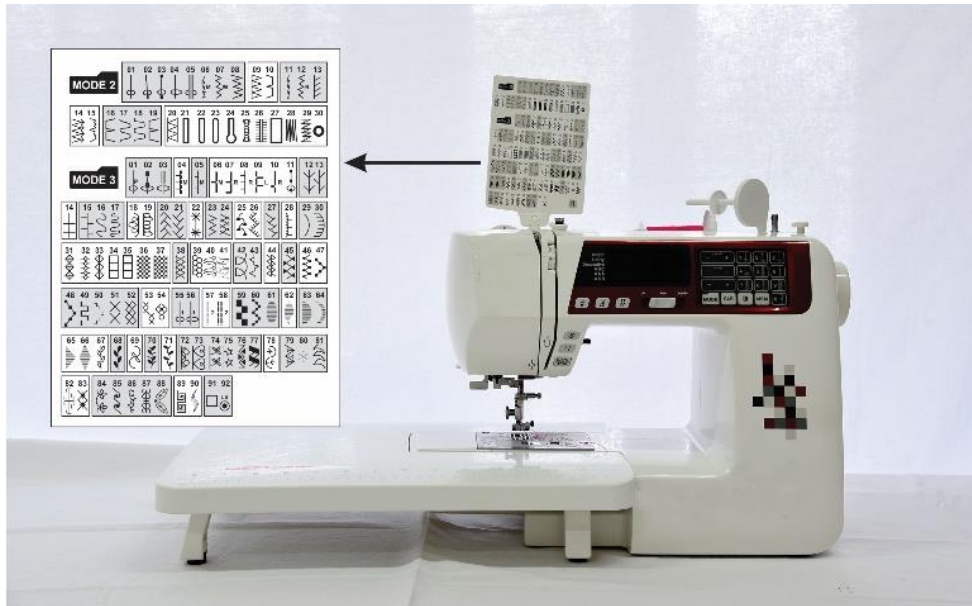


Draft Study Material



EMBROIDERY MACHINE OPERATOR (ZIGZAG MACHINE)

Qualification Pack: Ref. Id. AMH/Q0801
SECTOR: Apparel, Made-ups & Home Furnishing

(GRADE XI)



PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION

(A constituent unit of NCERT, under MOE, Government of India)

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Preface

Vocational Education is a dynamic and evolving field, and ensuring that every student has access to quality learning materials is of paramount importance. The journey of the PSS Central Institute of Vocational Education (PSSCIVE) toward producing comprehensive and inclusive study material is rigorous and time-consuming, requiring thorough research, expert consultation, and publication by the National Council of Educational Research and Training (NCERT). However, the absence of finalized study material should not impede the educational progress of our students. In response to this necessity, we present the draft study material, a provisional yet comprehensive guide, designed to bridge the gap between teaching and learning, until the official version of the study material is made available by the NCERT. The draft study material provides a structured and accessible set of materials for teachers and students to utilize in the interim period. The content is aligned with the prescribed curriculum to ensure that students remain on track with their learning objectives.

The contents of the modules are curated to provide continuity in education and maintain the momentum of teaching-learning in vocational education. It encompasses essential concepts and skills aligned with the curriculum and educational standards. We extend our gratitude to the academicians, vocational educators, subject matter experts, industry experts, academic consultants, and all other people who contributed their expertise and insights to the creation of the draft study material.

Teachers are encouraged to use the draft modules of the study material as a guide and supplement their teaching with additional resources and activities that cater to their students' unique learning styles and needs. Collaboration and feedback are vital; therefore, we welcome suggestions for improvement, especially by the teachers, in improving upon the content of the study material.

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Module 1	Introduction to Embroidery Machine
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Module Overview

Although hand embroideries are unique and look very classic, machine embroidery has taken over the garment industry now which can produce embroideries very close to hand crafts with their improved technologies and automated versions. Machine embroidery can quickly produce multiple copies, save time and efforts and develop variety of designs in no time.

Specialized machines have made the job of garment designers very easy. One can decide which embroidery machine to buy as per the need and then select from the options. Some prefer energy saving machines, some more designs and inbuilt patterns in multi colours and some prefer high speed depending upon the priorities like personal domestic use or for large scale industry. The purchase of work aids and attachments also differ from company to company.

Indian hand and traditional embroideries are considered India's strength but with the advent of automated and computerized machines, any design is possible with great speed and accuracy. Indian designers keep a balance in the use of hand work and digital designs to spread the Indian traditional crafts with the use of new technologies at the same time to keep at par with the designers of the world. The parts, application, and usage of different embroidery machines is discussed in this unit. These machines can create complicated patterns and quality products in no time. Embroidery Machines are of great help in recent times due to frequent fashion changes. They are ideal for mass production like in ready to wear clothing industry. Embroidery machines combine features that are not easy to match like minimum noise generation, high precision, and fast speed.

Clothing is one of the basic necessities of human beings. To enhance the aesthetic appeal, surface ornamentation is done on fabrics or garments and embroidery is one of them. Embroidery means to decorate a surface with colourful threads by selecting different designs. As the name suggests, machine embroidery is to embroider using a machine. Embroidery is a craft done to beautify the surface of different types of fabrics as a craft or hobby. It is an art to express the creativity using different types of techniques like beadwork, metal thread work, appliqué work, decorative thread work, cutwork, patchwork, etc. Different types of garments, (male, female and kids), home furnishings such as bed sheets, pillow covers, tablecloth, wall hangings

etc. are embroidered to give them a rich look. It is also used commercially in product branding, corporate advertising and uniform adornment.

Embroiderer usually takes the inspiration from surroundings, nature and environment. Embroidery is an art of self-expression and it should be done with patience and hard work to get the desired results. Embroidery is a versatile skill that covers variety of ornamental work done with a needle. It includes a lot of techniques that produce different effects, from flat to embossed, using threads that vary in style, colour and thickness. For example, silk thread, zari, wool, chenille and laces, ribbons can be used creatively in addition to use of mirrors, sequins, stones, shells, Swarovski, beads. This adds to the richness of the fabric and creates products that suit the demands of the consumer as well as the occasion.

Learning Outcomes
After completing this module, you will be able to: <ul style="list-style-type: none"> • Explain scope and types of embroidery machines; • Identify and explain Different types of threads, needles and fabrics used for machine embroidery; • Identify and explain Various parts and attachments of free- motion and semi-automatic embroidery machines; • Explain Care, Maintenance and Safety rules while working on Embroidery machines.
Module Structure
Session 1: Scope and types of embroidery machines
Session 2: Different of threads, needles and fabrics used for machine embroidery
Session 3: Various parts and attachments of free-motion and semi-automatic embroidery machine
Session 4: Care, maintenance and safety rules while working on embroidery machines

Session 1: Scope and Types of Embroidery Machines

Importance and Scope of Embroidery Machine

Machines have transformed almost every industry in the world and embroidery is certainly one of them. The urge to look different has

led to the invention of many products like embroidery machines. Sewing and embroidery machine is one of the important outcomes of such innovations. With the industrial revolution, mechanical machines followed by automated sewing machines were developed. With the advancement in electronic, computerized machines with multiple functions including programming for embroidery on fabric and garments and with the use of multiple coloured threads market is full with embroidered fabrics. These machines not only create complicated patterns but also mimic the hand embroidery designs. For a good finished product, a good quality machine along with appropriate fabric, motifs and accessories is required. Although hand embroidery is considered to be unique and special, it still takes a lot of time and efforts to do it. But machine embroidery produces quality products which are durable, cheaper and have good quality and precision.

Some important benefits of machine embroidery are:

1. Reliability- Embroidery machines can be trusted to produce precise pattern and designs with accuracy and without any errors. This ensures high quality of products
2. Speed- Machines work very fast as compared to humans without physical and mental fatigue, so it cuts down the time of production. More work can be done in lesser time.
3. Raised profits- As no labour is required in automatic and computerized machines, labour cost are cut and the profits of the industry increases.
4. Low cost -Machines eliminate human errors, and so reduce any alteration costs.
5. Bulk production- Hand embroidery is a tedious job and needs a lot of hard work, so bulk production is a problem and is very expensive. Machine work is good for large scale production in short time.
6. Accuracy – Machines are accurate and produce designs in perfect size and symmetry, thus it increases and quality of the final product in larger production.

These reasons make embroidery machines and their usage more popular in garment industry.

SCOPE – Embroidery art as a profession has immense versatility and scope. It is commonly used as it is pocket friendly for both small- and large-scale garment industries. If one learns to work on machine embroidery, then sky is the limit.

Today, embroidery is commonly seen on ladies, gents and kids garments, such as hats, T-shirts, coats, blankets, denim etc. Embroidery is very commonly used to decorate furnishing items such as bed sheets, bed covers, tablecloths, pillow covers, table runners, table mats, curtains, kitchen aprons

etc. Embroidery enhances the beauty and style of the object even in the articles of everyday use.

Therefore, the scope of Machine embroidery has a vast scope in the present scenario as it is used for domestic as well as for export market. It is a useful option for large scale production houses like apparel industry, export houses, accessory designing units to deal with mass productions. Similarly, it is very useful for small scale outlets like design studios, boutiques, designer stores to reach the demand of clients in time. For an intern or student, it has a good Job scope to work in a textile unit, garment manufacturing unit or start up their own design unit, holding exhibitions, and working as an assistant designer under an established designers. Today embroidery serves an equal opportunity for both male and females to earn their living. Skills learned from embroidery also nurtures creativity and ingenuity. Embroidery can be used on any product; it only depends on an individual creativity and how one uses it.

Some important areas where embroidery is used are:

1. Machine embroidery is of great use in the fashion industry to decorate textile and apparel.
2. It is also used in kids, men and women wear in different category of garments like casual, sports, marriage wear, evening wear, etc.
3. It is done on business shirts, jackets, uniforms in form of logos and monograms, and also on accessories like bags, caps, handkerchiefs, patches, scarves, and gift items. It is also used to decorate household linens, draperies, and decorator fabrics that imitate the intricate hand embroidery of the ancient times.

HISTORICAL BACKGROUND:

Needle work has been a popular craft for men and women since medieval period. Through the centuries, people have experimented with embroideries with the resources available to them. Inspirations were drawn from the nature, art, architecture, craft and culture of a particular time and region. Embroidery was considered a symbol of high social position in Muslim societies. Embroidery Or “The craft of two hands” as called by a Turkish traveler Evliya Celebi, was done on flags, shoes, robes, tunics, handkerchiefs, uniforms, horse trappings, footwears, sheaths, pouches, and even leather belts in the medieval Islamic period. The needlecraft or the embroidery work dates back to 2300 - 1500 BC and has been luxuriously inherited by several regions, each having its special style. In many cultures, embroidered products including religious items, household pieces and clothing items have been a

mark of luxury and richness like in ancient Persia, India, China, Japan, Mexico and Europe.

Over the years, Embroidery has been used for many purposes: to commemorate public and private events, to express ideas, to decorate different surfaces to enhance their beauty, to tell stories and to celebrate the beauty of the natural world. A lot of advancement took place in Embroidery in the 18th century, when hand embroideries were overpowered by machine embroideries as machines took less time to embroider larger design areas and could produce as many copies as needed. The first embroidery machine was invented in France in 1832 by Josué Heilmann. The next evolutionary step was the schiffli embroidery machine. The first Zig Zag machine of India which was introduced in 1936, and which was invented for the consumer market was the Singer 206K

In the Fashion Industry, machine embroidery played an important role. Machine embroidery started in many countries like Germany, Japan about 70 years ago and then gradually it became very popular in India as well. Pieces of earlier date are extremely rare in India. The majority of them are preserved carefully in some museums like Victoria and Albert museum of England where many costumes of the time of Queen Victoria are displayed in which intricate and unique Machine embroidery designs can be seen.

The use and growth of Machine Embroidery started for large scale production but it happened gradually in stages. With the growth and development in the apparel industry in India, need of Semi- Automatic, Automatic and computerized machines for sewing and embroidery work, has increased to meet the demand of fashion industry and the domestic and international buyers. Earlier embroidery was mainly done on T-shirt logos, brand monograms, but slowly it was adopted in apparels, household items, accessories, etc. Fashions in embroidery come and go, but many basic stitches remain the same.

TYPES OF EMBROIDERY MACHINES

Embroidery machines are an aid to add decoration to the products. Embroidery machines are manufactured all over the globe. A number of machines are available with specialised function. These machines operate at various skill-levels. Embroidery machine ranges from simple embroidery functions to the multiple function computerised machine. Not all machines are solely used for embroidery; some of them are also used for sewing. Using embroidery machine, freehand designs as well as specialised designs can be prepared. Machine embroidery can be done in variety of ways. To get maximum output

of the available resources, it is necessary to understand the machines in detail. Thus, knowledge of handling these machines, material, motifs, threads, texture and design and colour configuration is important along with the embroidery machine. There are different types of embroidery machine manufactured by different companies.

Some embroidery machines are free motion machines where one has to move the frame manually and then do the embroidery using basic Zig-Zag stitch to create pattern. Others are automatic where embroidery can be automatically obtained on the product by setting the stitch details and stored inbuilt patterns on the machines which is controlled by a computer.

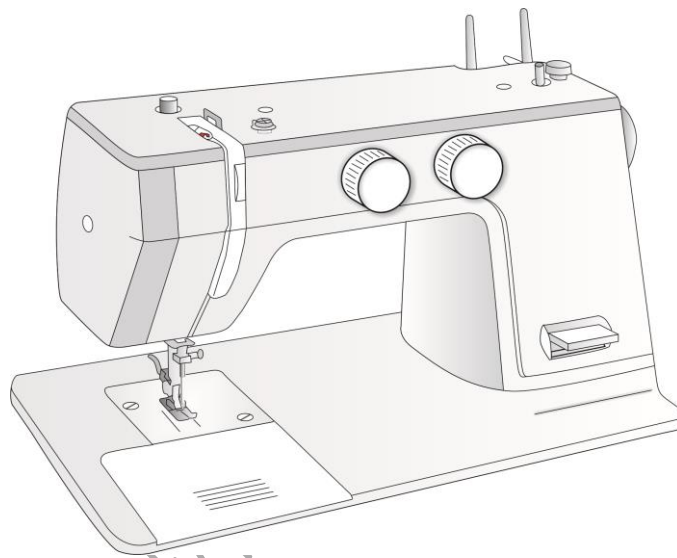


Fig.: 1.1 Embroidery Machine

Majorly there are four types of Embroidery Machines:

1. Free- Motion Embroidery Machine (Sewing Embroidery Machine)

In Free – motion embroidery machine, embroidered designs are created using a basic Zig-Zag sewing machine which is primarily used for tailoring. These machines lack automated features. These are the most basic machines and simple to use. They are used at homes and in small projects like at a boutique, tailoring shop and can be easily used by beginners. It has limited options and are very common.

In this machine, the embroiderer runs the machine skilfully by tightly hooping the fabric and placing it under the needle to create a design. The operator develops the embroidery manually by covering the feed dog with an embroidery plate. The machine can be set for running and some fancy stitches along with movement of hoop with hand. Filling

stitches can be prepared by sewing many parallel rows of straight stitches; machine Zig-Zag creates thick lines.

Free-motion machine embroidery can be very time consuming as this machine only has single needle and the operator has to change the thread and rethread it again and again in case of multi coloured designs. The operator needs to cut the stray, loose or connecting threads and clean up the work manually after the design is complete. Designs created by these machines are unique as they are done with hand and cannot be reproduced unlike the computerized embroidery machine patterns.



Fig.: 1.2 Free- Motion Embroidery Machine

Advantage:

1. Easy to operate
2. Suitable for tailoring.
3. Patterns created with free-motion embroidery are unique.

Disadvantage:

1. Time consuming as operator has to move the fabric manually.
2. Lacks specialized feature so complicated and creative designs can not be created.

2. Semi Automatic Embroidery Machine

Semi- Automatic machines can be used manually as well as it has certain automatic features like some automatic stitch patterns and options which can be used without the actual use of hands. Some patterns are in built with the machine which can be embroidered on the fabric just like in automatic machines by adjusting the stitch length

and width, and along with that a beginner can start working on it with manual movement of hoop with hands to obtain unique and customized designs.

Many Indian brands of machines develop semi-automatic machines as they are pocket friendly as compared to the fully automatic machines and have an option for beginners to learn embroidery easily. One can even mix and match the manual and ready patterns to create innovative designs.

These machines are quite good for small tailoring shops, boutiques and production units where an embroiderer needs quick work and an option to switch between manual and automated features. These are mostly used by hobbyists also for personal use and smaller craft projects.

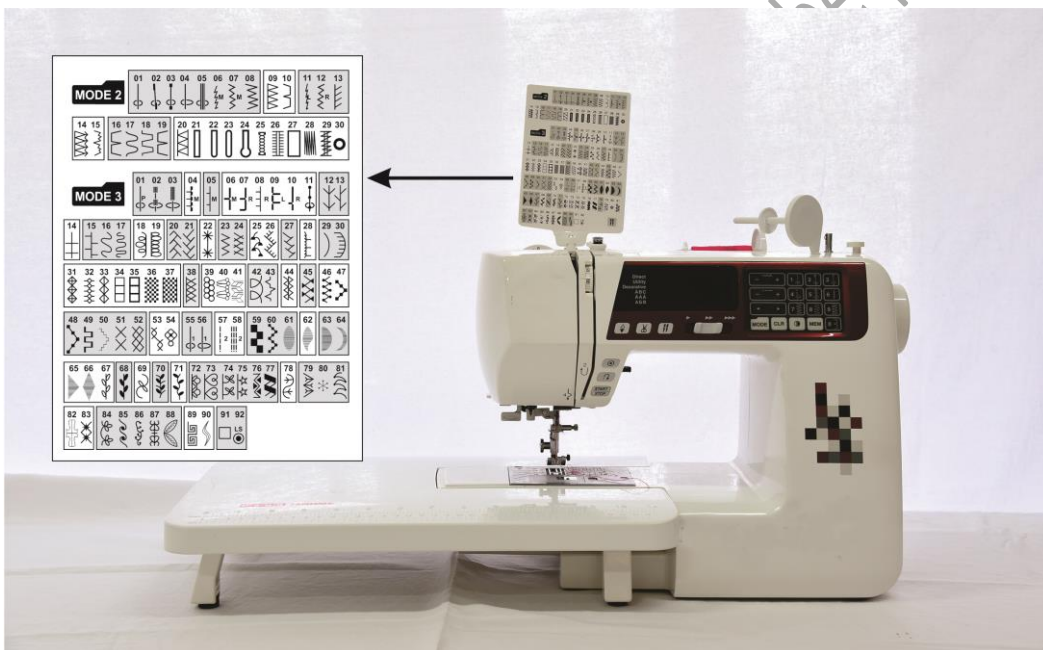


Fig.: 1.3 Semi-Automatic Embroidery Machine

3. Automatic Embroidery Machine

With the growing technology, many automatic and electronic machines are introduced in the market which have high speed and are very easy to use. They have a great choice of inbuilt embroidery patterns to choose from and are very portable and light weighted. They are generally very expensive but are very good for large scale production like in export houses, garment industry, etc.



Fig.: 1.4 Automatic Embroidery Machine

HEAD AND NEEDLE DETAILS

Different types of machines come with different head and needle options and it is a very important point to consider for those working on complicated projects on a large scale.

First one is the Single head machine which comes with basic settings of single head and single needle option. They are used for simple as well as complex projects in single colour thread, but they are not appropriate for elaborate and large scale projects as one has to change the thread manually every time one needs to embroider with some other coloured thread. In that case, Single head machine with multiple needles is used which provides the options to use multiple coloured threads in a design. These machines come in various sizes and shapes and around four to ten needles can be attached in it. The settings of the machine are then done accordingly to use multi coloured threads in an embroidery work.

i) SINGLEHEAD EMBROIDERY MACHINE

Single-head embroidery machine is used for producing small scale orders and customized garments. It can be both manual or computer operated and is mainly used for customized designing. Manually operated machine depend on skilled operators to position and manipulate material under the needle whereas computerized embroidery machines are designed to stitch the selected design and operator simply places the garment. Technology has extended the use of single head embroidery machine. With the help of a computer program, an embroiderer can work fast results by controlling the

work on multiple single- head machines in such a way that each machine can produce completely different embroidery pattern at the same time. This lets the manufacturer to customize their services and quickly produce very small orders as needed by their clients.



Fig.: 1.5 Single head Embroidery Machine

Advantages:

Single-head machines have a huge market in short-run and mid-size business firms like uniform development for hospitals and restaurant chains. These have their own in-house embroidery machine for customized work

Disadvantages:

- They take a lot of space as compared to other basic machines.
- It is not appropriate for large scale orders and evergreen classic designs.

ii) MULTI HEAD EMBROIDERY MACHINE

Multi-head embroidery machine is same as a single-head embroidery machine except that it contains two or more heads that stitch the same pattern simultaneously in different colours. Smaller areas with higher stitch count can be embroidered with this type of machine. Here each head utilizes 1 to 6 needles and up to 6 colors for stitching a design. These machines are purchased with specified number of heads.



Fig.: 1.6 Multi head Embroidery Machine

Advantages:

- Suitable for larger designs.
- A two-head machine could be a perfect fit for large business.
- It saves time while working on intricate embroidery work involving high stitch counts.

Disadvantages:

- It is not suitable for small orders due to high efficiency compared to the single head machine.
- This Machine is very expensive so not recommended for a small scale company having less order.

4. Computerized Embroidery Machine

In the modern era most embroidery machines are specifically engineered computer controlled for embroidery work. All types of machines including combination sewing-embroidery machine, industrial and commercial embroidery machines have a mechanism set wherein whole of the framing area contacting the needles moves automatically according to the pre-programmed embroidery pattern. Depending on the type of the machine, the embroiderer needs to read and develop pattern as follows:

1. Machine with only one needle require changing thread colours during the embroidery process.
2. Multi needle machines are threaded before running the design and thus do not require re-threading. The embroiderer has to decide the change in colour before starting the embroidery.
3. Multi needle machine has multiple sewing heads. Each of these heads can embroider the same design onto a separate garment on the same time.
4. Multi needle machine may have up to 20 heads. Each head consists of 15 or more needles.
5. A head in machine can produce many special effects which includes chain stitch, satin stitch, sequins, applique etc.



Fig.: 1.7 Computerized Embroidery Machine

Since the late 1990s, computerized machine embroidery has grown in popularity as cost has fallen down tremendously. Many manufacturers sell their own designs and also independent seller are selling designs online. These machines are the most expensive and can be programmed to do complex stitches without human help. Once the settings are selected and then the operator just has to watch the machine to complete the job. All these machines are fully equipped with automatic attachments like needle threader and different needles to choose from.

Steps of embroidery process on computerized machine:

Machine operator can use the instructional manual comes with every computerized machine but there are some basic steps which needs to be followed.

1. **Create a digitized embroidery design on suitable software:** A designer uses computer software to develop an embroidery design which can easily be redesigned and modified. These software files hold important information about motif outline, thread colours, original artwork to punch the design.
2. **Load the final design file into the embroidery machine:** After designing and final editing, the file is loaded in the embroidery machine. Different machine requires different formats that are proprietary to that company.
3. **Stabilize the fabric and place it in machine.** The fabric must be stabilized to prevent any wrinkles or loose tension. The fabric can be stabilized in many ways. Mainly two methods are used for it, one is adding the backing at wrong side of the fabric and the other is to add a topping above the fabric. Stabilizers are used as per the fabric and embroidery type.
4. **Embroidering the design.** Start the embroidery machine by switching on the power plug. Depending on the quality and size of the design, sewing a design may require a few minutes to over an hour.

Advantage

1. Suitable for mass production.
2. Easy to create complex patterns.
3. Designs can be digitized and converted into stitch file thus saving time for embroidery machine operator.

Disadvantage

1. It requires technical knowledge of various machine features.
2. It is expensive than free-motion and semi-automatic.

The garment industry has upgraded itself through innovations and introductions of new products from time to time. Sewing and embroidery machines are coming up with some new features each day as per the demand of the growing customer needs. Now a days, Computerized machines with smart software applications, automatic re-threading facility, build-in artistic embroidery designs, high speed and good storage memory are trending.

Embroidery machines are also classified as per the use they are put to like domestic machines and industrial machines. Some basic features of Domestic and Industrial machines are listed below:

Sr. No.	Features	Domestic Machine	Industrial Machine
1.	Price	Not very expensive	Expensive
2.	Speed	Moderate Speed and may be motorized	High Speed Motorized
3.	Stitch	Variety of fancy Stitches can be created with the use of different presser foot and adjustment.	Different machines for different stitches
4.	Maintenance	Maintenance is required as per use	Regular maintenance (daily) is required
5.	Attachment Options	Limited presser foot available	Various presser foot attachments available for different output
6.	Complications	Simple and easy to handle. Needs practice for setting stitch length as per requirement	Speed needs special practice for better output.

TERMINOLOGY RELATED TO EMBROIDERY MACHINE PARTS AND EQUIPMENTS

Bobbin: Bobbin provides the thread for the underside of the stitching. It needs to be wounded so that it functions properly.

Bobbin Case: Bobbin is placed inside the bobbin case. It is fixed to the bottom cavity of the sewing machine below the needle and moves into position to

catch the top thread and form the stitch as the needle is lowered into the bobbin chamber. The lower tension of the thread can be adjusted (by loosening or by tightening) by a small screw fixed in bobbin case.

Bobbin Winder – It is used for winding thread on the bobbin.

Double/Twin needle: Set of Two machine needles attached to a single shaft that sew two parallel rows of stitches at once with two spools of thread and one bobbin. It is also called as twin needle.

Feed Dog - This consists of a set of teeth fitted below the needle plate. It helps to move the cloth forward while sewing.

Needle: A small, thin, polished steel, spiked device with an eye at one end and sharp point at the other. Needle is the stitch forming device that carries the thread through the fabric. Needles vary in thickness, length, size of eye, sharpness and shape of point. Needles of different numbers are available in market, higher the number, finer is the needle.

Needle Bar - This is a steel rod to hold the needle at one end with the help of a clamp. Its main function is to give motion to the needle.

Presser Foot – The attachment on the embroidery machine that holds fabric steady at the point it is advanced at, while the needle is stitching. It is fixed to the presser bar to hold the cloth firmly in position when lowered.

Presser Foot Lifter – It is a lever attached to the presser bar for raising and lowering the presser foot.

Stitch Regulator -It controls the length of the stitch.

Spool Pin for Bobbin Winding - Spool of thread is placed on this at the time of bobbin winding.

Seam Ripper: A small tool used for cutting and removing stitches

Scissors: A cutting tool with two opposite sharpened blades that vary from 3 to 6 inches in length

Seam Ripper: Small tool used for ripping out unwanted stitches

Spool Pin - It is fitted on top of the arm to hold the reel or pool of thread while stitching or winding the bobbin.

Tailor's Chalk: A small piece of chalk of one-and-a-half-inch size square, used to mark lines temporarily on the fabric or garment

Thread Guide - It holds the thread in position from the spool to the needle.

Tension Disc - In tension disc, two concave discs are put together with the convex sides facing each other. The thread passes between the two. The tension of the thread is adjusted by a spring and screw which increases or decreases the pressure discs.

Take Up Lever - It is a lever fitted to the body of the arm. It's up and down movement feeds the thread to the needle and tightens the loop formed by the shuttle.

Thread tension: The amount of thread that can pass through the machine to create the stitch similarly on both sides of the fabric.

EMBROIDERY TERMINOLOGY

Applique: An ornamental technique of fabric decoration, in which cut pieces of one fabric are sewn on to a contrasting background to form a design.

Alignment: Correctly mark and place the designs which are to be embroidered

Auto- Digitizing: Changing manual art work into embroidery designs using a software that does the digitization automatically

Backing: Backing term is used for the material used to give a support to the fabric being embroidered. Woven or non-woven materials are used to provide support and stability to the fabric being embroidered. As name shows, backing is put on the back side of the fabric. It is occasionally referred to as a stabilizer in the hand embroidery. It can be large enough to be lined with the item being embroidered. Various varieties and weights of backings are available in the market. Backings can also be cutaway, tear-away, etc.

Backstitching: Reverse stitching by machine to lock the stitch

Basting: Temporary stitches used to hold the fabric layers in place before adding the final seam/stitch

Bead: One or more pieces of glass, plastic, wood, crystal or other material bored through the center and stuck in a cord or thread. Usually round, but also available in square, disc and cylindrical shape used to do bead work.

Beading: Embroidery in which beads of various kinds are sewn onto dresses, accessories, etc

Buckram: Buckram is a coarse, woven backing fabric that is usually very stiff. It is used to stabilize fabric for stitching. It is frequently used in caps or panel of the garments to hold the embroidery pattern straight.

Cord: A string made of soft woven threads or yarns twisted together available in several sizes. It is mainly used for cording stitch

Cut work: A type of freestyle embroidery featuring areas outlined with close stitches and then cutaway leaving holes in the fabric for creating cutwork pattern.

Design: In embroidery, the term design is used for a pattern or motif, which is decorated with different stitches of embroidery.

Design Catalogue: A collection of different types of designs, which may be used for various types of embroidery. Many times design catalogue also gives details of colour combination, types of stitches and threads for the designs.

Density: It is the distance between the lines of the stitches

Decorative stitching: A zig-zag machine stitch to create a design effect.

Digitize: To convert a manual design into a digital format or to create design from art work for machine embroidery

Digitizer: A person who digitizes the designs

Embroidery Machine: An automatic or computerized machine that can stitch patterns automatically

Embroidery thread: It is a thread or yarn that is factory-made or hand spun used for embroidery work and other types of needlework.

Embroidery Hoop/Frame: It is a device which holds fabric to be embroidered. It provides firmness and tightness to the fabric during the process of embroidery. This grips the fabric tightly between an inner and outer ring. Embroidery frames of different sizes and material (Plastic, metal, or wood) are available in market. Wooden frames are very popular for embroidery.

Paper Foam: It is used to add dimensions to an embroidery pattern. It is mainly used on caps, jackets, quilts, bags etc. It gives a 3D appearance. Various thicknesses are available in paper foams.

Filling Stitches: Long and short, satin, close herring bone, fishbone are considered as filling stitches in embroidery. Filling stitches cover large areas and they generally have a flat look.

Finishing: Finishing process is performed after embroidery work is completed. This includes trimming loose stray threads, removing stains, cutting or tearing away the backing, ironing or steaming to remove wrinkles.

Freehand stitching: Any embroidery done by following design lines, and not by counting threads

Fill Stitches: A sequence of running stitches sewn closely together to fill broad areas of embroidery with varying patterns and stitch directions

Fabric glue: Glue or an adhesive used to fix fabric pieces on place before doing the embroidery.

Format: The computerized embroidery machines have a special language which it can read and file format to save the digital designs like ART, PES, XXX, etc. They are different in different brands of embroidery machines. They are three letters after the dot in a file name.

Fusing: It is the fabric having a deposition of thermoplastic adhesive on one side which can be bonded to another fabric by the application of heat and pressure.

Gapping: In embroidery the term gapping is used for the spaces (fabrics) between the stitches in design is seen. It is seen through the embroidery design either in the middle of the design or on its edges.

Hooping: It is also known as “framing”. In this method fabric is fixed in a hoop.

Ironing: The process of using a heated iron on fabric to smoothen and stabilize fabric.

Lettering: When embroidery is done for making beautiful alphabets or expressions of words. It is often called “keyboard lettering.”

Locking Stitch: It is a series of three to four very short stitches taken on the back side of the fabric to lock the stitch. It is used to avoid the stitching from unravelling after the embroidery is completed.

Marking: Marking is done on the instruction sheet to help the embroiderer to initiate the embroidery work on the given design. It is mainly done to referring the materials and stitches.

Memory card: A normal computer card to save computerized embroidery designs for future use

Monogram: A design composed one or more letters, often intertwined, used as an identified mark of an individual or institution. Monograms are very attractively developed by embroidery.

Motif: A basic of any design on which embroidery has to be done.

Puckering: It results when the fabric is being gathered by the stitches. It is caused due to incorrect density of stitches, blunt point needle, loose hooping, insufficient backing, and incorrect thread tensions.

Running Stitch: One straight line of stitches used for outlining is called as running stitch.

Satin Stitch: Mostly used for filling a design. It is produced by closely stitching on both side of the outline of design covering the motif.

Scale: In embroidery the term scale is used to enlarge or minimize the size of the design without changing the elements of design.

SPI: Abbreviation for Stitch/Stitches per Inch. Mostly this term is used for machine stitching but in embroidery also the term is used.

Stitch Density: It means the number of stitches used to give proper coverage in the pattern without creating a thick, hard area in the embroidery or it is the distance between the stitch lines traveling in the same direction.

Stabilizer: A non-stretch material placed under the main fabric before doing the embroidery so as to prevent the shifting and stretching of fabric.

Stitch count: The total number of stitches in the embroidery design is known as the stitch count.

Tear away: A stabilizer that can be easily removed or torn away after the embroidery is done.

Template (embroidery): Print out of design on paper as a reference for proper placement on the fabric

Test sew: Embroidering on a scrap material or rough fabric before doing the final work to ensure that the design is fine and okay.

Thread: There is a vast range of threads available to the embroiderer today. These are available in a variety of colours

Thread Clippers: Small spring loaded scissors designed to operate with just the thumb and forefinger for clipping the threads.

Trimmings: Decorating a garment using decorative and functional accessories or details is referred as trimming. The trim is added to a garment to make it look embellished and attractive. Beautiful trims can also be prepared by embroidery.

Underlay Stitches: Under lay stitches are put down before the design is embroidered. It is used to stabilize the fabric or raise the design so that the fine details are retained.

Water soluble stabilizer: A stabilizer that melts when dipped in water.

Machine Basting: A quick way to fix and hold the two layers of fabric at a particular area temporarily using the machine before doing the final stitch.

Stitch: A stitch is a single turn or loop of the thread or yarn in sewing, knitting, and embroidery.

Stitch length: It is the length of each stitch sewn using the machine, Stitch length can also be changed according to the final design or look required.

Stitch width: In the Zig-zag embroidery, the width of the stitch can be adjusted in the horizontal space (Left to right) that a stitch takes at a time.

Zigzag stitch: Commonly used Z-shaped machine stitch sometimes used to finish raw edges or to sew a stretch seam. It is a regular stitch where all stitches are of same width. Stitch width and length can be set depending on the desired end look

Activities

Activity 1.

Identify different embroidery machines by visiting a boutique/ Garment industry.

Material required:

Practical File, Stationary for assignment like pencil, eraser, ruler, markers, coloured pens, Camera to click pictures of machine, computer system with internet connection

Procedure:

1. Visit a boutique or garment industry and search on internet about different types of Embroidery machines.
2. Click pictures of different embroidery machines.
3. Document in a tabular form enquiring the questions regarding: Type of machine, working process or steps, material required, performance of machine, satisfaction level, products they make.
4. Prepare a report

Activity - 2 Market survey

Find out the brands of machines for each of the three types of the embroidery machines.

Compare the brands for each category in terms of:

Cost, Availability, Sale, Ease of operation, after sale services.

Fill information in the given table using information of Sr. No. 1 as example

Sr. No.	Type	Grade	Usage	Maximum stitch for flat stitch	Number of needles	Embroidery area
1	Embroidery sewing machine (brandname)	Automatic	Home, Industrial	500-1000spm	Single and double	170mm x 200mm
2						
3						
4						
5						
6						
7						
8						
9						
10						

Check Your Progress

A. Fill in the blanks:

1. Single head embroidery machine is most often used for _____ and _____.
2. _____ is not recommended for a small-scale company having less orders. (multi head embroidery machine).
3. _____ machines are threaded prior to running the design.
4. Since the _____, computerized machine embroidery has grown in popularity.
5. Machine with only _____ needle require to change thread colours during the embroidery process.

B. Questions

1. Differentiate between Free- motion embroidery machine and Computerized embroidery machine.
2. Explain how a Sewing embroidery machine is different from computerized embroidery machine.
3. Write in detail about types of embroidery machines.
4. Write in brief about the scope and historical background of embroidery machines.
5. Explain any five terms of the following:
 - a. Backing
 - b. Motif
 - c. Puckering
 - d. Thread tension
 - e. Feed dog
 - f. Stitch length
 - g. Cut work
6. Discuss the advantages and disadvantages of the following:
 - a. Zigzag embroidery machine
 - b. Single head embroidery machine

Session 2: Different Types of Tools, Equipments, Threads, Needles and Fabrics Used for Machine Embroidery

Tools and equipment are an essential feature for any project of embroidery. It is important to have the knowledge of the tools and equipment available and its functioning. Proper selection of tools will not help in easing out the process of embroidery but also in giving the quality work. Here in this unit we are going to learn the tools and equipment used in embroidery machine which will help in operating and adjusting the machine according to the requirement of the work. The designing also requires some tools and equipment especially when it calls for design for competitive market. Appropriate selection of tools and equipment will help in creating good designs and ease in producing.

Machine embroidery is very easy to start which can be viewed as putting design cards and plugging on the machine. But to have good perfect embroidery it is a complicated process. One should have in-depth knowledge of machine, design, fabric, needle, threads, and inter-relation and suitability to each other. After the selection of embroidery machine following points needs to be considered.

For a design to be qualified as a good design should have the following characteristics:

- a. Visual aesthetics
- b. A good framework of stitches for the outer edge, fill in and underlay stitches.
- c. Well planned sewing sequence
- d. Suitable for the fabric.

Though embroidery machines and threads are required to do embroidery on fabric to make elaborate and quality pieces, one needs a good amount of embroidery supplies and tools. Those supplies and tools are listed below:

Primary supplies and Tools required:

- Embroidery thread
- Small pointed scissors
- Fabric
- Embroidery hoop

- Hooping Board
- Tracing material
- Thimble
- Ruler
- Needle
- Darning Foot
- Drawing materials
- Needle threader
- Dressmaker's pins
- Iron and ironing board.
- Ball pointed scissors
- Embroidery transfer materials
- Crewel embroidery needles
- Chenille needles, tapestry needles, beading needles
- Pinking scissors, applique scissors, microtip scissors
- Laying tool
- Thread organizers
- Magnifiers
- Markers
- Backing material
- Tweezers
- Computer system and Software
- Beads, sequins, mirror, ribbons, etc.

Different types of tools and equipment used in machine embroidery

The advantage of machine embroidery is that one can create a range of designs and products starting from tiny designs for handkerchiefs to designs for quilts and curtains. To achieve this one should have right kind of tools and equipment as per the requirement of the machine and operator should be aware of those tools. The basic tools required for all the types of embroidery machines are discussed below:

1. Darning Foots

It is also known as embroidery foot and is especially used in embroidery machines. It is used for free hand embroidery and helps in proper stitch formation by keeping the fabric intact in the embroidery frame. This foot minimizes skipped stitches and puckering. It also protects ones under fingers while moving the fabric

freely under the needle. It is very beneficial for the beginners and is easily available in the market.

This foot has a small opening in the centre of the foot. This area comes into the contact of the fabric. It is also called 'toe'. With this attachment, monogramming, quilting, darning and textured patterns are possible.

