since fabric is generally more flexible than paper the fabric will shift around the apex of the cone and form a softer, but still curved, shape. In a garment a dart ends in a point at a full area of the body.

A dart in a flat pattern has two important properties: its point, the point in the pattern at which the dart aims or converges, and the intake, or the amount of fabric

taken in or removed. Since the dart can extend toward any edge of the pattern without affecting fit, the length of the dart intake at the edge of the fabric is not a good measure of dart intake. Rather, the angle subtracted from the pattern by the dart is what determines the dart's intake.

Manipulating darts in flat patterns

As long as the focal point of a dart and its intake remain the same, a dart can be rotated around its focal point, or stylized in one of several ways without affecting the fit of the garment.

Slash-and-spread dart rotation

An easy way to rotate a dart on a flat pattern is to slice a straight line from the dart point to another edge of the pattern (the slash). The two pieces thus created can then be pivoted (spread) at the dart point to shift the dart to the position of the slash.

Pin and pivot dart rotation

The pin and pivot dart rotation technique requires tracing a new pattern from the original. First, the pattern with the dart to be rotated is set on top of another piece of paper on which the new pattern will be traced. A pin is pressed into the dart point to hold that point in place. Then one leg of the original dart and an arbitrary part of the original pattern is traced onto the paper. This tracing starts from the one dart leg and continues from there to the new point where the dart will reach the outside of the pattern piece. The pattern is then rotated around the pinned dart point until the other dart leg lines up with the traced dart leg. Tracing can then continue from the same spot on the original pattern. The pattern is then removed and the new dart legs drawn between the dart point (marked by the pin hole) and the gap in the pattern created during rotation.

Dart equivalents

Pleats or gathers in the fabric can be used for the same purpose as a normal stitched dart. These are called dart equivalents. Darts can also be worked into style lines.

Two kinds of darts are common in blouses for women:

- Vertical darts— these are sewn from the bottom of the blouse to a point generally around the bust line. This type of dart may be found in the front, rarely in the back of a garment and are used by the garment maker to pull in the bottom of the blouse towards the wearer's waist.
    - Fisheye darts
- Bust darts— these are short triangle folds that provide space for breasts such that the fabric under the breasts isn't hanging, rather is fitting closer to the wearer. There are several subtypes of bust line dart
    - Center
    - Waistline
    - French
    - Side seam
    - Armhole
    - Neckline
    - Shoulder
    - T-dart
    - Inverted T-dart

DARNING

Darning is a sewing technique for repairing holes or worn areas in fabric or knitting using needle and thread alone. It is often done by hand, but it is also possible to darn with a sewing machine. Hand darning employs the darning stitch, a simple running stitch in which the thread is "woven" in rows along the grain of the fabric, with the stitcher reversing direction at the end of each row, and then filling in the framework thus created, as if weaving. Darning is a

traditional method for repairing fabric damage or holes that do not run along a seam, and where patching is impractical or would create discomfort for the wearer, such as on the heel of a sock.

Darning also refers to any of several needlework techniques that are worked using darning stitches:

- Pattern darning is a type of embroidery that uses parallel rows of straight stitches of different lengths to create a geometric design.[2]
- Net darning, also called filet lace, is a 19th-century technique using stitching on a mesh foundation fabric to imitate lace.
- Needle weaving is a drawn thread work embroidery technique that involves darning patterns into barelaid warp or weft thread.

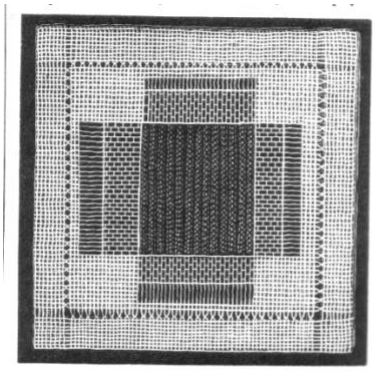


FIG. 272. CASHMERE DARN.

FIG. 279 SWISS DARNING.

DRESSMAKER CHALK

Dressmaker chalk /Tailor's chalk is traditionally a hard chalk used to make temporary markings on cloth or a garment. This type of special chalk marks the

spot on a garment where a garment might need to be taken in or let out, shortened or mark the placement of where to place an embellishment making it easy to see the exact placement.

1. Mark darts using tailor's chalk on a bodice of a garment for accuracy.
2. Use chalk to mark the location of where to alter a seam on a garment or project.
3. Chalk can be used to mark embellishment or button placement on a garment or craft project.
4. It is perfect for marking the location of where to shorten pants or jeans that are too long.
5. Draw a temporary line using tailor's chalk from the inside corner to the outside corner of your border pieces to create and mark a mitered corner on your next quilting project.

FACING

In sewing and tailoring, facing is a small piece of fabric, separate or a part of the fabric itself, used to finish the fabric edges. Facing makes a garment look professionally finished with the seams well hidden inside the folds of the facing. Facing is mostly used to finish the edges in necklines, armholes, hems and openings. They are also used widely in all other sewing like quilts and home decor items like curtain hems.

There are basically three types of facing. 1. Shaped facing 2. Extended facing 3. Bias facing

Shaped facings are cut to match the outside shape of the piece to provide a neat finish, and are often cut from the same pattern pieces. Shaped facings are typically made of the same fabric as the garment, but may also be made of lighter-weight fabric or in a contrasting color as a design element. Extended facings are extensions of the garment fabric, folded back and usually stabilized. Bias facings are strips of lightweight fabric cut on the true bias (US) or cross-grain (UK), and shaped rather than cut to match the edge to which they are applied.

Shaped facing

After sewing the structural seam of a facing, it must also be under-stitched to prevent it rolling to the outside. Under-stitching is done close to the seam line, attaching the facing to the seam allowance. A facing can also be used decoratively by applying it from the inside, allowing it to be turned to the outside as a contrasting piece. An all-in-one facing is used to finish the armhole and neckline of a garment together, all at once. Interfacing, grading and clipping the seams are all terms closely associated with facing.

FUSIBLE

Fusible interfacing is by far the easiest to use, especially for beginners. It has an adhesive on one side which bonds permanently with the fabric when applied with an iron, due to the combination of heat and steam. Fusible interfacing is suitable for most uses, but avoid it for:

- very textured fabrics – the glue won't bond well to the fabric
- napped fabrics (e.g. velvet / fur) – the pressing needed to bond the adhesive will crush the fabric
- fabrics that are very heat sensitive – e.g. sequins, metallics, vinyl fabrics (the heat can melt or distort the fabric)
- fabrics with a very loose or open weave e.g. lace, mesh (the glue may seep through to the right side of the fabric)

Whether to use sew-in or fusible interfacing can make subtle changes to the drape of a garment. For most beginner sewing projects, you will be absolutely fine with fusible interfacing; in fact I don't really recommend using sew-in interfacing until you are really comfortable handling multiple layers of fabric on the sewing machine. Badly sewn in interfacing can really affect the shaping of the garment and give it a poor finish, so unless you're feeling super confident, and / or your sewing pattern or fabric demands otherwise, stick to the fusible interfacing.

INTERFACING

Interfacing is an additional layer applied to the inside of garments or other sewing projects, in certain areas only, to add firmness, shape, structure, and support to areas such as collars, cuffs, waistbands and pockets; and to stabilise areas such as shoulder seams or necklines, which might otherwise hang limply.

Interfacings come in two main types (fusible or sew-in), three main weaves (non-woven, woven and knit), and in different weights (light, medium, heavy weight). It is important to choose the correct type of interfacing for your garment; if you are using a pattern, they will normally indicate if interfacing is required and what type you need.

Non-woven interfacing is made by bonding fibres together and therefore has no g rain. You can cut it in any direction, plus it will not ravel, so it is particularly easy to use, and is suitable for most uses (except stretch fabrics – see knit interfacing).

Woven interfacing, like woven fabric, has a lengthwise and crosswise grain. When you cut woven interfacing, be sure to match the grain of the interfacing with the grain of the part of the garment to be interfaced, to make sure the two layers of fabric work together properly. Because of the need to match the grainline, it is less economical than non-woven interfacing, which can be cut in any direction.

Knit interfacing is made by knitting the fibres together, and so it has an amount of stretch in it. Knit interfacing is especially suitable for use with jerseys and other stretch fabrics as it will stretch with the garment and not hinder it (if you apply woven interfacing to a knit fabric, you reduce the fabric's stretch properties as the interfacing layer is unable to stretch with the outer fabric layer).

The decision as to whether to buy woven, non-woven or knit interfacing is usually dictated by the pattern and/or type of fabric you are using. As a general rule, non-woven interfacing is suitable for most tasks unless you are sewing with a jersey of stretch fabric in which case knit interfacing is appropriate. You only really need to consider woven interfacing for particularly fine fabrics such as sheers and silks, where a very natural shaping is essential to preserve the qualities of the fabric.

GATHERS

Gathering is a sewing technique for shortening the length of a strip of fabric so that the longer piece can be attached to a shorter piece. It is commonly used

in clothing to manage fullness as when a full sleeve is attached to the armscye or cuff of a shirt, or when a skirt is attached to a bodice.

In simple gathering, parallel rows of running stitches are sewn along one edge of the fabric to be gathered. The stitching threads are then pulled or "drawn up" so that the fabric forms small folds along the threads.

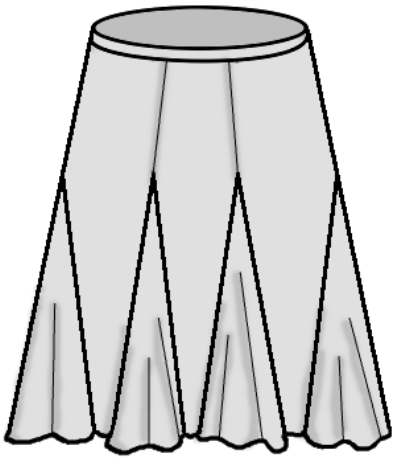
Gathering seams once involved tedious hand sewing of basting, which was time-consuming, especially with heavy fabric. However, finer gathers could be achieved. Now, a quick and easy way to make a gather is to use a wide zigzag stitch with a sewing machine. Both the upper and lower thread are pulled long and placed in front of the sewing machine. Then zigzagging is carefully sewed over top of the two threads without catching the threads as it is sewn. At the end the thread is pulled and is then gathered.