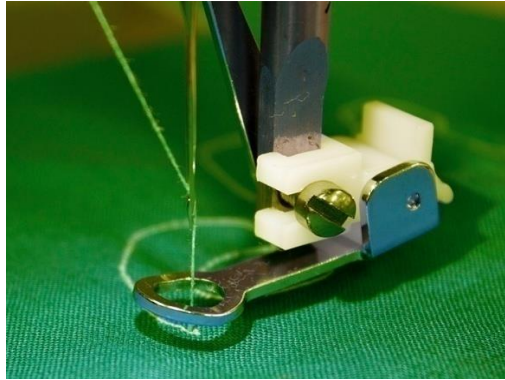


Fig.: 1.8 Darning Foot

Advantages:

1. With regular presser foot the machine controls the movement of the fabric whereas with darning foot it is self-guided as it disengages the feed dog.
2. It enables the embroiderer to have contact with just enough fabric which is required for embroidery and thus helps in making good stitch.
3. The opening in the foot provides a guide to track the needle position which is not possible with normal foot when needle moves too fast.
4. The visibility of the design around the needle through the opening in the foot helps in shaping the stitches also.
5. This presser foot can be used for both types of machines, one which have built-in embroidery programme as well as those which do not have built-in embroidery programme.

How to attach darning foot:

1. Remove the regular presser foot and presser foot holder.
2. Depending on the machine model, lower or cover the feed dogs to disengage presser foot.
3. Raise the needle to its highest position.
4. Now slowly lower it to halfway down.
5. Ensure that arm at the top of the foot is resting above the needle clamp.
6. Attach the presser foot.
7. Set machine for straight stitching.
8. For length no additional setting is required. It is determined by the speed with which fabric is moved under the needle.

1. Embroidery Hoops/Frames

An embroidery hoop holds the fabric in secured stretched condition. This helps in getting even stitches without puckering. Hoops come in a wide range of sizes from as small as 4 inches to as large as 14 inches. Embroidery can be accomplished with any size of the hoop but best is the one that encircles the entire design. Also the smaller the hoop, there is greater control while holding and moving the fabric around. Hoops are available in different materials like: plastic, wood or metal. Beginners can opt for plastic hoops



(a)



(b)

Fig.: 1.9 (a & b) Embroidery Hoops/Frames

For 3-D toys, jackets, blankets, canvas bags a strong double height hoop to hold the garment and a table on the device to support the garment is needed.

2. Hooping board

Hooping board helps in fixing the hoops quicker and easily with the help of the magnets. It is elevated board with non-slip surface. To use, the inner ring of the hoop is placed on the hooping board and secured with powerful magnets. The backing fabric is placed on the hoop and above that is the fabric to be embroidered. The outer ring of hoop is placed and fixed properly. The hoop is ready to use for embroidery. Hooping board speeds up the process.



Fig.: 1.10 Hooping board

3. Marker

Varieties of markers are available in market which are used for designing on fabric. The best markers are of vanishing type. This type of markers uses ink which fades away or washed out completely after laundering. These are also called vanishing pencils. Advantage of these markers is that its ink does not stain the fabric permanently. Other types of markers sometimes not only stain the fabric but also hinder the embroidery work as it stains the thread also while working.

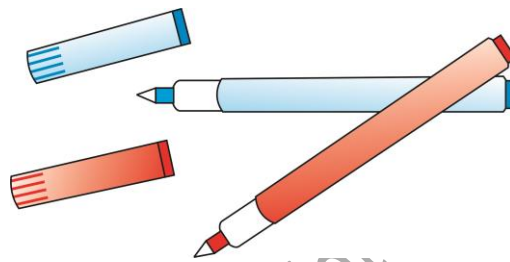


Fig.: 1.11 Markers

4. Seam Ripper

While trying out the new embroidery design or embroidering any projects there are chances of not getting right embroidery or some mistakes may occur. That embroidered area needs to be ripped off to do the correction. Seam ripper is used to take off the thread from the area for correction. It is a device with sharp point and edge fixed on a handle to cut the thread easily and smoothly without disturbing the whole area or causing any puckering on the surface of the fabric. The beginners should keep the seam rippers handy. Use of seam rippers also needs practice. If not used properly, seam ripper may cause damage to the fabric.

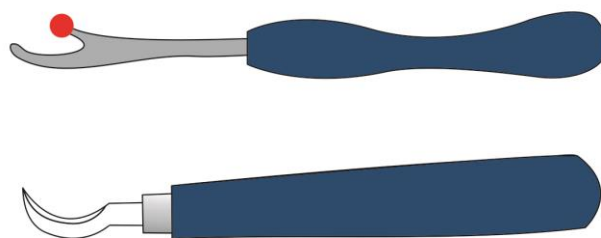


Fig.: 1.12 Seam Ripper

5. Embroidery Scissors

There are scissors designed for specific function to facilitate the embroidery work. Generally embroidery scissors have a fine needle point tip.

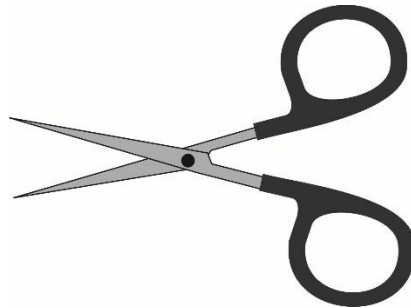


Fig.: 1.13 Embroidery Scissors

Embroidery scissors small in size with a sharp point, are for snipping threads and removing unwanted stitches. Fabric shears are good for cutting fabrics. All-purpose scissors are good for cutting out patterns on transfer paper. Classic scissors are used for cutting loose threads.

1. Software

Computer system is a major component required for modern commercial embroidery machines. Softwares and memory cards are the most important element for creative embroidery and they are different softwares for different machines. All automated machines need these software to run smoothly as they have the ability to produce precise designs as per their digitized designs set in them.

2. Design Catalogue

It is a collection of design detailed with colour combinations, images, sizes and stitch count which is useful for

- Beginners: to select from the readymade designs
- Merchandiser: to present basic options to the customers
- Designer: customization in digitizing and design software.

Basic, maintenance and design tools should be selected according to the

1. Base material and accessories used: for thin fabric fine needle which do not form holes in the fabric should be selected. For embroidery with

accessories like dori or sequins stronger invisible threads should be used.

2. Fabric cover: Fabric with open structure should be used with backing material. Design for open structure fabric should not be compact.
3. Placement of the design (overall, border or corner): Depending on the placement of the design, design materials should be selected.
4. Density of the design: Selection of the thread, needle, and stitch depends on the density of the design.
5. Toppings and backings used: Depending on the toppings and backings used other materials like needle, tracing material, scissors are selected.

Though the machine embroidery seems to be simple but the embroiderer should know and follow the sequences required for actual production. After selection of embroidery machine steps to start with the machine embroidery are as follows:

1. Selection of thread
2. Selection of needle
3. Selection of material (base fabric)

1. Different type of threads

Threads are essential materials for embroidery. Without threads, embroidery is not possible. Earlier there used to be only rayon and polyester threads available for embroidery. But now there is a lot of variety in the market. While working with the embroidery machine one needs to make sure, to have proper variables for different types of threads and there has to be a co-relation between thread, needle, and type of fabric used.

Not only the surface embroidery thread should be of good quality, the thread which is filled in the bobbin should also be kept in mind.

Threads come with different weights, types, texture for different types of fabrics. The most important factors to select the thread is Thread Quality, Fiber, weight, and Color.

Good Quality thread is the most important aspect as the swing machine works on a consistent feed of thread to make a constant stitch. As the threads travel through the machine it goes through guides, tension disk, the needle groove, and then the needle eye. If the thread is of poor quality having small knots, unsteady thickness, and loose fibers it will cause constant breakage of thread leading to poor quality embroidery.

1. (Silk) Resham Thread: Resham threads also known as silk threads, known for their shining, strength and luxury. These threads are

made up of natural fibers which give it its unique identity and first choice of the embroider.

The embroidery made up of silk thread is more durable as it is heat resistant and is generally machine washable. They come in a wide range of colors and are available in various brand.



Fig.: 1.14 Silk Thread

2. Cotton Thread: These threads are made out of 100% cotton, these are mostly used to fill in the bobbin for embroidery work. A good quality cotton thread should be used in bobbins to give strength to the stitches and thus durability of embroidery.



Fig.: 1.15 Cotton Thread

3. Metallic / Zari Thread: These resultant threads have the nature of extra shine of real metal and they are mostly used for highlighting the embroidery.

These threads are available in Gold, Silver, Copper, and various other metallic shades.

These days zari threads are again classified into KasabZari, NeemZari, Badla Zari.



Fig.: 1.16 Metallic/Zari Thread

4. Flat Badla: These are the threads that are made by melting the gold metal and passing it through a plate to form thin sheets and then are cut into various widths, which then looks like thin and flat strips. These strips brilliantly reflect light making the threads sparkle. These threads are available in a wide variety of widths and colors.



Fig.: 1.17 Flat Badla

5. Varigated Thread: These varieties of thread are shaded which have multi colour dyed pattern throughout. They have a repeating pattern of four to five colors which minimises the number of times thread change in the machine and stands out against the fabric. They are available in cotton, rayon, silks, polyester, and much more variety of yarns.



Fig.: 1.18 Varigated Thread

Selection of thread:

Thread plays an important role not only in the development of the design and also at different stages of the design. A contrast colored thread is used for making temporary stitches whereas for permanent stitches a thread that is a shade darker than the fabric is used.

Threads are available in various sizes which are indicated through numbers. The higher the number the finer the thread will be. Threads are also made from different materials like polyester, cotton, and their blends. Different fabrics require different threads as shown in the table given below:

Fabric type/application		Thread type
Medium weight fabric	Broadcloth	Cotton thread
	Taffeta	Synthetic thread
	Flannel, Gabardine	Silk thread
Thin fabric	Lawn	Cotton thread
	Georgette	Synthetic thread
	Challis, satin	Silk thread
Thick fabric	Denim	Cotton thread
	Corduroy	Synthetic thread
	Tweed	Silk thread
Stretch fabric	Jersey	Threads for knits
	Tricot	
Easily frayed fabric		Cotton thread
		Synthetic thread
		Silk thread
For top-stitching		Synthetic thread
		Silk thread

Fig.: 1.19 Selection of thread

A perfect design is formed only if the thread size matches the fabric and needle type.

2. Study of different types of needles

Before buying the machine needles, one must keep in mind the specifications of the machine, type of fabric to be embroidered, thread and stabilizer one is working with. Using the right needle, avoids the risk of thread breaking and the result obtained will be clean and smooth. Machine embroidery needle have a longer eye, one flat and one round side to fit well into the machine needle bar.

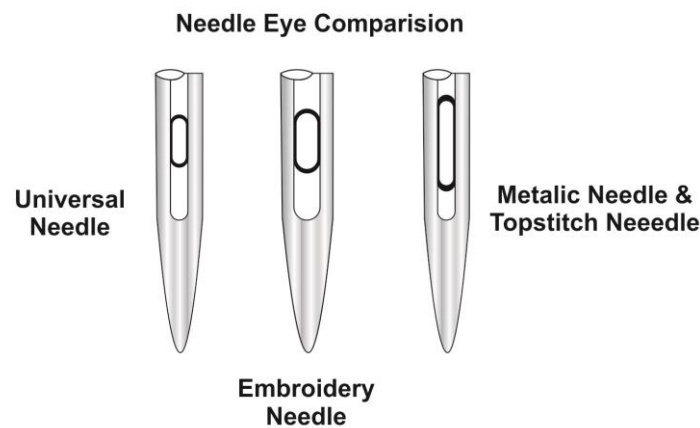


Fig.: 1.20 Types of needles

Needle

The selection of the right needle for embroidery is very much important. Every machine manual has the details on the selection of the right type of needle which the user should study before beginning the embroidery work. Generally large needles are used for heavy fabrics and small one for lighter fabrics.

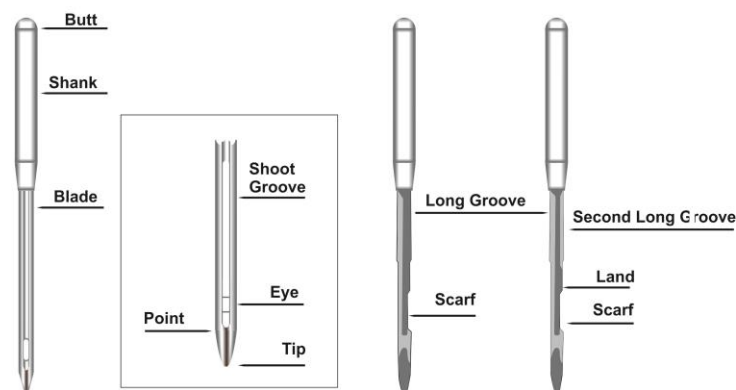


Fig.: 1.21 Types of needles

A. Parts of machine needle

1. **Shank:** The shank is the flat or round part of the needle where it is attached to the machine with screw. The back side is flat in case of home embroidery machine whereas for industrial machines it is round.
2. **Shaft:** After shank the long centre part is shaft also referred as blade.
3. **Blade:** Blade is the part of shank to the point

4. **Scarf:** The indentation on the backside of the needle starting above the eye and ending slightly below it is scarf.
5. **Needle point:** It is the part of the needle that pierces the fabric. Sharp needles have very precise point whereas ball point needles have a slightly rounded tip.
6. **Eye:** The open portion through which thread passes is the eye. Embroidery needles are provided with elongated eye in order to accommodate thicker embroidery threads.

B. Types of needle

The needle should be the right kind and of high quality. It must fit well in the machine. The low-quality needles may damage the machine and will turn out to be an expensive option. Different types of needles help in making work simpler and easy and give different surface finishing.

C. Size of needle

Choosing a needle size depends on the fabric, the thread, and the application. The size of the needle refers to the diameter of the needle shaft. The lower the number, the smaller the shaft. There are two measuring systems, the American and the European measurement systems.

- i. American system: This system uses the sizes 10, 11, 12, 14, 16, etc.
- ii. European system: This system uses 70, 75, 80, 90, 100, etc.

A size 70 needle in the European system is equivalent to a size 10 in the American system, a size 75 is equivalent to an 11, a size 80 is equivalent to a 12, and so on. So measurements are listed with both numbers, such as 75/11 or 80/12.

The most common size needle across all sewing applications is a size 80/12 and for embroidery: (refer the table below)

Needle size	75/11	80/12	90/14
Fabric	Satin / Cotton	Linen	Denim
Fabric weight	Light weight Fabric	Medium weight Fabric	Heavy Weight Fabric

Embroidery needles are unique in the following features:

The embroidery needle's eye is larger than the eye in the same-size regular needle.

This larger eye helps prevent shedding and breaking. If embroidery thread is breaking more than usual, make sure that the needle is an embroidery needle and not a sewing needle.

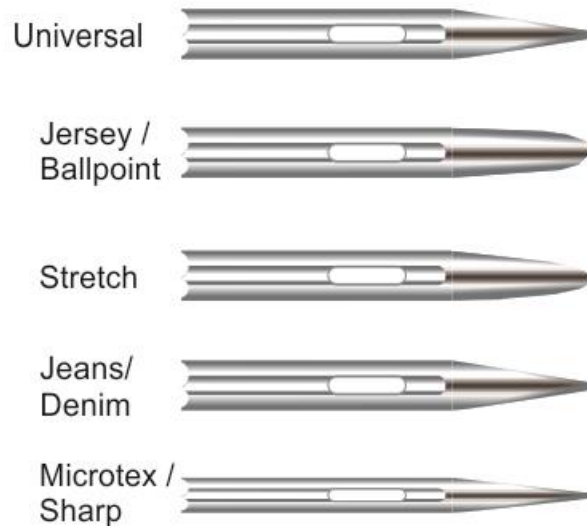


Fig.: 1.22 Embroidery needles

Embroidery needles have a specially shaped scarf. It also has a slightly shorter distance from the point to the eye of the needle. This feature helps to form clear stitches.

The needle tip varies and should be selected depending on the type of fabric being stitched. For embroidery needles, there are three basic types of needle tips available and various speciality needles for different kind of fabrics and sewing tasks.

Sharp embroidery needles: A sharp needle will pierce the fabric precisely. It is used for tightly woven fabrics.

Ballpoint embroidery needles are used for knit fabrics. It helps to prevent holes in knit fabric. The tip of the ballpoint needle pushes the knit fibres aside rather than piercing them to prevent holes.

A **universal tip** is somewhere between a sharp and a ballpoint. This can be used for either woven or knits, but may not be sharp enough for some woven fabric to give a clean stitch, or may still cause a run in some knits.

An **Embroidery Needle** has a large eye is designed to protect decorative embroidery thread. They are sold in sizes 75/11 and 90/14

A Double (Twin)/ Triple Needle Multiple needles arranged on a crossbar with variable distance between the needles. They allow perfectly spaced distance in between the stitching. The distance between the needle varies from 1.6mm to 8mm.

Selection of Needle: Machine Needles are available in various sizes ranging from 10-16. Selection of needle depends on:

- **Type of Fabric:** Heavy fabrics require thicker needles. If fine needles are used the needle will break due to the strain on the needle. Fine fabrics require fine needles. The thicker or coarse needle will break the yarns of the fabric leading to puckering in the work.
- **Type of thread:** A fine thread should be used for fine needle and for coarse thread thicker needle should be used. The stitches will be weak if a fine thread is used in a thicker needle. The needles will create big holes on the base fabric which will not be properly covered by fine threads. Coarse thread in fine needle will not work as excessive friction of thread through small eye of the needle will lead to thread breakage.

SELECTION OF FABRIC

The final result of any embroidery project depends on a number of factors. One needs to ensure the selection of right needle, fabric, stabilizer to suit the size and stitch density of the embroidery design. For a great outcome other than needles and stabilisers one should make sure that the embroidery machine is well-tuned, set at the appropriate needle and bobbin tensions and using the right settings in the embroidery software.

When choosing the fabric for machine embroidery, the following points should be considered:

1. **Fabric weight-** while selecting a fabric for embroidery, fabric weight is very important point to be kept in mind. Technically, embroidery can be done on any fabric but the fabric needs to be strong enough to hold the design. Looser fabrics are less able to hold the threads. The thread weight should complement the weight of the fabric to make beautiful and balanced artwork.
2. **Fabric properties-** the weave of the fabric should also be considered before the selection of fabric. The 'thread count' of the fabric refers to the fabric's weave and determines the capacity of the fabric to permit a

needle to thread through it without effort. One must change the density of the stitch to embroider on a different fabric or with a different thread.

3. Designs- While selecting a fabric for machine embroidery, the weight of the design should also be taken into consideration. Design weight is the number of stitches it takes to create the design and adjusts the stitches within a design. Heavy and thicker designs are done on stronger fabrics with tighter weaves to support them. The combination of the correct selection of fabric and design plays an important role in reducing the total cycle time. Total cycle time is always dependent on stitch count in the design. Reduction in stitch count will always reduce sewing time.
4. Any design cannot be done on all kinds of fabric. It will not work even if a proper stabilizer is used.
 - i. A densely stitched design may put pressure on certain fabrics, such as knits and lightweight fabrics, loosely woven fabrics which may distort the weave. Dense designs should be used on steady, medium- to heavyweight woven fabrics but they are not appropriate for fluid fabrics. The machine needle might bend easily while embroidering coarsely woven fabrics. This can produce uneven work. The same design comes out cleanly on a smoothly woven fabric
 - ii. A small, less densely stitched design is not suitable for a thick pile fabric, such as fleece or terry cloth, because its coverage is insufficient and design is not seen properly. This type of design is good to work on a smooth-surface like a plain-weave fabric.
 - iii. A design with substantial underlay stitches is suitable for a deep pile fabric to avoid the pile from being damaged through the stitches. It can be too compact for a soft knit fabric.

DIFFERENT TYPES OF FABRICS USED FOR EMBROIDERY WORK:

Cotton, linen, silk, and wool with a tight weave are the best fabrics for machine embroidery. Its construction ensures a sturdy surface that easily supports decorative stitching. Individual fibers run both horizontally and vertically, allowing needles to easily pass through them.

COTTON

Cotton is a versatile natural fabric. Its important properties such as affordability, easy-care, strength, durability have made it the world's principal clothing fabric. It is a natural fabric and produced from natural fibers. Available in a wide variety of fabric weight, color, surface, patterns, weaves, and price range.

Hundred percent cotton in medium weight and heavy weight, gingham fabric, broadcloth fabric and heavyweight canvas cotton are suitable fabrics for machine embroidery.

MUSLIN

The most commonly used cotton fabric for different embroidery work is Muslin. It is available in a thread count of 70 going up to 250. The 250-thread count gives a very fine muslin fabric. It is tightly woven and has a smooth surface which does not damages even after being stretched tightly on any embroidery hoop. It can even be used without any backing for any fine embroidery like needle painting.

LINEN

Linen has been highly valued for many centuries for its incomparable hand and visual appeal. Linen fabric possesses unique properties of quick-dry, lint-free, resistant to moth they have good shape retention. This fabric wrinkles easily, even when treated with crease-resistant finishes, shrinks and grows yellow with age.

Linen is available in a wide variety of weight from handkerchief linen to heavy suiting's linen. Linen is lighter, more textured, and 30 percent stronger than cotton and wears extremely well. Linen is a plain weave fabric. The beauty of the fabric makes this slight rough surface bearable. It has become synonymous with a classic, relaxed, elegance and is the supreme choice for comfort in hot weather.

Linen fabric is a little expensive but is best for embroidery work. Linen blended with silk is also used for embroidery. One can choose linen from different counts ranging from 19 counts to 36 counts.

SILK

Silk is a natural fibre and is a product of secretion of the silk worm. It has a natural sheer. Silk is a beautiful fabric and hence a wonderful choice for embroidering dressmaking and home décor items. Embroidering Silk has been a practice for centuries.

A sharp needle with a very small eye is used on silk fabric. Big needles should be avoided as it might also leave holes on silk and as it is tightly woven fabric, the head of the needle will have difficulty going through it. Use short lengths of thread. Silk with its textured effect, luxurious shine, crispiness and strong base are good for embroidery.

SATIN

Satin is basically a weave construction with a maximum amount of warps on the face of the fabric achieving a flat smooth and lustrous finish.

Historically, silk yarns were used to weave satin fabric. Today high quality satin is still made from silk while less expensive alternatives use man-made fibers.

Satin has shiny front, beautiful drape, durability, wrinkle resistant. Its smooth and shiny surface makes it look beautiful with embroidery.

Good quality satin should be chosen with smooth surface and tight weave to avoid thread snagging.

WOOL

Wool is soft, warm and cozy. It is a natural fibre made from animal hair.

Wool in any form whether pure wool, felted wool, or even synthetic blends of wool felt, is suited for embroidery. These fabrics are strong, do not fray in felt form, and provides depth for embroidery. The benefit of the wool fabric is that it does not produce a raw edge that needs to be finished through hemmed.

TERRY CLOTH

Terry cloth is a woven fabric with uncut loops to one side. Better quality fabric has a closely woven background with closely packed loops. Terrycloth can also be used with a water-soluble topping on the top of the fabric for embroidery.

It is suited for embroidering monograms. Designs with solid fills should be taken as it will not let lost in terrycloth texture.

NET [Mesh]

Mesh is a loosely woven fabric. It can be made of almost every material, but mostly made of polyester and nylon. It is lightweight and permeable. The most important quality of this fabric is it is always breathable. Nylon mesh is often strong and stretchable. Net Fabric comes in a lot of colors and has the

property of merging well with the base fabric, therefore: one of the ways to use machine embroidery on net fabric is in the form of patches and is later applied on the base fabric. These patches are easily available in the market these days.

DENIM

Denim although it is cotton, is an entirely different fabric because of its twill texture and heavy weight. Now a day's denim fabric has too many variations in its list and is mixed with various other yarns and weave style. Denim is also very sturdy and can support very detailed and complex machine embroidery designs.

Machine embroidery on denim opens up a whole world of opportunities, not just as embroidery hoop art, but also in decorative stitches on jean pants, skirts, jackets, and more.

TAFFETA

Taffeta is very similar to poplin weaves. In the textile industry taffeta is made from multifilament a yarn which is a very shiny yarn. Due to the shiny nature of the fabric, it is also categorized in the rich and luxurious feel and appearance, used in making embroidered wedding gowns, lehenga, evening dresses, and embroidered jackets. etc.

A huge range of machine embroidered laces are also developed on taffeta fabric, easily available in the market which can be fixed on any article.

RAYON

Rayon was one of the first man-made fibre to be developed. It is extracted from cellulose and was developed to mimic the quality of silk; to be strong, absorbent, to drape well, and to have a soft hand.

There are different types of rayon named on the various processes and different chemicals used for their production. They are Acetate Rayon, Cuprammonium Rayon, and Viscous Rayon. All the synthetic fabrics share general properties, such as low moisture absorbency, resistance to insects, and for the most part heat sensitivity.

Other materials like burlap or jute, vinyl, modal, velvet, lycra {spandex yarn, is appropriate for all stretchable fabrics regardless of brand}, leather, can also be used for machine embroidery.

OTHER DECORATIVE ELEMENTS USED IN MACHINE EMBROIDERY

Because of the upgraded embroidery machine, it has become very easy to decorate the surface of the material in faster manner. These days, Other than simple threads, various embroidery materials can be used to create a 3D effect on the surface using a specialized presser foot.

1. **Ribbons:** Pure silk ribbon has drapability and allows easy manipulation. When ribbons move well the design can be more creative. Ribbons are available in the various sizes: 2mm, 3.5 to 4mm, 13mm, 32mm etc.



Fig.: 1.23 Ribbons

2. **Cording:** Cords are available in various thickness and twists in a full range of colors.



Fig.: 1.24 Cording

3. **Bead:** Beads and pearls are always a tedious task but now because of specialized sewing machine presser feet, it has become a dream come true.



Fig.: 1.25 Beading

4. **Sequence:** There are sequence laces available which can be used for the embellishment of the material in no time with the help of a machine.

A sequence can be of shiny or matte finish, can be flat or slightly three-dimensional, and are available in variety of shape and sizes.



Fig.: 1.26 Sequence

5. **Gota:** Gota work is Indian embroidery originated from Rajasthan. It is a form of applique work.

There are various types of gota, seekhi, phool, bijiya, mothda, bakhandi, and lappa.



Fig.: 1.27 Gota

6. **Mirror Work:** Mirror work is also known as shisha embroidery. Mirrors are cut into desired shape and sizes. Circular shapes are more popular though other shapes like square, triangular, polygon, hexagon, are also available these days.

Due to the breakage of needles, while attaching the mirror by the machine, flat metallic sequence are more popular these days.

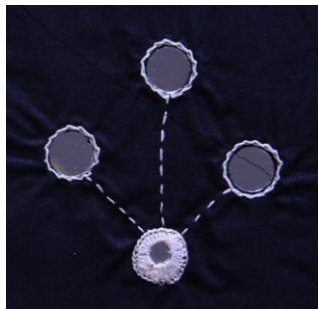


Fig.: 1.28 Mirror Work

Relationship between thread and Needle sizes by weight of the fabric

As there are different variations in embroidery projects, one must consider the relationship between the thread, needle and fabric type to be used to avoid any problems while working.

There should be a sink between thread, needle, and material for perfect combination otherwise it will create faults during stitching.

Machine needles are selected according to weight and other characteristics of the fabrics as well as their type of construction.

The needle should be sharp enough to enter the fabric without damaging it, yet having an eye that is big enough so that the thread does not break.

It is important to know the right sewing thread as per the type of fabric. The thread and fabric should have same qualities and characteristics as they have to be laundered and ironed together. They should shrink and stretch together.

Table: The relation between Thread, Machine Needle and Fabric

	FABRIC	THREADS	NEEDLE SIZE
Light Weight	Crepe de chine, Voil, lawn, Organdy, Tricot.	Fine Silk Fine Cotton Fine Synthetic Fine Cotton Covered Polyester	9 or 10
Medium Weight	Linens, Cotton, Pique, Serge, Doube Knits, Percale	50 Silks 50 to 80 cottons 50 to 60 Synthetic Cotton Covered Polyester	11 or 14
Heavy Weight	Denim, Tweed, Gabardine, Suiting, Drapery,	50 Silk	14 or 16

	and Upholstery Fabric	40 to 50 Cotton 40 to 50 Synthetic Cotton Covered Polyester	
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Activities

Activity 1.

Prepare a scrap book of different types of threads, needles and other materials used in machine embroidery enlisting their names, sizes, types and uses

Material Required:

Different variety of threads, needles and embroidery material like mirrors, ribbons, Gota, sequins, beads etc. collected from the local market, glue, scrap book, markers, ruler, cello tape

Procedure:

1. Stick different types of threads, needles and embroidery material used in machine embroidery
2. Write details of these material like thread type, size of needles, variety of ribbons, sequins and beads available in market.
3. Write the uses of these material just below them and finish the file.

Activity 2.

Make a swatch file of different types of fabrics on which embroidery can be done

Material Required:

Fabric swatches collected from the local market, chart sheet, glue, markers, pen and ruler

Procedure:

1. Stick different types of fabric swatches on the sheet collected from the local market.

2. Write the details of threads and needle appropriate for each fabric type just below it keeping in mind the relation between the fabric weight, needle size, thread and type of embroidery to be done.
3. Finish the sheet and prepare a file.

Check Your Progress

A. Fill in the blanks:

1. It is recommended to get embroidery machine serviced _____ in a year (once)
2. Rewind and insert a new bobbin if the thread _____ constantly (breaks)
3. For embroidery needles, there are _____ types of needle tips available. (three)
4. For medium weight fabric the recommended needle size is _____ (80/12)
5. _____ needle has a long eye, sharp teeth and a slightly thinner shaft. (Chenille)
6. embroidery is done with the use of different sizes and using a special cording foot. (Cording)

B. Questions:

1. Discuss in detail the parts of the embroidery needle.
2. What are the different types of the needles used for embroidery machine? Discuss the characteristics of each.
3. Write about the different types of threads used for machine embroidery
4. Explain the relationship of thread and needle as per the use of different types of fabrics through a chart/table.

Session 3: Various Parts and Attachments of Free-Motion and Semi-Automatic Embroidery Machines

FREE MOTION EMBROIDERY MACHINE (Zigzag embroidery machine)

A basic type of zigzag sewing machine can be used to produce embroidery designs in case of free-motion machine embroidery. Fabric should be tightly hooped to prevent puckering and has to be moved beneath a needle to create a design in this kind of machine embroidery. In this case, the embroidery has to be developed manually by the operator using the machine's settings so that the tight stitches form a design or an image on a fabric.

These types of machines have only one needle, hence the operators have to stop and manually rethread for every colour in a multi colour design, which consumes lot of time. Any design created by this machine is very unique and cannot be accurately reproduced, unlike with computerized embroidery as this is a manual process rather than a digital production system. Zig Zag is one versatile stitch.

Advantages:

Altering the width and length of the stitch creates so many variations and uses.

By lowering the tension with zigzag stitching upper thread will be slightly visible at the lower side of the fabric thus creating a new look.

Closely spaced zigzag stitch will create satin stitch.

A multi stitch zigzag stitch makes three short stitches while the normal zigzag makes only one.

It is also used for:

1. Decorative finishing of edges or hems
2. Couching
3. Joining pieces together
4. Applique and patch work
5. Effectively done on knit or stretchy fabrics

Different parts of Free- Motion Zig-Zag (MANUALLY OPERATED) machine and its application

Knowledge of the parts of machine not only helps in understanding and operation of machine but also in finding and repairing of faults during operation.

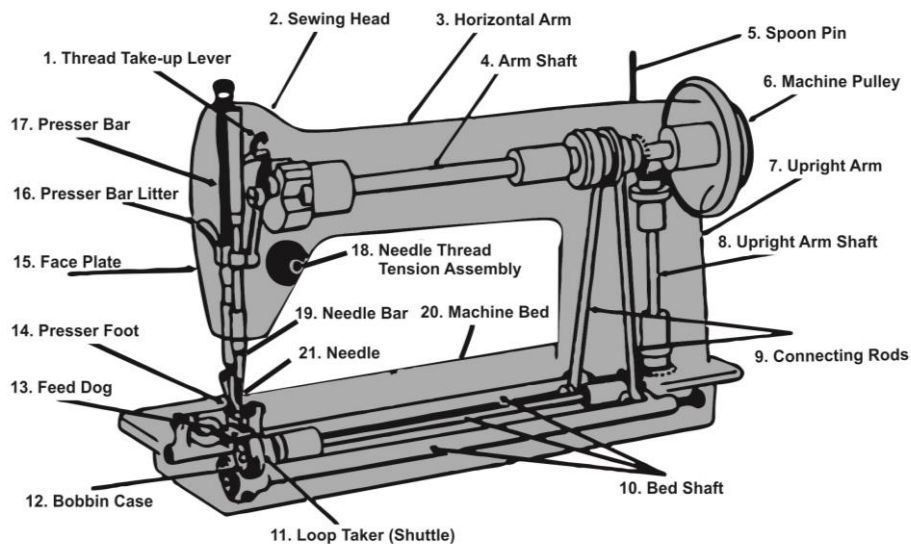


Fig.: 1.30 Parts of Free- Motion Zig-Zag (MANUALLY OPERATED) machine

A. Parts of machine

1. Arm: It is the horizontal part of the head of the machine that houses the shafts.
2. Spool pin: A metal rod on top of the machine for correct positioning of the spool.
3. Cord: Rope connecting the Fly wheel and treadle.
4. Fly wheel: Helps in revolving the machine which can be operated manually or electrically.
5. Stitch regulator: Use to adjust the length of the stitch according to the requirement.
6. Thread guide: Guides the thread by holding the thread in position from the spool to the needle.
7. Tension disc: Control the delivery of thread from spool to the needle by increasing or decreasing the tension.
8. Thread take up lever: Located at the body of the arm above the tension disc. It releases the thread from the tension disc and delivers to needle.
9. Needle: It is attached to the needle bar. Needles are selected and used according to the end product.
10. Needle bar: It is a metal rod which holds the needle. It helps in moving the needle

B. Attachments of machine:

1. **Bobbin:** Attachment on which lower thread is wound.



Fig.: 1.31 Bobbin

2. **Bobbin case:** Placed in the bottom chamber of the sewing machine which holds the bobbin. The screw provided helps in adjusting the tension of the thread by tightening or loosening it.



Fig.: 1.32 Bobbin Case

3. **Bobbin winder:** Holds the bobbin and assist in winding the thread on bobbin properly.

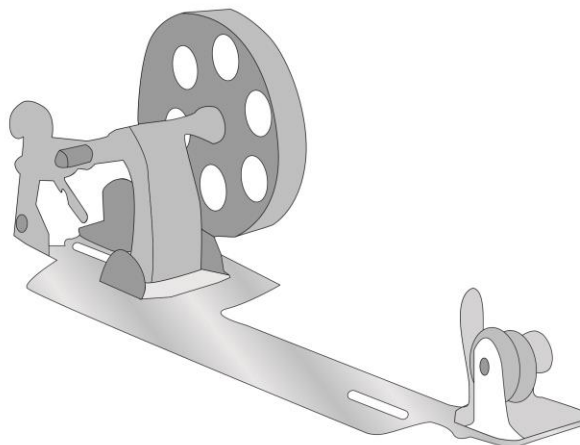


Fig.: 1.33 Bobbin winder

4. **Thumb screw:** Located in the center of the fly wheel. It controls the mechanism of stitching by connecting or disconnecting the fly wheel

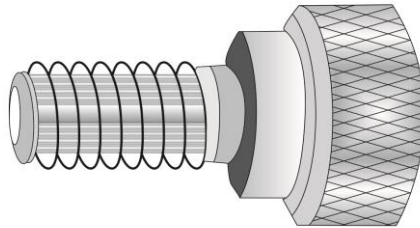


Fig.: 1.34 Thumb Screw

5. **Needle clamp:** Holds the needle.

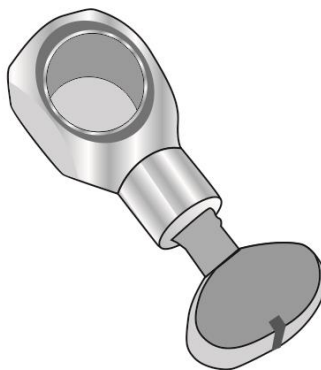


Fig.: 1.35 Needle Clamp

6. **Shuttle:** Located at the lower side of the bed of the machine. It holds the bobbin case. Its movement forms the loops to form stitch.



Fig.: 1.36 Shuttle

C. Special attachments:

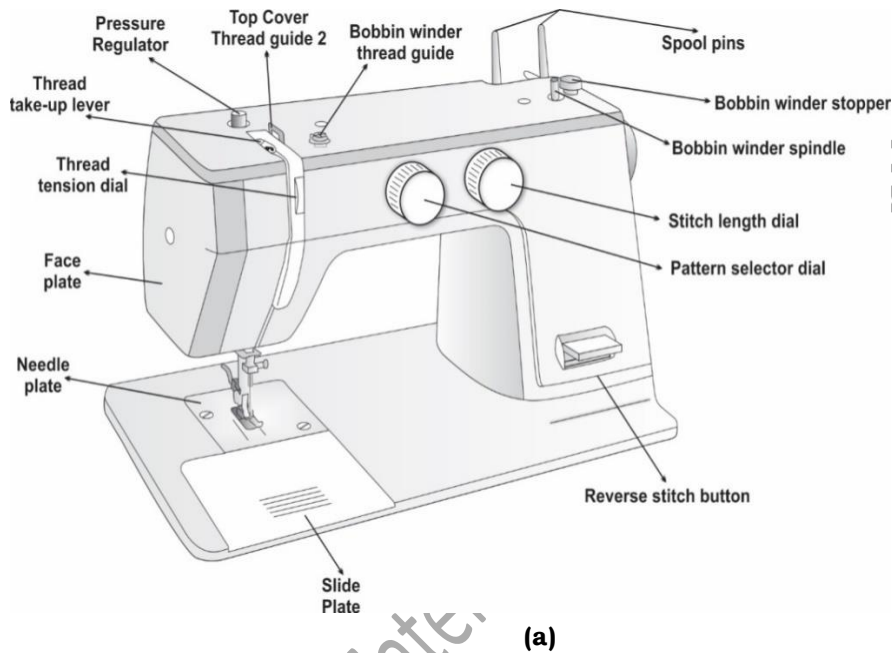
Attachment for special functions are called foot. Different types of feet used in embroidery machines are:

1. **Braiding/Cording:** Used while working with cord as a part of embroidery.
2. **Button hole:** Use to produce simple button hole stitch.
3. **Circular sewing:** To stitch circular patterns using straight and zigzag stitch.
4. **Decorative (trimmings) tape:** To attach different trimmings.
5. **Gathering:** It gathers the fabric as it is stitched with high speed.
6. **Zigzag:** To create designs using zigzag stitches of different widths.
7. **Overcasting:** For decoration at the edge.