Types OF Gathers

- Pleating or plaiting is a type of gathering in which the folds are usually larger, made by hand and pinned in place, rather than drawn up on threads, but very small pleats are often identical to evenly spaced gathers. Pleating is mainly used to make skirts, but can have other uses.(See main article Pleat.)
- Shirring or gauging is a decorative technique in which a panel of fabric is gathered with many rows of stitching across its entire length and then attached to a foundation or lining to hold the gathers in place. It is very commonly used to make larger pieces of clothing with some shape to them.

GODET

A godet is an extra piece of fabric in the shape of a circular sector which is set into a garment, usually a dress or skirt. The addition of a godet causes the article of clothing in question to flare, thus adding width and volume. The most popular use of godets is in petticoats. Adding a godet to a piece of clothing also gives the wearer a wider range of motion.



A skirt with godets on the seams.

GORE

In clothing and similar applications, a gore is a triangular piece of a textile as might be used in shaping a garment to fit contours of the body.

The word is derived from Old English gār, meaning spear. In the course of time the word came to be used for a piece of cloth used in making clothes.[1] In dressmaking and hatmaking, it refers to triangular or rhomboid pieces of fabric which are combined to create a fuller three dimensional effect.
In knitting gloves and mittens, a "thumb gore" is often incorporated from the wrist part way to the tip of the thumb to accommodate the gradually increasing width of the hand.

GUSSET

In sewing, a gusset is a triangular or rhomboidal piece of fabric inserted into a seam to add breadth or reduce stress from tight-fitting clothing. Gussets were used at the shoulders, underarms, and hems of

traditional shirts and chemises made of rectangular lengths of linen to shape the garments to the body.

Gussets are used in manufacturing of modern tights and pantyhose to add breadth at the crotch seam. As with other synthetic underwear, these gussets are often made of moisture-wicking breathable fabrics such as cotton, to keep the genital area dry and ventilated.

Gussets are also used when making three-piece bags, for example in a pattern for a bag as a long, wide piece which connects the front piece and back piece. By becoming the sides and bottom of the bag, the gusset opens the bag up beyond what simply attaching the front to the back would do. With reference to the dimension of the gusset, the measurements of a flat bottom bag may be quoted as L×W×G. Pillows too, are often gusseted, generally an inch or two. The side panels thicken the pillow, allowing more stuffing without bulging.

The meaning of gusset has expanded beyond fabric, broadly to denote an added patch of joining material that provides structural support. For example, metal gussets are used in bicycle frames to add strength and rigidity. Gussets may be used in retort pouches and other forms of packaging to allow the package to stand. Gusset plates, usually triangular, are often used to join metal plates and can be seen in many metal framed constructions. Expanding folders or accordion folders also employ gussets to allow for expansion when containing more than just a few sheets of paper.

HEM

A hem in sewing is a garment finishing method, where the edge of a piece of cloth is folded and sewn to prevent unraveling of the fabric and to adjust the length of the piece in garments, such as at the end of the sleeve or the bottom of the garment.

Types of hems and hem stitches

Hems of different depths (which includes the seam allowance) may have a particular style to achieve, which requires more or less fabric depending upon the style. A handkerchief-style edge requires a hem allowance of 0.6 cm or a quarter inch. A typical skirt or pant hem may be 5-7.6 cm.[3] The hem's depth affects the way the fabric of the finished fabric will drape. Heavier fabric requires a relatively shorter hem.[4] An interface fabric sewn to the fabric in the hem has a useful function in some hem styles. A bias strip is sometimes used as a hem interface. This adds fullness to the finished garment and reduce wrinkling.[5]

The hem stitches that are commonly used for hand-sewn hems include: pick stitch; catch stitch (also called a herringbone stitch); slip stitch; and blind stitch.[6]

Sewing machines can make a stitch that appears nearly invisible by using a blind-stitch setting and a blind stitch foot. Blind-stitches are commonly used to finish hems of applique designs on fabric.[7] Modern sewing machines designed for home use can make many decorative or functional stitches, so the number of possible hem treatments is large. These home-use machines can also sew a reasonable facsimile of a hem-stitch, though the stitches will usually be larger and more visible.

Clothing factories and professional tailors use a "blind hemmer", or hemming machine, which sews an invisible stitch quickly and accurately. A blind hemmer sews a chain stitch, using a bent needle, which can be set precisely enough to actually sew through one and a half thicknesses of the hemmed fabric. A rolled hem presser foot on a sewing machine[8] enables quick and easy hemming even by home sewers.

Heavy material with deep hems may be hemmed with what is called a dressmaker's hem—an extra line of loose running stitch is added in the middle of the hem, so that all the weight of the cloth does not hang from one line of stitching.

METHOD

There are many different styles of hems of varying complexities. The most common hem folds up a cut edge, folds it up again, and then sew it down. The style of hemming thus completely encloses the cut edge in cloth, so that it cannot unravel. Other hem styles use fewer folds. One of the simplest hems encloses the edge of cloth with a stitch without any folds at all, using a method called an overcast stitch, although an overcast stitch may be used to finish a folded "plain hem" as well.[1]

There are even hems that do not call for sewing, instead using iron-on materials, netting, plastic clips, or other fasteners.[2] These threadless hems are not common, and are often used only on a temporary basis.

The hem may be sewn down with a line of invisible stitches or blind stitch, or sewn down by a sewing machine. The term hem is also extended to other cloth treatments that prevent unraveling. Hems can be serged (see serger), hand rolled and then sewn down with tiny stitches (still seen as a high-class finish to handkerchiefs), pinked with pinking shears, piped, covered with binding (this is known as a Hong Kong finish), or made with many other inventive treatments.

Most haute couture hems are sewn by hand. Decorative embroidery embellishment is sometimes referred to as a hem-stitch design.

LINING

In sewing and tailoring, a lining is an inner layer of fabric, fur, or other material inserted into clothing, hats, luggage, curtains, handbags and similar items.

Linings provide a neat inside finish and conceal interfacing, padding, the raw edges of seams, and other construction details. A lining reduces the wearing strain on clothing, extending the useful life of the lined garment. A smooth lining allows a coat or jacket to slip on over other clothing easily, and linings add warmth to cold-weather wear.

Linings are typically made of solid colors to coordinate with the garment fabric, but patterned and contrasting-colored linings are also used. Designer Madeleine Vionnet introduced the ensemble in which the coat was lined in the fabric used for the dress worn with it, and this notion remains a characteristic of the Chanel suit, which often features a lining and blouse of the same fabric.

In tailoring, home sewing, and ready-to-wear clothing construction, linings are usually completed as a unit before being fitted into the garment shell. In haute couture, the sleeves and body are usually lined separately before assembly.

Some specialized types of lining include the following

Interlining

This is an additional layer of fabric between the lining and the outer garment shell. Insulating interlinings for winter garments are usually sewn to the individual lining pieces before the lining is assembled.

Partial or half lining

This type lines only the upper back and front of the garment, concealing the shoulder pads and interfacings, with or without sleeves.

Zip-in, zip-out, snap-out or button-in lining (sometimes called a "liner")

This is a warm removable lining for a jacket, coat, or raincoat that is held in place with a zipper, snap fasteners, or buttons. Garments with removable linings are usually lined with a lightweight fabric as well, to provide a neat finish when the warm lining is not worn.

MUSLIN

Muslin is a loosely woven light to medium weight cotton cloth with a lot of uses in sewing. Some trace the origin of Muslin fabric to Mosul in Iraq and some to the South Indian Port Musulipattam; wherever it was first made, today it is a widely used cotton fabric throughout the world.

In sewing terms Muslin also refers to the test garment you make, before you make the final garment – this practice garment is termed so because this is usually made with an inexpensive muslin cloth. (Though now a days even if you make a test pattern in polyester it is still called a muslin). It is regarded as an important step in fashion designing as a muslin serves as a neutral medium to develop the designer's creative vision.

NOTCHES

Notches are **clips** or **wedges** cut into the seam allowance in order to facilitate matching and sewing the corresponding seams during garment construction. In other words, you can figure out which fabric pieces should be pieced together to form the seam by matching the corresponding notches to one other

. 

Notches are extremely important in the sewing process. All fabric components of a garment should be marked such that each seam is easy to piece together once the patterns are removed. It is much easier to figure out which edges should be sewn to one another when you are looking at the marked patterns. However, once the fabric pieces are cut and the patterns are removed, a lot of important marks and lines are often lost visually, and you are left with fabric pieces that can appear a bit confusing, especially to the untrained eye. Transferring notches from the patterns onto fabric will ensure that that each edge is properly aligned and the front and back pieces are not mismatched during sewing.

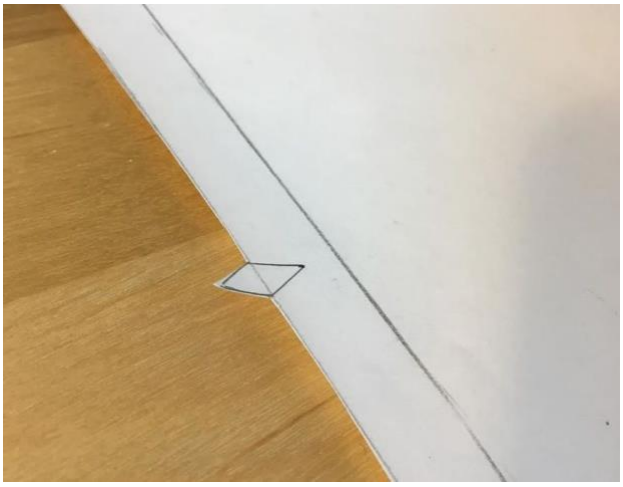
Notches are always marked into the seam allowance, stopping at less than halfway through the width of the seam allowance itself. They become hidden

on the inside of the garment once it is complete, and are used for construction purposes only.

Keep in mind- individual notches that are added to seam edges are strictly used to facilitate sewing and they should not add any form of tension release or affect the fit and look of the clothing item being constructed. Specialized notches and wedges used for release tension are cut in groups along more curved areas of a seam, and are applied much closer to the seam-line.