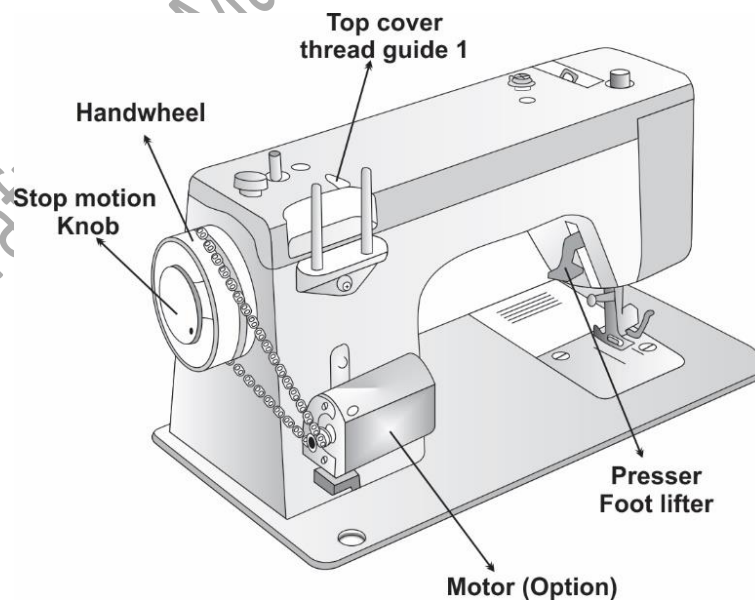
Different parts of SEMI-AUTOMATIC embroidery machine and its application**A. Parts of Machine-**

1. Reverse Stitch lever
2. Pattern selector Dial
3. Stitch length Dial
4. Bobbin Winder Stopper
5. Bobbin Winder Spindle
6. Spool Pins
7. Bobbin Winder thread Guide
8. Top cover thread guide 2
9. Pressure regulator
10. Thread take up lever
11. Thread tension Dial
12. Face plate
13. Needle plate
14. Slide Plate

15. Top Cover Thread Guide 1
16. Hand wheel
17. Stop motion Knob
18. Presser foot Lifter
19. Motor



(a)



(b)

Fig.: 1.37 (a & b) Parts of semi automatic embroidery machine

B. Standard Accessories

1. Bobbin
2. Seam Ripper

3. Felts
4. Needle Set
5. Screwdriver
6. Round hemmer Foot
7. Foot control

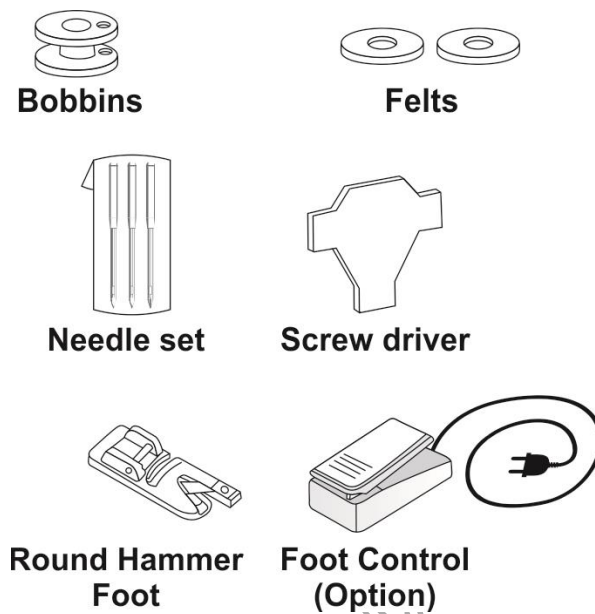


Fig.: 1.38 Accessories

A. Special Attachments

1. Darning Foot
2. Cording Foot
3. Pin tucking foot
4. Beading foot
5. Ribbon Sequins foot
6. Needle Set

PREPARATION OF MACHINE BEFORE STARTING THE EMBROIDERY WORK

At first, the instruction manual of the machine should be thoroughly studied to know about all its attachments, adjustments, settings and applications. Machine should be clean, well oiled, running in good condition. Check for correct attachment of needle, throat plate, needle bar and darning foot and the correct thread tension. Keep the top tension looser than the bottom. Take a test sample and work a little on it to check the stitch from both right and wrong side before starting on the final product.

STEPS OF GETTING READY TO EMBROIDER

A. Connecting to the Power Supply

Before connecting the power cord, the voltage and frequency shown on the machine, one should ensure to conform to the electrical power.

1. One should first insert the foot control plug into the motor socket.
2. Then insert the power supply plug into the outlet.

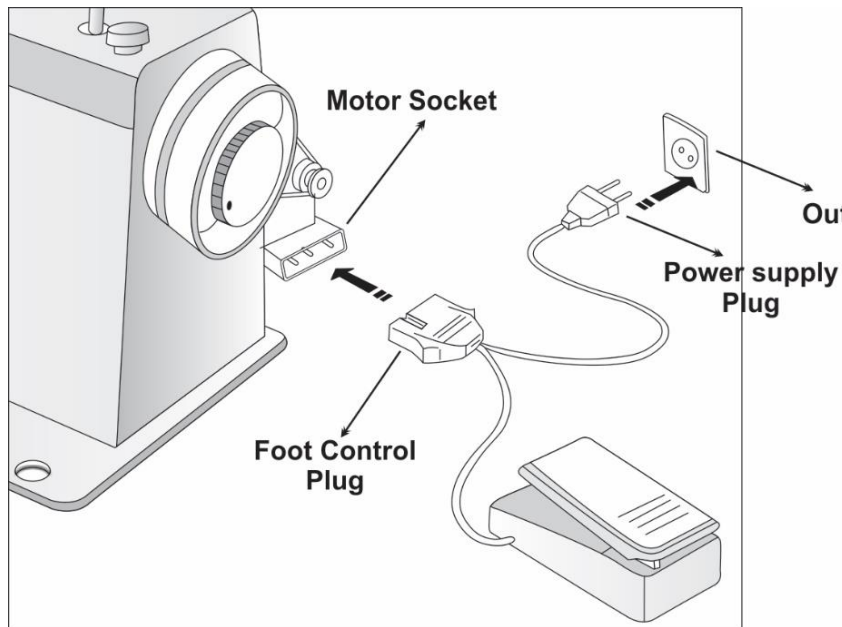


Fig.: 1.39 Connecting to the Power Supply

A. Foot Control

The speed of sewing can be varied by the foot control. The harder you press on the control, the faster the machine runs.

Take care that you do not place anything on the foot control, otherwise the machine will start itself.

If the machine is used without motor/foot control, use a treadle operation table/stand.

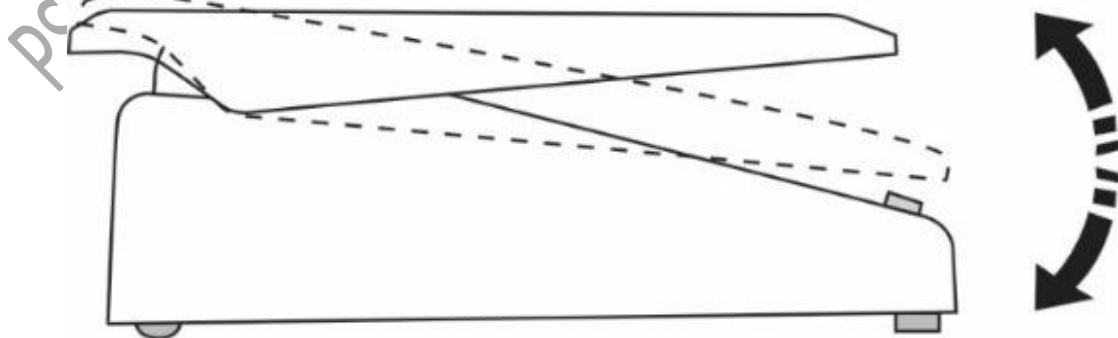


Fig.: 1.40 Foot Control

A. To Attach and Remove the Presser Foot

To attach

- One should place the presser foot so the pin on the foot lies just under the groove of the foot holder.
- Then lower down the foot holder to lock the foot in place.

To remove

- First, one should turn the handwheel toward oneself to lift the needle to its uppermost position.
- Lift the presser foot.
- Press the lever on the back of the foot holder.
- Finally the presser foot will drop off

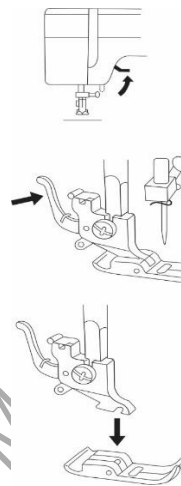


Fig.: 1.41 Attach and Remove the Presser Foot

A. Pressure Regulator

The foot pressure can be adjusted with the pressure regulator.

For applique, sewing on fine synthetics and elastic fabrics, reduce the pressure by turning the pressure regulator counter-clockwise.

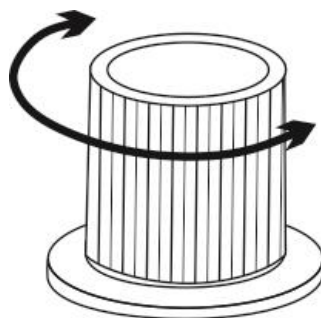


Fig.: 1.42 Pressure Regulator

A. Changing Needle

- First the needle should be raised up by turning the handwheel toward you and lower the presser foot.
- Loosen the needle clamp screw by turning it clockwise.
- The needle should be removed from the clamp.
- Insert the new needle into the clamp with the flat side inside, away from you.
- While inserting the needle into the clamp, push it up as far as it can go and tighten the clamp screw properly with the screwdriver.

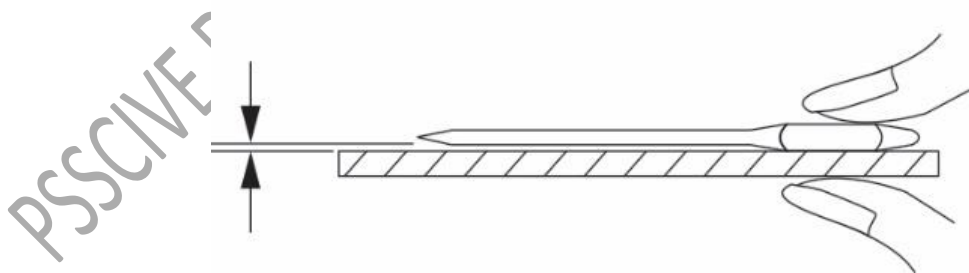
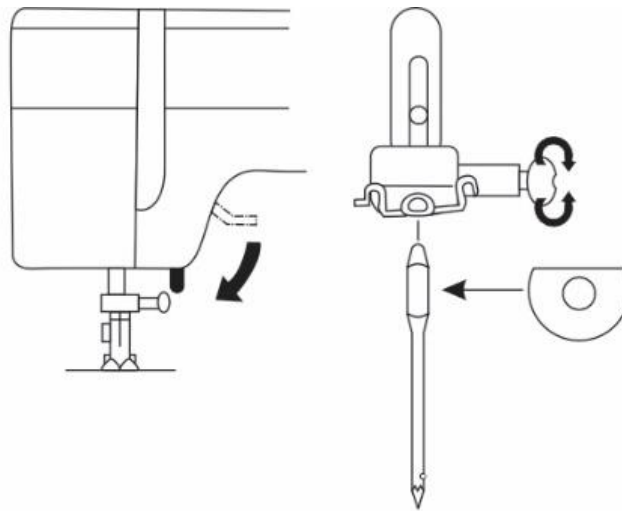


Fig.: 1.43 Changing Needle

To check the needle

Place the flat side of the needle on something flat (needle plate, glass etc.). The clearance between the needle and flat surface should be consistent. Never use a bent or blunt needle.

A. Removing or Inserting the Bobbin Case

Open the slide plate

- Lift the needle up by turning the handwheel towards you.
- Take out the bobbin case by holding the latch
- Place the horn into the recess of the hook race, while inserting the bobbin case

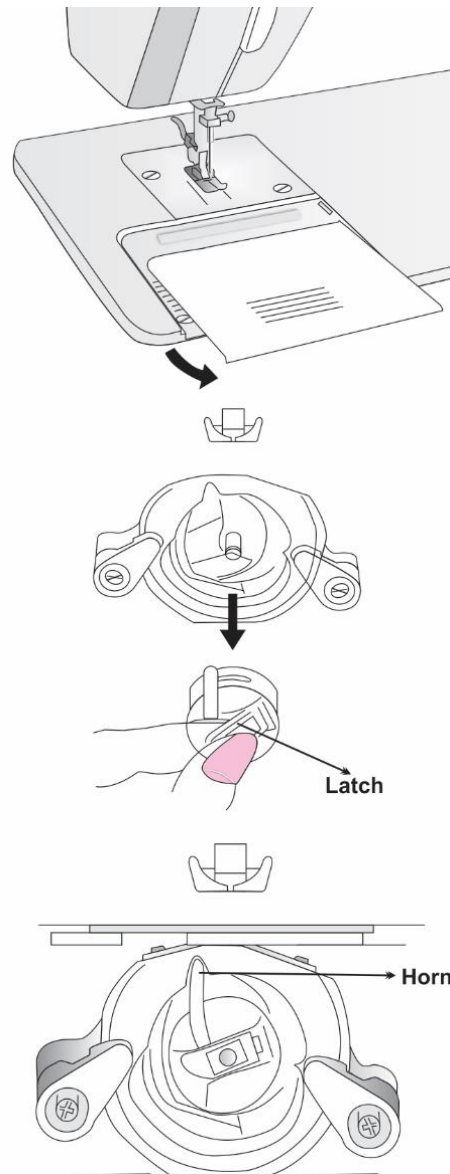


Fig.: 1.44 Removing or Inserting the Bobbin Case

A. Winding the Bobbin

1. First, turn the stop motion knob with the right hand and hold the hand wheel with left hand
2. Now, place the felt and spool on the spool pin.

3. Draw the thread from spool. The thread should pass through the top cover thread guide.
4. The thread should then be guided around the bobbin winder thread guide 1.
5. The thread is inserted through the hole in the bobbin on the bobbin winder spindle and push it to the right.
6. With the free end of the thread held in ones hand, run the machine. Stop the machine when it has made a few turns, and cut the thread close to the hole in the bobbin.
7. Start the machine again.
8. Tighten the stop motion knob.

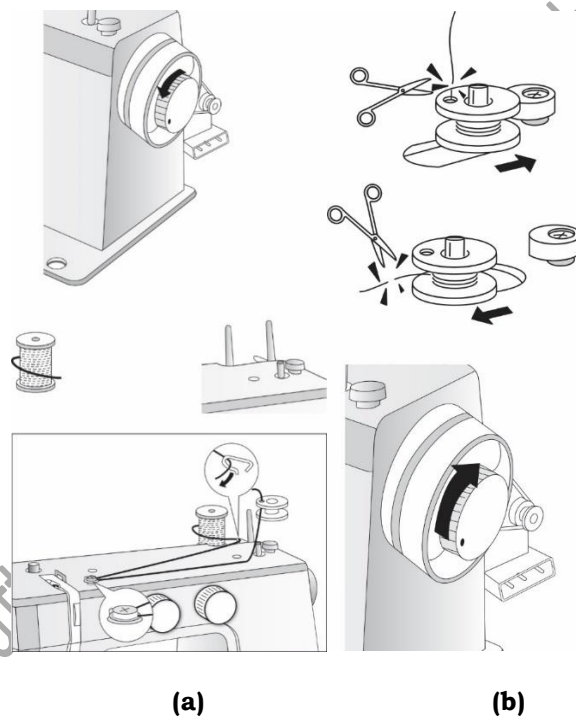


Fig.: 1.45 (a & b) Winding the Bobbin

H. Threading Bobbin Case

1. The bobbin should be placed into the bobbin case and make sure the thread unwinds in the direction of arrow.
2. Then, pull the thread into the bobbin case slot.
3. The thread should then be drawn under the tension spring and into the delivery eye.

Leave about 10 cm (4") of free thread.



Fig.: 1.46 Threading Bobbin Case

I. Threading the Machine

For threading the machine, lift the thread take-up lever to the highest point by turning the handwheel. Then raise presser foot with the presser foot lifter and pass the thread in the order from 1 to 7.

1. The thread should be passed through the top cover thread guide.
2. Then the thread is drawn into top cover thread guide 2 using both hands.
3. Then down around the check spring holder.
4. Then the thread should be firmly drawn up and taken through the take-up lever from right to left.
5. Then down through the lower thread guide.
6. The thread is then taken behind the needle bar thread guide on the left.
7. Finally, thread the needle from front to back.

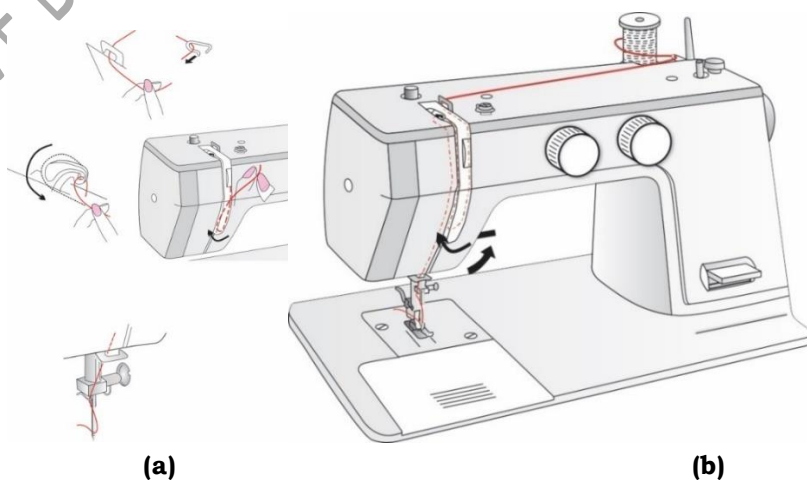


Fig.: 1.47 (a & b) Threading the Machine

J. Drawing up Bobbin Thread

1. Lift the presser foot and hold the needle thread lightly with the left hand.
2. The handwheel should be slowly turned with right hand until the needle goes down and continue turning the handwheel until the take-up lever is at its highest position.
3. Draw up the needle thread lightly forming a loop of the bobbin thread.
4. Finally pull 15cm (6") of both threads back and press under the presser foot.

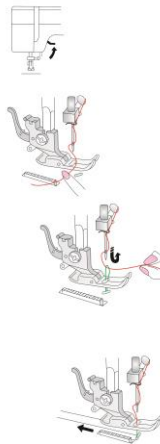


Fig.: 1.48 Drawing up Bobbin Thread

K. Pattern selector dial

The needle is raised above the fabric and match the desired pattern with the setting mark by turning the pattern selector dial.

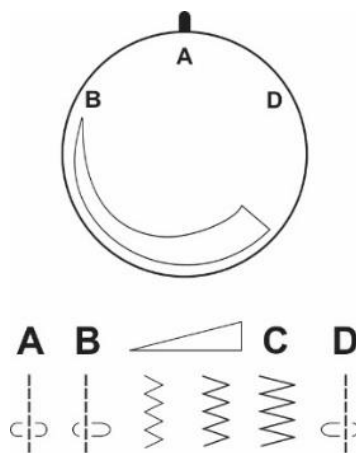


Fig.: 1.49 Pattern selector dial

M. Stitch Length Dial

- The desired number should be placed at the setting mark by turning the stitch length dial.
- The higher the number, the longer the stitch length and vice versa.
- While sewing the zigzag stitch, the dial should be adjusted in the 3 to 4 range

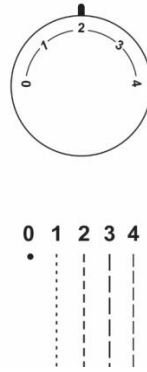


Fig.: 1.50 Pattern selector dial

N. Reverse Stitch Lever

As long the reverse stitch lever is lowered, the machine sews backwards.

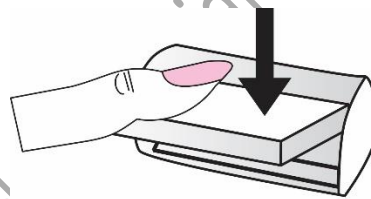


Fig.: 1.51 Reverse Stitch Lever

O. Seam Guide Line

- The distance between the center needle position and the line is indicated by the numbers on the needle plate
- The numbers in front are millimetres and the numbers in back are fractions of an inch.

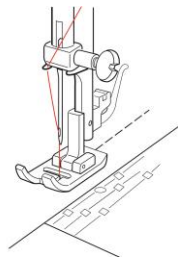


Fig.: 1.52 Seam Guide Line

P. Dropping the feed dog

The slide plate is first opened. Then the drop lever is pulled down to drop the feed dog.

To raise the feed dog, pull down the drop lever and move it to the left.

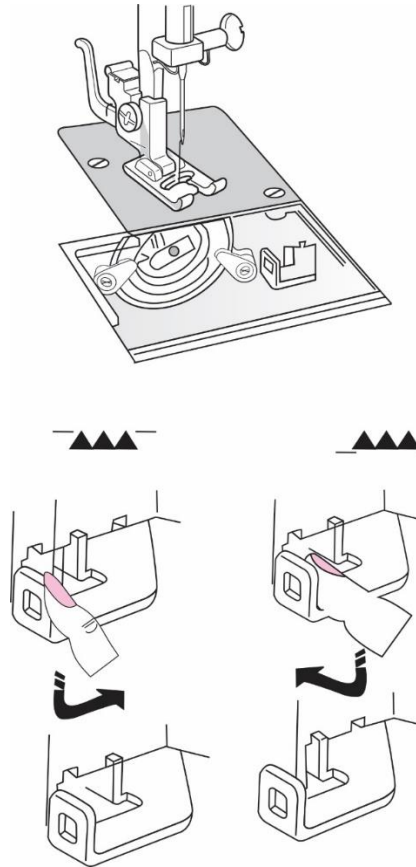


Fig.: 1.53 Dropping the feed dog

After the machine is ready, one can begin the process of embroidering in the following way:

A. Tracing the design

Once the machine is ready, one needs to trace the design which is to be embroidered. The tracing paper with the design should be placed on the fabric where the embroidery is to be done and the any tracing methods like tracing through prick and pounce, carbon paper, block, through light source, stencil, etc. can be used for transferring the design on the fabric. These tracing methods are described in detail in the second unit of this book.

B. Inspecting the stitch before doing the final work

Inspect the stitch on a rough cloth. A perfect stitch means no loops on both sides of fabric, no topping, threads perfectly locked in center midway

between the two layers of cloth and no puckering in the cloth near the seam.

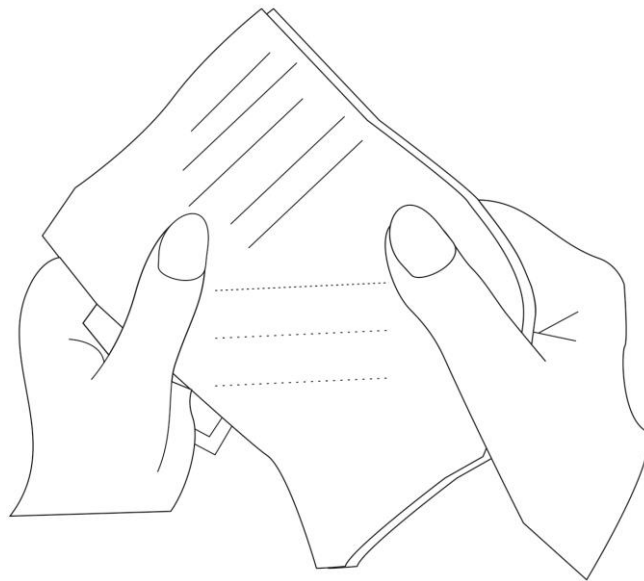


Fig.: 1.54 Inspecting test stitching on a piece of cloth

C. Hooping the fabric

Tightly place the fabric in between the two rings of the hoop and adjust the screw. Lay the larger ring flat on the surface and centrally place the fabric with traced design on it with design side up and then put the smaller ring into it in place. Finally tighten the screw by pulling the fabric from all sides.



Fig.: 1.55 Hooping the fabric

B. Moving the hoop and Sewing over the design

Thread the machine with the selected colour of silk thread on top and same coloured cotton thread in bobbin. Bring the bobbin thread up by moving the

hand wheel a little. Place the hoop with the fabric below the needle and lower the presser foot lever. Set the stitch width as desired using the stitch regulator. Use the hand wheel and slowly start inserting the needle into the fabric and start working over the design lines by slowly moving the hoop at even speed such that the thread does not break. Always move the hoop back and forth of from side to side as per the design to avoid the breaking of the needle.

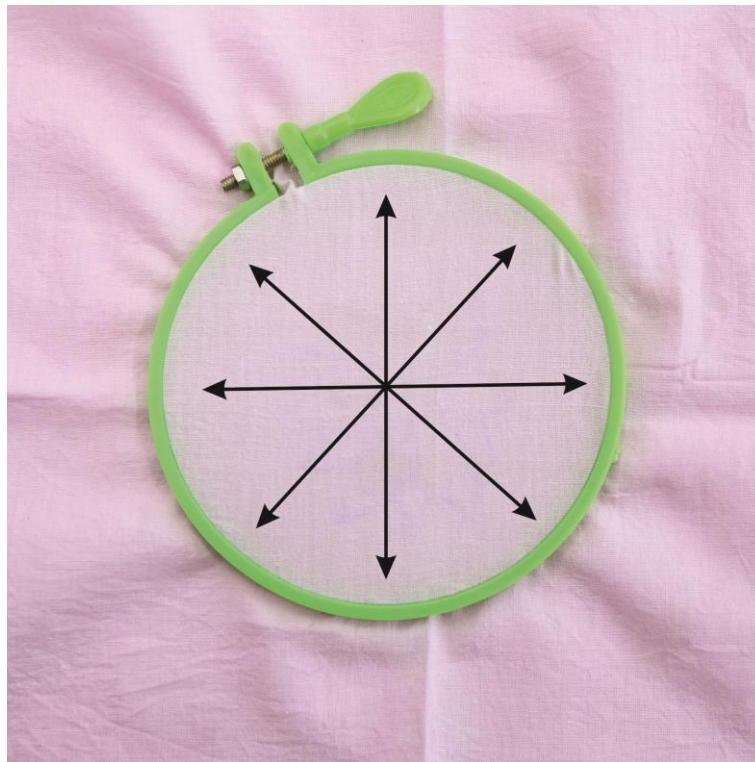


Fig.: 1.56 Moving the hoop and Sewing over the design

Some precautions to be taken while embroidering:

1. Keep both the threads under the presser foot and hold them to the backward side.
2. In the embroidery design, while turning at corners, stop the machine for a second with the needle inside the fabric, raise the presser foot and turn the fabric along with the hoop by keeping needle point as a pivot. Resume sewing by lowering down the presser foot.
3. Move the fingers safely along with the fabric and hoop to prevent the fingers from any wound.
4. Do not eat food or drink water while working on the machine.

SPECIAL ATTACHMENTS OF ZIG-ZAG EMBROIDERY MACHINE:

A. Optional Foot Accessories

S. No.	Optional Foot	Features	Benefits	Application	Fabric
1.	Darning Foot	Free Hand Stitching	Also known as the embroidery foot, the darning foot is used for 'Free Hand' embroidery and darning to ensure proper stitch formation, minimize skipped stitches and puckering. It also protects fingers while moving the fabric freely under the needle.	Very beneficial for those learning to do free hand embroidery, patch work and applique. In case the customer is not comfortable in making free hand embroidery then one can be encouraged to trace the outlines.	All kinds of fabric
2.	Foot Cording	Decorative Foot	The slots in this foot will hold one to three lengths of cord in place while stitching a decorative stitch over the cords.	Useful foot for decorating home decor objects, table ware and garments. Using thicker cord gives an embossed effect on the fabric.	All kinds of fabric
3.	Pin Tucking Foot	Decorative Foot	The pintucking foot is used with a 2mm twin needle to create multiple rows of pintucks. The grooves on the underside of the foot make it easy to stitch several rows parallel and evenly spaced from each other.	This foot is useful for giving a decorative finish and also adding value to the garment.	Light weight fabric

4.	Beadin g Foot	Decora tive Foot	Helps in sewing beads string easily. First, a zigzag stitch is selected and the stitch length and width is altered to ensure that the stitch goes over and between the beads.	Helpful foot for stitching bead strings on the surface of the fabric like Skirts, Lehangas, Salwa Suits etc.	All kinds of fabric
5.	Ribbon Sequin Foot	Decora tive Foot	It is a special foot for easy attachment of ribbons and sequins, The ribbon is first inserted into the hole of the guide and then pull a little of the ribbon to the back of the foot. Select a stitch and begin sewing.	Helpful foot for stitching ribbon/ sequin tape on the surface of the fabric like skirts, Lehangas, Salwar Suits etc.	5mm ribbon/ sequin tape

Pin tucking Foot

It is used with a 2 mm twin needle to create multiple rows of tucks parallelly and evenly.

Machine Setting	Steps of Construction
Fix Twin Needle, Stitch – Straight Stitch Thread tension 7-9, Stitch length	<p>Cut a piece fabric as per card board dummy F. Make a line joining the opposite corners of the swatch. We will get a cross (X) on the fabric. Use card Board Dummy E to make parallel lines on along the lines drawn.</p> <p>We will make boxes 1 inch X 1 inch. Make pin tucks on each line to make the decorative sample. ke pin tucks on each line.</p>
1.8-2	Iron out the sample created. Cut a piece of buckram / thick fusing paper as per card board Dummy A, Place this under the sample. Pin up the back cloth with the main sample. make a seam on all four corners of the piece. Cut a back cover cloth 3/4 inch bigger than the sample on all sides (as per card board dummy B). Fold the edge into half and then

	on top of the sample. Use 1/4 in seam foot to make straight seam. Stitch both the lengths of the sample first and then both the width of the sample.
--	--

Beading Foot

It is used to sew bead strings, pearls. Etc. which otherwise can be a tedious job. It is mainly used to embellish wedding wear, heavy gowns, accessories. Evening wear and so on. These come in two sizes, narrow groove and wide groove and can be selected as per the size of the beads.

Machine Setting	Steps of Construction
Stitch - Simple Zig zag thread tension 3-5 Stitch width 2-3	Cut a piece fabric as per card board dummy A. Ensure that a paper fusing is fixed under the fabric. Fold the fabric along the 3 inch side to mark the center line.
	Fix the beading foot on the machine and fix the center cord of the bead string on the center fold. Sew three lines of equal distance on either side of center cord.
	Iron out the sample created. Cut a piece of buckram / thick fusing paper as per card board Dummy A, Place this under the sample. Pin up the back cloth with the main sample. make a seam on all four corners of the piece. Cut a back cover cloth 3/4 inch bigger than the sample on all sides (as per card board dummy B). Fold the edge into half and then on top of the sample. Use 1/4 in seam foot to make straight seam. Stitch both the lengths of the sample first and then both the width of the sample.
	Ensure that the corner edge is pressed in for getting fine corners.

Ribbon Sequin Foot

It is used to attach ribbons and sequins and thin laces on the fabric. This foot is designed with guides through which ribbon or sequins string can be inserted and it will allow them to feed through evenly as you sew.

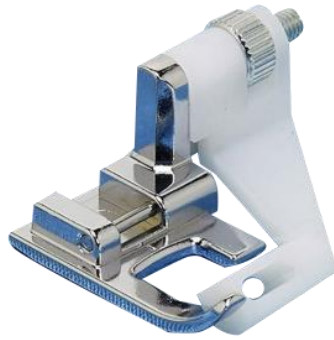


Fig.: 1.57 Ribbon Sequin Foot

Machine Setting	Steps of Construction
Stitch Decorative	Cut a base fabric as per card board dummy A. Ensure that a paper fusing is fixed under the fabric. Fold the sample fabric in to half along the 3 inch side. Make three lines 0.5 inch apart on both left and right side of the center fold. Now fix the ribbon and sequin on each line.
Thread tension 3-5 Stitch Length 2.5 Stitch width 0-5	Fix the ribbon sequin foot and fix the sequin tape and the ribbon tape on the lines.
	Iron out the sample created. Cut a piece of buckram / thick fusing paper as per card board Dummy A, Place this under the sample. Pin up the back cloth with the main sample. make a seam on all four corners of the piece. Cut a back cover cloth 3/4 inch bigger than the sample on all sides (as per card board dummy B). Fold the edge into half and then on top of the sample. Use 1/4 in seam foot to make straight seam. Stitch both the lengths of the sample first and then both the width of the sample.
	Ensure that the corner edge is pressed in for getting fine corners.

CORDING FOOT

This foot grips cords and threads to attach them well on the embroidery design and get perfect embossed shapes. A large variety of utility or decorative stitches can be stitched over the cords to couch them onto the base fabrics.

The choice of cord, thread and stitch are all contributory factors to the final effect of the embroidery.



Fig.: 1.58 Cording Foot

Activities

Activity 1.

Preparation of machine before starting the embroidery work

Material Required:-

Machine, bobbin, bobbin case, bobbin winder, spool, needle, paper, fabric

Procedure:

1. Attachment of needle
2. Winding of bobbin
3. Putting the bobbin in bobbin case
4. Fixing the bobbin in shuttle
5. Threading the upper thread from spool by following the procedure to the needle
6. Bringing the thread from the bobbin on the bed of the machine with the help of the needle.
7. Attaching different types of a foot for special embroidery.

Check Your Progress

A. Fill in the blanks:

1. _____ is attached to the needle bar.

2. ----- helps in revolving the machine.
3. Thread from the tension disc is released and delivered to needle by_____.
4. Attachment for the decoration of the edge is_____.
5. Needle bar is used to hold the _____.

B. Match the following:

- | | |
|---------------------|---|
| 1. Arm | a. Holds the needle |
| 2. Cord | b. Adjusts the length of the stitch |
| 3. Stitch regulator | c. Connecting the flywheel and treadle. |
| 4. Tension disc | d. Horizontal part of the machine |
| 5. Needle bar | e. Regulating the tension |

C. Questions:

1. Enlist the attachments of machine and explain any three with their uses in detail.
2. Write in brief about the special functions of the following:
 - i. Beading foot
 - ii. Cording foot
3. Explain in detail any five parts of the machine with the help of diagrams.

**Session: 4 Care, Maintenance and Safety Rules
While Working on Embroidery Machines**

Due to the advancement of technology nowadays, embroidery is done mostly on machines but not manually. Automatic machines help to do the job faster and more efficiently. These machines help in working on multiple designs, doing elaborate and creative work on various textiles. Embroidery machines can be used for personal work as well as for commercial large-scale production. They save time and energy and help in developing innovative designs with different mix and match of embroideries. These machines are a big investment and so to make them last for a longer period, one should take proper care of them and should maintain them with time-to-time services for its consistent working.

Any electrical appliance or machine should be used carefully by using all the basic safety precautions. Some machines are used only for household work and some are used commercially like in industries. The machine should never be left unattended when plugged in and wherever it is being used. After use and before cleaning the embroidery machines should be immediately unplugged from the electric outlet. As all the automatic and computerized machines need special on job training, the ways to handle them should also be understood thoroughly. These machines are not to be used by children or person with lack of experience and knowledge, unless they are given proper training and direction.

Embroidery Machines are very expensive and require a good investment whether for domestic purpose or for any production unit, so it really becomes important to take good care of machines. Cleaning includes oiling, cleaning, and right handling of embroidery machines. This prolongs the life of machines. Things needed for cleaning and maintenance are-

- A clean brush
- Tissue papers
- Rough cloth pieces
- New Sharp needles
- Screwdrivers (also available in the machine kit)
- Embroidery machine oil (As per the type of machine)
- Tweezers

Before starting the cleaning process, all the machine parts should be removed. Remove bobbin case and then remove all the stray threads and lint

thoroughly. Take a rough piece of cloth and wipe the machine top, bobbin area, faceplate area, handwheel with it. Bobbin area and faceplate area should be cleaned using a soft brush and tweezers can be used to remove the lint and stray threads. Oiling should be done as per the instructions given in the manual of a particular machine. One can put two drops of oil in all the holes designated for it. Finally, clean and replace the needle.

Some main points to keep in mind while taking care of Embroidery machines:

1. Clean the Machine Regularly

One should ensure daily cleaning of the machine. While working on the fabric, if the machine is not clean, stains might cover the fabric surface and to avoid it regular cleaning is a must. Fabric lint might entangle in the bobbin and can lead to malfunctions if not handled properly. After oiling, the machine should be cleaned and wiped with a rough cloth to avoid Oil stains. Effective cleaning improves the life of a machine and help reduce problems. The feed dog should be cleaned properly after removing the presser foot and needle plate. A brush is used to clean the dirt and lint clogging the teeth of feed dog.

2. Keep Your Machine Covered

The machine should be placed at a dust and insect free area. The machine should be properly covered when not in use to avoid any damage and moisture. So, it is necessary to always keep your machine covered to reduce the possibility of any insects and rust to go inside it.

3. Oil Your Machine Regularly

The different parts of the machine need daily oiling for its smooth running. One can check the manual to know which parts need regular oiling and how it can be done. Specific machines have specific lubricant for them and some embroidery machines have their own particular oils for its proper working. Regular oiling is very important to reduce the noise of machines.

Steps of oiling the embroidery machine.

1. Switch off the embroidery machine and open the needle plate to take out the bobbin case.
2. Move the handwheel to the position so that oiling can be done easily.
3. Also clean the rotary hooks and feed dog with a brush.
4. Put few drops of oil in all the holes

5. After oiling is done, placed a rough cloth on the needle plate just below the needle so the excess oil drips off on it.
6. Then insert the bobbin case in its proper position.

4. Frequently Change Your Needle

As needle is one of the most important part of the machine, so one must pay full attention to its quality and function for specific fabric. It is suggested to change the needle when a project is completed or when its tip is bent. A bent or blunt needle can damage the fabric and result in poor tension or skipped stitches which can ruin the overall embroidery work and its look. It can also break and damage the machine. One should avoid using old needles as needles do not cost much and one cannot risk on the finishing of the final look of the embroidered product.

Steps on How to Change a Sewing Machine Needle

1. Take out the old needle by loosening the screw and pull it out downwards from the needle bar.
2. Insert a fresh, sharp and new needle by pushing it upwards and tighten the screw.

5. Cleaning the Feed dog:

Steps to clean the feed dog-

1. First, remove the needle and the presser foot, then remove the needle plate by unscrewing it.
2. Clean the dust, clogging lint from the feed dog using a brush
3. Reset the needle plate, presser foot and insert the needle

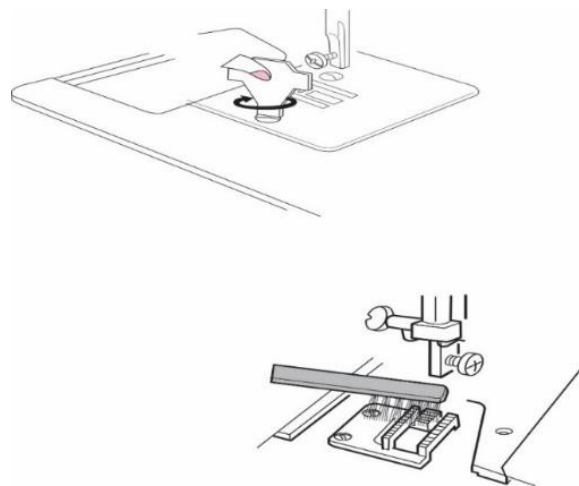


Fig.: 1.59 Cleaning the Feed dog

6. Use Quality Thread

Quality threads help in producing quality output of embroidered pieces. Threads are cheap and one can easily get them from the local market in multiple colours. Poor quality of thread can create tension problem and breakage of thread and can result in poor stitch. Poor threads leave more lint and can thus create faults in machine on a long run. Using right size and weight of thread is also very important. Thread used for embroidery is thinner and tightly spun. Machine embroidery thread is mostly 2 ply (Twisted from two strands of fibers). 40 weight of thread is fine for embroidery and even 30 weight thread can be used for computerized machines. One can even mix and match different weight of threads if it is the need of the project.

7. Service Your Machine Regularly

Regular or yearly service is very vital for the machine's long life. It is a good way to check and repair the faults in the machine in time before it breaks down completely. This can reduce the chances of breakdown and the costs which it could bring.

8. Protect Your Machine Electronically

This applies to computerized and automatic machines. Power plugs can be checked from time to time to avoid the risks like low voltage, short circuits, etc. It is very costly to fix the electronic parts of a machine, therefore it is significant to protect the machines from electronic damages.

9. Care of motor:

Some electric motor need oiling and some need only need lubrication once a year. This should be done as per the instructions in the Manual to avoid excess vibrations and sound of motor while working. Care should be taken while oiling the machine as over oiling may ruin the motor, only a few drops on the bearing are enough. The lubricating oil should be of good quality and non-gum forming. All motor connection should be checked and should be tight. The belt from the motor to the hand wheel should have enough tightness to avoid any slipping and the electric cord from the motor should be of excellent quality.

Maintenance of Embroidery Machines:

A maintenance schedule should be established weekly, monthly and annually as per the organization's norms and the amount of work performed by the machines.

There are mainly two types of maintenance

1. **Regular Maintenance:** This is done at specific and fixed intervals to take care of day-to-day problems and faults instantly. Record should also be maintained to check the problems occurring in the embroidery machine every month or week.
2. **Breakdown Maintenance:** When a machine collapses due to some reasons, breakdown or emergency maintenance is needed to avoid delay in work process. Till the time machine is repaired a proper signage should be attached on it so that no one touches the machine and increases the risk of damage.

Maintenance of Embroidery machines includes the following:

- Handle materials, machinery, equipment and tools safely and correctly
- Use correct lifting and handling procedures
- Use materials efficiently to minimize waste
- Maintain a clean and hazard free working area
- Maintain tools and equipment
- Carrying out the maintenance running within fixed schedules
- Fix the responsibility of a person to carry out maintenance and cleaning under his/her supervision
- Reporting any unsafe tools, equipment and other dangerous incidences
- The correct machine guards should be at proper place
- Use cleaning equipment and methods appropriate for the work to be carried out.
- Dispose of waste safely in the designated location
- Store cleaning equipment safely after use
- Carry out cleaning according to schedules and limits of responsibility

Some precautions to be taken while repairing, setting, replacement and maintenance of embroidery machines are:

1. During any repair and Maintenance work, the Machine should be switched off.
2. The repair tools and machine tools should be at right place and should be used correctly.
3. Well trained person should perform the Maintenance work who is specialized in that job.
4. All the components should be handled carefully and safely.
5. The needle and other attachments should not be too tight or too loose

6. Before starting to sew, oiling, threading and cleaning should be done properly.
7. Correct needle as per the thread and fabric type should be used. Needles should be sharp and straight. Change the needles frequently.
8. The bobbin and the spool thread should be similar other than while creating any special effect.

Safety Instructions to Handle Embroidery Machine:

An Embroidery machine should be handled safely whether one is working at home or in an industry. Machines should never be left unattended when plugged in. Machines should be immediately unplugged after use and before cleaning to reduce the risk of any accidents.

The safe working practices must be strictly followed because the employee not adhering to these might cause risk to other employees as well. This can even lead to employee leave, reduced productivity and decrease in profits. Serious accidents and injuries caused by it lead to adaptation of compensation plan for the affected employee which in turn ends up costing money to the business only. And most importantly, employees should feel protected from hazards and safe at workplace.

Some important safety measures while handling Embroidery machines are listed below:

- Use the Machine as described in its owner manual
- Always inspect the machine before starting the work, be sure it is clean and threaded correctly
- Wipe off any oil spilled on the floor immediately to avoid anyone from slipping
- While operating a motorised machine, wear flat shoes and closefitting clothes and with hair properly tied. Avoid loose fitting dresses, ribbons, jewellery. Trim your nails.
- Never operate the machine having damaged plugs or cords and get it repaired
- Keep fingers away from the moving parts like the machine needle
- Use proper needle plate to avoid needle breakage
- Do not use bent needles

- Use scissors carefully while cutting the fabric, threads, drafts etc.
- Immediately unplug the sewing machine from the electric outlet after using and before cleaning
- The machine should not be touched by children or persons without proper training and supervision
- The fabric should not be pulled or pushed while stitching as it might break the needle
- Switch the sewing machine off while changing the needle, threading the bobbin, changing presser foot, and oiling the machine
- Unplug the machine from electrical outlet while removing covers, lubricating or while making any adjustments in the needle area.
- Do not unplug by pulling the cord
- Keep correct distance from the Machine
- Do not tilt the chair forward or backward while operating the machine and keep an erect posture.
- The feet should be kept off the treadle when one is not operating the machine or while threading the needle
- In case of emergency or doubt or when not in use and before unplugging the machine, turn the motor off
- Keep your hands, scissors and other sharp objects away while operating the machine,
- Keep the waste fabrics cuttings and trims in the waste basket
- Do not eat or drink in the work area.
- Be cautious of cords
- Avoid distractions and work with concentration with eyes on the needle.
- Avoid sewing over pins
- Proper light and correct posture is a must
- Store cutting tools and pins properly
- Take short breaks to avoid any stress






- Do not go very fast while using automated machines
- Turn off any electrical appliances off, like iron, after use.
- Place Signage on broken down machines and equipments to avoid any accidents at workplace.
- Check power connection and voltage issues and get them repaired as soon as possible.

OTHER IMPORTANT SAFETY MEASURES

- When in doubt, ask the instructor.
- Report any injuries or accidents immediately to the instructor. Also, record any breakage of a tool or machine to the instructor. Notify the supervisor immediately, if the equipment does not operate properly
- Oil spills should be wiped off from the floor immediately to prevent anyone from slipping. Ensure that the aisles are clear at all times.
- The machines for which one has been trained to operate should only be operated only and in the presence of the instructor or supervisor.
- Machines should only be operated with permission.
- The machine should always be inspected before starting the work. Make sure it is clean and correctly threaded, with no loose threads on the pulley belt and all guards should also be in place.
- Only those adjustments should be made for which one is trained
- Low shoes & close-fitting clothes should be worn while sewing on a power machine. Loose fitting sleeves, sweaters, jewellery, ties, and ribbons should be avoided when operating the machine. In case of long hair, tie them back for comfort while working
- Proper posture should be always practiced to reduce fatigue and back strains, which helps prevent accidents and increase efficiency. The height of the chair should be adjusted so that your feet rest flat on the floor.
- While operating the machine, do not pull your chair too forward.
- To lift & lower the machine head, use both the hands
- Head of the operator should always be above the table.

- While setting the machine or threading the needle, feet should be kept off the treadle.
- Turn off and unplug the machine when no one is there for more than few minutes.

Signage used for safety in Garment Industry and Embroidery units of an industry:

	<p>This is the hazard symbol for explosives or an explosion hazard</p>
	<p>This sign prohibits flames and smoking</p>
	<p>This sign indicates flammable gas</p>
	<p>Eye protection required sign</p>
	<p>Gloves required symbol</p>





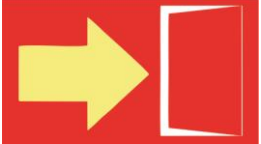
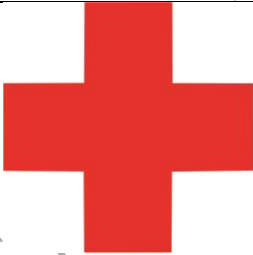


	Protective footwear sign
	Protective clothing sign
	Ear protection required sign
	Fire extinguisher sign
	Escape route sign
	First aid symbol
	Fire exit symbol
	Warning sign

Fig.: 1.60 Signage used for safety in Garment Industry

Thus, proper safety plan should be followed by the management at a workplace and should be sincerely observed by the employees. A Safety and Health Management Plan should be followed to keep a high morale in the employees and giving them an impression that their safety is very important for the organization. For this a safety consultant or head can be hired to visit and visually assess the work area from time to time and make a note of places which need more safety and guide the employees for the same. Safety equipment should also be provided to workers like thimbles, ear plugs, first aid kit for the embroidery machine operators. A proper training programme should also be designed to train the employees how to handle the machines and the safety equipment while using them. A supervisor should also keep an eye to test if these rules are properly followed or not. Employees should also be trained about the plan of action which they need to follow in case of emergencies like shut off procedures, reporting the emergency and reporting any injuries caused by it. Safety plans can be subject to change from time to time as per the current work environment. If new procedures are introduced, the employees should be well guided about it.

Activities

Activity 1:

Visit a Garment industry/ Embroidery unit and observe the maintenance and safety measures followed there. Prepare a report or a Power point presentation

Material Required:

Notepad, camera, pen/pencil, computer system, markers

Procedure:

1. Take permission from the HR manager of a garment industry to visit the industry and click pictures of their maintenance procedure and observe the safety rules followed there.
2. Take pictures wherever necessary and talk to the supervisor to gather all the information.
3. Prepare a PPT or a report.

Check Your Progress**A. Fill in the Blanks:**

1. should be wiped off from the floor immediately to prevent anyone from slipping.
2. A schedule should be established weekly, monthly and annually as per the organization's norms.
3. Embroidery Machines are veryand require a good investment whether for domestic purpose or for any production unit.
4. Maintenance is of two types – Regular and maintenance.
5. The should be placed at a dust and insect free area.
6. Poor leave more lint and can thus create faults in machine on a long run.

B. Questions:

1. Explain the points to be considered while taking care of an Embroidery Machine.
2. Write down some safety measures while handling an Embroidery machine.
3. Explain briefly the types of maintenance of an Embroidery machine.

Module 2	Supporting Materials, Embroidery Designs and Tracing Methods Used for Machine Embroidery
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Module Overview

While doing embroidery many supporting material other than the basic supplies are also needed. These include backing material like stabilizers, adhesive sprays, embroidery motifs or designs, etc. The method to use and handle them as per the base fabric should also be learnt by an embroidery machine operator. Before starting embroidery, one should be aware of preparing different types of motifs/ designs and their tracing methods on different types of fabrics. The right type of colour combination in an embroidery work is very important to obtain a beautiful overall look in the final product. One can make infinite Embroidery patterns using basic machine embroidery stitches like straight, filling and satin stitches. Combination of different embroideries is a matter of personal innovation and application of available embroidery patterns in the machine effectively. Various sources of inspiration are available for an embroidery Machine operator to choose their designs from or one can use the design provided by the buyer in the specification sheet. Developing different patterns by trying various placement of design can be learnt with practice. In a garment Industry, usually embroidery is done as per the buyer instruction using the colour and threads mentioned by them but in customized work like in design studios and boutiques, one can prepare their own embroidery motifs according to the design of the garment.

Learning Outcomes

After completing this module, you will be able to:

- Describe Supporting materials used for machine embroidery;
- Describe and develop designs for machine embroidery;
- Explain Different types of tracing methods.

Module Structure

Session 1: Supporting materials used for machine embroidery

Session 2: Developing designs for machine embroidery
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Session 3: Different types of tracing methods

Session: 1 Supporting Materials Used for Machine Embroidery**Different types of supporting materials and fabrics used in Machine embroidery and their selection.**

Different type of supporting material is used while working on the embroidery machine, some of them are

A. Stabilizers-

- i. Backing
- ii. Topping material

B. Adhesive Spray

A. Stabilising material/ Stabilizers: It is an essential material for machine embroidery. It supports the fabric while the sewing process. These materials are specially used while doing machine embroidery to stabilise the fabric to be embroidered and avoid any puckering. These helps in multidimensional stability of a fabric so that while doing embroidery material do not puckers, get pulled or reshapes the designs. There are variety of stabilizers available in the market. These stabilisers are to be removed after completion of work. Use of stabilisers enhance the result of embroidery. It is classified as backing or topping material. Materials which are used at the back of the fabric to be embroidered are referred as backing material and materials used at the top of the fabric to be embroidered are topping material. Tear-away stabilizer is used with stable fabrics, while less stable fabrics should be stabilized with cut away stabilizer.

For embroidery, the selection of backing and topping material is as important as the design. At the time of embroidery, the fabric to be embroidered is to be stabilised.

This requires two steps depending on the type of material.

1. Keeping the fabric in tension
2. Stabilising the fabric.

1. Keeping the fabric in tension

The fabric to be embroidered is hooped. Types of the hoop are already discussed in the previous chapter. While hooping the material take care that fabric is hooped smoothly with neutral tension and no stretching.

2. Stabilising the fabric

It is important to stabilise the fabric otherwise it will stretch on body when worn or design will appear puckered when fabric is relaxed. For stabilising the fabric one can use backing or topping material as per the requirement. The stabilisers are hooped with the fabric to be embroidered. Very stable and tightly woven fabrics do not require backing. This also depends on the design. Stabilizers are classified as per the method used to remove the excess from the back of the product after the design has been embroidered.

The three most common types of stabilizers are:

1) Cut-Away- They can be used on any fabric type. They should be definitely be used while stitching on knits or stretchy fabrics. The extra stabilizer is cut away, but the stabilizer behind the stitches will stay there for the lifetime of the garment. It will secure the design stitches from popping as the garment is stretched or manipulated.

2) Tear-Away - When one wants to remove most of the excess stabilizer from the back after doing the embroidery, tear away stabilizers are used. They can be used on all fabrics but should not be used for stretchy fabric or knits or very sheer fabrics. The stitches should be supported with the fingers as you carefully tear or remove the excess stabilizer away.

3) Wash-Away- Wash away stabilizers should be used when all traces of the stabilizer are required to be removed from the back of the product, like while using a sheer fabric. It can also be used while embroidering on a fabric in which the back side will be noticed. This type of stabilizer does not support as many stitches as tear-away or cut away stabilizers, and so one should be careful while choosing the design. This stabilizer should not be used if the fabric selected cannot be washed.

4) Sew-In cut away and wash away- Sew in cut away backing are better than tear away backing material, mainly for thick and stretchable fabrics like knits, silk, satin, fleece, denim etc. Sew in wash away backing are good for sheer fabrics like organza, net and are good for embroideries like shadow work, applique and lacing. This backing can be washed away once the embroidery is completed.

Other than these some other types of stabilizers used in fabrics to keep the embroidery work stable and wrinkle free are:

Paper- Very inexpensive, easily available but cannot be hooped

Fusible stabilizer- This type of stabilizer should be fused to the back of the fabric using heat. A correct one should be chosen for the right effect as they come in different fabric weights.

Fabric- Woven pre washed fabric like muslin can be used as backing in some cases.

Within each group of stabilizers, several weights are also available. Choose the weight that most closely corresponds to the weight of the fabric to be embroidered. Choose the weight according to the stitch count of the design – the greater the stitch count, the heavier the stabilizer should be.

i. BACKING :

A backing is a special material used to make the fabric more stable while doing embroidery. It is mostly non-woven and it is placed under the main or base fabric which is to be embroidered. It prevents fabric puckering, stretching and distortion of embroidery even after laundry.

Types of Backing Material:

- * Nonwoven tearaways (Sulky Stiffy, Tear-Easy, Totally Stable); can be used on most fabrics
- * Nonwoven and woven cutaways (Sulky Soft 'n Sheer, Cut-Away Plus); use on knits and lightweight woven
- * Sticky backings (Sulky Sticky; Stick-It-All from Hoop-It-All); use on fabrics that cannot be hooped, such as velvet, suede, and leather
- * Sticky backings (Sulky Sticky; Stick-It-All from Hoop-It-All); use on fabrics that cannot be hooped, such as velvet, suede, and leather
- * Melt-a-way, burn-a-way, wash-a-way (Soft and Sulky Heat-Away); use on sheer and lightweight fabrics and for cutwork designs

Hoopng Method of Backing material:

1. Hoop below the fabric.
2. If hooping not possible due to residual markings stick the backing to the material.
3. Hoop the backing and stick the fabric onto it with temporary spray adhesive.

ii. TOPPING:

Embroidery topping is a special material, designed to prevent embroidery stitches from sinking into fabrics with loops on its surface which absorb the stitches within. For example, if embroidery is to be done on fabrics like terry cloth, knits, fleece, jersey, velvet, corduroy, artificial fur and so on, topping is a must.

Types of Topping Material

- * Water-soluble films (Soft, Sticky- dissolving); use on textured knits and on top of other stitching
- * Cover-up from Hoop-It-All (available in colours); use on fabrics with high-contrast colours.
- * Lamé, or mylar; use to create shimmering effect through embroidery.

One should select the backing or topping to coordinate with the fabric or design used.

Hooping Method of Topping material:

1. Place on the top of the hooped material.
2. For pile fabrics compress the toppings on the hooped fabric.

These stabilizers are attached to the fabric with a temporary adhesive spray before hooping is done, to keep the layers from moving during the embroidery process and to make it easier to hoop the fabric.

General rules of using Stabilizers:

1. In case of delicate fabrics, where wetting the fabric is not a good option, heat away stabilizers are good as they are easy to remove without wetting the fabric, they are fast and convenient to use.
2. If one is not sure about the type of stabilizer to be used, one can take a tiny piece of fabric and test on it
3. A good quality heat away backing can leave stains on the fabric, so one should be careful and should use a good quality backing.
4. Steam iron should not be used for heat away stabilizers
5. For removing the heat away topping, one should a piece of paper on it to remove it.
6. For thick heavy weighted fabrics, thick backings are used and for light weighted fabrics, light backings work better.

7. The denser is the embroidery, the heavier backing is required and for loose embroidery designs, light weighted backing is used.
8. For the projects in which metallic thread and Zari is used, avoid polyester backings and use backings made of natural components like cotton or poly-viscose as they are softer and frictionless. This helps in less breakages of needle and thread

B. ADHESIVE SPRAY

- The stabilizer is kept on the wrong side of the fabric and using a temporary adhesive spray. It is fixed to help keep the layers from shifting while doing the embroidery work.
- Spray the adhesive on one side of the stabilizer and apply it to the wrong side of the fabric. Then hoop the two layers as one element.
- If one is using two layers of stabilizer, stick the two layers together first, then attach it to the fabric.
- Use an empty box as a “spray station” to help keep the spray from getting your table sticky.

HANDLING OF APPROPRIATE SUPPORTING MATERIAL FOR MACHINE EMBROIDERY:

For machine embroidery, different fabrics require different treatments at each stage. The selection of appropriate material and its use is very important.

1. For hooping the material to be embroidered hoop both woven and knits smoothly, with neutral tension, and without stretching except for lycra knits. Lycra knits should be stretched in the hoop as it stretches in all directions. Velvet fabric is not hooped as marks of hooping will be seen on the surface.
2. Designs: for knits choose design with a lot of open space.
3. Backing: Use backing for the embroidery except for very stable and tightly woven fabric. Always hoop the backing below the fabric.
4. Toppings: It is not hooped but is placed on top of the hooped fabric to compress nap or pile which helps in improving the resolution of stitches by keeping them from going into the fabric.
5. Fabric coverage: It is another important aspect of the embroidery. Poor fabric coverage spoils the whole embroidery work.

It is due to the mismatching of fabric color, texture, thread choice, size of the design. This results in stiff embroidery pattern leading to puckering, thread breaks, or even fabric damage.

To overcome this:

Select colour toppings. The correct color neutralize the effects of colored or printed fabrics. Customize the stitches for the enlarged designs according to the fabric.

6. Threading on machine and thread used for embroidery should be correct.

Some problems that occur due to thread are:

- a) Improper twist of yarn
- b) Wrong needle size selected for the type and weight of thread
- c) Improper storage of thread
- d) Quality of the thread

Thread Solutions:

- Select a high tenacity quality embroidery
- Use the correct size thread for the embroidery application.
- Use appropriate size needle.
- Make sure the thread stored properly

7. Needle: Though needle is a small part of the machine but it is very important for the quality results. It can lead to costly damage to the machine.

Following leads to the poor embroidery results:

- Bent or blunt needles
- Incorrect installation of the needles in the machine
- Incorrect size of the needle.
- Poor quality of the needle
- Lint /Rust/ Adhesive build up on the needles

Solutions

- Use the correct needle for the thread being used
- Check the needles at regular intervals to make sure they are not bent or burred
- Use quality needles from a reputable needle supplier
- Change the needles often

Activities

Activity 1:

Market Survey of different types of Stabilizers, their uses and market prize and preparing its scrap file.

Material Required:

Scrap book, pen/pencil/ markers, swatches of different types of stabilizing material available in the local market

Procedure:

1. Collect different types of Stabilizers (Backing and topping) available in your local market.
2. Paste them in the scrap book.
3. Write their uses and market prize below them.

Check Your Progress**A. True/False:**

1. The stabilizers are not hooped with the fabric to be embroidered. (F)
2. Stabilizers are classified as per the method used to remove the excess from the back of the product after the design has been embroidered. (T)
3. Embroidery backing is a special material, designed to prevent embroidery stitches from sinking into fabrics with loops on its surface which absorb the stitches within. (F)
4. The stabilizer is kept on the wrong side of the fabric and using a temporary adhesive spray. (T)
5. When one wants to remove most of the excess stabilizer from the back after doing the embroidery, tear away stabilizers are used. (T)

B. Questions:

1. Explain the difference between Backing and Topping.
2. Explain the general rules of using Stabilizers on the fabrics to be embroidered.
3. Explain different types of Stabilizers and their uses.

Session 2: Developing Designs for Machine Embroidery

The first step in any embroidered project is choosing a design. A basic understanding of the elements of design can help in the process of choosing a design that is pleasing to the eye. Design can be defined as a composition of lines, forms or shape, color and texture done for the purpose of decoration. Each element is associated with some psychological (symbolic) attributes also. Elements are the tools used to create a design and Principles are guidelines for deciding how these tools will be used to create the design. For an embroiderer also, drawing designs with the correct use of Elements of design is very important.

Elements of Design

1. Line
2. Shape/Form:
3. Space
4. Color
5. Texture

1.Line

Line as an element of the design is represented by a continuous sequence of points that are not joined at the ends. It does not matter how thin or thick the line is. Even a broad brush-stroke would qualify as a line so long as it is not joined at the ends. Lines are also used to create shapes. The difference between lines and shapes is that creating a shape requires the lines to be joined together at the ends.

One of the important properties of the line is that it guides the eye in a particular direction to be in up and down or sideways. Lines give a visual sense of length, direction, and movement.

Lines can create both physical as well as psychological effects. The physical effects are created due to their various aspects. Use of lines of different sizes, thickness, continuity, the path can be used in any design to create illusions and emphasize the good features and hide the undesirable ones. These illusions created by the lines can give an impression of greater height or width and enhance the overall apparent size.

Lines are directional, create optical illusions, express feelings, emotions, and contour various shapes. Therefore, understanding them properly is quite significant.

Types of Line

Lines can be broadly categorized into two types:

1. **Straight lines** – these include vertical, horizontal, diagonal, and zigzag lines.
 - **Vertical Lines** communicate a feeling of dignity, strength, masculinity and formality. Vertical lines lead the eyes in an up and down motion, from top to bottom and therefore accentuate height and length. They create an illusion of slimness and elegance.
 - **Horizontal lines** lead the eyes in a width-wise direction. They communicate a feeling of restfulness, calmness, serenity, and stability. Horizontal lines emphasize width wherever they are used in embroidery. Their placement is utilized wherever an illusion of width has to be created.
 - **Diagonal lines** move diagonally in a garment. They necessitate both vertical and horizontal eye movements and require more effort. They suggest movement in design. They are strong and draw attention to the area where they are used in a garment. The eye movement is directed from the upper to the lower end of the diagonal line.
 - **Zig zag lines** zig zag is a pattern made up of a series of short lines inclined at an angle in alternate direction, tracing the path between two parallel lines. Zig zag line is a combination of different emotions such as irregular, intense, sudden, fun, busy, confusing, and assorted. These lines are visually eye-catching and create confusion.

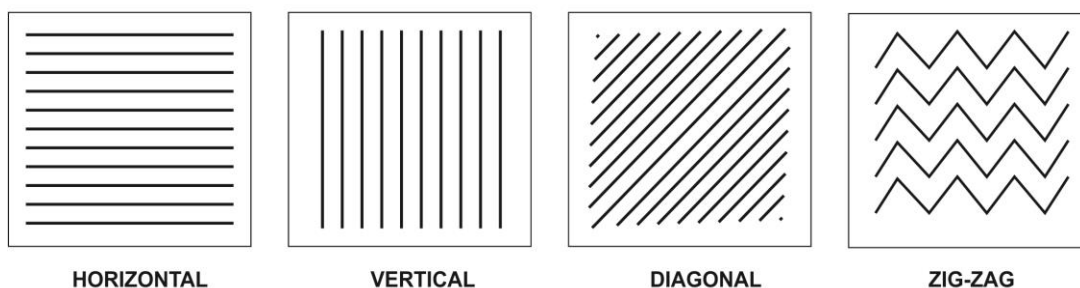


Fig.: 2.1 Different types of Line

2. **Curved lines** – Curved lines adds softness, gentleness to the design and gives a flowing, graceful and feminine effect. Curved lines tend to

emphasize the curves of the body. They add weight to the area where they are used. Curved lines may be gentle or extreme. A gentle curved line on princess line, neckline, garment edges give feminine, youthful and flowing effect.

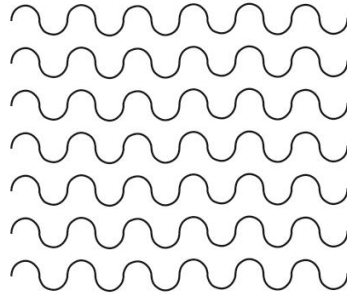


Fig.: 2.2 Curved Line

2. Shape

A shape is an enclosed area of space created through lines or other elements of the composition.

- Geometric shapes - Geometric shapes are precise areas that can be made using a ruler or compass. These shapes can be simple or complex and generally give an artwork a sense of order.
- Organic/ free- form shapes - Organic shapes are complex and imprecise. They give works of art a natural feeling.



Fig.: 2.3 Shape

Form

Form is an element of art closely related to shape. Form is always a three-dimensional shape. A form is measurable by length, width, and height, and encloses a volume. Forms are well-defined, such as a cube, cuboid etc. or they can be free-form, such as an animal form. They can also be created by combining two or more shapes and are often demarcated by the presence of light source and shadow formed by it in any art work or design.

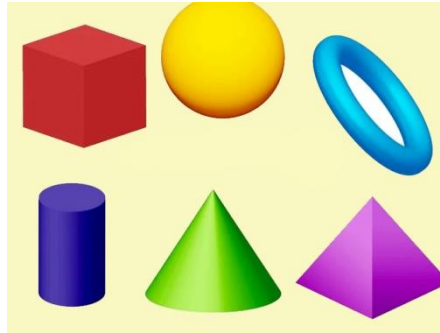


Fig.: 2.4 Forms

Color

Color is the visual property of the pigment of an object that is detected by the eye. It is as a result of the way the object reflects or emits light. There is no perceptible color without natural or artificial light, making it one of the most diverse and powerful elements of art.

Color is not as simple as a crayon box, each color is distant and clear from each other. Every color has meaning that we either inherently sense, or have learned about by association or coordination which enables us to recognise the message and meaning delivered.

While creating a design, colors should be selected carefully according to the nature and purpose of the design. Color plays a significant role in creating illusion of warmth, coolness, and distance. Correct selection of color produce

Color wheel

The color wheel gives information about the color and its combinations. The understanding of the color wheel helps in making decisions for color combinations in different designs.

The Color Wheel was developed by Sir Isaac Newton in 1666 and it is the basis for all color theories.

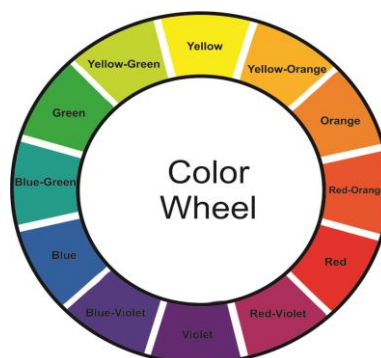
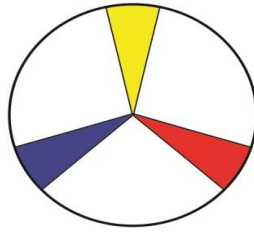
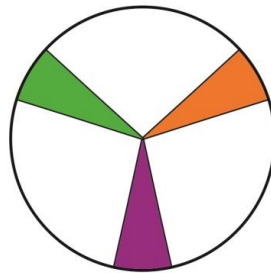


Fig.: 2.5 Color wheel

PRIMARY COLOR**Fig.: 2.6 Primary Color**

Red, yellow, and blue is the three primary colors.

These are the colors that can be mixed to produce other “secondary” colors but cannot themselves be produced form mixture.

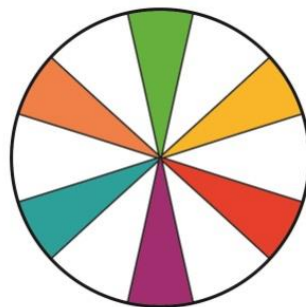
SECONDARY COLOR**Fig.: 2.7 Secondary Color**

Orange, green, and violet are created by mixing two primary colors. And are known as Secondary color. The result of mixing two primary colors is as mentioned bellow.

Red + Blue =Violet

Yellow+Blue=Green

Red+Yellow=Orange

TERTIARY COLORS**Fig.: 2.8 Tertiary Color**

Tertiary colors or intermediate color are the resulting color formed when an equal amount of a primary and a secondary color are mixed in its full saturation state. The primary and secondary color must be adjacent to each other on the color wheel. For example, a mixture of 50% red and 50% orange would result in the tertiary color of reddish orange.

Each primary, secondary, and tertiary hue is at its level of its full saturation or brightness, which means that there is no black, white or grey added.

Properties of color

The twelve pure colors shown in the basic color wheel are referred as to **hue**. Altering these Hue by adding white, black, and grey produces tints, shades, and tones respectively. A tint is hue in which white is added. Tints are commonly known as pastel colors, soft and full of light. A shade of a color is produced by mixing black with it. A tone is created, if a hue is mixed with grey. The base grey mixed with the hue can be very light to very dark and anything in between the full range.

Hue is the name of colour like red, green, blue.



Fig.: 2.9 Hue

Value refers to as lightness and darkness of Hue. Adding white or black gives are hue and lighter or darker value.



Fig.: 2.10 Value

Saturation / Intensity or Chroma refers to the purity and intensity of a hue. Another way of understanding of saturation is as the brightness or dullness of a color. Brightness is more instance color usually denotes a pure saturation of the particular hue. Mixing of 2 colours opposite from colour wheel can explain the brightness and dullness of colour.



Fig.: 2.11 Saturation / Intensity

Temperature refers to the warm and cool color. Red, orange, yellow are considered warm side of the wheel and green, blues, and violet are the cool side of the wheel. Color temperature also create spatial effect. Warm hues, seem to move outwards towards the viewer. Cool hues have the opposite effect.



Fig.: 2.12 Temperature (cool & warm color)

Texture

The word texture indicates the nature of the surface. There are various kinds of texture such as soft or smooth, hard, rough, silky, and leathery. Each type

of texture has its own effect which is to be considered while preparing a design.

While doing embroidery, it is very important to understand what type of embroidery will look appropriate on which type of texture/fabric. Both fabrics and embroideries are selected in such a way that it full fills the purpose of the wearer and gives the desired result.

Like, for casual garments cotton, linen, rayon fabric can be used, but for special occasions like marriage or party wear, silk, tussar silk, satin, muslin, velvet, etc. are preferred.

Smooth and shiny fabrics reflect light and enlarge the area they cover. Fabrics with low lustre reflect light to a less degree and give a subtle look. Thus, an embroiderer must effectively combine the fabric properties with properties of thread type to obtain a pleasing look of the overall product.

Principles of Design

Principles of design provide the guidelines and approximate rules for making the best use of the different elements of design. These principles apply to all elements of design although there may be variations in the scope of their application to each of these. The primary aims of these principles of design are to start, sustain and satisfy sensory experiences and pleasures. These principles are:

1. Proportion–It is primarily concerned with visual area of the design
2. Balance–It deals with its visual weights
3. Rhythm–It governs visual movement in the design
4. Emphasis–It highlights visual focus
5. Harmony –It is for visual ease and pleasure

Proportion

The principle of proportion applies to how well the relative size and scale of the various elements of design have been used. A garment is a single unit of design and its parts cannot be evaluated independently of whole. Therefore, the principle of proportion applies to all the relationships within the entire garment design - be it between the objects or between the objects and parts, or between the parts and the whole. The same applies to the application of the principle of proportion to garment design.

Proportion is concerned with the spatial relationships among the various elements and objects that form part of a garment design such as the silhouette, lines, lengths, patterns, textures and colours in a design. These relationships of size and scale would need to be evaluated on the basis of one to one and one to all. These relationships should also be in proportion to the wearer's body type, posture, height and other body measurements.

The application of the principle of proportion is also conditioned by the functional requirements of the wearer as well as the functionality of each garment part. The four different levels at which the principle of design operates are as follows:

- Inside a single part of a design
- Between or among the various parts of the design
- The relationship between the various parts and the design as a whole
- The relationship that the whole design has with the environment

At the same time proportions should not make the design look monotonous or boring. The principle of proportion must be applied in a way that makes the design interesting and attractive. However, variety must just good enough to create interest. It cannot be allowed to dominate and overwhelm the design.

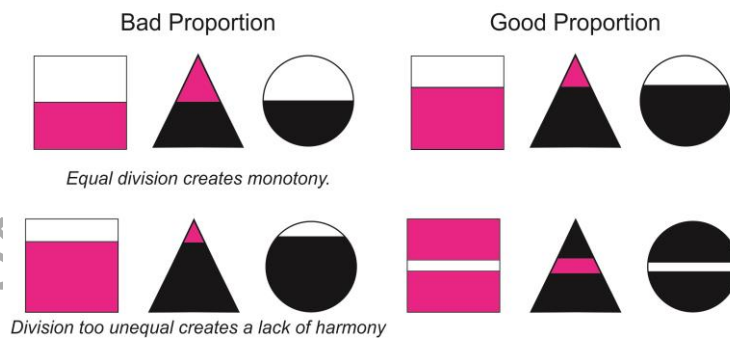


Fig.: 2.13 Proportion

A line that is divided into two equal parts or two dimensional shapes of the same size may not be as interesting as the lines with significant difference in length or the shapes whose sizes are considerably different. An interesting proportion is where the difference between the two is good enough to call for a comparison. The desire for comparison would automatically create an interest in the design,

BALANCE

Balance is a universal principle of design governing the structural stability of objects. It is human nature to feel secure and happy viewing and experiencing perfect balance. Our preference for balance is rooted in our desire for stability and equilibrium in our lives.

Balance implies that each part of garment must interact with all the others to achieve stability. This stability can be obtained by grouping design elements in a manner where there is equal visual weight on either side of the visual centre in a design. Designers generally perceive balance in terms of distribution of visual interest in the design. A well-balanced visual field is always easy on the eyes and for the brain. Visual balance thus becomes a source of pleasure. The principle of balance does not advocate that everything should have symmetry. Its aim is to prevent designs becoming unbalanced or go off balance.

Types of Balance in design

There would be always unlimited opportunities for achieving balance in design. Based on the distribution of visual interest in design, following are the basic types of balance:

- **Symmetrical Balance:** Our love for symmetry is rooted in our own body proportions where the right and left sides are mirror images of each. Symmetrical balance is achieved in design when all the design elements are equally distributed on both sides of the central axis. This is also known as formal balance. Symmetrically balanced dress is not only easy to design but also less expensive to make. It produces dignified and calm effects; but can be quite monotonous at times. The monotony can be broken by adding areas of interest using creative shapes, colours and textures in garments. Formal balance gives a sense of stability, and makes the wearer seem more dignified.
- **Asymmetrical Balance:** It is also referred to as informal balance. Asymmetrical balance is achieved in design when objects arranged on either side of a center are equal but not identical in all aspects. The designer creates asymmetrical balancing with the help of counteracting visual sources. Asymmetrically balanced dresses would have asymmetric internal design.
- **Radial Balance:** Radial balance occurs when the design elements radiate from a central point. Garments can be embroidered using two dimensional or three dimensional radial effects. Radial balance helps create highly decorative and eye catching visual patterns.

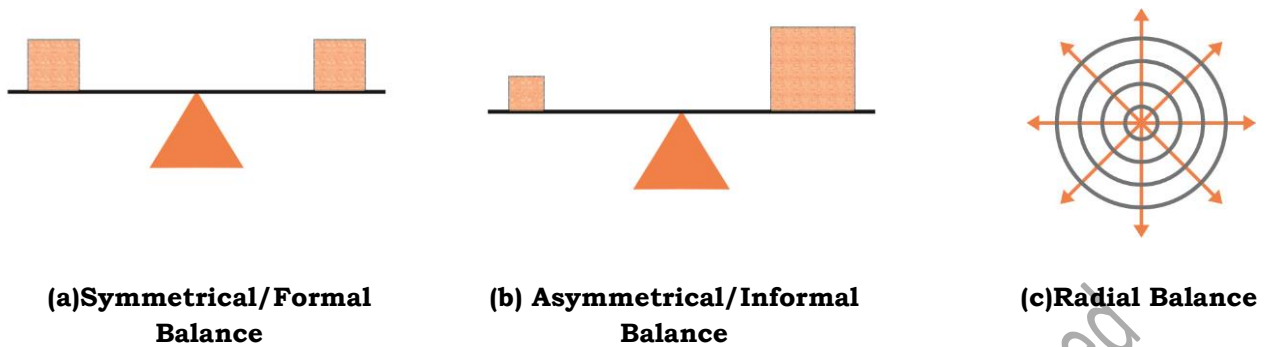


Fig.: 2.14 (a, b & c) Different types Balance

RHYTHM

Rhythm is like the beats that flow along the melodies in repetitive patterns. When one is listening to music which keeps flowing, the brain recognises the constant pattern of beats which is getting repeated. Similarly, whenever one's eyes watch any movement, it is able to recognise pattern and direction in the movement. The pattern detected by the brain with the help of the eyes becomes the rhythm in visual design.

In any design, rhythm refers to regular repeated pattern of movement or harmonious flow of lines, shapes, textures and colours of garment. It is a linear design principle that leads the eye easily from one part of a design to another in an easy, flowing manner.