Types Of Notches On Sewing Patterns

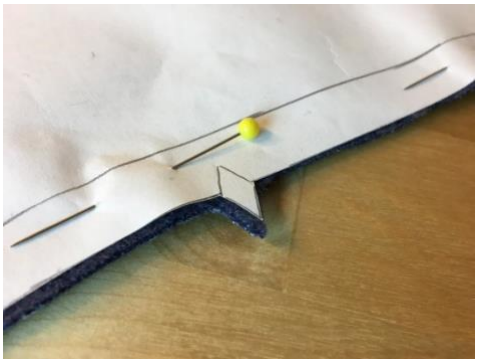
Triangle shaped notches-wedges: These style notches are found mainly on commercial patterns and most commonly used by home dressmakers. Triangle notches require to be cut in a v-shaped wedge which makes them most visible during the pinning process. For that reason, they are the preferred method for sewing beginners as they are easier to see during pinning and stitching.



A single triangle notch

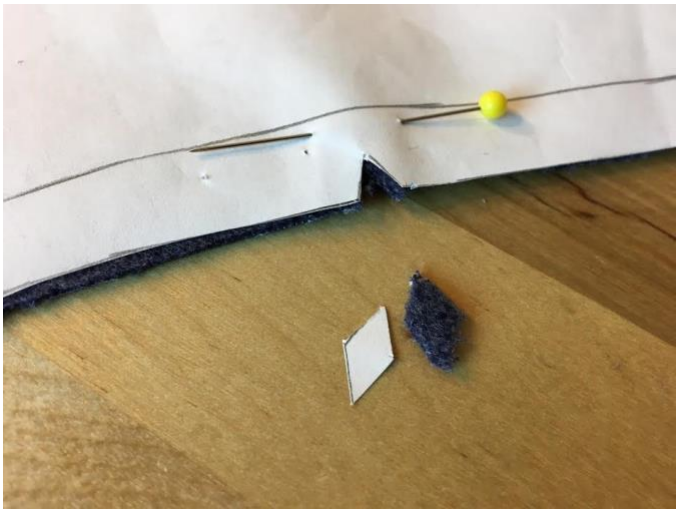
Nevertheless, triangle or v-shaped notches take a bit longer to cut- you have to be very careful not to cut too far through the seam line in the process since it requires the cutting of a very specific triangular shape.

There are two different ways to cut triangle notches (both methods are demonstrated bellow): inwards or **outwards**.



Outward cut triangular notch

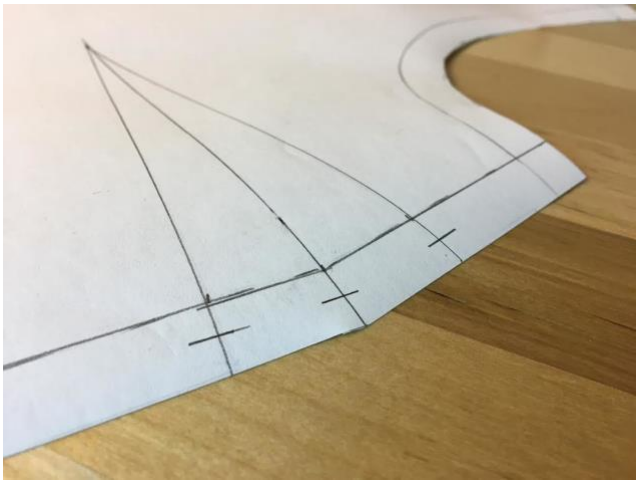
Cutting the notch **outwards** creates an **outward triangular fabric extension** and is better for sewing beginners as it leaves less room for error such as accidentally cutting too far into the seam allowance (too close to the seam line). They take you a bit of extra time to cut but they are certainly worth it when it comes time to actually putting the garment together.



Inward cut triangular notch

Vise versa, marking triangle notches inwards requires that you cut a triangular shape out of the seam allowance which entails you to be very careful as to how far you cut into the fabric. To cut inward notches correctly, follow the angular lines on the pattern very carefully and always cut using just the top of the scissors as shown. Always keep in mind that notches should only be cut at about half-way through the seam allowance from the edge of the fabric inwards- they are never marked too close to the actual seam line.

T" shaped notches (clips/slits) - "T" shaped notches are marked with two simple criss-cross lines: A horizontal line extends from the edge into the seam allowance with a vertical line intersecting it to mark how far into the seam allowance to clip with the scissors (usually about half-way in). These notches are simple and faster to draw and cut, and used mainly in the fashion industry on the industrial level.



"T" shaped notches on a single pointed bust dart

Due to the fact that you can conveniently cut a small clip through the fabric as opposed to having to carve out an actual wedge, "T" shaped notches are used a lot by intermediate and more advanced dressmakers to save time and facilitate the patterning and sewing process. **If you plan on getting into pattern-making yourself, we suggest you work with "T" shaped notches** as they are much faster and easier to mark and will save you some time in the fabric transfer process.

PATCHWORK

Patchwork or "pieced work" is a form of needlework that involves sewing together pieces of fabric into a larger design. The larger design is usually based on repeating patterns built up with different fabric shapes (which can be different colors). These shapes are carefully measured and cut, basic geometric shapes making them easy to piece together.

Patchwork is most often used to make quilts, but it can also be used to make rugs, bags, wall-hangings, warm jackets, cushion covers, skirts, waistcoats and other items of clothing. Some textile artists work with patchwork, often combining it with embroidery and other forms of stitchery.

When used to make a quilt, this larger patchwork or pieced design becomes the "top" of a three-layered quilt, the middle layer being the batting and the bottom layer the backing. To keep the batting from shifting, a patchwork or pieced quilt is often quilted by hand or machine using a running stitch in order to outline the individual shapes that make up the pieced top, or the quilting stitches may be random or highly ordered overall patterns that contrast with the patchwork composition.

PATTERN

n sewing and fashion design, a pattern is the template from which the parts of a garment are traced onto woven or knitted fabrics before being cut out and assembled. Patterns are usually made of paper, and are sometimes made of sturdier materials like paperboard or cardboard if they need to be more robust to withstand repeated use. The process of making or cutting patterns is sometimes compounded to the one-word Patternmaking, but it can also be written pattern(-)making or pattern cutting.

Student tracing pattern onto fabric

A sloper pattern (home sewing) or block pattern (industrial production) is a custom-fitted, basic pattern from which patterns for many different styles can

be developed. The process of changing the size of a finished pattern is called grading.

Several companies, like Butterick and Simplicity, specialize in selling pre-graded patterns directly to consumers who will sew the patterns at home. Commercial clothing manufacturers make their own patterns in-house as part of their design and production process, usually employing at least one specialized patternmaker. In bespoke clothing, slopers and patterns must be developed for each client, while for commercial production, patterns will be made to fit several standard body sizes.

A **patternmaker** typically employs one of two methods to create a pattern.

The flat-pattern method is where the entire pattern is drafted on a flat surface from measurements, using rulers, curves and straight-edges. A pattern maker would also use various tools such as a notcher, drill and awl to mark the pattern. Usually, flat patterning begins with the creation of a sloper or block pattern, a simple, fitted garment made to the wearer's measurements. For women, this will usually be a jewel-neck bodice and narrow skirt, and for men an upper sloper and a pants sloper. The final sloper pattern is usually made of cardboard or paperboard, without seam allowances or style details (thicker paper or cardboard allows repeated tracing and pattern development from the original sloper). Once the shape of the sloper has been refined by making a series of mock-up garments called toiles (UK) or muslins (US) or Nesse in German, the final sloper can be used in turn to create patterns for many styles of garments with varying necklines, sleeves, dart placements, and so on. The flat pattern drafting method is the most commonly used method in menswear; menswear rarely involves draping. You can learn pattern drafting on many fashion design courses either on a short further education course or as part of a Fashion degree at a university.

The draping method involves creating a mock-up pattern made of a strong fabric (calico) in a linen weave. The fabric is far coarser than muslin, but less coarse and thick than canvas or denim. However, it is still very cheap owing to its unfinished and undyed appearance. Then by pinning this fabric directly on a form, the fabric outline and markings will be then transferred onto a paper

pattern or using the fabric as the pattern itself. Designers drafting an evening gown or a sculpted dress which uses a lot of fabric, typically cut on the bias, will use the draping technique, as it is very difficult to produce with a flat pattern. This method is also used for collars.

There are different pattern systems such as Müller & Sohn etc., for women's outerwear and underwear, for men's clothing and for children's clothing. Special knit patterns are used for knitted fabrics. The model patterns are developed from the basic bodice pattern. Special rulers and the tracing wheel are used for this. The paper cuts are transferred to card stock as they need to be sturdier to withstand repeated use. Each manufacturer has their own size ranges. A distinction is made between basic pattern, first pattern and production pattern. Patternmaker grade the first cuts to the desired size with the aid of CAD software (computer-aided design). The production pattern must contain all the information necessary for production and all the necessary parts. The collections are produced in sets of sizes. The customer has the garment altered after purchase if necessary.

Pattern digitizing

After a paper/fabric pattern is completed, very often pattern-makers digitize their patterns for archiving and vendor communication purposes. The previous standard for digitizing was the digitizing tablet. Nowadays, automatic option such as scanner and cameras systems are available.

Fitting patterns

Mass market patterns are made standardized, so store-bought patterns fit most of people well. Only some experienced dressmaker can adjust standard patterns to better fit any body shape. A sewer may choose a standard size (usually from the wearer's bust measurement) that has been pre-graded on a purchased pattern. They may decide to tailor or adjust a pattern to improve the fit or style for the garment wearer, using French curves, hip curves, and cutting or folding on straight edges. There are alternate methods, either directly on flat pattern pieces from measurements, using a pre-draped personalized sloper or using draping methods on a dress form with inexpensive fabrics like muslin.

Some dress forms are adjustable to match the wearer's unique measurements, and the muslin is fit around the form accordingly. By taking it in or letting it out, a smaller or larger fit can be made from the original pattern So, a sewer may choose a standard size (usually from the wearer's bust measurement) that has been pre-graded on a purchased pattern. They may decide to tailor or adjust a pattern to improve the fit or style for the garment wearer, using French curves, hip curves, and cutting or folding on straight edges. There are alternate methods, either directly on flat pattern pieces from measurements, using a pre-draped personalized sloper or using draping methods on a dress form with inexpensive inelastic plain weaved fabrics like canvas. Creating a sample from canvas is another method of making patterns. Canvas-fabric is inexpensive, not elastic and made from Urticaceae. It is easy to work with when making quick adjustments by pinning the fabric around the wearer or a dress form. The sewer cuts the pieces using the same method that they will use for the actual garment, according to a pattern. The pieces are then fit together and darts and other adjustments are made. This provides the sewer with measurements to use as a guideline for marking the patterns and cutting the fabric for the finished garment.