Types of Rhythm

Rhythm is classified based on the observable patterns in it. The following are the three primary types of rhythm:

1. **Regular Rhythm:** A regular rhythm gets created when there is a regular repetition of the elements in a predictable sequence. The character of the repeated elements remains the same in all the repeated instances in the pattern.
2. **Graduated Rhythm:** A graduated pattern of rhythm gets created when there is a progressive scaling up of the character of the elements of design at each successive stage. Lines would proportionately get longer or shorter, shapes would become larger or smaller and the colours would be darker or lighter as compared to the previous occurrence in the pattern.
3. **Random Rhythm:** It refers to instances of rhythm formed by irregular repetition of the elements of design. In this case, the rhythm does not

have any physical pattern but is generated by the movement of the eye over the elements or their compositions.

Application of Rhythm

The following are some of the ways in which rhythm can be introduced in to the garments:

- **Repetition:** Repetition of design elements makes it easy for the eye and brain to recognise and store visual effects. Rhythm can be created by repeating any element of design at intervals. It can be repetition of intricate patterns or motifs.



Fig.: 2.15 Repetition

- **Parallelism:** Parallelism is akin to repetition but the difference would be in the parallel nature of the recurrence of lines, shapes, textures, etc. The distance between any two repeated elements or objects would be the same at every point. Embroidery patterns may be arranged parallelly on the garment to create this effect.
- **Alternation:** It is another way of creating rhythm by using alternating elements, patterns or compositions back and forth. It is usually created by repeating any two designs together to form a linear or directional pattern. Some of the design elements used for creating alternating rhythm include lines, space, shape, texture and patterns.
- **Sequence:** Sequence is about creating orderly placement of design elements. The order in which one element succeeds the other is what provides the connectedness. For example, different types of lines can be placed one after another creating an effect of succession. Similarly,

space, shapes, textures and patterns could also be organised in succession.



Fig.: 2.16 Sequence

- **Gradation:** In the case of graded rhythm only one of the aspects of adjacent elements is varied in an eye pleasing manner in increasing or decreasing proportions. For example, the size of motifs can be progressively increased to create a graded rhythm.
- **Transition:** It is characterised by the arrangement of different types of design elements in a way that does not break the eye movement. The change is so continuous that it is difficult to pinpoint the exact place of change.
- **Concentricity:** Concentric rhythm is created when the eye movement is constantly led to the centre. It can be in the form of concentric squares, circles or shapes.



Fig.: 2.17 Concentricity

- **Radiation:** Radiating rhythm is just the opposite of concentric rhythm. It creates an outwardly bursting effect like a cracker or a flower in full bloom. It is a visual effect flowing inside out from a centre.

EMPHASIS

Emphasis is the eye catcher in any design. It is created with the specific purpose of drawing and sustaining the attention of the eye. A good emphasis must also be able to expand the viewers' attention to the rest of the design elements and aspects. The effect of emphasis in design is like that of a moon dominating the night sky. Similarly, emphasis in design is expected to dominate and highlight the intended features of the body or areas of the dress. Emphasis in design also helps in creating hierarchy of importance of other design features in relation to what is highlighted.

However, there cannot be more than one point of emphasis in a good design. When a dress has more than one highlighted features, each would be for the attention of the eyes and become points of distraction rather than being the focal point.

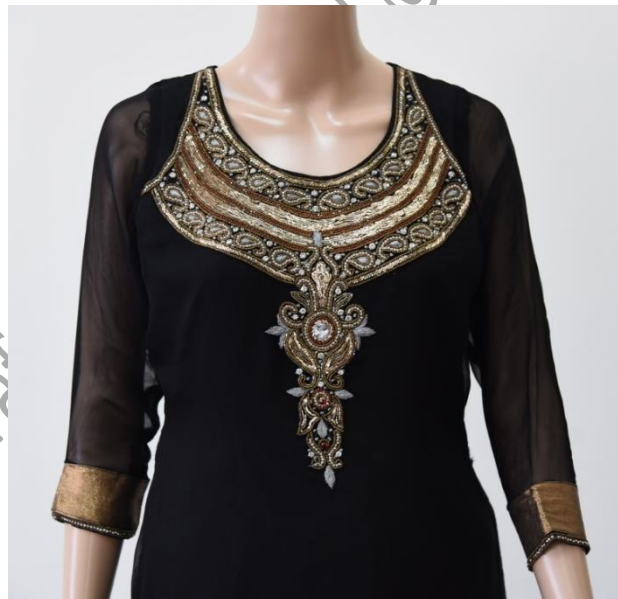


Fig.: 2.18 Emphasis by embroidery

Emphasis Creation in garments

Emphasis can be added to garments by the appropriate use of the two-dimensional design elements as well as the three-dimensional design techniques. The following are some of the popular methods and purposes of including emphasis in garments:

- **Use of Visual Elements for Emphasis Creation:**

- **Line:** Lines can be used to create emphasis through thickness, direction, contrast or continuity.
- **Shape:** Shapes can generate emphasis based on size or contrast. They can also highlight the area where they remain isolated
- **Space:** Empty space surrounded by filled area as well as filled space surrounded by empty space can create emphasis
- **Texture:** Textures can also be used to create emphasis through thickness, direction, contrast or continuity. The degree of progression of a texture can also help highlight an area
- **Colour:** Warmer and brighter colours create emphasis. Alternatively, contrast could also be used to create emphasis.

HARMONY

A simple yet meaningful description of harmony is unity in diversity. It is more an abstract concept and can be recognised only by the visual effect of direction and connected-ness of the whole design and not between a few parts. This connectedness is also referred to as unity or oneness. An additional requirement of harmony is that there should be nothing in the design which looks out of place, out of sync or jarring. In a harmonious design, everything would appear to belong to the design.

Harmony may be considered as a very important principle of design because the lack of it would spoil all other design effects. The principle of harmony is concerned with the whole design. In reality, the diverse elements and principles used in any design would compete with each other for attention. In this process, the visual and structural design elements could start distracting the eyes in a confused manner. Such confusion would make the entire garment visually less appealing. The importance of the harmony principle hails from the fact that our visual brain likes harmonious images. The images having oneness is processed and stored as a single image. Visuals with jarring parts are treated as multiple images involving more work and energy.

Application of the Harmony

Garment design is more utility oriented than pure aesthetic design. Overall, the garment should also be able to flatter the body of the wearer by highlighting the attractive features and by understating or hiding the less attractive ones. Harmony in garment design depends on functional, structural and decorative aspects.

In garment design, visual harmony is very important. Visual harmony requires that each part of the visual, structural and decorative components of the garment agree with each other on the one hand and go with the whole design on the other. Finally it should also meet the psychological expectations of the wearer.

Role of design in selection of fabric for embroidery

Design type should match the fabric structure and fabric properties.

1. Line work machine designs include outline designs can only be sewn on even and flat fabrics. These designs will sink into the texture of the fabric when applied to the textured fabrics.
2. Light type of the design should not be done on loosely woven fabric as stitches will not have enough base to hold on stitches.
3. Cutwork embroidery designs should not be done on elastic fabric as these fabrics are not stable enough to support the patterns of the design.
4. Overly light weight or elastic fabric are not recommended for cross stitch designs. Light weight fabric might get puckered and the drape quality of the fabric will be compromised on elastic fabric
5. Designs filled with dense stitches should be avoided on light weight, stretchy, loosely woven or knitted fabric.
6. While choosing fabric for applique, take care that at least one property is similar to base fabric. It should be done on sturdy fabric.

An artist or designer should be well versed to combine the above sources effectively. Of all the above, the prime one is the combination of visual and tactile elements. To begin with art work understanding of elements and principles of art is very important. The elements of art and principles of design are the fundamental of an artwork. Most works of art will make use of many or all of the elements and principles of art. The quality of art work is determined by how effectively the artist used these design fundamentals.

The elements and principles of art can be called the lens, to view and understand art, but they are not only what makes art work. They are an artist's toolbox. Knowing the tools improves studio art skills. It also develops deeper appreciation when viewing artworks. Art inspires higher level thinking, focus, a growth mind-set, visual literacy, curiosity, respect, and connection.

ANALYSING AND INTERPRETING DIFFERENT EMBROIDERY DESIGNS AS PER SPECIFICATION SHEET.

Any art work is the inspiration and combination of the sources for the development of ideas. These sources include:

1. The combination of visual and tactile elements such as: color, line, form, tone, texture, shape, pattern, composition, decoration, repetition, scale, structure and surface.
2. The cultural, social, historical, contemporary, environmental and creative contexts.
3. The ideas, feelings, forms, and purposes that address needs to meet external requirements, such as client expectations and any associated constraints.
4. The use of Fig.:urative and non-Fig.:urative representations, stylization, illustrations, simplification, surface ornamentation, constructional details and imaginative understanding
5. Suitable use of materials for designing.

To start making a customized design for machine embroidery work there are three ways:

- A. Use the available designs already created by artists and designers. This is very easy and useful for beginners. The embroiderer can pick up the design from the available sources and concentrate on the production of the design. One can also work on the design provided by the buyer in the specification sheet.
- B. Use the design provided by the buyer in the specification sheet along with the details of thread type, colours and type of stitches to be used.
- C. Create your own design. This method results in new and unique designs.

For this follow the following steps:

1. Search and research on some sources of inspiration to get certain initial ideas. Look around and go on collecting references, pictures that can be useful for designs.
2. One can select Pictures of natural objects like flowers, leaves, shrubs, creepers and trees, animals, birds, butterflies, fish, water, clouds, rainbow, mountain and manmade objects like vehicles, boats, etc. Whatever you see around, in pictures or photographs.
3. Floral designs are in vogue all the time. Draw and paint real flowers and leaves.

4. Prepare the drawings with details keeping in mind the elements of design

Steps to draw design:

1. Take any picture from any source or take inspiration and draw own design.
2. Variate it and draw it in own style to create five to six designs.
3. Select one out of the above options.
4. Try to place these designs in different ways by repeating, alternating, and sequencing them.
5. By changing the proportion and combining different designs create borders, corner designs, all over the designs.
6. An infinite number of motifs can be combined to create a design.
7. Using as many permutations and combinations one can produce a new design every time.

NOTE

1. Always try to develop a new composition and a new color scheme.
2. Abstract forms can always be handy for use in the background.
3. Most importantly keep all elements and principles of design.

Of all the properties of the design in embroidery, the density of the design is the most important one.

Some sources of inspiration for selecting designs are natural, geometric, abstract, nursery designs, architecture, history, movies, museums, and so on. A designer can select any design as per the collection being designed or as per the requirement of the collection.

COLOR COMBINATION IN EMBROIDERY

It is important to know the relationship between colors to coordinate colors in the design. Color combination is an essential skill for a designer. One of the keys to making the design come alive is just to choose the right color combination.

Selecting suitable colors

Color is a powerful communicator, as a complex language or music. Color invariably conveys moods that attach themselves to human feelings and reactions. Color is tied to our emotions and our intellect. We also have a specific reaction to color that is spawned by a belief system found in specific principles.

Factors affecting the choice of colour while doing embroidery work:

- **Colour Forecasting:** The textile industry collaborates with a range of experts for guidance on trend direction, this influences the preliminary stage of the development of color palettes.

Colour plays a major role in marketing the product. It is a strong marketing tool that influences customers buying so much that it accounts for 85% of the reason why someone decides to purchase the product.

Therefore, the marketer should study the psychology of colour to use it efficiently. The most predicted colour palate is ready to distribute to the textile and fashion industry at least one or two years in advance of the retail period.

- **Color Trend:** Selecting color and forming a defined color palette is one of the first considerations when planning a range of collections. Many industries depend heavily on constantly changing taste of color. The prediction of color trend involves an ongoing assessment of all the subtle factors that influence consumer taste. A group of colors can express a cultural attitude or inspirational lifestyle.
- **Tuning color to consumer personality:** Some color associations be strongly rooted, a lot depends on the personality, age, gender, and cultural background of the consumer. For eg- Men prefer orange to yellow while, women prefer yellow to orange. Men's favorite color includes blue, black, brown, green, and red, women like blue, orange, yellow, purple, green, and red at the best.

The meaning or emotional impact or color impact will vary across different cultures and can fluctuate out timely, acquiring both positive and negative connections throughout the age. Colors can remind us about favorite traditions, at the time of the year or special place.

Color associations rely on an audience that shows the same cultural experience. The idea that blue, green, and violet are cool in temperature and red, orange, yellow are warm colors, is shared by many cultures worldwide.

- **Likes and dislikes:** Your likes and dislikes can - and often do- changed over the years. Your preference can also reveal some of your secret Desires. It reflects the way you operate in the world. Your strengths and weaknesses, your vulnerability, your deepest need, and your challenges at that time in your life. Having a favorite color doesn't mean that you surrounded yourself with it, or wear it constantly. It simply means that

something happens - every time you look at that color, it speaks to use and brings you joy.

- **Geography:** it also plays an important role in is the color selection. The tropical climate favors bright colors and white. The colder climate favors rich deep tones, dark and natural. Very good example can be seen in the embroideries done in kutch Kathiawar and Kashmir. Their surrounding plays a very important role in selection of colours. Kutch is a deserted area so to add colours in their life mostly red, yellow, orange and their shades are used. On the other hand Kashmir is a place where lot of greenery and nature is there, which is depicted in their use of colours while embroidering.

Color coordination is one of the major components of the design. It should never be overlooked while designing. Well-chosen colors are a detail that can entirely make or break a design.

A design done keeping in mind the elements of design in the wrong color combination may not be considered as a good design. If we don't take a proper color combination, the result is most likely going to be boring. There are standard color schemes that can be used for designs, especially for beginners.

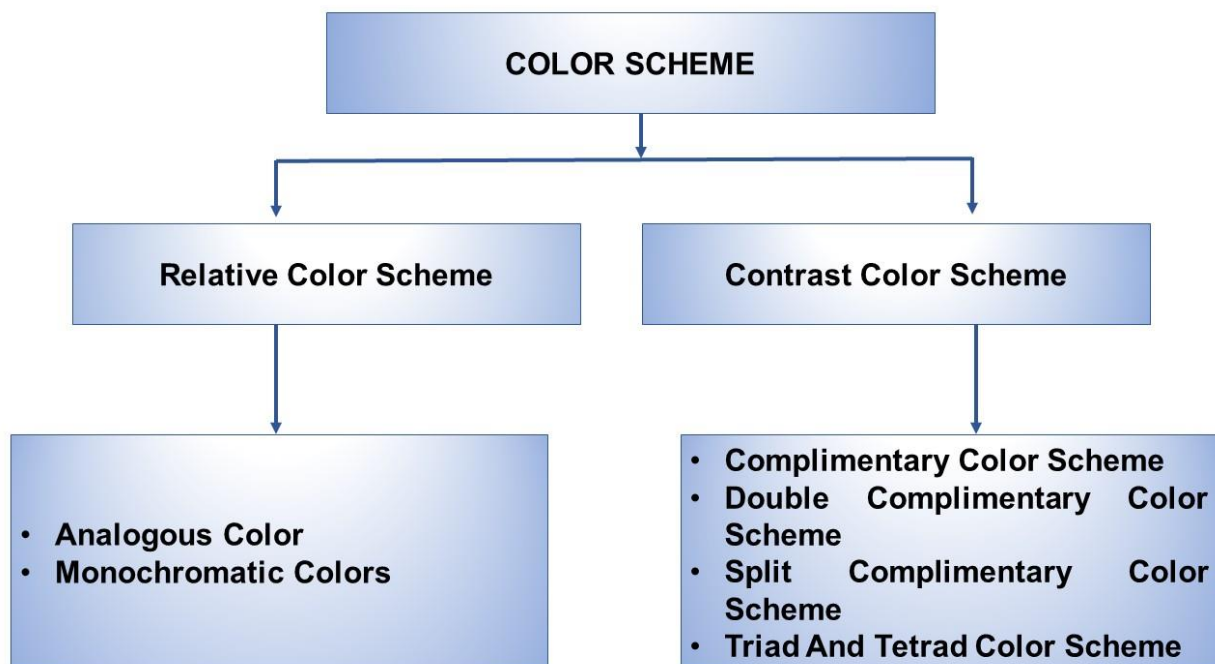


Fig.: 2.19 Color Scheme

Relative color Schemes: The colours adjacent to each other on the colour wheel are called related to each other . Some relative colour schemes are as follows-

- **Analogous Colours:** using only three consecutive hues or any of their tints and shades adjacent on the color wheel. This creates a minimized contrast, giving a little restrained look to the collection. It is best to give a unified color combination.
- **Monochromatic colours:** use one hue in combination with any or all of its tints and shades. It is the full range of color from its lightest tint to its deepest shade and everything in between, but it is always one very specific hue.

Contrast colors scheme: The colours on opposite sides of the colour wheel are called contrasting to each other. Some contrasting colour schemes are as follows-

- **Complementary colour:** They are directly opposite to one another on the color wheel. This is used to create contrast in a design. This can be used to get striking attention at a particular point in the design or to highlight the part of the design.
- **Split complementary color:** combines a color with the hue to the right or left of its complement on the color wheel. This color scheme is very bold and has high color contrast.
- **Double complementary color:** A combination of four colors on the color wheel made up of two complementary pairs. It is also called as rectangular color scheme, as when the four colors are linked on the color wheel they form a rectangular.

Other color schemes: -

Triad Colors Scheme: A triad is colour scheme is when three colours are taken from the colour wheel in such a way that they form an equilateral triangle on it. All of these three colours are equidistant from one another on the color wheel. This creates the most balanced form of contrast.

Tetrad Colours: Tetrad is a colour scheme when four colours are taken from the colour wheel which are equidistant from one another.

Achromatic color scheme: without using any color, but only using black, white, and gray.

Neutral scheme: Neutral colors contain equal parts of each of the three primary colors: red, blue, and yellow. Use a hue that is diminished or neutralized by the addition of its complementary or black. A neutral color is defined as being a color of very low saturation. Black, white, gray, and sometimes brown are considered to be "neutral."

Other than this tints and shades of the colors should be used according to the end use of the design and required look of the design. A single design can be done in different color combinations.

The selection of color again will depend on the material on which the design is embroidered, the area the design is going to cover, and also the type of stitch used for the design.

Activities

Activity 1:

Prepare a portfolio on Colour wheel and value scale and colour schemes

Materials Required:

Chart sheet, coloured pens, pencil, ruler, poster colours

Procedure:

1. Prepare a colour wheel on a A-3 size sheet and paint it with poster colours representing primary, secondary and tertiary colours on it
2. Prepare and paint 12 value scale of any two primary colours on an A-3 size sheet
3. Draw boxes of size 6”x 6” and draw any design in them and paint them using all the colours schemes mentioned in the session before
4. Finish the sheets and prepare a portfolio

Activity 2:

Prepare a floral, a geometric and an abstract design/ motif of size 6 inch by 6 inch in an A3 size sheet for embroidery work

Materials Required:

Chart sheet, coloured pens, pencil, ruler, eraser

Procedure:

1. Search some pictures for inspiration and develop and draw three embroidery motifs – floral, geometric and an abstract design suitable for embroidery work
2. Make three blocks of size 6” X 6” for the three motifs

3. Draw outlines of the motif using a pencil and then finally finish it with a fine marker.

Check Your Progress

1. Fill in the blanks:

- a) The is a proprietary, standardized colour system used in many manufacturing industries. (Pantone Matching System/ PMS)
- b)refers to the purity of a colour.(intensity)
- c) is the name by which a colour is known and is distinguished from other colours.(Hue)
- d) Apattern of rhythm gets created when there is a progressive scaling up of the character of the elements of design at each successive stage. (graduated)
- e)is the eye catcher in any design where the dominating element is highlighted.(Emphasis)

2. Short answer questions:

- a. Explain the types of textures, its types and properties.
- b. Explain all the contrasting colour schemes with the help of diagrams.
- c. Explain the types of lines with the help of diagrams.
- d. Describe how one can develop their own design.

3. Long answer questions:

- a. Explain the difference between symmetrical and asymmetrical balance with examples/ illustrations.
- b. Describe the golden mean ratio and how good proportion in garments can be obtained.
- c. Explain rhythm and its types with examples.
- d. Explain the factors affecting the selection of colour in Embroidery work.

Session: 3 Different Types of Tracing Methods

An embroiderer, who has created his / her own designs, will require tracing it on to the selected fabric. Once we are aware of the types of design and motif arrangement, we must now learn about transferring these designs onto the fabric. There are mainly two types of transfers- the single impression and multi-print. As the name suggests, the single impression can only be used once and the multi-print can give more than one impression, depending upon the type and weight of fabric used.

There are various techniques of transferring designs on fabric. An embroiderer should have knowledge of all these methods and how to select a proper method as per the fabric type and colour, number of impressions needed, type of embroidery to be done on the design and area where an impression is required.

One may need some material for tracing the design on fabrics as per the method used and the type of fabric selected.

TRACING MATERIALS:

- Notebook
- Embroidery design/pattern
- Tracing paper
- Pen/pencil
- Eraser
- Carbon paper
- Iron
- Glass and light bulb
- Needle
- Chalk powder
- Ruler and measuring tape
- Kerosene Oil
- Dress maker pins
- Thick Sheet for stencils
- Tracing wheel
- Cotton/ Cotton cloth
- Thread

The different tracing methods are explained in detail as follows:

1. DIRECT DRAWING METHOD:

One, who is good at drawing, can directly draw the designs on fabric free hand with the help of a pencil. Design can be drawn on a piece of paper and can be kept below the transparent fabric to directly take the impression on the fabric as it will be clearly visible from beneath the fabric.

Direct method can be used on transparent fabrics like lawn, organdie, nylon, georgette, voile, etc. Drawing free hand with the help of a pencil or a water-soluble pen on the fabric directly is the easiest method to transfer the embroidery designs. When one is drawing the picture on the fabric it is better to keep the fabric stretched on the embroidery hoop.



Fig.: 2.20 Direct drawing method

2. USING CARBON PAPER:

This is the simplest method to transfer the designs on the fabric. This is a very suitable method even for very complex designs. Carbon paper is available in many colors. The common colours are red, green, yellow, blue and white. Yellow and white carbon papers may be used on dark coloured fabrics and black, green and dark blue carbon is used for light coloured fabrics. It is very important to note that if dark coloured carbon papers are used, it is advisable to rub on rough fabric against it else it will leave colour all over the fabric on which it is used. Rubbing the rough on the surface of carbon paper will remove extra ink and avoid the smudging of colour on the final fabric.

Method:

- Place the fabric on a smooth and hard surface
- Carefully place the carbon paper, carbon side down between the fabric and the design tracing.
- Pin or tape the tracing paper and carbon to the fabric to hold them together.

- Gently trace over the design lines with a pencil
- Lift up a corner of the carbon paper to make sure and check if the design is transferred properly. If is done then gently remove the design sheet and the carbon paper, else retrace the design and then remove.



Fig.: 2.21 Transferring pattern using carbon paper

3. HEAT TRANSFER PENS AND PENCILS:

Heat transfer pencils or pens are also used for making an embroidery design on fabric and will work well on both light- and heavier-weight fabrics. Transfer pencils and pens are available in different colors and thicknesses, and the ink is activated by the heat of an iron.

These markings made by heat transfer pens are permanent and do not wash off, so they can be covered with the embroidery completely so that they are not visible when the embroidery is done. A fine-tipped transfer pen should be used for best results.

For using these pens, first trace the design in reverse form on a lightweight sheet of paper (the design is traced in reverse as the ironing process creates a mirror image of the design marked on the paper). The easiest and quickest way to do this is to print your pattern, turn it over, and then trace the design on the back side of the paper using the heat transfer pencil.

If pencil is used, one should be sure that it's very sharp while tracing. The pattern lines transferred to the fabric should be as thin as possible so that they do not peek out from under your beautiful embroidery.

To transfer the design to fabric, place the paper against the fabric and press with a hot iron, lifting the iron off the paper before moving it to the next location. Do not iron by moving your iron back and forth along the paper, as this distorts the image.

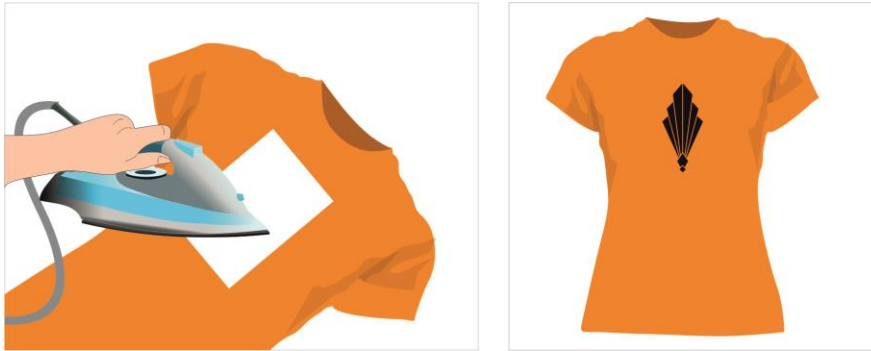


Fig.: 2.22 Heat transfer method

4. TRACING THROUGH LIGHT TRANSFER METHOD:

In this method an embroidery motif is transferred, by using light. It allows tracing each line, prior to stitching. In this method daylight or a light box is needed. Trace the lines with marking pencil or pen. Another way is to bridge two boxes with a piece of an opaque glass and put a lighted bulb under the glass. Transfer the design on a thin paper and then put it on the glass. Lay the fabric on it and tape it properly and outline the design directly which one can see through the fabric using a hard pencil.



Fig.: 2.23 Light transfer method

In case of non-availability of light box following are the alternatives:

1. A window

For this, tape your design with the fabric over it to the window. It will work better if sunlight isn't coming indirectly through the

window. A cloudy day is good for this, or a window away from direct sunlight.

5. PRICK AND POUNCE METHOD:

Using this method, a paper pattern is pricked with a pin at regular intervals. The pattern is then attached to the fabric using a cello tape or pins and a powdered pigment is worked through the holes in a similar direction using a soft fabric pad or cotton ball. The steps of tracing are as follows:

- Draw the design on to a sheet of butter/tracing paper
- Prick along the design lines of a pattern, using a needle or a sharp pin. Keep the holes close together
- Take powdered chalk and mix it with a little kerosene oil and then dip a thin cloth pad in this solution
- Position pricked design over the fabric (Smooth side up and rough side down towards the fabric. Properly pin it
- Gently rub the cloth pad with the powdered chalk solution over the pricked hole of tracing paper
- Remove the tracing paper and blow off any excess powder from the fabric
- Using a sharp pencil connect the dots that will form the design outline.

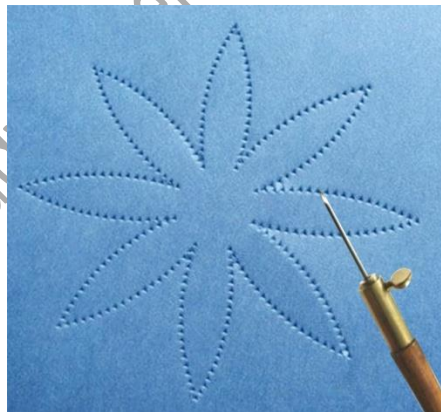


Fig.: 2.24 Tracing through light transfer method

6. STENCIL METHOD: For this method, first the stencil of the design to be traced is prepared and then used for transferring.

Cutting your own stencils does require a little patience, but is easy and rewarding. To prepare a stencil one needs:

- A craft knife or cutter (sharp one is ideal).
- A cutting board or piece of card on which to cut the stencil.
- A drawing or the printout of the stencil design
- Cello Tape



Fig.: 2.25 Stencil method

Cutting a Stencil

The cello tape is used to secure the edges of the drawing or printout of the stencil design so that it does not move when the stencil is being cut. Start cutting the pieces from stencil. A sharp craft knife should be used for it. Cutting should be started along the longest, straightest edges of the stencil design as it can be easy to begin with. Each line should be cut once only to obtain smooth outlines, so press the cutter or knife firmly. Rotate the stencil while cutting at an easy angle. Once the entire design is cut it should be finished by making the edges smooth.

Tracing with the Stencil

1. Place the fabric on which design is to be traced on a flat and smooth surface
2. Place the stencil on the fabric and secure using tape so that the stencil does not move.
3. Now carefully draw over the cut out lines of the stencil to transfer it on the fabric at the required area.
4. Remove the stencil and start embroidering your design.

7. USING A TRACING WHEEL:

Tracing wheel can also be used to transfer designs on fabric. Firstly, place the design made on a paper/sheet on the fabric and then draw over the design lines of the pattern using a tracing wheel. One can also keep a carbon paper between the design paper and the fabric. Impressions of fine dotted line are obtained on the fabric due to the tracing wheel which can be darkened using a

sharp pencil. This method is used when only one or two impressions are needed as the teeth of tracing wheel damage the tracing sheet.



Fig.: 2.26 Tracing through tracing wheel

1. **TACKING/RUNNING STITCH METHOD:** In this method, the design is placed right side up on the fabric and is pinned along the edges. Then with the help of running stitches, the outlines of the design are stitched. Even a sewing machine can be used on design lines to do the work speedily. A Light coloured thread is used if the fabric is white and light, and a dark coloured thread is used if the fabric is dark. This method is mostly used for coarse, uneven and rough fabrics and single impressions. The drawing can be torn away before the embroidery is started. When the embroidery is completed, these basting stitches can be removed.

Tacking method is used for textured fabrics like velvet, suede Felts and other piled fabrics, which cannot be marked with any of the previous methods. The design which is drawn or traced on to a tracing paper is kept on the fabric and running stitch is done by hand to outline the embroidery design on to the fabric.

Steps

1. The fabric should be hooped.
2. Keep the design transfer paper on the fabric.
3. Work the running stitches along the line of the design through the paper and fabric. Ensure that at the start and end of the stitch the thread is secured on the fabric with back stitches

4. After the outline is done pull the fabric gently away to remove paper.

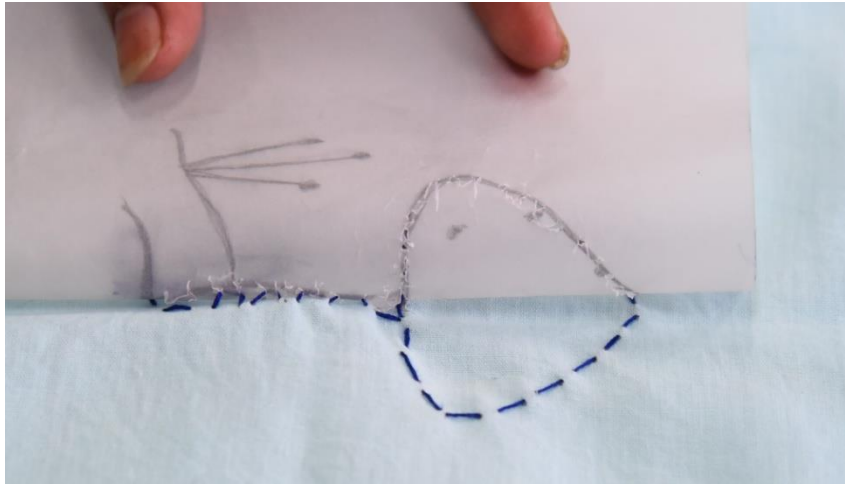


Fig.: 2.27 Tracing using running stitch

9. TRACING THROUGH BLOCK PRINTS:

Wooden and metallic blocks with fine outlines are used to print the design on the fabric. Using temporary colours, block printing is done onto the cloth with the help of neel (on light coloured fabrics) and safeda dyes (on dark coloured fabrics). The design is then embroidered using various embroidery stitches followed by washing the piece so as to remove any trace of the rough print of the design or dirt. This method is very simple and most appropriate to use when one needs multiple impressions for overall work, for example in Chikankari work, this method is commonly used.



Fig.: 2.28 Tracing using block printing method

10. USING TRANSFER PAPER AND SEALING WAX:

This method is worked out in the following steps:

- Place the transfer paper on the design

- Heat sealing wax till it turns to liquid
- Sealing wax should remain hot till the design outlining is completed
- Draw the outlines of the design using the liquid sealing wax using a fine brush
- Place the waxed side against the fabric and move the hot iron on the reverse side of the paper
- This will transfer the design onto the fabric.

11. PRINTER INK METHOD

This can be done by two different methods:

- One way is transferring the designs printed on the paper using laser printer. This is transferred using heat to the fabric, as most of the laser ink transfers to the fabric. But the disadvantage is that it is not effective while complex designs because the transfer lines are not dark
- The second way includes printing the fabric using an inkjet printer. The problem with this method is that the fabric should be of the exact dimension which is accepted in the printer. The drawback is that the marks made by the printer ink may be permanent and so will have to be covered fully with embroidery.

12. A COMPUTER SCREEN OR TABLET

Turn the laptop/tablet on. Turn the brightness of the screen up. Open a new document on Google Docs. Carefully stick your pattern with the fabric over it onto your screen. Use a soft pencil or a fabric pen to gently trace the design.

Enlargement and Reduction of embroidery design

This is the method used for a small design to embroider on a large area. Enlarge the design and then work. The method is simple enough. Similarly, if any design is large and needs to be reduced in size, it can be done in the following way:

Steps:

1. Take a printout of the design.
2. Draw this on a paper with a grid pattern or draw the grid pattern on the printout itself.
3. Draw the outline of the design as in each rectangle very close to the design.

4. Draw a diagonal line crosswise the design as well.
5. Now draw another rectangle in the size you want on a large paper with the diagonal lines as well.
6. Count how many squares are in the smaller drawing.
7. Mark this many squares on the bigger rectangle as well.
8. Now draw the pattern of the small rectangle to the big rectangle grids with pencil.

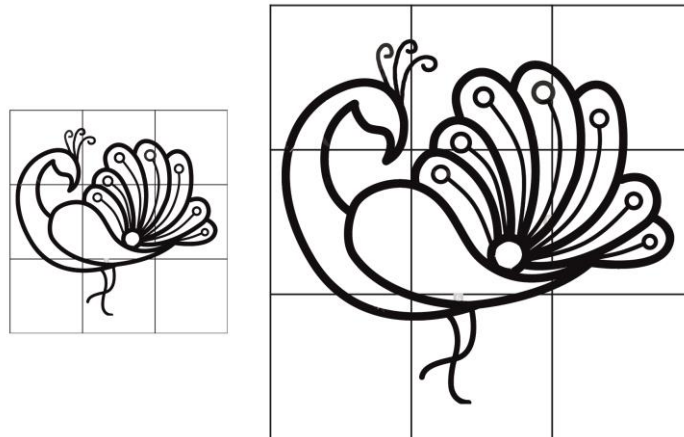


Fig.: 2.29 Enlargement and Reduction of embroidery design

To make your embroidery pattern smaller, reverse these instructions. This should be done very cautiously. It is done by following the position of the outline on the squares that the drawing stays in proportion; i.e., each part is increased by the same amount in width and height. This is because the squares are of the same shape but are larger in size.

Suggestions

To get best results use any of these transfer methods according to the fabrics or items. It should be taken care of that the fabric should be clean, starch free stain free or protective coatings free, because these coatings can interfere with the ink or chalk transferring to the fabric.

Note:

1. Heat transfer methods make a stable image. It should be completely covered by the stitches of the embroidery so that it will not be visible. Design transfer through hot iron, create a reverse image of the design. It means that the design required to be transferred in reverse.

2. Use pearl headed pins wherever they are required to fix the fabric, sheet etc.

Developing designs on CAD

Design practice are classified into two categories: traditional manual design practice and computer aided design (CAD).

Traditional design practice involves creating design by drawing, painting or photographing the idea on paper. Individual artists skill help in obtaining the required level of aesthetic finish in traditional design practice method. In the computer, the ideas are enhanced by minor or major modifications that may involve refining a design that is difficult to achieve by drawing or painting. Advantage of working with CAD is that repeat pattern and different colour schemes can be done much faster as compared to when done by hand. Nowadays CAD is extensively used. Handmade designs can also be taken on computer for commercial purpose.

However, despite the presence of CAD, there is still a need for designers to possess technical skills that involves the creative handling and use of traditional tools and media, such as paint and brush, pencils, pens, pastels and paper.

Blending traditional design practice with the digital (CAD) is effectively realized by scanning drawn, painted, collaged and photographed ideas created on paper into the computer. Selection of particular tool and a specific material affects the aesthetic style of a design. To get a quality work it is necessary to have knowledge of tools and equipment required for developing designs. Tools and equipment for developing design step by step as per the process of design are as follows:

1. Drawing material for exploration of composition, scale and pattern as well as image manipulation.
2. Photocopy equipment for exploring scale and composition in design.
3. Scanner to scan the designs.
4. Computer, graphics tablet, digital stylus pen.
5. Software (Photoshop, Coral and illustrator) to design motifs digitally.
6. Colour palette to select the attractive colour combination.
7. Printing material to print design(stencil, transfer or digital)

Different products require different types of design: also some designs can be used for many products. Generally, the designs are shown in smaller sizes

than are used in actual products. Copy, enlarge, and meliorate or alter those designs according to the requirement. The selection of a particular tool and a specific material affects the aesthetic style of a design

Activities

Activity 1:

Tracing a design on fabric sample using carbon paper method

Material Required:

1. Tracing paper
2. Carbon paper
3. Pencil
4. Chart sheet
5. Fabric Sample (8"x8")

Procedure:

1. Draw two natural/geometrical design of size 6"x6" on a sheet
2. Trace the design on the tracing paper
3. Using the transfer method through carbon paper, trace the design on the fabric sample (Follow the instructions as given earlier in the session)
4. Attach the sample on chart sheet and keep in your practical file.

NOTE:

Same as Activity 1, prepare samples of any three tracing methods on the fabric out of the following:

- Direct method
- Using Stencil
- Running Stitch Method
- Tracing through light transfer method

Activity 2:

Prepare a sample of Prick and pounce tracing method on butter/tracing paper

Material Required:

1. Pencil
2. Tracing paper
3. Needle

Procedure:

1. Draw an abstract design of size 6"x6" on a thick tracing paper
2. Trace the design on the tracing paper
3. Using the needle prick the design
4. Keep the tracing in your practical file.

Activity 3: Enlargement of design**Material Required:**

1. Pencil
2. Tracing paper
3. Ruler
4. Eraser
5. Marker

Procedure:

1. Select any design of size 3"x3" and draw it in a grid of ½" by ½" block size each in the grid.
2. To enlarge it to 6"x6" size make another grid of 1"x1" block size each in the grid
3. Draw the same design in the bigger grid following the design lines in the smaller grid
4. Draw the final enlarged design and outline it with a marker.

Check Your Progress**A. Fill in the Blanks:**

1. Yellow and white carbon papers may be used on coloured fabrics. (Light/Dark)
2. Markings made with heat transfer pen are..... (Temporary /Permanent).
3. The stencil design is cut with a (Sharp craft knife/Scissors)

4. (Blocks/Glass) can also be used for tracing the designs on fabric.
5. (Carbon paper Method/ Transfer paper and sealing wax Method) is one of the easiest ways to transfer designs onto the fabric.