Pattern grading

Pattern grading is the process of shrinking or enlarging a finished pattern to accommodate it to people of different sizes. Grading rules determine how patterns increase or decrease to create different sizes. Fabric type also influences pattern grading standards. The cost of pattern grading is incomplete without considering marker making.

Parametric pattern drafting

Parametric pattern drafting implies using a program algorithm to draft pattern for every individual size from scratch, using size measurements, variables and geometric objects.

Standard pattern symbols

Sewing patterns typically include standard symbols and marks that guide the cutter and/or sewer in cutting and assembling the pieces of the pattern. Patterns may use:

Notches, to indicate:

Seam allowances. (not all patterns include allowances)

Centerlines and other lines important to the fit like the waistline, hip, breast, shoulder tip, etc.

Zipper placement

Fold point for folded hems and facings

Matched points, especially for long or curving seams or seams with ease. For example, the Armscye will usually be notched at the point where ease should begin to be added to the sleeve cap. There is usually no ease through the underarm.

Circular holes, perhaps made by an awl or circular punch, to indicate:

A dart apex

Corners, as they are stitched, i.e. without seam allowances

Pocket placement, or the placement of other details like trimming

Buttonholes and buttons

A long arrow, drawn on top of the pattern, to indicate:

Grainline, or how the pattern should be aligned with the fabric. The arrow is meant to be aligned parallel to the straight grain of the fabric. A long arrow with arrowheads at both ends indicates that either of two orientations is possible. An arrow with one head probably indicates that the fabric has a direction to it which needs to be considered, such as a pattern which should face up when the wearer is standing.

Double lines indicating where the pattern may be lengthened or shortened for a different fit

Dot, triangle, or square symbols, to provide "match points" for adjoining pattern pieces, similar to putting puzzle pieces together

Many patterns will also have full outlines for some features, like for a patch pocket, making it easier to visualize how things go together.

Patterns for commercial clothing manufacture

The making of industrial patterns begins with an existing block pattern that most closely resembles the designer's vision. Patterns are cut of oak tag (manila folder) paper, punched with a hole and stored by hanging with a special hook. The pattern is first checked for accuracy, then it is cut out of sample fabrics and the resulting garment is fit-tested. Once the pattern meets the designer's approval, a small production run of selling samples is made and the style is presented to buyers in wholesale markets. If the style has demonstrated sales potential, the pattern is graded for sizes, usually by computer with an apparel industry specific CAD program. Following grading, the pattern must be vetted; the accuracy of each size and the direct comparison in laying seam lines is done. After these steps have been followed and any errors corrected, the pattern is approved for production. When the manufacturing company is ready to manufacture the style, all of the sizes of each given pattern piece are arranged into a marker, usually by computer. A marker is an arrangement of all of the pattern pieces over the area of the fabric to be cut that minimizes fabric waste while maintaining the desired grainlines. It's sort of like a pattern of patterns from which all pieces will be cut. The marker is then laid on top of the layers of fabric and cut. Commercial markers often include multiple sets of patterns for popular sizes. For example: one set of size Small, two sets of size Medium and one set of size Large. Once the style has been sold and delivered to stores – and if it proves to be quite popular – the pattern of this style will itself become a block, with subsequent generations of patterns developed from it.

Standard designing and adjusting tools

- Hip curve

- L-Square
- French curves
- Pattern notcher
- Dress forms
- Slopers - Bodice, skirt, trousers, etc.

Retail patterns

Home sewing patterns are generally printed on tissue paper and sold in packets containing sewing instructions and suggestions for fabric and trim. They are also available over the Internet as downloadable files. Home sewers can print the patterns at home or take the electronic file to a business that does copying and printing. Many pattern companies distribute sewing patterns as electronic files as an alternative to, or in place of, pre-printed packets, which the home sewer can print at home or take to a local copyshop, as they include large format printing versions. Modern patterns are available in a wide range of prices, sizes, styles, and sewing skill levels, to meet the needs of consumers.

The majority of modern-day home sewing patterns contain multiple sizes in one pattern. Once a pattern is removed from a package, you can either cut the pattern based on the size you will be making or you can preserve the pattern by tracing it. The pattern is traced onto fabric using one of several methods. In one method, tracing paper with transferable ink on one side is placed between the pattern and the fabric. A tracing wheel is moved over the pattern outlines, transferring the markings onto the fabric with ink that is removable by erasing or washing. In another method, tracing paper is laid directly over a purchased pattern, and the pieces are traced. The pieces are cut, then the tracing paper is pinned and/or basted to the fabric. The fabric can then be cut to match the outlines on the tracing paper. Vintage patterns may come with small holes pre-punched into the pattern paper. These are for creating tailor's tacks, a type of basting where thread is sewn into the fabric in short lengths to serve as a guideline for cutting and assembling fabric pieces.

Besides illustrating the finished garment, pattern envelopes typically include charts for sizing, the number of pieces included in a pattern, and suggested fabrics and necessary sewing notions and supplies.

Ebenezer Butterick invented the commercially produced graded home sewing pattern in 1863 (based on grading systems used by Victorian tailors), originally selling hand-drawn patterns for men's and boys' clothing. In 1866, Butterick added patterns for women's clothing, which remains the heart of the home sewing pattern market today.

PIPING

In sewing, piping is a type of trim or embellishment consisting of a strip of folded fabric so as to form a "pipe" inserted into a seam to define the edges or style lines of a garment or other textile object. Usually the fabric strip is cut on the bias. It may be made from either self-fabric (the same fabric as the object to be ornamented) or contrasting fabric, or of leather.

Today, piping is common on upholstery and decorative pillows, but it is also used on clothing. Piped pocket openings, garment edges, and seams are characteristic of Western wear.

PLACKETS

A placket (also spelled placquet) is an opening in the upper part of trousers or skirts, or at the neck or sleeve of a garment. Plackets are almost always used to allow clothing to be put on or removed easily but are sometimes used purely as a design element. Modern plackets often contain fabric facings or attached bands to surround and reinforce fasteners such as buttons, snaps, or zippers.

In modern usage, the term placket often refers to the double layers of fabric that hold the buttons and buttonholes in a shirt. Plackets can also be found at the neckline of a shirt, the cuff of a sleeve, or at the waist of a skirt or pair of trousers.

Plackets are almost always made of more than one layer of fabric, and often have interfacing in between the fabric layers. This is done to give support and strength to the placket fabric because the placket and the fasteners on it are often subjected to stress when the garment is worn. The two sides of the placket often overlap. This is done to protect the wearer from fasteners rubbing against their skin and to hide underlying clothing or undergarments.

Variations

A button-front shirt without a separate pieced placket is called a "French placket." The fabric is simply folded over, and the buttonhole stitching secures the two layers (or three layers if there is an interlining). This method affords a very clean finish, especially if heavily patterned fabrics are being used. This method is normally only used in stiff-fronted formal evening ("white-tie") shirts. However, the normal, separate placket on a shirt gives a more symmetrical appearance.

If the buttons are concealed by a separate flange or flap of the shirting fabric running the length of the placket, it is called a "fly front". The inner placket of a fly front shirt can be made as a less constructed French placket or as a fully constructed regular placket.

Historically, a placket may also be:

- A decorative front-panel used to fill in the opening of a doublet or gown (later called a stomacher). Also spelled placard.
- A decorative panel or "forepart" (see 1500–1550 in Fashion) attached to a woman's petticoat.
- An opening or slit in a skirt or petticoat to access a separate, hanging pocket.
- A petticoat or skirt pocket.

APPAREL PRODUCTION

Apparel Production is also known as garment production. It is the process of converting fabric into garments. When garments are manufactured in a factory in a vigorous quantity, then the term apparel production is used. It comprises managing the complete activities related to the manufacturing of garments which is ready for sale in the market.

A factory produces bulk quantity of garments for a style or design at a time. Prior to start production of an order factory needs to gone through some activities which is known as pre-production. Pre-production process includes sampling, costing, production planning, sourcing of raw material and production pattern making. Fabric cutting, printing, embroidery, sewing, thread trimming, washing, ironing, folding and packing are the production functions.

Sampling:

Sampling is a process where factory develop garment samples according to buyer's specified design. This is also known as product development stage. Samples are required at various stages to get approval from buyer on a particular design. As per the development stages samples are named as Proto sample, Fit sample, Size set sample, Sales man sample, production sample, Top of production (TOP) sample and shipment sample.

Costing:

A business is all about making profit. So correct costing of a product before order finalization is very important. Costing of garment is the cumulative cost of raw materials, direct labors and direct and indirect overheads. After developing sample or directly receiving buyer's sample factory needs to send FOB (freight on board) price of the garment. To decide FOB of a garment factory makes cost sheet including raw material cost, total of direct labour costs of each processes, factory overhead. An FOB is the sum of garment cost, factory margin and taxes.

Production Planning:

After receiving the order factory plans for raw material requirement for the order. Raw materials like fabrics, sewing threads, packing materials, hang tags and other accessories. Factory plans timelines like when to start cutting, when to submit pre-production sample, when to finish sewing and finishing, final inspection date and shipment date. In production planning stage job responsibility for different processes is defined.

Cutting:

In this stage fabrics are layered on a table layer by layer up to a certain height. Then by means of a cutting machine fabric are cut into garment shapes or pattern and separated from the layer. Fabric layering is possible both manual spreading and automated spreading. Cut parts are then numbered and bundled and send to sewing room. For details about cutting process see cutting room overview. The quality of end product (garment) is very much depends on the good cutting quality. Secondly, fabric the main raw material of the garment represents about 70% of total garment cost. That is why cutting is an important process like others where control the fabric saving and garment quality.

Sewing or Stitching:

Garment panels are stitched together in sewing room by means of sewing machines. In sewing 2D fabric patterns are converted in 3D forms. An operator run the machine and using sewing threads garment parts are joined together. Various types of sewing machine are available for sewing. Machines are selected according to the seam and stitch requirement. In industry traditionally sewing machines are laid in a raw. Cut parts are feed at the start of the line, passed through the line and at the end of the line a complete garment come out. Each machine is run by individual operators and an operator sews only one or two operations of the garment. A line consist of sewing operators, helper to feed them with cut parts,

thread and other trims, quality checker and one fully or partially devoted supervisor.

Thread trimming:

After stitching, all hanging thread are cut by means of hand trimmer. Auto thread trimming machines are also available to perform this task. All loose threads inside a garment are removed as well. Garments without any loose thread and long tail are basic quality requirement.

Washing:

This process is performed when buyer want washing or special finishes to the garments. For light color garment washing is carried out to remove dirt and stains though buyer does needed washed garment for orders.

Finishing:

Generally this process includes checking of garment, measurement checking, ironing, and spotting. After sewing of the garments, all pieces are checked by quality checker to ensure that garments are being made as per buyer quality standard. Checking normally is done for visuals appearance and measurements. Spotting is required to remove stain in the pieces. Various chemicals (solvents) are used to remove various kinds of oil stain, marks and hard stain. Each garment then ironed to remove creases by means of press.

Packing and folding:

Each pressed garment is then folded with tissue or card board. Folding varies product to product and also buyer to buyer. Hang tags, special tag and prices stickers are attached with plastic Kimble or threads. Folded and tagged garment are

then packed into poly bag. During packing garments are randomly checked by internal quality controllers to ensure that only quality goods are being packed.

Other Processes:

In current fashion trend very few garments are made without value added processes, like printing, garment dyeing, special washing, embroidery, adda work (hand embroidery with lot of bead work)

Final Inspection and dispatch:

Once garments are packed (also known as shipment), before dispatching quality inspection of the garments is carried by buyer quality assurance (QA) department. Many times a third party quality auditor is hired for this final inspection job. If the packed goods meet the buyer's quality standards, shipment is accepted by buyer. Factory then dispatches goods to the buyer.

UNIT II TYPES OF SEWING MACHINE

INDUSTRIAL SEWING MACHINE

Industrial sewing machines are normally used in mass garment production. An industrial sewing machine is power-driven and runs at a very high speed. There are different types of industrial sewing machines. There are some special sewing

machines developed for making specific seam and stitch classes.

To have in-depth knowledge of sewing machines, different types of sewing machines are listed in this post. The application of these machines is also mentioned with an example. This would help beginners to visualize the machine's application in making the common products.

Single Needle Lock Stitch Machine

This machine makes lock stitches (stitch class 301). Lock stitches are formed with one needle thread and one bobbin thread. This is a widely used sewing machine and used for sewing stitch class 301. Basic to computer-controlled version is available in this machine category.

Purpose: Single needle lock stitch machines are used for joining two or multiple fabric plies together. The machine is used to sew lightweight, medium weight, and heavy materials.

OVERLOCK SEWING MACHINE

Overlock machines are available in 3 threads, 4 threads and 5 threads over edge sewing. An overlock machine can form various types of stitches like stitch class 503, stitch class 504 and stitch class 512.

Purpose: This machine is used for serging garment panels (for example: trouser panels serging) and for overedge stitch. These types of machine are mostly used in knitted garment sewing for overedge stitch. Like side seam stitch of a t-shirt is done using an overlock machine.

Manual Sewing Machine

Manual sewing machines are run by pedaling and therefore, no electricity or battery is required to run them. They have simple functions and basic features and hence are quite cost-effective. However, they are quite slow as compared to electronic or computerized sewing machines.

- Manual sewing machines are the cheapest sewing machine in the market
- Since they do not have wiring, they are very low maintenance
- Extremely durable and long-lasting

MOTOR OPERATED SEWING MACHINE

These machines have a single motor that runs on electricity. A worker can derive power from the motor by pressing on the foot pedal. A designated dial allows you to select the length and type of stitches. It also comes with several other features.

- The best type of sewing machines for beginners as it is easy to use
- Comes with a huge variety of versatile features, like types of stitches
- Provides more control through a foot pedal
- Electronic sewing machines are way faster than manual sewing machines

DIGITAL SEWING MACHINE

They are the most advanced sewing machines and come with valuable features that have revolutionized the sewing experience. They do not have any buttons or dials but are equipped with LED touch screens that help you select the required features. They also come with a Wi-Fi and USB feature so that you can download designs or extra features online. These machines are extremely precise and do not make any mistake in stitch length.

- Packed with various features like over 100 built-in stitch types for personalized sewing
- No cumbersome dials and buttons
- Automatic creation of buttonholes
- Better control of machine speed
- Stitches are extremely precise and the risk of mistakes is tiny

Lock Stitch

Lock stitch is the most common and basic stitch found in every sewing machine. Lock stitch machines lock together two threads before they pass through the hole into the fabric. A lockstitch is found in the center of the thickness in the fabric.

INDUSTRIAL SEWING MACHINES

Industrial sewing machines have the capacity to be used on the toughest of fabrics without experiencing wear and tear. As such, they are more powerful, tough, and durable. Moreover, major components like connecting rods, gears, housing, and body are all made of a strong material like aluminum and iron.

Industrial sewing machines are also equipped with high quality and advanced features that allow you several different options, which are not found in domestic sewing machines. These machines are also much larger in size than their household counterparts, and hence, also much more expensive.

Here are some types of industrial sewing machines:

Flat-bed

These machines consist of an extended needle arm, very much like the ones used in domestic settings. They are used in factories to sew together flat pieces of fabric and other simple projects.

Post-bed

Post-bed machines are fitted on a sewing table with an external motor. These devices consist of feed dogs, bobbins, and loopers in a raised vertical column above the flat base of the machine. The column may range from 10 cm to 45 cm in height. This type of machine is used to attach emblems and stitch boots, purses, hats, bags and gloves.

Cylinder-bed

Unlike the flat-bed sewing machine, these devices consist of a horizontal cylindrical column instead of a flat base. The cylinder may be 5 to 16 cm wide and is used to sew cylindrical pieces like sleeves and cuffs as well as bulky items like shoes and saddles.

Free Arm Sewing Machine

Free arm sewing machines come with a detachable flat-bed arm, which can give way to a free arm. A free arm is a much narrow working surface than a flat-bed and has space beneath it so that it doesn't touch the sewing table on which the machine rests. You can use it to make sleeve or pant hems by inserting fabric around the arm, which will give you the edge and space to sew circular projects.

Feed-off-the-Arm Sewing Machine

In this machine, two or three needles and loopers may be used and sewing may be done from four threads. The feed-off-the-arm machine produces two to three rows of parallel chain lock stitching rows. This machine is used for sewing light-weight to heavy-weight material like jeans, inside of knit shirts and T-shirts.

Buttonhole

Before the modern multipurpose sewing machines were invented, people used other machines to create buttonholes. They were known as buttonhole sewing machines. However, the newer sewing machines have come up with various options for making buttonholes and the use of a dedicated buttonhole machine has largely been eradicated.

Button Attachment

Button attachment sewing machine is a specialized sewing machine used to attach buttons. It is usually used in the garment industry.

UNIT III

PARTS AND FUNCTIONS OF SEWING MACHINE

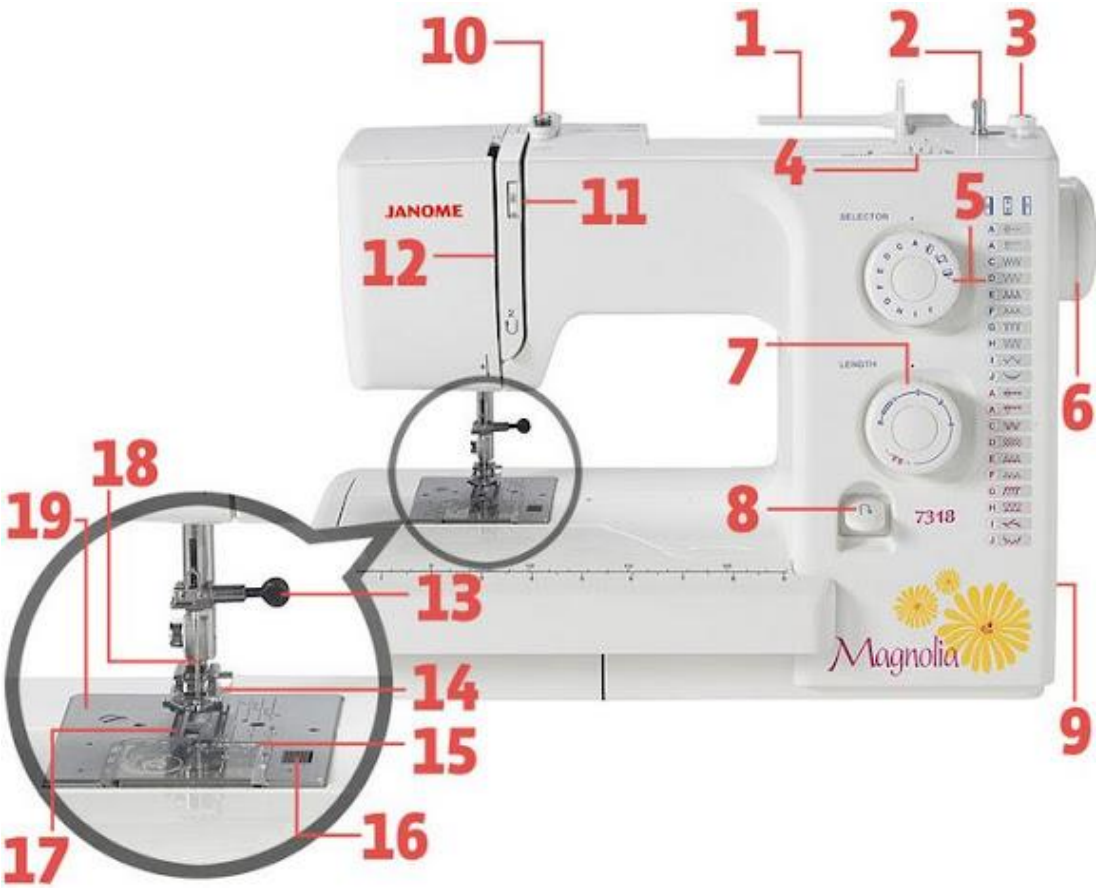
Introduction:

Sewing machine plays an important role in the garments manufacturing industry. There are a lot of sewing machines used in the ready-made garments sector. This article has shown all the parts of a sewing machine and the function of those.