B. Questions:

1. Explain briefly the materials required for tracing the embroidery designs on fabrics.
2. Explain how designs for embroidery work can be developed using Computer aided design/ CAD
3. Explain in detail the prick and pounce method of tracing design.
4. Explain the method of tracing used for transparent fabrics.
5. Explain how enlargement and reduction of design can be done by illustrating a design as an example.

module 3**Operating Embroidery Machine for Basic Stitches****Module Overview**

An Embroidery machine operator must start learning the basic embroidery stitches first to have an ample practice of them. There are several stitches that can be done on machines manually and also there are some built in stitches depending on the type of machine one is working on.

One should understand all the settings and instructions given in the manual of the machine to begin working on the embroidery machines. Basic stitches include straight, satin and fill stitches which can be varied as per one's creativity.

The step-by-step process of making these stitches should be thoroughly understood. The use of special attachments for different embroidery types is significant for a quality output. Different embroideries should be done carefully as per the type of the base fabric. Garment industries train their employees for all these points in an organized manner.

The process of embroidering is completed by finishing and quality checking process before the final packaging. Buyers instructions and specifications are of prior importance in the process of embroidering.

Learning Outcomes

After completing this module, you will be able to:

- Explain Basic Machine embroidery stitches;
- Detect and rectify different types of defects in embroidery machines;
- Finishing and packing of final embroidered products.

Module Structure

Session 1: Basic machine embroidery stitches

Session 2: Defects in embroidery work, embroidery machines and materials

Session 3: Finishing and packaging of final embroidered products

Session 1: Basic Machine Embroidery Stitches

Before starting the embroidery work on the Machine, proper setting of machine is extremely important. The following steps can be followed to ensure proper working-

Machine settings for different embroidery work

Before we start any embroidery, we should always check the machine settings according to the fabric, thread, and design selected for the project. Once we are sure of the settings we need, we should start setting the embroidery machine step by step as discussed below.

1. **Connect to the power supply**-First, turn off the power switch, Insert the machine plug into the machine socket and insert the power supply plug into the outlet. Then turn on the power switch and activate the power and sewing light. [add pic]
2. **Controlling sewing speed** – Put pressure on the foot control to start the machine. The harder you press on the foot control, the faster the machine runs. The maximum sewing speed can be varied by the speed control slider. [add pic]
3. **Adjusting the embroidery presser foot**- One can raise and lower the presser foot lifter. This step is easy to remove and attach the foot according to the selected embroidery and easy to place thick material under the machine foot.

The darning foot is used to do machine embroidery, which is an essential tool for free motion. [add pic]

The presser foot dial should also be set at “6” for regular stitching, set the presser between “3” to “6” for applique, cutwork, drawn work, basting, and embroidery. set the presser between “1” to “3” when sewing on chiffon, organdy, and other fine fabrics.

4. **Attaching the needle**-Lift the needle up by turning the handwheel towards you, then lower down the presser foot.

Next loosen the needle clamp screw by turning it clockwise. Then put the needle into the needle clamp, with the flat side inside. Push it up as far it can go and tighten the clamp screw firmly with the screwdriver. [add pic]

5. **Winding and inserting the bobbin-** Draw the thread from the spool. Guide the thread around the thread guide and pass the thread from the hole in the top of the bobbin from inside to outside.

Put the bobbin on the bobbin winder spindle. Start the machine and stop the machine when it has made few turns, cut the thread close to the thread in the bobbin. Lower the foot control again, and when the bobbin is fully wound. Stop the machine. Return the bobbin winder spindle to the original position, and cut the thread.

Inserting the bobbin, place the bobbin in the bobbin case so that the thread feeds clockwise from the bobbin. Draw the thread through the hole of the case. Pull out about 4” of thread.

6. **Threading the machine-** Lift up the thread take-up lever to the highest point to by turning the hand wheel towards you.

Then raise the foot with the presser foot lifter and pass the thread as guided. While holding the thread near the spool, draw thread down into the thread tension area and then through the spring holder. Next draw the thread down and slip into the needle bar guide on the left. Thread the needle eye from front to back.

Lift the presser foot and hold the needle thread lightly with left hand. Turn the hand wheel slowly towards the front with right hand continuously till the needle goes down. Lightly draw up to needle thread forming a loop of the bobbin thread. Pull up bobbin thread back and under the presser foot.

7. **Balance needle thread tension-** The needle thread and the bobbin thread should interlock in the center of two layers of fabric when sewing straight seam. The thread tension is adjusted depending on the sewing material, layers of fabric, and sewing method.



Fig.: 3.1 Balance needle thread tension

8. **Adjust Pattern selector dial-** Raise the needle above the fabric and match the desired pattern with the setting marked by the pattern selected dial.



Fig.: 3.2 Pattern selector dial

9. **Adjust stitch length and width dial-** Set the setting mark at the desired stitch length on the stitch length dial. The higher the number, the longer the stitch length. To adjust the stitch width, turn the stitch width dial to the set the setting mark at the desired stitch width. The higher the number, wider the stitch width.

Before using the machine for embroidery place the waste fabric under the presser foot and run the machine for a few minutes. Wipe away any oil which may appear.

Important Points to be kept in mind to use correct tools and equipment for machine embroidery as per the type of fabric:

It is important to understand the correct usage of these tools and equipment. Following guidelines are to be followed for the selection and used of the tools and equipment.

- a. While working with thin stretchy knit or silk fabric always use stabiliser on the back for stability.
- b. Dissolvable or tear-away, iron on interfacing on the back is used as a stabilizer for designs which are heavy (ones with metallic thread) or muslin fabric can also be used.
- c. While working with Velvet, first hoop the stabilizer and with the help of gum stick fix the velvet fabric gently on the top of stabilizer.
- d. Alternatively, a dissolving stabilizer with the design marked on it can be used for velvet and other napped fabric which can be dissolved after completion of embroidery.
- e. Water soluble stabilizer can be used for sheer transparent fabrics as it is dissolved after the work is done. Other stabilizer are not appropriate to use as the fabric is see through.
- f. A sturdy tear away stabilizer is used for loose weave fabrics like net/as it gives strength to the embroidery. It can be cut off after the embroidery is done.
- g. Hoop the fabric Spandex without stretching and embroider carefully without stretching it.
- h. The thread does not bleed if it is washed before starting the embroidery.
- i. Some bright colours like red, pink even belonging to good brands may bleed
- j. Rayon thread though they look super fine and silky almost also bleed.
- k. To check colour fastness, wet the thread and put it on a white tissue to see if it bleeds.
- l. Add some salt or vinegar in the final rinse water of the thread to act as a fixative for the dye on thread, if the colour bleeds from thread. Wash it until the bleeding stops and then dry it.
- m. The design should be hooped and stretched properly.
- n. For fine and delicate work on fabrics like satin use finer thread.
- o. While working on thick fabric select thicker yarns.
- p. Start from the face of the design /fabric and leave the end of the thread inside the design to make back neater.
- q. One can fill any large design easily by using satin stitch by making this stitch in rows and connecting them inside a design area.
- r. Never use different types of thread when stitching a design as threads not only stitch differently they also wash differently. If you mix polyester and cotton together there will be distortion in the design after washing it.
- s. While using metallic threads different types of thread can be mixed.

- t. Choose the right needle size.
- u. Know the different needle-point types
- v. Change the needles regularly.
- w. Understand the relationship between thread, fabric weight and needle sizes.

BASIC EMBROIDERY STITCHES

The two basic machine embroidery stitches are outlining and filling. It is done using Zig zag in vertical, horizontal and circular form. Outlining can be done with one or more rows of straight stitching. For a thick outline zig zag stitch in horizontal form can be done. Filling can be done using straight or zig zag stitch too. If vertical fill in stitch is used, the hoop is moved backward and forward and this movement forms distant rows of stitches or the stitches can be overlapped and blended to create a dense look.

Zig zag stitch also helps in creating a feathering look in the outline of a design. It gives a jagged outline and is helpful in embroidering where filling is not done and only outline highlights the design. Stitches should be close enough so that the fabric is not visible underneath and they even should not be too close that an uneven layer of stitches are created. Keep your fingers out of the stitching path. Hold the fabric tight in the hoop. Check the tension of the thread frequently to avoid any loop formation on the top. To finish and end the stitch at a point, move the stitch regulator to “O”, and then stitch three to four stitches on the same place and finish the stray threads by taking them to the wrong side of the fabric. Trim the extra threads with a small scissors.

Depending on the type of machine one has, many inbuilt stitches are there to choose from. Still, there are three basic stitches which an Embroidery Machine Operator should learn before learning the complex stitches.

1. Straight Stitch

This machine embroidery stitch is the most simple, basic and versatile one. It is done by simply sewing a line or series of stitches, and repeating them over the same area to add thickness within that design area. Different effects can be obtained by varying the stitch length. Short stitches look rough and tight whereas long stitches appear shiny and smooth. ‘Straight Stitch’ usually contain stitches of the same length, but digitizing software can vary stitch length automatically to form tight curves. Straight stitches are used in small detailing work, manual shading work, outlining, and single colour drawings of all kinds.

a. RUNNING STITCHES

Running stitch is the simplest stitch and is mainly used for outlining and are done in a single line or series of lines. They are also used as the base for many underlay and fill stitches to give them an embossed or raised look. A single running stitch means a single stitch from one point to the other. A line of repeated single running stitch of same length forms a continuous straight line. Different effects can be achieved by varying the stitch length. Long stitches look shiny and smooth and short stitches give a pebbly tight look. It is mostly used for quilting.

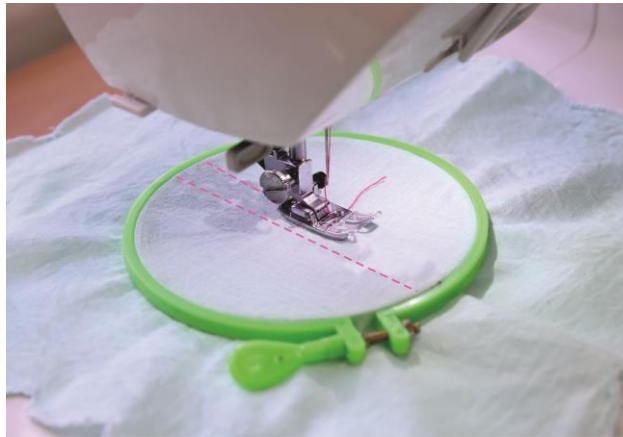


Fig.: 3.3 Running stitch

There are about 12 stitches per inches in a single running line and 25 stitches per inches (Normal Outlining Stitching) in double running line. The running stitch in triple line is also called is bean stitch and has about 37 stitches per inch. Similarly, the 4-ply running line has about 48 stitches per inch.

PROCESS OF MAKING:

- First, trace the design on the fabric.
- Thread the embroidery machine with embroidery thread and try to use it on waste fabric to check the tension of the machine.
- Adjust it in such a way that the tension is neither tight nor loose.
- Place the fabric on which the design is traced in the hoop and fix it properly.
- Keep the frame under the machine needle, such that the motif should be clearly visible.
- Pull the bobbin thread up by running the flyer of the machine towards oneself. Here, the upper thread should be kept loose and the lower thread should be kept tight in the machine.
- Run the machine on top of the drawn lines and cover all the motif lines, as per the chosen color thread.
- First do the outline of the motif and then gradually start filling each area from right to left or vice-versa.

- It is easy to complete the motif by single color first and then switch to another color.

b. BEAN STITCH

This stitch is an outline stitch and forms three stitches between two points. “Bean” stitches are more noticeable than Running Stitches. It has about 37 stitches per inch.

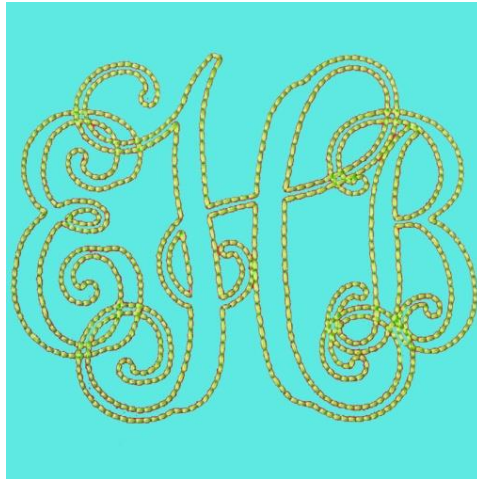


Fig.: 3.4 Bean stitch

c. UNDERLAY STITCHES

These stitches are used as a base or foundation for many embroidery stitches. They are the stitches in a design that are made before the doing the final stitches just below it so as to stabilize and emboss the main stitch in the design. This gives a fine detailing in the embroidery. This stitch is mostly done below the satin stitch to give a raised effect.

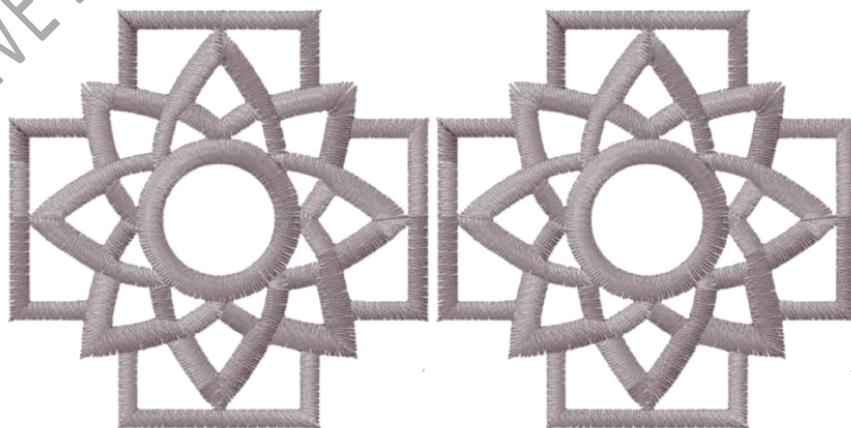


Fig.: 3.5 Underlay stitch

d. MOTIF STITCH

This stitch includes built -in motifs in the machine. Motif stitch is made by repeated small stitches placed using one of the Universal or machine motif patterns. Motif patterns usually have spaces between the stitches.

The motifs can be of different sizes and can even be made at an angle. Motifs can also be used in an alternating pattern. The stitch length and width can also be varied.

2. Fill Stitch

It includes lines of straight stitches done very close to each other so as to completely cover the base fabric. The density can be varied and a number of effects can be obtained.

This stitch gives an effect of weaving on the fabrics which helps to create volume and texture in the garment or product which is being embroidered. This stitch is used to fill large areas within the design. It works better than satin stitch with its alternated lines of stitches for covering a large area but it does not give sheen like the satin stitch. The stitches penetrate in a fill area line by line in such a way that it looks like a woven material. The fill stitch can be altered by changing the stitch length, spacing and alignment of its stitch penetrations and thus help in creating various textures. New innovations in design software has made it possible to even add curved lines in fills. This helps in enhancing the contours. The modern digitizing programs have a number of “Fill” stitch patterns that can be selected to give variations in the appearance of design. Some “Fill” patterns are very complicated, while other patterns are quite simple. Sometimes the fill stitches are taken in an angle on some fabrics so that they do not lay down in the weave of the fabric. Once an embroiderer has practiced this stitch and gained confidence, blending of colours can also be done to get more dynamic look in the embroidery patterns.

One can experiment with different colour and stitch combinations and create newer patterns and generate various ideas by digitizing the designs on CAD as well. With time one can prepare beautiful pieces using the various machine embroidery stitches and mix matching different types of threads and embroidery materials.

Note: Once a stitch is selected, a test run on an extra swatch of fabric is advisable. Every stitch will have a different effect and could cause pulls or straining depending on the weave of the fabric.

a. SATIN STITCH

“Satin” stitch is also known as “Column” stitch. It is made with zigzag stitches which are very close together at an angle. This stitch can be made in varying stitch lengths. Satin stitches can be made in widths from 1.5 mm to 8 mm. The wider the satin stitch, the more likely that they look snaggy. Wide satin stitches should be avoided in children garment due to this reason. It gives a shiny finish due to the unbroken long stitches. It is used for thick borders, small leaves, thick outlines text and lettering. It is not possible to make stitches more than 12mm in width as they become loose and look snaggy. 1 mm satin stitch has about 100 stitches per running inch and 115 stitches with underlay stitches. To do the lettering embroidery with satin stitch, stitch width and density is very important to get sharp corners and edges.

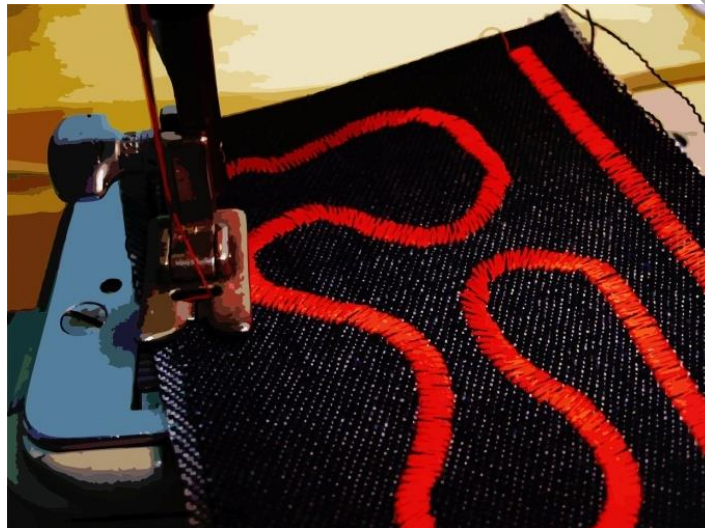


Fig.: 3.6 Satin stitch

b. TATAMI STITCH

This stitch is also called as Ceeding stitch. Tatami stitches are used to embroider large areas and it comprises of lines of straight stitches worked very closely so as to completely cover the base fabric. The density of the stitch can be varied to obtain various effects in the design.

1 square inch of “Fill” stitches at a normal density with a stitch of 6mm forms about 1000 stitches. This is the a basic “Fill” to cover an area with no stitching on top.

1 square inch of “Fill” stitches at a normal density with a stitch of 4 mm has about 1500 stitches. This is normally used as a basic “Fill” to cover an area on which lettering or any other stitch on top has to be done. The stitch length

is reduced to avoid the stitches from pulling apart when the additional top stitching is done.

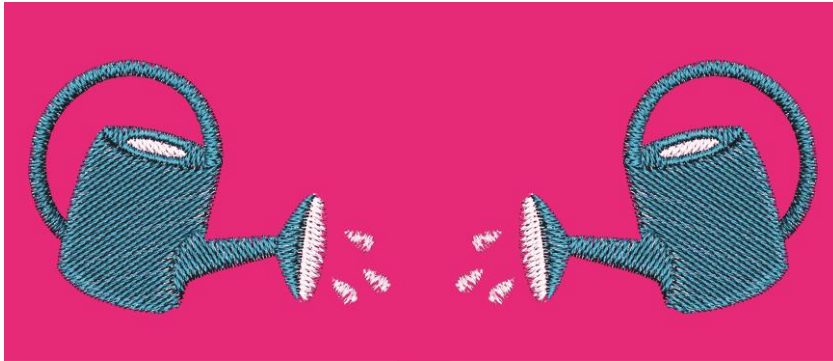


Fig.: 3.7 Tatami stitch

c. CURVED FILL

Designers and Embroiderers need to fill some areas with curved lines of stitching instead of straight lines in some special embroidery pieces. Curved lines of stitching can give very good, artistic effects to the look of the embroidery, creating a 3-dimensional like effect, or giving a more life-like feel to the embroidery.

Curved “Fills” are also becoming more popular in the industry. Using a “Fill” stitch in a curve can add more dimension to a design. This type of stitch is very useful for hair and water.

6 – 8 mm in width = 175 stitches per running inch. 200 stitches with underlay.

4 – 6 mm in width = 150 stitches per running inch. 180 stitches with underlay.

3 – 4 mm in width = 138 stitches per running inch. 165 stitches with underlay.

2 – 3 mm in width = 125 stitches per running inch. 150 stitches with underlay.

d. LONG AND SHORT STITCH

This stitch is practically painting with needle. It is a filling stitch that fills the motif, flowers etc. with coloured embroidery thread giving a shaded effect. It is a simple variation of the satin stitch, in which the length of the stitches are at two level, one long and one short just as the long and short done with hand. It is used to fill the spaces which are too big and cannot be covered with the satin stitch. This stitch is done by dividing the design area in two rows. In the

first row the stitch is alternately taken long and short and follow the upper outline of the design or motif. The stitch in the next row is worked in the similar way to give a smooth and shaped painted look to the design.



Fig.: 3.8 Long and short stitch

e. STIPPLE FILL STITCH

This stitch is used to create texture fill of running stitch which blends more or less randomly with borders. It can be applied to a closed object with a single stitch angle. Stipple stitch embroidery is made by maintaining stitch length and loop spacing differently for different motifs.

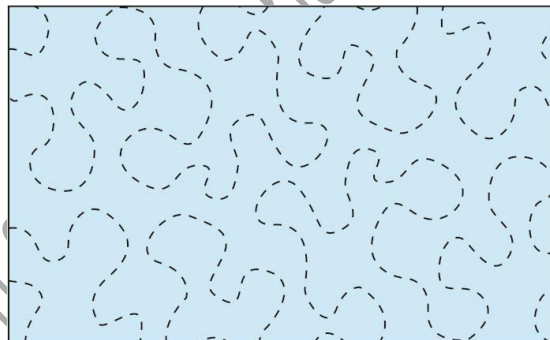


Fig.: 3.9 Stipple fill stitch

CONVERSION INFORMATION.

3.2 mm = 1/8"

6.4 mm = 1/4"

9.5 mm = 3/8"

12.7 mm = 1/2"

19.1 mm = 3/4"

25.4 mm = 1”

According to the above matrix for the different stitches calculation and combination of the stitches should be done according to the weave, surface, fibre and weight of the fabric to be embroidered taking into the consideration the toppings and backings which can be used.

Basic Embroidery Stitches	
Straight stitches	Filling stitches
Running stitch	Satin stitch
Bean stitch	Tatami stitch
Underlay stitch	Curved fill stitch
Motif stitch	Long and short stitch
	Stipple fill stitch

Special Techniques

If decorative stitches are programmed into semi-automatic and automatic machine, they can be used for machine embroidery. Select those that will add to the character of free-motion embroidery. Use the patterns one at a time or in groups to create special and mix match effects in the designs.

A beginner should practice all the stitches thoroughly before starting them on the final project. Try and experiment different combinations and variations of the stitches in different colours and on different types of fabrics to get varied results. Variations in designs can be obtained by changing the stitch width and length, using trims like cord or ribbon and stitching over them, using a twin needle, using variegated thread, and so on. Even the machine manual has various ideas which can be tried.

Activities

Activity 1:

Set the machine before starting embroidery and make a test sample to check the Stitch

Material Required:

Embroidery machine, thread, needle, hoop, scissors, rough fabric to test the stitch

Procedure:

1. Set the machine as per the steps given above in this session like plugging the machine to power supply, attaching the presser foot and needle, winding the bobbin, threading the machine, checking the thread tension
2. Tighten the rough fabric in the hoop
3. Test the stitch on the rough fabric before starting the final work in different stitch length

Activity 2:

Prepare samples of different embroidery stitches

Material Required:

Embroidery machine, thread, needle, hoop/embroidery frame, tracing material, scissors, fabric samples of size 8"X8"

Procedure:

1. Set the machine and test the stitch on a rough fabric
2. Trace a design on the fabric as per the type of the stitch
3. Tighten the fabric sample on the hoop/embroidery frame
4. Make 5 samples of straight stitch, tatami stitch satin stitch, fill stitch like long and short and built-in stitch of machine (motif stitch)
5. Finish the samples and paste them in a file

Check Your Progress

A. Fill in the Blanks:

1. is used to create texture fill of running stitch which blends more or less randomly with borders.
2. stitch is also called as Ceeding stitch.
3. stitch is made by repeated small stitches placed using one of the Universal or machine motif patterns.

4. Running stitch is thestitch and is mainly used for
5. The modern digitizing programs have a number of patterns that can be selected to give variations in the appearance of design.
6. Zig zag stitch also helps in creating alook in the outline of a design.

B. Questions:

1. Explain the important points to be kept in mind to use correct tools and equipment for machine embroidery as per the type of fabric.
2. Explain all the straight stitches used in machine embroidery with the help of illustrations.
3. Explain any two fill stitches of the following:
 - a) Tatami Stitch
 - b) Long and Short Stitch
 - c) Satin Stitch
 - d) Curved Fill Stitch

Session 2: Defects in Embroidery Work, Embroidery Machines and Materials

Methods to identify different types of defects in embroidery work

Any deviation of the final embroidery from its desired design in terms of colour, position, size, etc. is classified as a defect. The occurrence of defects' in embroideries is mainly due to factors like

- A. The fabric and the embroidery threads
- B. The design and the finishing of the embroidery.

These factors occur and reoccur at different stages. The stages where it is observed is divided into four:

1. in the design stage
2. in the manufacturing stage
3. during the finishing of the embroideries.
4. mixed defect

- 1. Defects in the design stage:** These defects occur due to the faults in the motif or design of the embroidery. For example, the incomplete overlapping between the filled object and its outline edge or the gaps and empty spaces between the embroideries, in which the fabric is visible through the stitches and embroidery that clusters at the corners.
 - Incomplete (poor) overlapping between the filled object and its contour
 - Visible fabric (gapping)
 - Bunching at the corners.

- 2. Defects in the manufacturing:** This relatively common group of defects is due to problems with the technology of preparation, choice of textiles, needles, thread tension, speed, machine problems etc. For example, Incorrect bobbin thread, incorrect thread, needle, thread tension. Too many stitches in one place, or incorrect removal of the backing after the embroidery can also cause such defects. Poor hopping is another defect that deteriorates the appearance of the fabric.

- Bobbin thread visible in the embroidery's surface
- Fabric damage
- Poor hopping

- Unraveled threads
- Separation of the textile layers in applique
- Distortion of the shape of the objects

3. Defects in finishing: These include the markings left due to the use of backings, marks of embroidery frame or any stains on the product. These marks might be permanent and cannot be removed by treatment with moisture and heat.

- Improper removal of the embroidery stabilizer
- Defect from the embroidery frame (hoop marks). When embroidering, an embroidery staff the backing is not removed completely after embroidering, the piece is classified as a faulty piece.

4. Mixed defects: They are a combination of defects, due to improper work within two or more manufacturing stages: mixed problems in the design stage and manufacturing stage.

- a. Missed trim is the defect which occurs when different coloured threads are used and changing of threads is done frequently to avoid this defect it is essential to exactly specify the sequence of the embroidery during the process of digitalization.
- b. The defect “incomplete coverage” can be reduced or eliminated in the design stage by selecting the suitable stitches, the density of the stitches and thick outline of the shapes in the embroidery. Proper selection of stabilizer in the manufacturing stage can also minimize this defect.
- c. Unravelling threads can be related to both the bobbin thread and the needle thread and is due to the process of manufacturing of the embroidery. It can be avoided by using threads with proper linear density and needles with necessary number. The tension between the needle and bobbin thread needs to be carefully set as well. Thick stabilizers should be avoided.

1- INSPECTING AND CORRECTING THE EMBROIDERY DEFECTS

Thorough final inspection of ready embroidered goods is must to ensure the quality standards. Errors in the embroidered fabric caused by thread break or missing stitch at the front or back must be eliminated by re-embroidering

the missing of faulty design parts. The defective area is fixed in a hoop and then the missing parts are mended. For repairing, the same thread should be used as the base embroidery thread. Some of the following common embroidery defects should be rectified during the finishing and before packaging.

- **Gapping-** Gapping occurs when the fabric is seen through the embroidery design either in the middle of the pattern or at the edge. Using same type of stitch and threads gaps can be filled out. This defect can be seen when the stitch density is not thick enough and very poor. One can see through the embroidery stitching.

Solutions: This defect can be rectified by: Using proper stabilizer(backing and topping), digitizing the design properly on automatic machines, increasing the stitch density, using underlay stitches and different fill patterns, using close by stitches and using thick satin borders.



Fig.: 3.10 Gapping

- **Missing Stitches-** When some stitches are skipped and are found missing, they should be modified.

Solution: The simplest way for this is to fill that area by using similar thread strand of same colour and stitch.

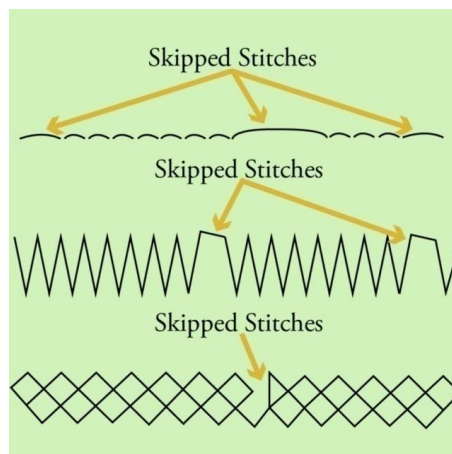


Fig.: 3.11 Missing stitches

- **Stray Threads-** They are the threads that often get trapped during the embroidery process or trail after completion of process.

Solutions: Trim off the threads as closely to the stitch as possible and stick them neatly with the help of adhesive. Take care not to cut the locked knots.



Fig.: 3.12 Stray threads

- **Thread Loops-** Sometimes loops may be observed in finished products as a result of loose stitches or faulty thread tension.

Solutions: These can be removed by pulling the thread from back of the embroidery and stick it with any permanent fabric adhesive.



Fig.: 3.13 Thread loops

- **Crooked Embroidery-** When the finished embroidery appears slightly twisted, wrinkled or puckered. This defect occurs when the fabric around the embroidery looks distorted because of poor hooping and does not lay flat.

Solution: They should be steam ironed well from back side of embroidered area and over the hoop marks and stretched when hot. Repeat the process till all the twists or wrinkles are disappeared. Take care that the temperature of iron must be appropriate to the fabric and thread. This defect can also be rectified by using proper backing and topping, proper hooping without stretching the fabric too much



Fig.: 3.14 Crooked Embroidery

- **Poor Registration**

This defect occurs when the stitches and design are not lined up properly. As different colours are sewn at different areas, the fabric might move. If the fabric shifts while one colour is being sewn, then poor registration will occur when the next colour is sewn. This defect appears similar to gapping. This might also occur in case of improper tracing of design done manually

Solutions: It can be corrected by: Proper hooping, digitizing the design accurately, Tracing the design neatly, using suitable underlay stitches; and by using correct backing

- **Bunching at Corners:** In this type of defect, the corners of letters or shapes are not sharp but are bunched up or distorted. This occurs when too much thread is collected at corners, using inappropriate stitches, or using long stitches at the corners.

Solutions: This defect can be rectified by using short stitches at corners, digitizing the design properly, and correcting the stitch balance.

- **Poor Stitch Balance:** This defect occurs when the bobbin thread is visible on the right side of the embroidery.

Solutions: It can be modified by using good quality Bobbin, embroidery needle thread of same colour as of the top embroidery work and checking the machine thread tension properly.

- **Fabric Damage** – In this defect Needle holes can be seen on the fabric. The fabric is usually damaged at the corners of the embroidery due to the use of incorrect needle type and size, not tearing the backing properly, inserting the needle at the same point again and again.

Solutions: It can be rectified by reducing the number of stitches at corners, using the correct size and type of needle as per the fabric and embroidery stitch.

2- DIFFERENT TYPES OF DEFECTS IN EMBROIDERY MACHINE AND THEIR RECTIFICATION

Consequences of incorrect settings in the embroidery machine

To obtain the desired results, correct embroidery machine settings are very important. There are registration and puckering problems are the effect of improper machine setup. Various other factors are improper stabilization, incorrect needle, standard thread and fabric selection, design resizing, or correct digitizing singly or in combination.

Needle or bobbin tension

Setting up incorrect needle or bobbin tension are the most common machine-related problems. Consequences of Incorrect tension settings include.

- looping in the top stitching
- bobbin thread dragged to top
- little or no bobbin thread shown on the back on satin stitch column
- invisible running stitches
- very loose stitches

Poor registration problems are highlighted by tight tensions, and so the stitches pull more. The fabric gets exposed more between the adjoining areas as well as the stitches in the fills. Thread break and even the needle break can be attributed through tension problems.

Other factors affecting thread tension

- The amount of thread on the spool or bobbin and how tightly it is wounded on it.
- Dirt and the lint build-up along the thread path.

- Fabric thickness
- Hoop should be properly attached and secure.
- The movement of the hoop should be smooth and steady, and there should be no obstacles in its free movement so as to cause registration problem.
- Flagging – the up and down movement of the hoop, may also result, which can further worsen registration.

Stabilization equation

Quality sewing and embroidery work needs a proper stabilization (backing and topping) and the stabilizers are affected by the hoop, hoop tension, and any adhesives used for it.

The hoop- selecting the correct hoop size according to the design size also affects the final result. The larger the hoop, the lesser support and more area it provides for the embroidery. Larger the fabric area in the hoop, the more opportunity there is for stitching, shifting, and flagging- all opportunity for poor registration. Therefore, small design should be combined with small hoops.

Hoop Tension- fabric must be held securely and smoothly in the hoop in its natural tension. Fabric which is stretched more during hooping, will relax back to its normal state when released from the hoop resulting puckering. Loose fabric can also result in puckering.

Over tightening the screw of the hoop can damage hooped goods and the hoop itself. Tightening the screw after hooping can also cause uneven tension on the fabric resulting losing the fabric on the screw area. Therefore the hooped fabric should be smooth and wrinkle free. . Hooping correctly and accurately takes time and practice, unfortunately it is an often-undervalued step in the process of creating good embroidery, especially for beginners.

Backing- selecting proper backing and hooping it correctly is essential for quality results. Backing should be large enough to give complete gripping by the hoop. Partially hooped backing will result in uneven support.

Needles and threads- for most accurate stitch placement and for the finest embroidery results, using the sharpest embroidery need is the must that carries the thread through the fabric without damage.

The threads now days used are polyester threads for reducing thread breakage issues. Polyester threads are much stronger than rayon threads, and will stretch further before breaking. Before breaking the stitches are sewn more tightly into the fabric. When the fabric is removed from the hoop, the

stretched thread will be released and relax to its upstretched state causing puckering.

Most designs are digitized for different fabric weights. Correct digitizing according to the thread weight will give a good end result. Bobbin thread is also important. Using the correct bobbin thread made for embroidery is equally important.

Some of the main embroidery machine defects and their rectification are as follows:

S. NO.	MACHINE PROBLEMS	CAUSES	RECTIFICATION
1.	Breakage of thread in the needle	<ul style="list-style-type: none"> • Thread tension is too tight • Needle is not correctly inserted • Needle is not per the thread in size and type • Needle is bent • Incorrect tension of needle and bobbin thread 	<ul style="list-style-type: none"> • Use Correct needle as per the thread and fabric and insert it properly • Check the thread tension • Change needle if it is blunt or bend
2.	Breakage of needle	<ul style="list-style-type: none"> • Needle is not correctly inserted • Clamp screw is loose • Needle is not per the thread in size and type • Needle is bent 	<ul style="list-style-type: none"> • Use Correct needle as per the thread and fabric and insert it properly • Check the thread tension • Change needle if it is blunt or bend
3.	Skipped stitches	<ul style="list-style-type: none"> • Wrong needle is being used 	<ul style="list-style-type: none"> • Insert the needle

		<ul style="list-style-type: none"> • Needle is bent • Incorrect tension of needle and bobbin thread 	<p>properly and change it if its tip is blunt</p> <ul style="list-style-type: none"> • Use a correct needle size and type
4.	Seam puckering	<ul style="list-style-type: none"> • Thread tension is too tight • Incorrect tension of needle and bobbin thread • Needle is not per the thread in size and type 	<ul style="list-style-type: none"> • Check the thread tension in needle in bobbin both • Use a correct needle size and type
5.	Noisy operation of machine	<ul style="list-style-type: none"> • Feed dog is full of lint • Thread is caught in the shuttle area • Lack of oiling 	<ul style="list-style-type: none"> • Clean the feed dog and shuttle area • Apply oil in the machine

There are some more problems which occur in machines while working like cloth not feeding, machine not working, etc. which can also be checked carefully to avoid any faults in the final embroidery work.

III-DIFFERENT TYPES OF DEFECTS IN THE MATERIAL.

The major material required for machine embroidery include the base fabric, hoop, needles, threads, trims like mirror, ribbons, beads, sequins and so on. With the growth of innovation in all the fields, these materials change from time to time and a designer gets newer options to work with every now and then. Any defected material can affect the quality of the embroidery work if it is unconsciously used in the final project. So it is always advisable to check these material before starting the final embroidery project.

Defects in Fabric:

These are the defects or flaws on the surface of the fabric occurred while the manufacturing process. The use of faulty yarns while weaving, incorrect printing and dyeing process, incorrect or distorted weaving are all the types of such defects. While selecting the fabric for an embroidery project, one must check the fabric for these faults and should select a defect free fabric.

The manufactured fabrics mainly have the following defects:

1. Yarn defects like Broken filaments, missing yarn, knots, etc.
2. Weaving defects like floats, holes, cuts, skipped stitches in knitted fabrics, uneven fabric width
3. Pattern defects like misprint, off print, shade variations, broken colour pattern
4. Wet processing or Dyeing defects like uneven dyeing, colour bleeding, dye marks, crease marks, fabric width variation, patchy dyeing
5. Other defects like pin marks, oil stains, wavy selvages

The fabric for embroidery work should be thus selected properly after checking for all these defects. The embroidery fabric should be attractive, durable and should satisfy the purpose for which it is being used. If in case the fabric is having some defects, one should work on it in such a way that all the damages and defected areas are minimized or covered.

Defects in materials:

Embroidery material include hoops, needles, threads, trims like beads, sequins, mirror, gota, laces ribbons. These materials should be selected carefully before starting the work as per the details in specification sheet provided by the buyer. Some of the material is necessary for all the projects like hoop, needle, thread, machine attachments and some are brought as per the need of that particular embroidery work like the trimming materials.

Some defects in material include the following:

1. Blunt or bend Needles
2. Rusted needles
3. Broken or damaged mirrors
4. Knotted and broken threads
5. Damaged and uneven sized gota, sequins, beads
6. Rough edged laces

7. Broken filament or yarns in laces

8. Bend or tilted hoop

The defects in material can be reduced by handling and storing them in separate boxes to avoid any wastage, damage and mixing. Embroidery material should be purchased as per the customized colour and design required for a project and in the right quantity required to avoid any wastage like the beads and sequins should be brought in small quantities as per the colour specification in a design as all designs need different material in different colour. Even thread colours should be brought accordingly. Basic thread colours can be stored for all the projects and the threads required for special projects like cords, metallic threads, ribbons, zari, etc. should be brought as per the demand of the embroidery project. Mirrors, gotta leaves, sequin laces, pearls and beads should be stored separately colour and size wise to reduce confusion while selecting them for a piece of embroidery. In both, large-scale and small-scale embroidery units, the leftover materials of one project can be reused in some other project to avoid wastage. The efficient use of embroidery material is very important to be considered by an embroidery machine operator.