Different Parts of Sewing Machine:

1. Spool pin,
2. Bobbin binder spindle,
3. Bobbin winder stopper,
4. Stitch width dial,
5. Pattern selector dial,
6. Handwheel,
7. Stitch length dial,
8. Reverse stitch lever,
9. Power stitch,
10. Bobbin winder thread guide,
11. Thread tension dial,
12. Thread take-up lever,
13. Needle clamp screw,
14. Presser's foot,
15. Bobbin cover,

16. Bobbin cover release button,
17. Feed dog,
18. **Needle**,
19. Needle plate.



Parts of the sewing machine

Functions of Sewing Machine Parts:

Functions of each sewing machine parts have discussed below:

1. Spool pin:
The main function of the spool pin is to hold the spool of thread.

2. Bobbin binder spindle:
During winding, the bobbin is placed here.

3. Bobbin winder stopper:
When the bobbin reaches its optimum capacity then the bobbin winder stopper stops the bobbin winding.

4. Stitch width dial:
The main object of the stitch width dial is to control the zigzag stitch.

5. Pattern selector dial:
The pattern selector dial is to set the symbol of the desired stitch pattern.

6. Hand wheel:
The hand wheel is used to raise and lower the need, which is situated on the right side of the **sewing machine**.

7. Stitch length dial:
Stitch length dial is used to control the length of the stitch.

8. Reverse stitch lever:
The machine will sew in the reverse while the lever is pushed.

9. Power switch:
Power switch means the off-on office of the sewing machine. Normally power switch is located on the right side of the machine.

10. Bobbin winder thread guide:
These types of thread guides are used during bobbin winding.

11. Thread tension dial:
A thread tension dial is used to control the tension on the top thread.

12. Thread take-up lever:
During sewing, the top thread passes through the thread take-up lever. Thread take-up lever moves up and down with the needle.

13. Needle clamp screw:
The needle clamp screw holds the needle in its actual place.

14. Presser's foot:
Presser's foot holds the fabric in its definite place.

15. Bobbin cover:
During sewing, the bobbin cover protects and covers the bobbin holder.

16. Bobbin cover release button:
This type of button is used to release the cover for entrance to the bobbin.

17. Feed dog:
During sewing, the feed dog pulls the fabric forward.

18. Needle:
The needle is used to form a stitch in the garments.

19. Needle plate:
A needle plate is a metal plate that is situated under the needle and presser foot. It helps to move the fabric forward during sewing.

UNIT IV

PROBLEMS RELATED TO SEWING MACHINE CAUSES AND REMEDIES

Common Sewing Problems

Causes and Remedies

There can be many reasons behind the problems that arise while sewing and knowing the cause of these problems and a solution for each particular cause is essential. These problems can be minimised by avoiding errors during handing

of materials / machines and by following the right working methods.

Some common sewing problems are:

- Needle thread breakage
- Bobbin or looper thread breakage
- Thread fusing when the machine stops
- Skipped stitches
- Imbalanced / variable stitching
- Staggered stitching
- Variable stitch density
- Seam pucker

The causes and solutions for each of the above problems are discussed in the following sections.

Cause	Remedy
Misaligned off winding from thread package.	Ensure that the overhead guide is directly above cop stand pin, at 2½ times the height of the thread package. Use a foam pad to prevent package tiltin
Trapping at package base.	Reduce the thread stand height to prevent vibratio and spillage. Use a foam pad to prevent trapping after spillage.
Thread trapped at thread guide.	Can occur after thread breaks. Rethread correctly.

Cause	Remedy
Snarling before tension disc.	Increase the wraps on pre-tension thread guides an reduce disc tension. Ensure discs are smooth.
Excessive tension.	Use a stronger thread or adjust tension.
Broken check spring.	Replace and adjust.
Sharp edges on throat plate, hook point, needle guard, bobbin case, needle groove or eye.	Polish rough edges and replace if necessary. Replace the needle being used with a higher qualit needle.
Thread fraying at needle.	Use finer thread or coarser needle, as appropriate.
Excessive needle heat; groove or eye blocked with melted fabric.	Improve the fabric finish. Change to a better needle, style and finish. Apply needle lubricant via thread. Use a needle cooler.
Hook overheating.	Ensure adequate oil supply. Check the needle to hook clearance.
Poor quality thread.	Change to a correctly finished thread of better quality.
Needle Thread Breakage	
Bobbin or Looper Thread Breakage	

Cause	Remedy
Badly wound thread on the bobbin.	Adjust bobbin winder alignment. Use pre-wound bobbins.
Tension too tight or bobbin over-running.	Adjust bobbin case tension. Insert a washer or a spring to prevent over-running.
Sharp edges on bobbin case or spring or looper eyelet.	Polish edges and correct surfaces.
Bobbin case not fitting correctly.	Check the size/type of bobbin for flange distortion.

Thread Fusing when the Machine Stops

Cause	Remedy
Poorly finished or incorrect thread.	Use better quality thread.
Densely woven fabric that is poorly or harshly finished.	Improve fabric finish. Change to more suitable needles. Apply needle coolants.
Damaged or overheated needle after thread breakage.	Change the needle.

Skipped-Stitches

Cause	Remedy
Hook, looper or needle failing to enter thread loops at the correct time.	Check machine clearances and timings. Check if the needle is inserted and aligned correctly. Use a needle with a deeper scarf.
Thread loop failure caused by incorrect needle size / style for thread size / type.	Change needle size / style.
Thread loop failure due to incorrect setting of thread control mechanism causing thread loop starvation.	Reset to standard and check loop formation with a strobe.
Flagging of fabric due to poor presser foot control or too large a throat plate hole.	Re-adjust the presser foot pressure. Change the throat plate to match the needle.
Needle deflections or bent needle.	Use a reinforced needle, reset the needle guard and replace the needle.
Incorrect sewing tension in the needle or under threads.	Re-adjust the tensions.
Poor thread loop formation.	Check with a strobe. Change to superior spun polyester or filament based corespun threads
Imbalanced / Variable Stitching	

Cause	Remedy
Incorrect sewing tensions.	Check for snarling, adjust thread tensions.
Incorrect threading.	Rethread machine.
Needle thread snagging on bobbin case or positioning finger.	Polish bobbin case surfaces. Reset positionin finger and opening finger.
Variable tension due to poor thread lubrication.	Switch to superior quality threads.

Staggered Stitching

Cause	Remedy
Needle vibration or deflection.	Increase needle size or change to a reinforced or tapered needle.
Incorrect or blunt needle point.	Change the needle.
Incorrect needle-to-thread size relationship.	Change needle or thread size as appropriate.
Feed dog sway.	Tighten the feed dog.
Poor fabric control, presser foot bounce.	Reset the presser foot. Change the feed mechanism.

Variable Stitch Density

Cause	Remedy
Poor fabric feed control.	Increase the presser foot pressure. Change to a more positive feed mechanism.

Seam Pucker

Cause	Remedy
Variable differential fabric feed.	Improve the fabric feed mechanism. Replace worn out feed dogs. Reduce the maximum sewing speed.
High thread tension.	Keep the bobbin tension as low as possible and set the needle thread tension accordingly.
Incorrect thread balance.	Ensure proper balance between the top and bottom thread.
Improper thread type.	Use threads with controlled elongation. Properly maintain tension guides.

UNIT V

TAILORING TOOLS

MEASURING TOOLS

1. Tape Measure
2. Meter Ruler / Yardstick
3. Ruler
4. Pattern master or Fashion curve
5. Hemline gauge
6. Buttonhole gauge
7. French curve
8. Flexible curve
9. Grading ruler
10. Folding ruler
11. L-Square Ruler

1. MEASURING TAPE

The ubiquitous tape measure. Without a sewing tape measure, we would get nowhere fast when it comes to sewing.

These tape measures are made of fabric and then coated, to last longer and prevent them from stretching out.

We generally use these tape measures for ***everything*** when it comes to sewing. use it to:

- Measure body
- Measure the pattern pieces
- Measuring points on garments that I am cloning into patterns
- Measure seam lines on my own patterns to make sure they match
- Checking the pattern piece is positioned accurately on the correct grain line

2. Meter Ruler / Yardstick

In the UK we call these thinks a meter ruler because, it's a meter in length, while in the US and other spots around the world it is referred to as a yardstick.

I love the old school wooden versions, but as I often use my rotary cutter along the length I have been using a metal version for a few years now to prevent damage to the meter ruler.

A meter ruler or yardstick is possibly only useful to you if you plan on adjusting sewing patterns yourself and will need a ruler longer than 45cm

. **3. Ruler**

Yes. A regular old ruler, like the ones we used in school! A simple ruler is great for drawing straight lines on patterns, or planning out pocket placement.

To be fair, although I do have a separate ruler, I mostly use my pattern master or fashion ruler instead, but if you did want to add a rule to your measuring tools for sewing collection, I'd recommend this ruler.

4. Pattern Master or Fashion Curve

This is the one measuring tool I have bought several of over the years, other than the tape measure of course!

I even asked my other half for the updated version of the pattern master – called the fashion curve – because I use these constantly! (I'm not such a fan of the fashion ruler though.)

What is a pattern master? It's a plastic ruler, great for all sorts of measurements, mostly for pattern making.

I use it to:

- Find the bias of my fabric
- Add seam allowances to patterns
- Measure the curves of armholes and necklines in case I want them bigger
- Mark in seam allowances

The list is endless on how a pattern master or fashion ruler can be used.

5. Hemline Gauge

I have a hemline gauge but being one of those 'make it up as I go peeps' I typically eyeball it or use my pattern master.

If you don't have the latter, and are not ready to just wing it, this hemline gauge tool is for you!

It will help you to turn over the right amount of fabric for your hemlines, be it on skirts, trousers, pants or sleeves.

It would be better to use this rather than the tape measure as the hem gauge is less flexible, so you'll likely to have a more accurate hemline!

I also use it as a tool to measure the diameter of buttons when sewing buttonholes on my sewing machine!

6. Buttonhole Gauge

I no longer have one of these – it's possibly still in storage – so I actually use my hemline gauge when I need to mark in buttonholes.

A buttonhole gauge is flexible, and works by expanding to the total length of the area needing buttons, with divisions for marking in the buttons and button holes equally.

It's great for anyone that just hates working out the math for button hole placement!

7. French Curve

If you have a pattern master or fashion ruler you won't need a French curve ruler, as it's kind of built in already.

But for those who don't, this is the curved tool for you.

As you can guess, rather having a straight edge like a traditional ruler, the French curve has two curved edges. This is great if you need to measure and adjust a curved part of a sewing pattern.

A plastic french curve is a great tool, but I myself have and use a metal vary form version which I love.

You can learn more about the best French curve rulers here!

8. Flexible Curve

A flexible curve is a recent addition to my measuring tools for sewing collection.

I didn't need it at uni and it is only as I am getting older that I have realised it's a very handy tool to have for measuring my new lumps and bumps.

A flexible curve allows me to be more accurate with measurements on curves – such as my crotch – for those times when I am creating more fitted trousers / pants.

9. Grading Ruler / Set Square

A large set square ruler is a measuring tool for sewing and pattern making, to ensure lovely straight lines. It can also be used to add seam allowance to your sewing patterns and grade patterns for a better fit!

I have a large set square which comes in handy as a grading ruler – it's basically a hard plastic triangle.

And I also recently bought these smaller grading rulers which I find perfect for measuring small amounts or when grading patterns up or down a little.

These are the same Flexi-rulers that quilters use too when cutting out their quilting blocks.

10. Folding Ruler

.

A ruler that folds down and fits in my sewing bag would be fab – but I suspect the 'glitches' I'd get on a drawn line to cutting line when using it might bother me.

like to have a really straight edge.

11. L-Square Ruler

L Square ruler of measuring tools. it really useful for measuring my other half when drafting menswear patterns for him.

I t use it at the neck – its perfect for creating the initial 'squared' neckline before adding in curved lines.

L Square ruler is a heavy black version but this clear plastic L square ruler has inches on the outer edge if that suits you more!

MARKING TOOLS

1. Tailors chalk

These triangles have been a staple in the tailoring industry for a long time. Use the long blades of the triangle to mark dart lines and the tip for notches and circles. Then brush the marks out of your fabric when youre done. Its really worth investing in a chalk sharpener if you want to use a triangle because they do blunt quickly.

2. Chalk cartridge pen

If you need a more strongly defined line, use this pen tool as the marks still wipe or wash out and you can replace the chalk sticks with different colours. Its essentially a mechanical pencil mechanism but you can still sharpen the chalk into a point.

3. Chalk pencils

These white and coloured pencils are designed to brush easily from fabric and just like a regular pencil can be easily sharpened to a point. They're nice for heavier fabric like canvas or denim and, when paired with a good ruler, you can get crisp straight lines. You can also find water-soluble pencils if you're happy to wash out your marks as you go or all at the end of your project.

4. Tailors beeswax aka wax crayon

Think of this an oddly shaped crayon. The idea is that the wax will melt away under an iron, but that isn't always the case, in which case the marks can be hard to remove. Best on wool and suiting fabric.

5. Air-erasable pens (AKA disappearing ink)

These fabric pens have revolutionised sewing in my opinion. Maybe you already own one but if not, heres why they're great. They come in bright colours that show up well on light fabric and the marks typically disappear completely with a light blot of water, touch of the iron, or with time. Unfortunately, these pens tend to dry out rather quickly, so it is good to have a back-up handy.

6. Chaco liner pens

Oh yes, someone's invented a chalk dust pen. It leaves a very thin, precise line of powder. It rolls easily and wont drag or distort fabric. Plus they come in a variety of colours, brush out of your material and you never have to sharpen them! You always run the risk of running out of powder mid-project so keep refills to hand. Theres also the chance a ghost chalk line may linger until you wash your garment.

7. Carbon paper and tracing wheel

Theres something to be said for marking both sides of the fabric at once in one motion, which you can achieve if you sandwich your fabric with the carbon paper. Packets contain a variety of colours of paper to use with light or dark fabric and its easy to mark long lines, curves or corners while copying a template or pattern exactly. You'll also need a tracing wheel to create a dashed line of chalk on your fabric. But be cautious these marks are almost always permanent.

8. Tailors tacks or thread basting

If you're interested in couture precision you can transfer pattern markings with bright coloured thread loosely basted onto your fabric. Silk thread is best and beeswax can help prevent tangling. Be warned this technique means your prep time is longer and is more tedious plus you might curse out loud if the thread then pulls out of fabric while handling.

CUTTING TOOLS

- Fabric Shears – Technically, you can buy a pair of scissors almost anywhere. However, the pair you bought at the dollar store to wrap a quick gift aren’t going to cut it when it comes to your fabric cutting needs. Choose a pair of fabric shears from a craft or sewing store – these scissors are specially made to cut fabric and they will give you clean lines instead of frayed or jagged edges.
- Applique Scissors – These funny-looking scissors are smaller than fabric shears and generally have one curved edge to them. They’re perfect for

cutting out appliques or for trimming seams. If you've ever accidentally cut through the wrong layer of fabric when trying to trim an applique, you can imagine how useful a pair of applique scissors can be! Read all about them on our guest post from Michelle of Sew Michelle.

- Small Embroidery Scissors – A pair of small embroidery scissors is easier to use, more lightweight, and better able to fit in tight spaces than a typical pair of fabric shears. Keep embroidery scissors next to your machine to trim threads after stitching seams and to snip those hard-to-reach places. Embroidery scissors generally have very sharp tips, though, so watch out!
- Electric Scissors – Though every seamstress may not find a use for a heavy-duty pair of electric scissors, if you sew any bulky weight fabrics or materials on a regular basis then they might be just the thing you need. These scissors have powerful blades that can easily cut through fabric and paper in addition to materials like cardboard, leather, and even metal.
- Pinking Shears – Not everyone will have these funny looking scissors in their drawer. The handles are fitted with teeth like blades. Instead of a straight cut in the fabric, these small triangular cuts will help prevent the fabric from fraying.

Rotary Cutting Tools – If you're a quilter, then these rotary cutting tools are must-haves. Even if you don't have a passion for patchwork, rotary cutting tools can make quick work of fabric cutting so you can get right down to the business of sewing.

- Rotary Cutter – A rotary cutter basically looks like a pizza cutter, but it's made for fabric. Rotary cutters usually have a plastic handle and a retractable, circular blade that screws in and out of the handle. The blades come in a variety of sizes, though the most common are 45mm and 60mm (the size generally comes down to personal preference and the types of items you usually cut, in the end). Be careful – rotary blades are extremely sharp so you should always keep your fingers well away from the blade when

cutting (I know someone who once cut through the cord to her ear buds while cutting fabric)!

- Self-healing Cutting Mat – A rotary cutter won't be much use to you if you don't have a cutting mat to go with it. If you try to cut fabric on some other surface the cutter's blade will likely damage that surface! Self-healing mats come with a grid right on them so you can easily see where to cut your fabric to the desired size. They are available in smaller sizes if you only ever cut small quilting pieces, but a larger mat will be more useful for cutting larger sewing pattern pieces or for taking fabric yardage and cutting it down for smaller pieces.
- Quilting Ruler – The last tool in the rotary cutting trifecta of must-haves is the quilting ruler. These rulers are generally clear and marked with every dimension you could possibly want in your cutting. They'll make cutting quilt pieces a breeze, and they're usually marked with bias lines as well for cutting at an angle. Make a sandwich of your fabric between a quilting ruler and a self-healing mat and slide your rotary cutter along the edge of the fabric to cut your pieces in no time. Technically the ruler isn't a cutting tool, but you'll be hard-pressed to get the most out of your rotary cutter without one.
- Electric Rotary Cutter – If you find that it's too hard on your hands or arms to use the pressure required for a traditional rotary cutter, there is a motorized option available to you. Be careful – if you thought a regular blade was dangerous, imagine what happens when you electrify it!

Shape Cutting Machines – If you cut a lot of shaped pieces for quilting (or really, any sewing project that uses applique), you might want to consider a quilt cutting machine. Most of these machines use dies that are cut in specific shapes to cut through layers of fabric all at once. Do you want to add hearts to your next Valentine quilt, or pumpkins at Halloween? These machines and their dies will cut specialty shapes for you within minutes. Here are some examples:

- AccuQuilt GO! Baby – The Accuquilt GO! Baby is a small, portable machine that won't take up too much space in your sewing area but will deliver big-time results. It will cut through six layers of fabric at one time and will give you perfectly shaped pieces of fabric without all the stress of tracing and cutting by hand.
- Sizzix Big Shot Pro – The Sizzix Big Shot Pro will cut fabrics or other materials up to 13 inches wide. It has an embossing feature that will help you not only with your sewing projects but with paper crafts, such as card-making, as well. It's compatible with a variety of accessories for any shape or occasion.
- Brother Scan and Cut– The Brother Scan and Cut will cut fabrics and other materials up to 11.7″ wide. It has over 600+ built-in designs and the ability to scan virtually anything, meaning that no cartridges or PC is required.

Industrial-strength cutting tools – Most home sewists wouldn't have much of an opportunity – or a need – to use industrial sewing and cutting tools. However, if you ever get a chance to watch a professional factory-style fabric cutter in action, it's something to see! With these machines, you stack the fabric several inches high and place the pattern on top, then saw through the fabric much like a band saw cuts through wood. These machines require a high level of skill but are essential in production-level sewing.

Cutting table

It is a large, flat table used to spread the fabric and patterns while marking, pinning, and cutting. They are often covered with thick felt, which allows the pins to be placed into the surface.

Notcher

It is a tool commonly used in pattern making and sewing. It creates notches in the paper pattern or material. By notching, one marks the balance points of the pattern and also seam allowance, centre lines, ease, dart intake, etc Notches are used to align the pattern pieces.

Thread cutter

It is a small handy spring loaded tool, specifically used for cutting extra threads on the garments and ripping seams. Threads are simply cut by pushing the upper blade down with the thumb.