Characteristics of the materials to be embroidered and probable faults

For a successful combination of fabric and design, the fabric's characteristics, its intended use, and the details of the design should be considered in detail. Different fabrics require different preparation. For stretchable fabrics like Lycra knits, a design with a lot of open space should be chosen. Mostly the fabrics are stabilized by hooping them with a backing but it is not essential to always use the backing if the fabric is stable and tightly woven like organza or denim do not need backing at all depending on the design. Start by making a sample and check the following points:

- Effect of stitch density on the feel of the fabric- Many times, the density of the stitches in a design may not be suitable for the fabric on which it is embroidered.
- Influence of fabric's weight, texture, and colour on design- Fabric's weight, texture and design are very important factors to be considered. All three factors are prime factors and influence the outcome. The design selected should be appropriate for the fabric's weight, colour, and texture.

- Need of backing or topping- Backing or topping plays a very important part in embroidery. Different fabrics need different fabric but something the design selected also demands the backing or topping e.g a design with normal density can be embroidered without any backing on poplin fabric but if a dense design is done the backing will be required for embroidering it on machine.
- Effect of thread colour on the design- Sometimes results are better just by changing the colours of the thread. After considering the point i. and ii always try embroidering the design by changing the colours of the thread.
- Type of motif to be embroidered- It also plays an important role in selection of the material to be embroidered. The size of motif is important whether it a Natural, stylized, and abstract motifs. It can be easy or more difficult to work on them depending on the size and the contrast between the motif and the background. Soft shading effects, small sized motifs, and multiple direction designs are easier to sew.
- Texture- Another aspect of material to be considered is texture, which includes the visual surface appearance and the feel of fabrics. Types of textures include: light weighted, crisp, medium to heavy weighted fabrics, soft and warm texture, and Transparent texture. Words that define texture overlap between the visual surface appearance and the its feel to the hand include: clingy-rigid, cold warm, crisp-limp, dry-moist, firm-flexible, heavy-light, opaque transparent, pliable-stiff, rough-smooth, shiny-dull, stretchy-stable, and thick-thin. After looking at the texture of the material consider the type of embroidery and its components.

After analyzing the fabric for colour, design, texture (visual and hand), analyze it in relation to the intended use. After analysis of the above factors consider the design and its placement. Accordingly select the threads – type, quality and colour for embroidery work.

Activities

Activity 1:

Inspecting defects in embroidered garments and making a report

Material required:

Some ready garments/ products in which machine embroidery is done, notepad, pen, camera

Procedure:

1. Collect as many machine embroidered garments/products as you can
2. Inspect each one of them for any defects
3. Note down the type of defect in each one of them, if any as given in the session above and take its picture
4. Prepare a report on types of defects in embroidery

Check Your Progress

A. Fill in the Blanks:

1. Backing or topping plays a very important part in..... (machine embroidery).
2. The in material can be reduced by handling and storing them in separate boxes to avoid any wastage, damage and mixing. (defects)
3. The defects like uneven dyeing, colour bleeding, dye marks, crease marks, fabric width variation, patchy dyeing are called as the (Wet processing or Dyeing defects).
4. threads are much stronger than rayon threads. (Polyester)
5. occurs when the fabric is seen through the embroidery design either in the middle of the pattern or at the edge. (Gapping)
6. are the threads that often get trapped during the embroidery process or trail after completion of process. (Stray Threads)

B. Questions:

1. Explain the causes and rectification method for the breakage of thread and needle in an embroidery machine.
2. Explain in detail any five defects in embroidery with the help of diagrams.
3. Discuss the following defects and their remedy of the following:
 - a) Poor hooping/ Crooked embroidery
 - b) Fabric damage
 - c) Thread loops
 - d) Missing stitch
 - e) Bunching at corners

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Session 3: Finishing and Packaging of Final Embroidered Products

Creating beautiful pieces of embroidered art is an investment not only in costly supplies, but time and energy as well. The hard work put in each and every embroidery project should be treated with the respect it deserves. Finishing a garment can present a more professional image to the customers and turn them into promoters of the business.

Almost every embroidered product has to undergo at least one or more finishing processes before being ready for sale. Finishing is a combination of processes like thread trimming, removal of excess backing or topping, spot or soil removal and ironing or steaming. They are performed between the two steps of completion of embroidery and packaging. Sometimes processes like chemical finishing add new and enhanced appearances to embroidered products.

Embroidery Finishing Process

I- Remove the Hoop Ring

After removing the hoop, you may find a light ring where the hoop was on dark garments. This ring can be removed by spraying it with water or a light ironing aid. It could also be steamed out of the garment.

II- Removal of Backing

Remove the backing before giving a garment to a customer. For tear away backing, tear the backing away from the inside of the garment while using your fingers to provide support to the threads.

For cutaway, hold the backing so that the garment falls toward you. This will present a clear line along which to cut. Leave $\frac{1}{8}$ to $\frac{1}{4}$ of an inch of backing around the design. Rounding your corners will also give a nicer feel to the design for the wearer.

III -Removal of Topping

Toppings are used to enhance the appearance of embroidery on textured garments. It should be removed before the garment is packed and sold to a customer. Toppings are especially used to prevent the stitches from hiding into the nap of lofty materials like terry cloth, fur or polar fleece. It can also

improve the overall appearance of your embroidery. Most toppings are water-soluble and can be easily removed after the embroidery is complete.

To remove water-soluble topping, tear away the larger areas and then steam iron it or spray water on it to remove the remaining part of topping. Allow the topping to be wet and begin to dissolve slowly. It will become sticky and then one can use a scrap piece of topping to stick to the little dissolving pieces. Then remove the scrap and the smaller pieces should come with it. If the topping is too wet, it may gum up and stick to the fibers of the garment. This should come out when laundered.

IV- Washing and Stain Removal

By washing dirt and oil particles are removed. Any stains which were obtained in the process of embroidery are also removed in this process.

- All embroidered garments should be washed with a mild detergent
- A small amount of chlorine bleach can be used if required. Non-chlorine bleach should only be used in accordance with product instructions
- The washing can be done in machine using cold water and delicate was cycle.
- If the colour bleeds in water, first rinse the fabric in cold water adding a little salt to it, several times until rinsed water becomes clear
- Embroidered clothing should not be soaking in water or lying in a pile when wet for long time
- Do not squeeze out the embroidered articles after washing
- Do not rub hardly on the embroidery

V- Shearing

This method is applied for designs which may have jump stitches. Jump stitches are used in designs in order to jump from one place of the fabric to another without making stitches. These “connections” will be removed by shearing afterward. At first, the connection threads are cut in the center. Through air suction, these threads are brought into an upright position and then totally removed.



Fig.: 3.15 Shearing

VI- Raw Merchandise Control

The raw merchandise control is a step, which serves the purpose to recognize and mark errors in the embroidered fabric. Normally errors are already marked on the machine by colourized adhesives and/or marked by inserting thick, colored threads with special needles. Markings should be positioned where they do not disturb the further embroidery process.

VII- Ironing

Before ironing, turn the item inside out again. Direct ironing on the embroidery should not be done as it could flatten the design or destroy the threads. Carefully iron from the back side of the garment or keep a thin cotton fabric between the iron and the garment. The steam function of the iron should not be used as it might shrink some fabrics or create a puckered look in the embroidery. After ironing, carefully hang or fold the embroidered garment or product.

When beautiful embroidered articles are created by putting a lot of hard work into them, one wishes to cherish them for generations. Lace, embroidery and similar types of decoration must always be ironed inside out. Lay the item on a soft surface such as a towel that will keep the decoration from flattening during ironing. For an ideal result, pour some sugar in the rinse water during washing to stiffen lace and embroidery.

Ironing according to type of the Fabric

Since natural fibres include a range of fabrics, such as cotton, wool, linen or silk, there are different rules that should be followed for each of them.

Cotton items are certainly the easiest to iron because they withstand high ironing temperatures and steam and will be perfectly de-wrinkled in a matter of minutes. High temperatures on fabric such as muslin cannot be used and

needs to be treated with additional care, just like waxed cotton that should be ironed inside out.

Linen is even more resistant to heat than cotton but stains easily during ironing. Protect linen items with a cotton cloth dampened with water, then press the hot iron to remove this undesirable effect.

Wool should always be ironed inside out and with a damp cloth as protection. Dampen dark wool items with water and vinegar and use a cotton cloth before using the iron.

Cover **pure silk** items with a sheet of tissue-paper before ironing. In any case, only press the iron to the surface of the silk once, otherwise it will be ruined. If the silk item has a loose weave, use a wool cloth barrier before ironing.

Both **satin and velvet**, whether they result from cotton, silk or man-made fabrics, should be ironed inside out. When iron a velvet item, keep a blow-drier close at hand and dry it immediately in case it gets damp during steam ironing, otherwise it will get permanently stained once the iron is passed again.

VIII-Check the embroidered products against the specifications

Finally, the embroidered goods are checked against specifications given by the buyer to avoid any rejections. All the pieces should be checked thoroughly before sending them to the Packaging department.

IX- Folding the Embroidered Article

Folding the garment enhances the sense of professionalism for the customers. A neat and well-presented garment attracts the customers and adds to its beauty.

Common factors affecting the finish of embroidery

There are some factors that directly affects the finishing of any embroidery design. To get a quality work, finishing is the most important aspect. Finishing of embroidery plays a key role in deciding the demand for the design and its price. It is important to know the factors which affect the finish.

Factor affecting the finish of the embroidery:

1. Selection of base material
2. Selection of embroidery floss

3. Selection of needle
4. Selection of topping and stabilizers
5. Selection of type of stitches and its combination
6. Calculation of stitch density according to the base material
7. Preparation of the fabric
8. Transfer of design
9. Appropriate design placement.
10. Hooping the material for proper tension
11. Size and type of the hoops according to the base material.
12. Appropriate fabric weight, texture, and colour on the design.

PACKAGING

Packaging means wrapping up, compressing, filling or storing of goods for the purpose of protection and their suitable handling. It also attracts the attention of the customers.

Appropriate package designs are followed according to the product types. Packaging can be defined as a synchronized system of preparing goods for transport, warehousing, logistics, marketing, sale, and end use. After the completion of final inspection as per the quality control system, garments are folded and packed. As per the instruction of the buyer, the garments are poly-packed dozen-wise, color wise, size ratio wise, bundled and packed in the carton. Important information is marked and printed which can be seen easily from outside the carton. Special care is taken to designate the sticker at a proper place.

Functions of packing:

Packaging is the last stage of product manufacturing. A perfect packaging is an important part for any product that helps to receive the customer attention. Some essential packaging functions are:

1. Protection:

The main function of packaging usually involves protecting the products from the any environmental hazards and others. It helps to protect the

goods from loss, damage and stealing. During transport, handling and storage operations different types of protections are needed. They are two types like Physical and Barrier protection.

Physical: Physical protection from vibration, mechanical shock, electrostatic discharge compression, climatic conditions, temperature etc.

Barrier: A barrier from humidity, precipitation and solar radiation, oxygen water vapor, dust, etc.

2. Storage:

Packaging products must be stored in many different locations. So, to fill up this storage function all the packaging materials and packaging containers are should be checked before packaging the product or garment.

3. Loading and transport:

During the loading and transportation time packaging product may be lifted, moved, set down and store in a warehouse manually or mechanically. To complete this process easily, efficiently and safely the perfect external shape and strength of the packages should be required.

4. Promotional function:

The packaging is the important promotional functions to attract the customer's and buyers attention and to have a positive impact upon the purchasing decision.

5. Sales:

It helps to promote the sales process and to make it more feasible.

6. Information transmission:

Packages and labels give the detail information about product like how to use, ingredients, transport, nature, composition, weight, quantity, storage, recycle or dispose of the package or product.

Types of packaging:

Packaging are mainly of two types and that based on two different ways they are

1. Merchandising packaging:

The function of a Merchandising packaging is

- Easy to identify the product.
- It helps to enhance the appeal of the product.
- To give the artistic value of a package, different color, design and other ingredients that are used to identify, enhance and attract.
- For attracting the consumer to the package.
- For protecting the product quality until the consumer uses the item.

2. Vacuum Packaging:

The function of a vacuum packaging is:

- To minimize the shipping bulk of unfinished garments.
- To reduce the shipping weight of garments shipped.
- To secure a garment from dust and odours before and after shipping
- To prevent garments from wrinkles or creases during shipping so that the retailer can display finished garments
- To help minimize storage space for both the manufacturer and retailer

Other uses:

Vacuum packaging is used not only for packing and storing garments, but also for packaging household accessories made from textiles, such as blankets, bedspreads, pillows and towels-anything with bulk that can be easily compressed.

Activities

Activity 1:

Visit a garment industry/ Embroidery unit and prepare a PPT/report on its finishing and packaging department.

Material Required:

Notepad, pen, camera, computer system with internet connection

Procedure:

1. Take permission from the HR manager of a garment industry to visit the industry and click pictures of their finishing and packaging department and observe the finishing process used there.
2. Take pictures wherever necessary and talk to the supervisor to gather all the information.
3. Prepare a PPT or a report

Check Your Progress**A. Fill in the blanks:**

1. Toppings are used to enhance the appearance of embroidery on garments.
2. Packaging is used to minimize the shipping bulk of goods like pillows and bed spreads.
3. should always be ironed inside out and with a damp cloth as protection.
4. is applied for designs which may have jump stitches.
5. Embroidered garments should be washed with a mild.....
6. is a combination of processes like thread trimming, removal of excess backing or topping, spot or soil removal and ironing or steaming.

B. Questions:

1. Explain what are the functions of packaging
2. Explain in detail the steps of finishing process of embroidered garments.
3. Write in short about the following:
 - a) Factors affecting the finish of embroidery.
 - b) Types of packaging

Module 4**Maintaining a Clean and Hazard Free Working Area****Module Overview**

All industries have different type of tools, equipment and machineries. There is always a risk of hazard while operating machines. Therefore, while handling of tools and machines, workers and employees must follow all precautionary measures and safety instructions. An Embroidery Machine Operator should also understand the importance of maintaining a clean and hygienic work environment. Improvements in working conditions can result in increased productivity and operating efficiency.

There are various manual, semi-automatic and automatic material handling equipment and technologies in an apparel industry which help in the design development, movement, protection, storage and control of materials and products throughout manufacturing, distribution, consumption and disposal channels.

While designing a material handling system for an industry, it is important to understand and refer to best industrial practices to ensure that all the equipment and processes including manual, semi-automated and automated in the industry work together as a unified system. By analyzing the goals of the material handling process, aligning and using them as per guidelines of material handling and waste management will improve customer services, reduce inventory & delivery time, and lower overall handling costs in manufacturing, distribution and transportation.

Learning Outcomes

After completing this module, you will be able to:

- Operate and handle tools, material;
 - Organize and store material safely and correctly;
 - Identify Proper Storage and Disposal Of Waste Material;
 - Identify and list different cleaning substances and equipment;
 - Personal hygiene and health.

Module Structure

Session 1: Material handling, cleaning and maintenance of tools
Session 2: Safe and correct storage of material
Session 3: Guidelines for proper storage and disposal of waste material
Session 4: Use of different cleaning substances
Session 5: Personal hygiene and health

Session 1: Material Handling, Cleaning and Maintenance of Tools

Handling tools and material safely and correctly

Material handling is the system of transporting and moving materials required in a garment industry (like fabrics, embroidery machines and material, finished garments and general items) from one place to another. The protection of material from damage, proper storage and maintenance of products throughout manufacturing, warehousing, distribution, consumption and disposal; all come under material handling.

Material handling processes should be simplified by reducing, combining, and avoiding unnecessary movement that will obstruct productivity. Examples include using gravity to help in material movement, and applying straight-line movement as much as possible. The following points should be considered.

- 1. Ergonomics:** The working conditions/facilities should be adapted to support the abilities of a worker, helps in reducing repetitive and strenuous manual labor movements and also emphasize on safety practices. Moreover, the work area should have plenty of space for the task to be accomplished, should be clean and ventilated. **For example:** the height of the chair should be correct as per the embroidery machines to avoid any strain in the back to avoid postural problems during long working hours of the employee.
- 2. Unit load:** One must ensure that fewer efforts are required for movement of individual items as they should be carried together as a single load instead of moving many items, one at a time. Thus, equipment such as pallets, containers or totes of items—should be used.
- 3. Space utilization:** We should focus on maximizing efficient use of space within a facility. It is important to keep work areas organized and free of unwanted clutter. We should try to maximize density in storage areas without compromising accessibility and flexibility, and to utilize overhead spaces efficiently.

4. System: All the movements of packages and storage should be coordinated throughout the production cycle that is from receiving, inspection, storage, production, assembly, packaging, unitizing and order selection, to shipping, transportation and the handling of returns. **Example:** Proper storage of raw materials like fabrics, embroidery materials like needles, thread, designs, hoop as per sizes, teck packs, trims, etc. should be done systematically.

5. Environment: We should take into consideration the use of energy and its potential environmental impact while designing the system and including/implementing the practices of reusability and recycling processes wherever possible. We should also try to incorporate safe practices for handling of hazardous materials **like** the disposal of waste materials like sharp scissors used for cutting. Fabric swatches can be reused in some creative way to reduce fabric wastes.

6. Automation: Automation should be introduced to improve operational efficiency, responsiveness, consistency, predictability, automated material handling technologies as and when feasible/possible and where they are required and make sense, **like** the use of automatic and computerized machines in embroidery work.

Tools and Materials that are mostly used by an Assistant Fashion Designer are as follows: -

1. Hand Scissor/Thread trimmer:

Hand scissor or thread trimmer should be used safely while cutting of extra threads while doing embroidery.

2. Thread sucking machine:

The loose threads on the fabric must be removed using thread sucking machines. Proper safety precautions must be followed while its usage.

3. Manual threads removing equipment:

In knitted fabrics, loose threads are removed manually by using gum tapes.

4. Garment checking work station:

At the initial stage all fabrics are thoroughly checked. For this quality checking workstation is required with adequate light, display board,

highlighters for defects etc. Ensure placing lighting fixtures in a way that light should fall on the working area properly.

5. Spotting gun:

Spotting gun is used to remove stains from the fabric. By using a spotting gun, we spray the solvent at a high speed to the stained area. The solvent then dissolves the stains found on the fabric. Sometimes we also use liquid soaps, solvent, and toothbrush for cleaning of stains.

6. Measuring tapes:

Measuring tapes are used to measure garments and placement of design on fabric while doing embroidery. Quality checkers use it while performing measurement checking. Workers should keep these tapes at an accessible location and also it should be kept safely so that it does not get lost.

7. Markers, Highlighters, and Calculators:

Markers and highlighters are used to highlight any defects observed during the embroidery operations. Calculators are used for measuring any deviation from the required width or length of the fabric and for preparation of drafts for garments.

8. Art Material like Design Pencils, colours:

Design pencils like 2B, 4B, charcoal pencils, Graphite pencils, Art material and colours like water pencil colours, poster and acrylic colours are used for rendering the illustration, preparing motifs for embroidery and make garment designs. Drawing boards, tracing paper, ruler, eraser are also needed.

9. Catalogue of designs created by the manufacturing unit, Fashion Magazines-

These are like guidelines while sketching new designs and while making embroidery motifs.

10. Ready Drafts and production patterns, Illustrations, embroidery design tracings-

They are used in the production department for drafting, cutting and sewing.

11. Sheets, brown paper, tracing paper rolls, Drafting scales, Graded patterns-

All these are a basic requirement of drafting, embroidery design making and illustration.

- 12. Dress forms and Muslin-** Used mainly for draping of high fashion garments and to prepare fit samples of garments.
- 13. Specialized sewing and embroidery machines-** Special machines like lock stitch, button and button hole machine, bar tack machine, feed off arm machine, single and multi-head embroidery machines are all needed in the design department and only specially trained people can work on them.
- 14. Drafting and cutting tables-** Drafting and cutting tables are made with correct height and width for work ease.
- 15. Dyeing and Printing Material-** Textile colours, dyes, Chemicals, binding agents, heaters/ stoves
- 16. Measuring, Marking, Cutting, sewing, embroidery tools-** All these tools are required in the production department for specific work.

Some other materials required in a Design Department of a garment manufacturing industry are-

Vaccum Cleaner, Trolleys for loading and unloading, Computer and its peripherals with softwares like Adobe illustrator, Photoshop, Coral Draw, dustbins, Racks for storing drafting papers and fabric rolls, measuring tapes, Sheets, Drawing boards, trimming materials like fasteners, zips, laces, beads, mirror, threads, needles, buttons, cords and dyes, printing material, tracing material, embroidery threads, and so on.

We should take care of the following points for proper handling of material and tools -

- Fewer and more efficient lifting operations. Don't lift loads higher than necessary. Use correct lifting and handling procedures. Make lifting more efficient and safer.
- We should move materials and perform tasks at safe, comfortable and working heights.
- Make transport and handling operations fewer, shorter and more efficient.
- All the passageways should be clean and clearly marked.
- Ensure that the correct machine guards are in place for safety of workers.
- All materials and tool should be handled safely and correctly as per the standard operating procedures.
- Use jigs and other mechanical devices to save time and effort.

- Threads should be kept properly and separately colour and size-wise to avoid any tangling
- Needles and pins should be properly placed in needle cushion or boxes as per their number and usage.
- Colours and other designing material like sheets, pencils, markers should be arranged properly to avoid any wastage.
- Drafting, measuring, cutting and sewing tools should be properly handled to avoid any accidents. The staff should be trained for it and regular maintenance and care of these tools is important for the smooth working of this department.
- Finishing tools like electric irons, thread trimmers should be kept safely before and after use.

Guidelines for safe Usage of Automatic Embroidery Machines:

- Use the Machine as described in its owner manual
- Always inspect the machine before starting the work, be sure it is clean and threaded correctly
- Wipe off any oil spilled on the floor immediately to avoid anyone from slipping
- While operating a motorised machine, wear flat shoes and close-fitting clothes and with hair properly tied. Avoid loose fitting dresses, ribbons, jewellery
- Never operate the machine having damaged plugs or cords and get it repaired
- Keep fingers away from the moving parts like the machine needle
- Use proper needle plate to avoid needle breakage
- Do not use bent needles
- Use scissors carefully while cutting the fabric, threads, drafts etc.
- Always unplug the sewing machine from the electric outlet immediately after using and before cleaning
- The machine is not intended for use by children or persons without proper training and supervision
- Do not pull or push fabric while stitching as it might break the needle

- Switch the sewing machine off while changing the needle, threading the bobbin, changing presser foot, and oiling the machine
- Unplug the machine from electrical outlet while removing covers, lubricating or while making any adjustments in the needle area.
- Do not unplug by pulling the cord
- Do not tilt the chair forward or backward while operating the machine
- Keep your feet off the treadle when you are not operating the machine or while threading the needle (in case of empress)
- Turn the motor off in case of emergency or doubt or when not in use and before unplugging the machine
- While operating the machine, keep your hands, scissors and other sharp objects away
- Keep the waste fabrics cuttings and trims in the waste basket
- Do not eat or drink in the work area.

CLEANING AND MAINTENANCE OF TOOLS

Regular cleaning and maintenance of tools goes a long way in increasing the life and efficiency of tools. Thus, the output or quality of work is also ensured if we take care of our tools and equipment. Maintenance can be regular and or during the breakdown of machines in emergency.

High levels of dust interfere with efficient production and require cleaning and maintenance operations that may otherwise spoil materials and finished products. Proper cleaning methods and maintenance protocol followed in a systematic way is an immediate, low-cost measure to improve overall cleanliness, and contamination control within workstations. Best practices should be followed with application of specific techniques of wipe down and particle control. Some of the most common contamination include solid dust, liquid, bacteria, fungus, human skin cells and hair, spills and leaks, lint, fibers, and more.

Improved conditions usually mean increased output, higher productivity and quality. There are simple and inexpensive ways to control most of the environmental problems. Maintenance of tools often result in cost savings, productivity benefits and increased safety of workers.

Points to be considered to clean and maintain the tools and machines are as follows -

- Avoid placing the embroidery materials and tools on the floor to avoid any damages or accidents.
- Keep all the tools and material at their designated places. Make use of racks, shelves which are properly marked for this purpose.
- Keep the work area near the embroidery machine free of any unwanted material like extra set of cartons, bins etc.
- The floor around the embroidery machine should be made anti slippage with the help of anti-skid mats or tiles.
- Ensure regular cleaning all the tools after every use.
- Keep all the tools and material back into their covers after use. This will not only prevent them from dust but will also prevent any accidents or injuries.
- Allocate proper space for embroidery operation outputs and inputs.
- Provide a fix and clean space for each tool and work item and ensure keeping each tool at its designated location after use.
- A regular system of inspecting, cleaning and repairing is an essential part of cleaning and maintenance of tools.

Activities

Activity 1

Visit an apparel industry and prepare a report on different types of tools and equipment used for machine embroidery and write about its maintenance and cleaning method used.

Materials used

- 1- Register/File
- 2- Pens and pencils
- 3- Eraser
- 4- Ruler

Procedure

- 1- Visit an apparel industry.
- 2- Study the tools and equipment used for machine embroidery and its cleaning and maintenance methods.
- 3- Prepare a report and submit the same.

Check Your Progress**A. Fill in the blanks –**

1- processes should be simplified by reducing, combining, shortening or eliminating unnecessary movement that will impede productivity.

2- Work area should have plenty of space for the task to be accomplished and should be and

3- We should move materials and perform tasks at and working heights.

4- We should keep all the and at their designated places.

5- A regular system of inspecting, cleaning and repairing is an essential part of and of tools.

B. Write Short Answers for the following –

1- Mention any four points on how to handle material and tools properly.

2- Mention any four points to be considered to clean and maintain the tools.

Session 2: Safe and Correct Storage of Materials

Safe working practices, risk assessments, maintaining standards are recommended practices in the industrial environment. The factors of risk are high since the workers constantly interact with numerous machineries, processes, and practices. The risk can be decreased by evaluating and registering them by training the workers, introducing and practicing safety measures, conducting emergency incident practice drills, displaying signboards, and ensure following of all standard procedures applicable at the workplace.

Health and safety at work is the responsibility of both employers and the employees. Manufacturers are required by law to follow strict rules and regulations to make sure that the workers are protected from possible dangers and using machinery and handling materials. The workers must follow all safety rules and instructions to keep themselves and those around them safe.

STORING THE MATERIAL SAFELY AND CORRECTLY

The dangers, hazards or risks involved in making a product can be identified, described and listed. This is known as risk assessment. In the workplace, it is essential to know what might cause harm or injury to people or the environment, so that safety precautions and systems can be put in place to prevent accidents.

The following precautions need to be followed -

- Carry out risk assessments.
- Display warning notices, safety rules and fire exit signs.
- Ensure that machinery, equipment, tools and materials are stored safely, have safety guards, are safe to use and are regularly tested for their safety standards.
- Ensure that chemicals used in manufacturing processes are recorded, stored and used safely, then recycled or disposed off safely.
- Check that the environment is safe with dirt free and neat work areas and sufficient ventilation to remove dirt and smoke, and has noise control.
- The best approach is to provide special storage space and containers for each productive item.

- Install storage racks, shelves and containers. For heavy items use wooden pallets. For light items use overhead space by installing overhead racks along walls that are less frequently used. Gain productive space by introducing multi-level racks which saves the floor space.
- Savings in floor space results in easy accessibility to work items and tools, and improved inventory control.
- Provide a place for each tool and work item- Consider the quantity, size, shape and weight of the necessary items in order to select the most appropriate means and place of storage.
- Identify tools that are most frequently used. Place the most frequently used tools such as spot guns and scissors which are constantly used in a location where they can easily be reached without leaning. Avoid placing materials on the floor. Provide a place for each tool and work item.
- Provide a stable work surface where items can be firmly placed place materials, tools and controls where they can be reached easily by the worker without bending or twisting the body.
- Movement of materials and tasks should be performed at working heights. One should not lift loads that are higher than guidelines of lifting. We must make sure that the lifting operations are more efficient and safer.
- Regular checking/inspection of the light conditions, guards and other fittings of the Machine embroidery section.
- Workers must ensure reporting hazards and potential risks/ threats to supervisors or any other authorized personnel.
- Follow organization procedures for shutdown and evacuation when required.
- Environmental control measures such as clean regularly and properly, do not spread dust, make local ventilation cost-effective and replace a dangerous substance with a safer one.

Guidelines for safe storage of chemicals:

- All containers, bins and bottles of chemicals should be well labelled.
- Only authorized personnel should be allowed to handle the chemicals and they should also be aware about handling instructions.
- Chemical material should always be stored in designated areas that are designed and constructed for that use.
- The storage location should be out of direct sunlight and heat.

- The chemical storage areas should also be away from high occupancy areas.
- Away from emergency exit and evacuation areas.
- The storage area where chemicals are kept should be designed with floors which are not affected by chemicals or do not absorb the chemicals.
- Mostly we require some kind of ventilation facility like a mechanical exhaust fan for providing adequate ventilation and avoid collection of highly flammable or toxic fumes in the work area in the event/time of a chemical leak or a spill.
- All chemical storage areas should be secured /locked when the factory is not in operation and only authorized personnel should be allowed to handle the chemicals.
- Operations involving smoke and heat should not be performed near the chemical storage.
- Electrical supply, switches, wiring etc. should preferably be outside the chemical storage areas.
- Equipment such as generators, boilers, etc. should not share the same space as chemical storage
- Provision of fire extinguisher should be there but these should also be kept outside the storage room and not inside.
- While storing chemicals their nature and compatibility issues should be kept in mind. For example chemicals which are corrosive or oxidizing in nature should not be stored with flammable material. There should be a distance of at least 5 metres between such chemicals if a separate storage is not possible.
- We must ensure availability of any absorbent material near the storage area to remove/absorb any liquid chemical from the floor or other surfaces after a chemical spill or leak. We may use sand for this purpose, although commercial adsorbent products are preferable. In addition to this, we should also ensure availability of equipment such as shovels, a container and suitable PPE protective gloves, eyewear, etc. depending upon the extent of the spill and the hazards of the particular chemical.

PROPER USAGE OF MATERIALS TO MINIMIZE WASTE

Some amount of manufacturing waste is always generated in almost every factory or manufacturing unit. Thus, it becomes mandatory to establish and implement practices for minimizing waste generation. Different production processes in apparel and textile units such as washing/drying, warp preparation, weaving, dyeing, printing, finishing, quality control, and warehousing etc result in waste-generation. Some types of commonly observed wastes in textile and apparel industries include fabric scraps, chemicals, untreated dye solutions, finishing agents, cutting and stitching waste etc. Wet finishing processes use up to 200 litres of water per kilogram of fibre. Thus, the largest chunk of waste in this sector is water (as per volume)

1. Efficient Inventory Management

One can reduce manufacturing waste, by controlling the excess/not required materials being used in the manufacturing process. Inventory should be managed efficiently and only required quantity of raw material should be procured to minimize wastage.

2. Reduce Packaging Materials

Product packaging may be redesigned to ensure that minimum amount of material are used. Incorporation of reusable or recyclable packaging content should be incorporated for packaging.

3. Recover and Reuse

Recover as much waste as you can from onsite and offsite locations. Recycling is another popular choice. Recycle materials like fabric, paper, plastic, and metal regularly, and avoid recycling hazardous materials as they rarely have any environmental benefits.

4. Establish a Preventative Maintenance Schedule

Regular maintenance should be performed. It is more beneficial to control the costs to prevent a breakdown instead of reacting to a breakdown later.

5. Label and Organize the Warehouse Properly

All the locations of inventory, tools, supplies, and assets necessary to manufacturing processes must be clearly marked throughout the warehouse. This may result in decreased time being spent on searching for

the right tool needed for an urgent repair. One should always replace the faded tags and repaint the floor lines regularly.

7. Minimize Water Usage

Industrial sludge and wastewater make up a significant portion of manufacturing waste streams. One can reduce these elements by minimizing water usage in the operations like dyeing and finishing processes. Install a treatment system to recycle waste water. Employees should be encouraged to reduce drinking water from plastic bottles. Promote the use of reusable bottles or glasses to drink water at the workplace.

8. Volume Reduction

Volume reduction refers to the segregation techniques that remove the hazardous portion of waste from the non-hazardous portion. As a result of using volume reduction technique, there is a considerable reduction in the volume and the cost of waste disposal.

They can be broadly divided into two categories — waste concentration and source segregation. The former may increase the chance to reuse the material and the latter consists of different types of materials within the waste being treated separately so that the value of the cloth can be recovered in bulk production.

Disposal of waste at designated locations

The need for effective apparel waste management is motivated by the increasing cost and decreasing availability of natural resources. It helps in reducing input and waste disposal costs, improve your environmental performance and be more competitive. Disposal of waste at designated location is of utmost importance as if the waste is not packaged and transported safely, hazardous materials may leak or spill and cause harm to factories, industry workers, transportation workers, communities involved in these work and the environment.

We should follow the following ways of waste disposal –

- The types and amounts of hazardous wastes generated should be identified and segregated and the waste disposal method for each category of waste should be determined.

- Sorting of waste ensures that the recyclable items are put to correct use and not go in waste. The responsibility of monitoring the bins and finding a viable solution for eliminating, reducing or reusing the generated waste should be carefully assigned to selected employees and workers and there should also be clear cut policy for this.
- Hazardous and nonhazardous wastes should not be mixed. Disposal of hazardous waste that cannot be treated or recycled should be done at a secure, permitted and designated place which has no access to the general public or any unauthorized personnel.
- Industrial shredders can be used to reduce waste by condensing cloth material, wood, rubber, and plastics to a fraction of their original size.
- Bins/Containers containing hazardous waste should always be kept covered only except when workers are transferring hazardous waste into them.
- Fabric waste from checking, cutting, sewing and embroidery departments should also be stored at a designated area and should be disposed as per the disposal schedule.
- The benefits of reducing the volume of solid waste generated at a factory include a positive effect on the environment, an economic advantage to the industry and better community relations.

Activities

Activity 1

Visit an apparel industry and study their methods and ways of waste disposal and prepare a report on the same.

Materials used

- 1- Register/File
- 2- Pens and pencils
- 3- Eraser
- 4- Ruler

Procedure

- 1- Visit an apparel industry.
- 2- Study the methods and ways of waste disposal.

3- Prepare a report and submit the same.

Check Your Progress

A. Fill in the blanks

1. We have to ensure that machinery, equipment, tools and materials are stored safely, have....., are safe to use and are regularly tested for their safety standards.
2. Savings in results in easy accessibility to work items and tools, and improved inventory control.
3. at designated location is of utmost importance as if the waste is not packaged and transported safely, hazardous materials may leak or spill and cause harm to the environment.
4. The types and amounts of hazardous wastes generated should be and and the waste disposal method for each category of waste should be determined.
5. The benefits of reducing the volume of solid waste generated at a factory include a positive effect on the environment, anto the industry and better.....

B. Write short answer for the following -

1. Explain any five ways of disposal of waste at its designated location.

Session 3: Guidelines For Proper Storage and Disposal of Waste Material

What will happen if you don't empty the dustbins in your house for a month? The waste will start to spill and overflow from the dustbins, it will give foul smell and the waste will also attract rodents and insects. Now imagine same situation in a factory, let's say any apparel factory. Lot of fabric pieces, threads, empty cans and bottles, packaging material, chemical is generated as waste in these factories. If all this is not emptied regularly, it will start spilling over to work areas, give a foul smell and some of the chemical waste is hazardous which can cause dizziness, irritation of eyes and may also result in fire hazards or accidents. The debris of waste if not disposed of properly and timely may cause employees to trip over and fall, may catch fire or get caught in machines and result in interrupted work cycle.

Apparel production involves converting raw material such as fabrics, buttons etc. to finished apparel items or embroidered garments such as kurta, tops, trousers, shirts, skirts etc. Apparel manufacturing companies thus have different departments such as cutting department, sewing department, store department, embroidery or fabric inspection department. Any production process, apart from producing useful products, also results in generation of waste material and apparel production process is no exception to this. Every department in apparel manufacturing generates its own waste. This waste is in the form of fabric scraps, loose threads and fibres, chemicals such as dye paste / dye solution, auxiliaries, detergent and enzyme solutions of different kinds, polyethene's and labels, papers etc.

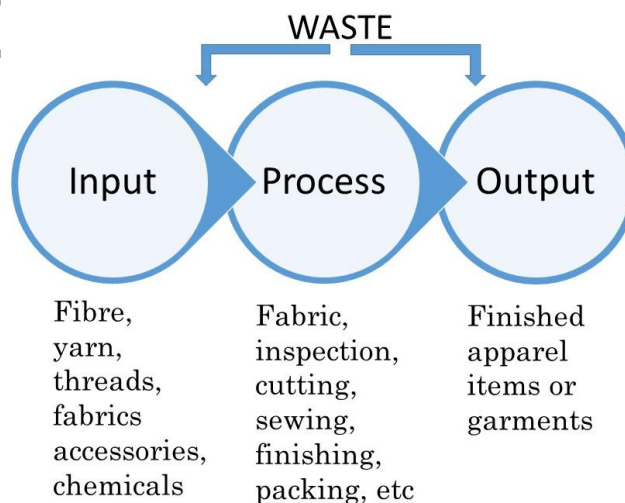


Fig.: 4.1 Apparel Production Process

Now the raw material such as leftover yarn, fabric, accessories can be recycled and turned into various other products such as mattress and carpet lining, etc. However, most chemical material is harmful to workers and to the environment.

Let's have a look at some of the chemicals used in the apparel production:

- Chemicals used for maintenance purposes, such as machine oils and cleaning products
- Chemicals used for fuel for machines and equipment.
- Chemicals used for washing, dyeing and fabric treatment etc.
- Chemical used in housekeeping and maintenance of the premises.

FACT SHOTS:

Textile and apparel industries come second in the list of most polluting industries and are a major source of waste.

Thus the waste material needs to be disposed off carefully because not only is it hazardous but it also makes the surroundings and premises unhygienic, unsafe.

WHAT IS WASTE?

Waste, also called trash, garbage, junk, etc., is generated during the production process and is unwanted material with no direct use. Waste cannot be used for further production, transformation, or consumption. It has no further use or value. Waste is perceived to be a problem because most of it is harmful to human health and environment, occupies space, and has no utility.

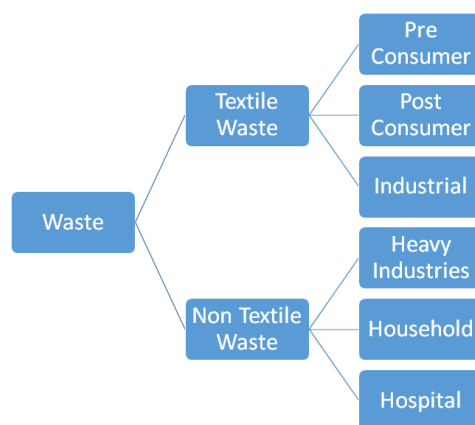


Fig.: 4.2 Waste & it's types

WHAT IS TEXTILE WASTE?

Waste generated by textile and apparel companies is called textile waste. It can be fibers, yarns, or fabrics. Fabric scrap, embroidery threads and trims, packaging material of fabrics, accessories, and chemical wastes are the main waste material generated during the apparel production process.