Seam ripper

It is a simple pen-like device that allows the removal of machine or hand stitched seams by cutting the stitches in an accurate and safe manner. A seam ripper is the best equipment to rip or open seams. While removing the stitches, the fabric should not be pulled as it can stretch and easily tear the fabric.

STITCHING TOOLS

Hand sewing needles

These needles are used for hand sewing work or embroidery. The needle design varies according to the purpose. Sharps of medium length can be used on most fabric weights; betweens are smaller, allowing them to make fine stitches. Use long Milliner's needles for tacking. Needles are mostly available in different sizes—from the very small size 9 to the heavy size 18. The selection of hand sewing needle depends on the work to be done and the type of fabric. For hand sewing, medium length needles with a short oval eye are selected whereas, for embroidery work, crewel needles with a long oval eye are selected. The hand sewing needle has three parts—the eye, stem and point

Sewing machine needles In the garment industry, there are several types of sewing machine, each requiring different type of needles. Each manufacturer of the needle identifies its needles in a different way; and needles for the same type of system may have several different names or numbers, depending on the manufacturer. Though the sewing machine needles are of various types, they may be selected according to its application. The size of the needles mainly depends on the structure and type of fabric, and sewing threads. Machine sewing needles are mostly available from sizes 9 to 18. The different type of needles are made to fix

on specific sewing machines and specific models. The needle sizes should match with the weight, thickness, and kind of the fabric . If the needle is very fine, it will abrade the thread; bend, break, affect the loop formation and cause skipped stitches. If it is too coarse, it will damage the fabric, producing an unattractive seam, and causing the seam to pucker.

The different parts of a sewing machine needle are as follows.

Butt

It is a small pyramid at the upper end of the shank. It is designed to make a single point contact with the hole in the needle bar

Shank

The upper end of the needle that is held in the needle bar by the needle screw is the shank. The shank is usually round, but it can have one or two flat sides. Designed to support and stabilise the needle blade. the diameter of the shank is mostly larger than the diameter of the blade.

Shoulder

It is the beginning of the shank just above the needle blade.

Blade

It is the thin section of the sewing needle that extends from the shank to the eye. It can be easily bent and hence, should be examined regularly for its straightening.

Scarf

It is a small indentation above the eye that permits the hook to pick up the thread loop. On some needles, the scarf is elongated and/or deeper to ensure that the needle thread loop will be large enough to prevent the skipped stitches.

Short groove

It is placed in the side of the needle where the hook or looper is placed. It is a small groove between the tip and the needle eye. Short groove helps the sewing thread to create a loop.

Eye

It is an opening in the needle blade at the lower end of the long groove. It carries the thread into the fabric to the hook or looper to make a stitch. The size of an eye is proportional to the diameter of the blade.

Point It is the tapered end of the needle and is often considered the most critical part of the needle. Mostly, the needles have a round point, ball point, or a cutting point. Generally, round points and ball points are used for woven and knit fabrics because they can penetrate the fabric by spreading the fibres or deflecting the yarns without damaging them, while needles with cutting points are used mainly for leather.

The different points of a needle are as follows.

Sharp needle It is pointed and ideal for almost all woven fabrics.

Ball point needle It has a slightly rounded tip, which is recommended for all knit and elastic fabrics.

Wedge point needle

A specially designed needle with a wedge like, triangular point, which enables it to make large, clean holes through thick material like leather, vinyl or suede (pronounced as swayed). They are ideal for shoe repair, belts and other leather garments and accessories. Sewing machine needles can affect the output of a sewing machine. When an inappropriate needle or bent needle is used, it can cause skipped stitches, poor stitch formation, and even damage to the machine.

Sewing thread

Wide varieties of sewing thread are available in the market. It is very important to select the correct sewing thread for the fabric. They should share the same characteristic as they will be laundered, ironed in the garment and thus, will stretch and shrink together. A long staple thread is smoother and creates less lint in the sewing machine. Made of short staples, the thread is uneven in texture and the result is less than perfect stitching. A strong thread is good for construction, especially on fabrics of natural fibre. Mercerised cotton has been treated to be smoother and straighter with less fuzz than other cotton threads.

Polyester thread has a high sheen and is abrasion-resistant. Silk thread is strong and lustrous. This thread is used for construction and stitched details such as buttonholes and top stitching. Always select a thread according to the type of fabric being used. Use synthetic threads with man-made fibres and mercerised cotton or silk thread with cotton or linen. Woollen fabrics should be sewn with silk or synthetic threads as they have stretching capacity with the fabric. Select a thread which is one shade darker than your fabric because when worked on a garment, a thread appears lighter. The higher the number on the label of a thread, the finer it is. When stitched, the thread should be well set into the fabric to give a firm long-lasting seam. If the thread is too heavy for the fabric, it will remain on the surface and tear out quickly, reducing the durability of your garment. Thimble It is used to protect the fingers or thumb in the process of hand sewing. A thimble helps push the needle to the fabric painlessly, without harming the finger. Metal, rubber and plastic thimbles are available in the market. Always use a thimble while hand sewing. Thimbles can be worn in any of the fingers or the thumb of the hand. Mostly, it is worn in the index or middle finger which holds the needle. It must be comfortable and should be light in weight

Stiletto

It is a sharp pointed tool used for punching holes in a fabric/material. It is used for forming eyelets in belts, and for making intricate holes in garments.

Bodkin

It is a flat needle with a blunt end and a large eye for threading elastic and tape through a loop or hem

. Iron

Pressing is an essential part of sewing. Every seam should be pressed as soon as it has been sewn, to give a clear, crisp line to the seam. Your pressing iron should be capable of both dry and steam ironing. A spray attachment is useful for dry ironing. An ordinary domestic iron is essential for general pressing; a steam iron is useful for lightweight fabrics. Pressing cloths are most important. Use cheesecloth for lightweight fabrics and cotton or linen for heavier fabrics.

References

^ Joseph-Armstrong, Helen (2010). Patternmaking for Fashion Design Fifth Edition. Pearson. ISBN 978-0-13-606934-8.

1. ^ Langdon, Nancy. Singer: The Complete Photo Guide to Sewing, 3rd Edition. p. 130.
2. ^ Calderin, Jay (2009). Form, Fit and Fashion. Rockport Publishers Inc. p. 131. ISBN 9781592535415.
3. ^ Hays, Constance. "Joseph Picone, 83, a Founder of Line of Women's Clothing." New York Times. June 26, 2001. Caulfeild, S.F.A.; Saward, Blanche C. (1885). "Darn". The Dictionary of Needlework: An Encyclopaedia of Artistic, Plain, and Fancy Needlework. Vol. 2 (2nd ed.). London: L. Upcott Gill. pp. 142–145 – via Internet Archive.
4. ^ Jump up to:a b Colton, Virginia, ed. (1979). Reader's Digest Complete Guide to Needlework. Pleasantville, NY: Reader's Digest Association. pp. 46–47, 57. ISBN 0-89577-059-8. OCLC 5676532 – via Google Books.
5. ^ Christie, Grace (September 1906). "Chapter 9: Methods of Work (continued)". Embroidery and Tapestry Weaving. The Artistic Crafts Series of Technical Handbooks. New York: Macmillan. p. 198 – via Internet Archive.
6. ^ Simon, Sally (4 March 2008) [1982]. "Pattern Darning". Needle Pointers. Vol. 10, no. 1. American Needlepoint Guild. Archived from the original on 27 December 2005. Retrieved 17 December 2005.
7. ^ Rafoogari: Art of darning, Deccan Herald, 13 April 2013.
8. ^ New Delhi: Mapping a forgotten tradition, LiveMint, 28 April 2017.

9. ^ Journey of a shawl , The Statesman, 19 April 2018.

10.^ The fabric of hope, The Hindu, 25 Aug 2016. *The Fashion*

11.Dictionary. Funk and Wagnalls.

12. Shaeffer, Claire B. (2007). Couture Sewing Techniques. Taunton. ISBN 978-1-56158-497-0.

13. Caulfield, S.F.A. and B.C. Saward, The Dictionary of Needlework, 1885, facsimile edition, Blaketon Hall, 1989, p. 219

14.^ Picken, Mary Brooks: The Fashion Dictionary, Funk and Wagnalls, 1957. (1973 edition ISBN 0-308-10052-2)

15.^ LovetoSew.com Garment Construction: How to Gather Fabric http://www.lovetosew.com/seamgathering.htm Retrieved on 2011-12-28

16.^ "Sewing Fabric Guide". Wednesday, November 21, 2018

17.^ Caulfield and Saward, The Dictionary of Needlework

18.^ Caulfield and Saward, The Dictionary of Needlework, p. 220

19. Skeat, Walter William (1901). A Concise Etymological Dictionary of the English Language. Oxford: Clarendon Press. p. 218. Colton, Virginia, ed. (1976). Complete Guide to Modern Sewing. Reader's Digest. ISBN 0-89577-026-1.

20.^ Burnham, Dorothy, Cut My Cote, Royal Ontario Museum, 1973.

21.^ Sturm, Mary Mark (1973). Guide to modern clothing (3rd ed.). Webster Division, McGraw-Hill. ISBN 0070622930.

22.^ US 2826760, Ernest G. Rice, "Combination Stockings and Panty", issued 1958-03-18

23.^ "U.S. National Library of Medicine - Vaginal discharge". Retrieved 2013-08-12.

24.^ US 20030196252 , Sara Blakely, "Two-ply body-smoothing undergarment", issued 2003-10-23

25.^ Prevention Magazine Editors: The Doctors Book of Home Remedies, Thousands of Tips and Techniques Anyone Can Use to Heal Everyday Health Problems. Bantam, USA 1991, ISBN 0553291564. P. 705, P. 707

26.^ I taught myself to crochet. No. 7702. Freeport, Illinois: Boye Needle Company. 1975. OCLC 51565050.

27.^ Ozepac Catalogue

28.Shaeffer, Clare B. (2011). *Couture Sewing Techniques*. Taunton Press.

29. Brockman, Helen L. (1965). The Theory of Fashion Design. John Wiley & Sons.

30. https://www.homestratosphere.com/types-of-sewing-machines/

31. https://ncert.nic.in/vocational/pdf/ivsm102.pdf