Different departments generate a variety of waste products as a result of their activities. One such is waste produced by the Embroidery Department.

WASTE GENERATED IN DESIGN DEPARTMENT:

- Rejected and waste fabric swatches
- Empty Thread reels, fabric rolls
- Broken hand and machine needles
- Rejected trims, and fasteners, buttons, needles
- Broken and degraded items like Bobbins, oil cans, old machine belts
- Waste paper and sketching material
- Leftover pieces of laces and cords

GUIDELINES FOR STORAGE AND DISPOSAL OF WASTE MATERIAL:

A systematic approach has to be followed for the storage and disposal of waste material in apparel manufacturing industries so that they don't pose a threat to humans and the environment.

Compliance managers, site supervisors as well as shop floor workers, everyone needs to be very careful while dealing with factory waste, especially chemical waste.

Waste needs to be segregated, stored, and then disposed off.

Disposal of the waste should be done on a pre-planned basis and in a scheduled manner like a daily, weekly, or monthly basis as requisite.

Waste disposal forms a primal component of the management of every corporation, as it is governed by health and environment legislation.

All this comes under waste management.

Indiscriminate disposal of these wastes into the environment without proper treatment could lead to frightening environmental repercussions and could lead to pollution of river water, land, and groundwater resources. Various precautionary measures are required for the handling of hazardous wastes generated in the industry.

SAFE DISPOSAL OF WASTE MATERIAL AND RETURNING REUSABLE MATERIAL:

Since the waste material is not only hazardous to human health but also the environment. Hence, even before the disposal of the waste, it must be classified and acted upon.

To classify the waste, the following things have to be kept in mind

- Is waste biodegradable or not?
- Can it be recycled or reused?
- Does the waste require any treatment before disposal?

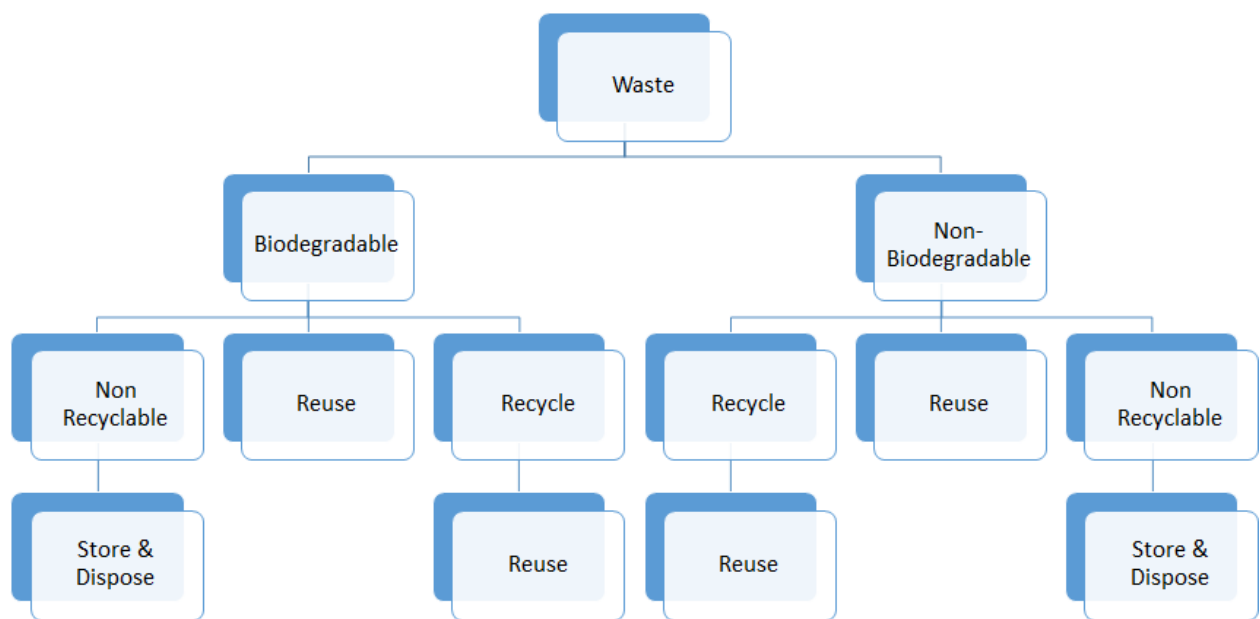


Fig.: 4.3 Classification of waste on the basis on the basis of Recyclability

As can be seen in the Figure above, some of the waste generated cannot be immediately disposed off, and hence it needs to be collected at a designated spot before disposal.

The various guidelines for safe storage and disposal of waste are as follows:

- Staff needs to be adequately trained
- Clear demarcation of the designated spot
- Restricted entry at the spot
- Set a defined process for cleaning and storage
- Specific time allocation in the working hours

Once the waste is stored at the designated spot, it must be recycled keeping in mind source, condition, composition, and resale value. This is referred to as Textile Recovery and Recycling.

Efficient and effective disposal of waste requires paying attention to safety measures along with ensuring no spillage of the same.

The methods of Waste disposal apart from recycling are as follows:

- Disposal at Landfills
- Incineration

Since the above-mentioned procedures again lead to a vicious trap, whereby they further lead to health hazards by entering the food and water cycle. Hence, the norms laid under the legislation guide us to follow the 3Rs model.

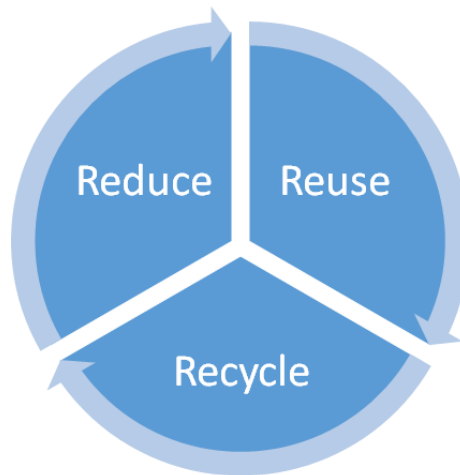


Fig.: 4.4 3 R's of Waste Management

RESPONSIBILITIES UNDER HEALTH, SAFETY, AND ENVIRONMENTAL LEGISLATION:

Environment health and safety is a primal tool in reducing and preventing health issues, emergencies and accidents at work, together with any environmental damage which could consequence from work practice. Hence, it consists of all processes, guidance, rules and laws structured to help protect the environment, the public and employees from harm.

The focus of the EHS (Environment, health and safety) is to reduce carbon footprint of business and manage waste keeping in mind the general safety and health of the workers by providing a healthy and safe working environment.

The motives behind having a Environmental, Health and Safety discipline in place are as follows:

- Protection of workers from various hazards and natural environment
- Strict compliance and adherence with regulatory standards and legal requirements
- To improve the morale of the workers thereby increasing profit and productivity in the long run

EHS departments also supervise an array of hazards which include heavy machinery, height falls carcinogens exposure, and ergonomic hazards.

As the Environmental, Health, and Safety Legislation play an important role in the overall management of the organization by the provision of a safe working environment to ensure an increase in both profits and productivity in the long run. Hence, there are several responsibilities of the legislation:

- To ensure proper implementation of laws and regulations
- To ensure development and implementation of all safety and health programs in the company
- To ensure right protective measures are applied to ensure workers safety
- To lower injuries risks by supervision of dangerous procedures
- To ensure timely communication of hazards by having systems in place
- To review and align environmental policies from time to time, advocating progress in all arenas
- To design and develop a book of general safety rules
- To ensure proper training of workers on the use of their respective working machines, equipment or chemicals
- To enable proper inspection of equipment before use and proper maintenance
- To perform risk assessment at the workplace

POTENTIAL HAZARDS ASSOCIATED WITH THE MACHINES AND THE SAFETY PRECAUTIONS:

As the primary role of the Environmental, Health and Safety legislation is to prevent hazards that affect not only health of the workers but also the environment, hence it is necessary to understand the types and nature of hazards. The various hazards are as follows:

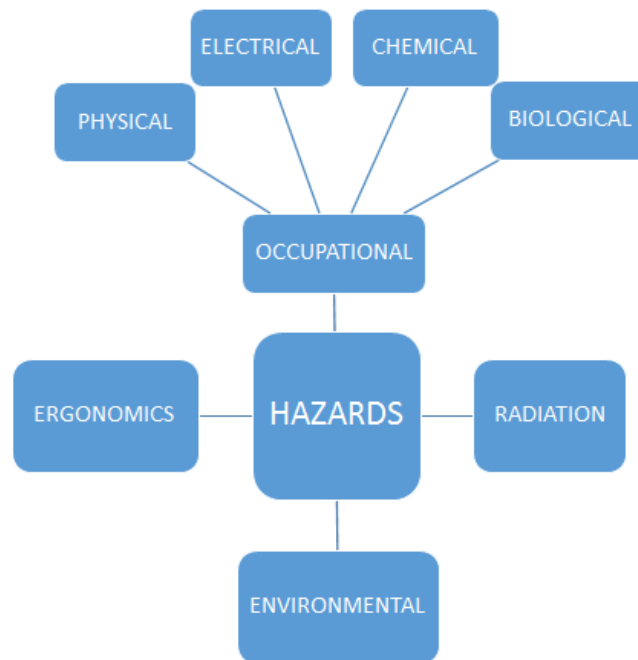


Fig.: 4.5 Types of Occupational Hazards

The above-mentioned flowchart briefly summarizes the various hazards associated with the working environment but neglects the hazards caused as a result of the negligence of workers while working, which results from either of the following:

- Psychological disturbance
- Physical fatigue

The various hazards falling under the various categories mentioned above are as follows:

Occupational Hazards

- Physical hazards: These arise as a result of mechanical equipment accidents. They can include burns, cuts, postural problems, weak eyesight, hearing loss and broken body parts among others.

- **Electrical hazards:** These basically include electrocution arising out of various factors including negligence. These include Short circuits due to loose wires or by using the machines and tools incorrectly.
- **Chemical hazards:** These include chemical burns, inhaling chemicals, eye splash, and skin irritation among others
- **Biological hazards:** These include viral, bacterial infections among other things.

Radiation hazards: These would include various skin diseases caused due to exposure to harmful rays emitted by machinery and tools

Ergonomic hazards: These arise due to incorrect posture of working emanating from the incorrect design of the machine or work station, inadequate training, etc

Environmental hazards: These mainly include the various types of pollution caused by the waste generated by the organization

The various hazards could be dealt with by using the various control methods, which are as follows:

- To instill in place personal protective equipment to prevent injuries during operations such as gloves, helmet, goggles, overall, ear plugs and boots among others
- To develop administrative control to alter how people work by devising new rules and procedures
- To set in place engineering controls to isolate workers from hazards by structuring the workspace in a more secure manner with proper ventilation and light sources.
- To substitute harmful substances with those having least harmful effects to avoid hazards
- To eliminate substances which might involve physical hazard

Activities

Activity 1

Discuss in a group of five students, the potential hazards that you anticipate and ways to mitigate while working in the laboratory. Present the findings in the form of a report

Procedure

1. Gather in a group of five and anticipate the hazards associated with working in the textile laboratory
2. Write the anticipated hazards on an individual basis
3. Discuss and narrow down to five most common hazards
4. Present the findings in the form of a Report in front of the class

Activity 2

Prepare a roadmap to effectively manage the waste generated in the textile laboratory and explore ways to apply the 3Rs model

Material Required

1. Dustbin
2. Empty buckets for segregation

Procedure

1. Accumulate all the waste generated in a common area
2. Classify the waste into biodegradable and non-biodegradable
3. Further segregate it into recyclable, Reusable and non-recyclable
4. Now, discuss the ways in which the recyclable waste could be reused
5. Dispose the non-recyclable waste into a dustbin

Check Your Progress**A. Fill in the blanks with the most appropriate word**

- a) _____ is a primal tool in reducing and preventing health issues, emergencies and accidents at work, together with any environmental damage which could result from work practice
- b) _____ can be used for second-grade products or sold to scrap vendors
- c) _____ include various skin diseases caused due to exposure to harmful rays emitted by machinery and tools.

B. Questions

- a. Explain the term hazard in the context of occupation. Also state and define the types of potential hazards
- b. Why is environmental, health and safety legislation required in an organisation? Substantiate with a real life example.
- c. What is waste. How is Textile waste different from Non-textile waste and what do they include?
- d. List the various types of wastes generated in a fabric checking department of a company.

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Session 4: Use of Different Cleaning Substances

Cleaning substances are referred to as materials which are primarily used for cleaning purposes. These cleaning substances can be further classified into:

- Cleaning agents
- Cleaning equipment

Cleaning agents as the name suggests, are referred to as strong chemicals which are used for spot removal of stains on fabrics, floors of premises. The work area needs to be kept clean, hygienic and disinfected at all times so that no damage is caused to stored goods. Mostly cleaning agents required in housekeeping need to be stored here apart from other chemicals such as dyes, pigments etc.

Cleaning agents for general housekeeping of the Design Department

General housekeeping involves regular operations of cleaning and maintenance, thereby making the role of cleaning agents a primal one. The most common cleaning agents used include floor cleaners, disinfectants etc.

Cleaning agents for fabrics and accessories in the Design Department:

Sometimes the stored fabrics and accessories may get spoiled due to unforeseen reasons such as spillage, seepage etc. Thus, cleaning agents may be required to ensure freshness and spotless fabrics prior to production. The primary purpose of the cleaning agents is spot removal but can also involve dyeing and washing if required. Apart from this cleaning agents are also used for keeping the premises of fabric inspection clean and tidy.

Though cleaning agents play an important role in various processes involved in the business and are widely used, still they must be handled with care and precautions.

The points to be kept in mind while using the cleaning agents are as follows:

- They should not be touched directly as it might lead to skin irritation.
- They should be stored in a separate, designated area as coming in contact with them would lead to fatigue, headache and dizziness.
- All the containers with cleaning agents should be well labeled and only authorized or limited personnel should be allowed to handle them.

- Protective gear such as apron, skullcaps and gloves, etc. should be made use of while handling cleaning agents as it might lead to breathing issues and damage of lungs

Many of these problems can be prevented and solved at little or no cost. If you use organic solvents, keep them properly stored and labeled. They should be very carefully handled and used sparingly.

These points must be kept in mind as if they are ignored, they would lead to reduction of productivity and product quality, increased absenteeism and turnover of staff.

Some of cleaning agents which are widely used could be be classified based on usage as follows:

- Cleaning agents for regular cleaning
- Cleaning agents for hard surface care formulations
- Repellents
- Cleaning agents for maintenance of machinery and space

Cleaning agents for regular cleaning:

These are primarily used to ensure upkeep, shine and functionality of the fabric. They include Antifoams, surfactants, cleaners, solvents, dispersants and polymers which ensure high performance fabric care.

Cleaning agents for hard surface care formulations

When the stains on the fabric are not easily removable by application of above mentioned cleaning agents, they are required to be treated with hard surface care substances. These include Surfactants, dispersants, chelants, solvents and rheology modifiers that clean more efficiently and improve fabric performance.

Cleaning agents for maintenance of machinery and space:

The substances that are used to ensure the upkeep of the machinery used and keep the space neat and tidy are referred to as cleaning agents for machinery and space. They include disinfectants, floor cleaners, etc.

The job of the cleaning agents cannot be possible without the application of cleaning equipment. Hence, cleaning equipment plays an important role.

CLEANING EQUIPMENT

The tools that are put to use to apply cleaning agents for the purpose of stain removal both for the purpose of housekeeping and Design department/ unit are referred to as Cleaning Equipment.

The different types of Cleaning Equipment are as follows:

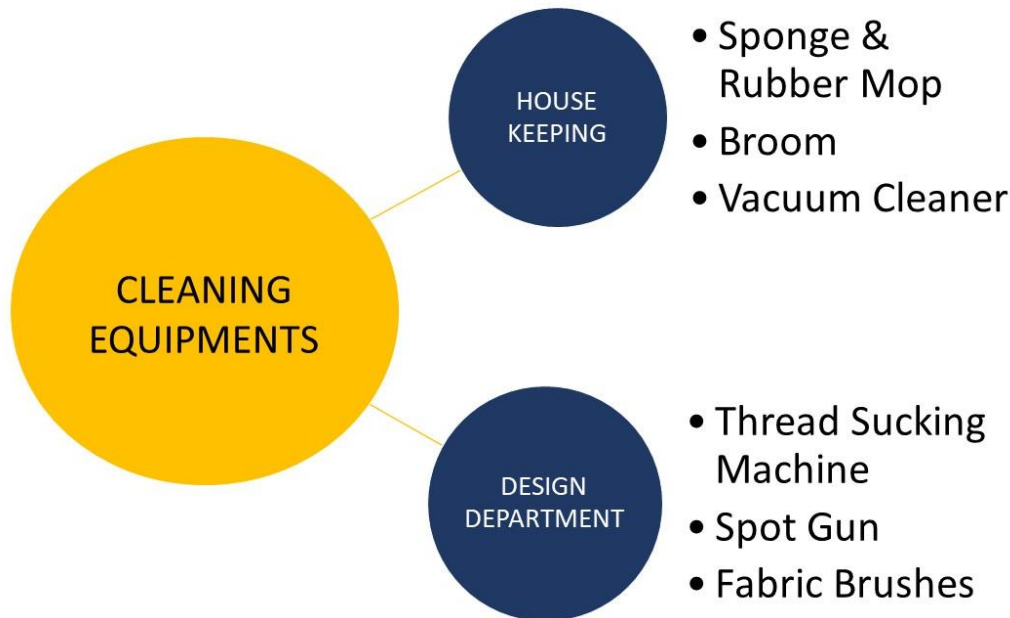


Fig.: 4.6 Cleaning Equipment

Cleaning Equipment for Housekeeping

1. Sponge and Rubber mop -They are used to clean all the plastic pallets as well as the floor with the help of a wet mop
2. Broom – Their use is to sweep the working areas
3. Dustbin –This is used to store all accumulated unused cloth waste rags, trash and dust of the working area prior to cleaning
4. Vacuum cleaner - It is used to remove the dust and powder in floors, the exterior surface of the machine walls, ceilings and ventilators.

Cleaning Equipment for Design Department:

1. Thread sucking machine -This machine has a crucial role as it primarily used to remove the loose threads on the top of the fabric
2. Spot Gun - It is used to remove the stains if they are detected prior to issuing of the fabric.
3. Brushes—To brush off the loose dust from the machines and drafting-cutting tables.

Activities

Activity 1

Imagine that the apparel and textile laboratory in your school had to be closed for a long duration say, 5 months. Clean the laboratory with the help from other students and support staff and make it fully functional again. Write the procedure followed in a chart.

Material Required:

1. Chart Sheet
2. Colourful Pens & pencils
3. Pencil
4. Eraser
5. Ruler

Procedure:

1. Write the steps you followed for the cleaning of the laboratory. List all the cleaning agents and equipment used in the process.
2. Prepare the chart.
3. Decorate it.
4. Now, present a comparison of the pre and post scenario of the laboratory by pasting adequate number of photos of various stages in the cleaning process
5. Attach the chart on the drawing board of the classroom.

Check Your Progress

A. Fill in the blanks with the most appropriate word :

1. Sometimes the stored fabrics and accessories may get spoiled due to unforeseen reasons such as _____ , _____ etc. (spillage, seepage)
2. _____ is primarily used to remove the loose threads on the top of the fabric.
3. _____ should be made use of while handling cleaning agents as it might lead to breathing issues and damage of lungs.

B. Questions

1. Describe the precautionary measures used while handling cleaning agents.
2. Explain the various problems associated with the cleaning of the machinery, space and fabrics and the various cleaning agents and equipment used for the same.
3. Briefly describe

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Session 5: Personal Hygiene and Health

Personal hygiene refers to all those habits and practices which help in maintaining good health and keeping illness away. Taking daily baths, wearing clean clothes, keeping neat and tidy hair are all examples of good personal hygiene. It helps in keeping healthy and maintaining a neat and pleasant appearance.

A healthy worker is also a productive worker. Poor health is the most common reason workers take a leave of absence from the workplace. Many illnesses are a result of the lack of knowledge of personal hygiene among workers and can be prevented by following simple rules of hygiene.

The incidences of various illnesses can be considerably reduced by a basic education in health and hygiene. Common health issues faced by the workers should be identified and marked clearly by the management and the workers should be trained for prevention and control of these problems.

The factory management must also remain alert and respond urgently to various health issues that can emerge. Good personal hygiene habits reduce illnesses and promote better health. Poor personal hygiene habits can lead to low self esteem and has some side effects, like body odour and greasy skin, which might irritate the people working around us. They can also lead to more troublesome or even serious issues. Hence workers should be given mandatory training in health and hygiene related issues.

Importance of Personal Hygiene:

Personal hygiene is important mainly because it saves us from illnesses and ensures good health. It also has many other benefits. These include:

- Neat and Tidy appearance
- Improved stamina and efficiency
- Boosts self confidence
- Acceptance and
- Lesser leaves and absenteeism

PERSONAL HYGIENE, TAKING CARE OF BODY, FOOD HABITS:

Unsatisfactory quality and quantity of drinking water, lack of sanitation and hygiene can cause a number of illnesses. These factors can affect individually or in combination also. The diseases caused by poor sanitation and hygiene mostly affect individual employees and are not communicable. Thus, they can be controlled but there are situation where lack of hygiene and sanitation may simultaneously affect many employees or group of employees. Such a situation is difficult to control and may result in huge loss of work. The latter is often indicative of poor working conditions in the factory.

The prevention of diseases related to water, sanitation and hygiene is possible with the institution of simple control measures at the factory level. Workers must be regularly trained in hygiene and sanitation practices to avoid loss.

The following mentioned are few tips on dealing issues regarding good personal hygiene at work and also some workplace health and safety tips:

NEAT AND TIDY WORKPLACE:

The employers must ensure to provide nest and clean workplace for the workers. A hygienic environment at work will result in increased motivation and satisfaction among workers. The workers must also ensure that they keep their work area/ station free from any clutter and clean it regularly.

ENSURING PERSONAL HYGIENE AND CARE OF BODY:

Poor hand hygiene increase the vulnerability to bacteria and potential transfer or introduction of microbes such as viruses and fungus. Hence washing hands frequently, wearing gloves etc. should be strictly followed

- Correct way of Hand Wash :
 - First wet your hands well with water and then apply soap solution.
 - Apply the manufacturer recommended amount of soap
 - Use of paper towels is prohibited. Use equipped hand dryers
 - Use hand Scrub for at least 15 seconds, and try to cover full hand.
 - Use of hot water should be avoided to reduce the risk of dermatitis.
 - Do not add soap to a partially empty soap dispenser.
 - Get input from employees about any fragrance or irritation issues
 - Do not touch a clean garment or material without washing your hand
- For EPA (electrostatic protected areas), apply cleaning lotion, as standard lotions may compromise the effectiveness of wristbands and monitoring stations
- Wear clean uniforms/ Protective clothes during working in the area along with cap, eye glass, face mask and footwear that adequately

covers their feet to protect products from human particles such as skin flakes or hairs.

SAFE WORKING PRACTICES AND ORGANIZATIONAL PROCEDURES:

Every organization's safety measures include proper training of machine operators, which is essential throughout the production line and across the workplace. Safety can be greatly enhanced by introducing automation in machinery and processes for materials handling, particularly for heavy loads or wherever fast-running machinery is used or where heat or sharp blades or needles are involved. Safety devices are used to check that machine setting is correct and to stop machinery in an emergency.

- All Organizational policies and procedures should be followed for issues related to security, material handling, potential hazards etc.
- All compliances should be strictly followed. Special care and attention should be paid to health and safety regulations and procedures in case of fire, chemical hazards, bio-hazards, etc.
- Maintain distance between moving machinery and stay within designated areas.
- Maintain a clean, neat and orderly working area
- Safety measures: Ventilation to remove vapors from heat sealers.
- Safety guards and protective clothing, gloves, ear plugs, eye glasses and footwear worn.
- Displaying educational posters is a powerful way to educate workers. It is very effective because deliver a consistent message, and use pictures which are a strong form of communication targeting specific behavior. Examples which have been used in other garment factories include posters on lifting postures, proper mask wearing, and reproductive health.

Safety Measures

- Workers should use and maintain personal protective equipment as instructed.
- They should also carry out their activities in line with approved guidelines and procedures
- Use and dependency of intoxicants such as liquor, cigarettes etc. Should be totally avoided and a healthy lifestyle should be maintained.
- Faults and malfunctions in machinery and equipment should be dealt with urgently and with utmost sincerity.

- Storage of materials and equipment should be done in line with manufacturer's and organizational requirements.
- Waste material should be handled carefully and safely
- Ask for clarity from supervisors or other department heads in case of any
- risk
- Examine the workplace and work processes for potential risks and threats.
- Report hazards and potential risks/ threats to supervisors or other authorized personnel.
- Workers should undertake all training and drills related to first aid, fire-fighting and emergency response very sincerely and should not do it just for the sake of formality
- Take action, based on instructions in the event of fire, emergencies or accidents
- In situations where shutdown and evacuation is mandatory or compulsory, workers should follow standard organizational procedures
- Environmental hygiene should not be neglected – regular checks of waste disposal, drainage, sewage and effluent treatment systems should be instituted.

• **Hazard Controls –**

a. Sharp Objects – An embroidery machine operator should not handle broken sharp objects like needle, succors, faulty machines, cutting equipment or broken glass by hand. Use tongs, forceps, tweezers, magnets or other devices to pick up and discard the broken object. Faulty machine should be repaired as soon as possible.

b. While disinfecting contaminated areas or equipment workers should wear protective gloves such as latex or other watertight gloves, safety glasses or goggles and cleansing wipes.

c. If work surfaces or equipment have come in contact with blood or other body fluids for example, a worker's finger has been cut and has bled onto the equipment surface; these surfaces should be cleaned and disinfected immediately.

All the earmarked areas such as walls, floors and doors of the work areas should be wiped with clean and sterile sponges and mops. Care should be taken to wet the sponges and mops with sterile disinfectant solution in proper concentration. All exposed surfaces of equipment and glass panels should be sprayed and wiped with sterile solutions. Spillage or leaks if any should be

cleaned and mopped immediately using sponge and sterile disinfectant solution.

GOOD HOUSEKEEPING PRACTICES AND ORGANIZATIONAL PROCEDURES:

INTRODUCTION TO HOUSEKEEPING:

Efficient production and good working environment are complimentary and go hand in hand for achieving organizational goals. A clean, orderly and attractive environment encourages tidy work habits in employees and also boosts their efficiency. Good housekeeping is more than just the cleanliness. It also involves minimizing risks due to accidents and hazards. Good housekeeping is mandatory in every phase of industrial operation. Entire premises that are indoor areas such as work area, reception, washrooms etc. as well as outdoor areas such as lounge, parking lot, garden etc. should be maintained and governed by housekeeping practices as followed in the organization.

Poor housekeeping leads to a sense of chaos, accidents and also gives rise to:

- Excessive material, waste or chips in the working area
- Congested aisles
- Tools left on machines
- overflowing waste bins
- Lockers and workrooms in disorder
- Chemicals and Acids in open containers
- Broken glass
- Electric leads or air lines across aisles
- Dirty light fittings, windows and skylights
- piles of paper and other packing materials being allowed to accumulate.
- infestation by pests such as rodents and cockroaches

GOOD HOUSEKEEPING PRACTICES AND ITS BENEFITS:

Housekeeping refers to cleaning and organizing a place as well as minimizing risks, accidents and hazards due to unkempt and untidy premises such as loose and dangling wires, overflowing bins and containers, slippery floors etc. Good housekeeping practices help in keeping the premises clean, systematic and hazard free and thus boost the efficiency and productivity of employees.

SOME GOOD HOUSEKEEPING PRACTICES:

1. REGULAR CLEANING AND MAINTENANCE:

Housekeeping should not be restricted to only few occasions such as inspections and audits, meetings etc. In fact, the entire premises should be cleaned and maintained regularly and frequently.

2. REPAIR AND CHECK OF ALL ELECTRICAL SWITCHES, WIRING AND SUPPLY

All power supplies and electrical wiring and switches also fall under housekeeping and should be checked and maintained regularly with utmost sincerity.

3. AISLES:

Aisles should have clearly marked floor lines to keep them segregated for work areas and storage areas. Also, these should not have any debris, scrap or boxes in their way.

4. FLOORS AND WALLS:

These should be clean and free from dust, dirt and marked clearly with signboards and placards. Spilt oil and other liquids should be cleaned up at once. Chips, shavings, dust, and similar wastes should never be allowed to accumulate. They should be removed frequently.

5. WELL-MAINTAINED AMENITIES:

Facilities or amenities such as washrooms and lockers for clothing should be clean and up to date. Lunchroom should be clean, well-maintained and inviting.

6. WASTE REMOVAL:

There should be a proper waste disposal schedule along with cleaning agents and equipment. There should be adequate facilities to prevent congestion and disorder in the premises.

7. MAINTAIN THE LIGHT FITTINGS:

Any good housekeeping programme will pay attention to light fittings and care and maintenance of all light fittings in the premises is an integral part of such a programme. Lamp shades and lights become dirty with use and often accumulate dirt and dust around them. This reduces their efficiency and the workers are devoid of essential light which puts strain on their eyes. Simple cleaning of lamps, reflectors and tube lights is known to improve the lighting efficiency may by 20 to 30 percent.

8. CLEAN THE WINDOWS:

Clean windows help in optimizing the availability of day light and dirty ones keep it out. Insufficient light causes strain on the eyes. This can lead to accidents as the employees are unable to see properly. Efficient housekeeping ensures that windows are not covered by stacking the material, equipment or articles on the ledges and are dust free.

9. VENTILATION:

There should be adequate ventilation in the premises. The ventilators and exhaust fans should be clean and free from dust, cobwebs, grease etc.

10. FULLY FUNCTIONAL FIRST AID GEAR:

First aid facilities and equipment should be kept under spotlessly clean conditions and fully stocked so that they are always ready in the event of accidents or illness.

11. INSPECTION OF FIRE EXTINGUISHING EQUIPMENT:

Regular inspection of all fire-fighting equipment such as extinguishers and fire hoses is vital for keeping them in good working condition. Fire protection facilities such as door and exits, automatic alarms, etc must be in excellent working condition. Care should be taken to check and avoid any jammed or blocked fire exits and doors. Doors and exits should always be kept clear of obstructions.

BENEFITS OF GOOD HOUSEKEEPING PRACTICES:

Good housekeeping is an important factor of quality assurance. Manufacturing and other production areas in an organization need regular cleaning in order to reduce spillage and dirt. Proper Cleaning avoids the chance of cross contamination and maintains tidy and safe working environment. Though good housekeeping practices require time, effort and planning but they are worth of investing time and energy. Every organisation has housekeeping practices as these not only help in keeping the premises clean but have several advantages and benefits too. Some of the benefits of a good housekeeping programme are:

- Well maintained and up to date premises
- Better working conditions
- Reduced risk of accidents
- Better efficiency and productivity of staff
- Safe and healthy work environment

HAZARDS OF POOR HOUSEKEEPING PRACTICES:

Regular and timely housekeeping has many benefits. If however, housekeeping is not practiced regularly and efficiently it may pose serious problems. Some of the hazards and problems associated with poor and irregular housekeeping practices are:

1. Untidy and unsafe premises
2. Accidents
3. Fire Hazards
4. Chemical and oil spillage
5. Dusty walls and windows
6. Slippery floors and handles
7. Jammed doors and knobs

8. Unkempt, smelly washrooms and change rooms etc.
9. Falling and tripping over objects lying on floors, stairs and platforms
10. Accidents due to falling objects
11. Wet or dirty surfaces causing slipping and falls
12. Striking against items kept in undesignated or wrong locations or items piled up in stacks near aisles and exits
13. Projecting nails, wire or steel rods which may cause injuries such as piercing any body part, tearing skin etc.
14. All this has a direct bearing on the efficiency and productivity of employees and may bring down their morale also.

Activities

Activity 1:

Prepare a chart on importance of personal hygiene.

Material Required:

1. Chart Sheet
2. Colourful Pens & pencils
3. Pencil
4. Eraser
5. Ruler

Procedure:

1. Collect all the required information.
2. Prepare your chart and get it verified by your teacher.
3. Decorate it.
4. Attach the chart on the drawing board of the classroom.

Activity 2

Prepare a skit on various hazards of poor housekeeping practices and enact it in your class. Also conduct a discussion on the same.

Procedure:

1. Plan your skit on any situation related to hazards of poor housekeeping practices.
2. Distribute dialogue and roles among all the participants.
3. Enact the skit in your class.

Check Your Progress**A. Fill in the blanks with the most appropriate word :**

1. Regular and timely ----- has many benefits.
2. Regular _____ of all fire-fighting equipment such as _____ and fire hoses is vital for keeping them in good working condition.
3. Good housekeeping practices help in keeping the premises _____, _____ and _____.
4. Good housekeeping is an important factor of _____ .

B. Questions

1. What do you mean by good housekeeping practices? Mention any 3 good house keeping practices.
2. Describe a few benefits of good housekeeping practices.
3. What is meant by poor house keeping practices? Explain briefly.
4. Mention a few hazards of poor housekeeping practices.

Module 5**Health, Safety and Security at Workplace****Module Overview**

In any industry workers are exposed to many activities and have to handle various tools, machineries, chemicals etc. In apparel and textile industry also workers are exposed to a number of chemicals, pigments, machines and associated heat, dust, smoke etc. The health and safety of workers has a direct bearing on their productivity and efficiency and hence company's output and profits. Therefore, it is of utmost importance to take care of their health and safety and to provide them with a safe working environment. Some issues can be extremely harmful and can even lead to accidents, hazards and permanent damage to the worker as well as the property.

Hence, we need to know about various potential health and safety hazards, risks. In addition to this we also need to understand and follow various health and safety related practices which should be followed in any organization to keep the workers and premises safe. The workplace related injuries usually start as minor aches and pains but can further develop into severe injuries that affect all day activities. At other times if these practices are not followed they can also result into severe workplace accidents and mishaps. People's efficiency in their working environment aims at preventing injuries by monitoring the risk factors such as force, repetition, posture and vibration that may cause injuries to develop.

Some basic ergonomic principles that should be followed are as follows:

- Proper tools/equipment.
- Keep repetitive/continuous motions to a minimum level.
- Avoid unbalanced postures.
- Proper lighting and ventilation.
- Safe weight lifting procedures.
- Appropriate resting time.
- Other aspects to monitor which can have potential risk factors.

Learning Outcomes
<p>After completing this module, you will be able to:</p> <ul style="list-style-type: none"> • List and analyze Potential hazards at workplace; • Demonstrate safe handling of equipment; • Describe the benefits of a healthy lifestyle; • Explain environmental management procedures, security details, potential accidents and emergencies; • Identify and implement safety measures at workplace.
Module Structure
Session 1: Potential hazards at work place
Session 2: Safe handling of equipment
Session 3: Benefits of a healthy lifestyle
Session 4: Environmental management procedures, security details, potential accidents and emergencies
Session5. Safety measures at workplace

Session: 1 Potential Hazards at Work Place

Hazard is a potential source of harm that can cause temporary and permanent damage or even death in severe case.

The first step towards workplace risk assessments is to identify the potential risks/hazards at the workplace. To overcome these hazards in a nominated person is appointed for conducting formal risk assessments; however, it is everyone's responsibility to be careful and mindful of hazards at the workplace and minimize the risk.

Not all hazards are obvious, and they will be unique to every workplace depending on the type of process flow. This can make it difficult to immediately identify and protect all the employees from the hazards; therefore, it is important to study various types of hazards and how to keep work area free from potential hazards.

Different type of potential hazards –

- **Biological.** Biological hazards includes viruses, bacteria, insects, animals, etc., that can cause adverse effects on the material lying in the store and also lead to negative health impacts. For example, any fungi attack on the fabric roll can deteriorate the condition of the fabric lying in the store.
- **Chemical.** Chemical hazards are hazardous substances that can cause harm. These hazards can cause health and physical impacts, such as skin irritation, respiratory system irritation, blindness, corrosion and explosions. For Example – Any hazardous chemical leakage in store can lead to damage in the raw materials/products stored. Its fumes may cause irritation of eyes or skin.
- **Physical.** Physical hazards are one of the most common type of hazard occurring at the workplace and often cause physical injuries to workers. These include any such factor or condition which can harm an employee without necessarily touching them, including heights, lack of light and ventilation, noise, radiation and pressure. Some physical hazards may result due to coming in contact with machines or bumping into boxes or material lying here and there.
- **Safety.** These are hazards that create unsafe working conditions. For example, exposed wires or blind corner can be injurious in the store. These are sometimes included under the category of physical hazards.
- **Ergonomic.** Ergonomic hazards are a result of poor and faulty designs of infrastructure, machinery that can result in physical injuries. For example, if the heights of the racks are not designed according to the height of the workers it may lead will result in body aches, stiffening and thus will lead to reduce productivity.
- **Psychosocial.** Psychosocial hazards are occupational hazards related to mental wellbeing of employees at workplace. These can have an adverse effect on an employee's mental health of employees. For example, sexual harassment, victimisation, stress and workplace violence.

Keeping work area free from potential hazards-

Workstations have to be kept free from any potential hazard to ensure the safety of workers and the work place. Therefore, following measures can be followed to maintain the safety and security –

1. Environmental Control Measures

Hazardous substances in one form or another can be found in almost all small and medium-sized enterprises. The garment industry generates a lot of dust from fabrics being cut and sewn, heat and noise from machinery. There are simple and inexpensive ways to control most of the environmental problems. Improvements often result in cost savings, higher productivity and increased safety of workers.

2. Regular and Proper Cleaning

Dust originates from fabrics and threads, from cutting and sewing to packing operations. It is very common to see small clothing enterprises with ceilings and walls full of dusty cobwebs.

One low-cost cleaning method is sweeping the floor carefully with an appropriate broom and accompanying dust pan to prevent dust from spreading. Spraying water on the floor before sweeping will avoid dust remaining airborne.

3. Cost-effective Local Ventilation

Local ventilation should only be considered as a means of reducing chemical hazards when other means have failed.

There are cost-effective ways of improving ventilation:

- **Use proper fans**

Apart from those used for ventilating workstations, fans may be utilized to remove dangerous substances from the workplace.

Contaminated air can be pushed or blown outside by having more open windows.

- **Good Lighting for Quality Products**

Good lighting does not necessarily mean more light bulbs and more use of electricity. Natural lighting is usually a better option than the bulbs. But if there is a difficulty in arranging for a natural lighting through windows and ventilators, it's important that the bulbs and other elements of artificial lights should be well-maintained. A good lighting arrangement is directly proportionate to an efficient workforce.

Lighting requirements are mainly affected by following factors:

- The type of operation or task to be done for ex. Fabric checking requires very efficient lighting to detect fabric defects if any

- The eyesight of the worker, if any worker has very good eyesight then they can work efficiently in dim light too but workers with poor eyesight require optimum and efficient lighting system
 - Area where the work is being done. If the work area has ample day light and clear, open windows then requirement of light is not that important. But during night shifts and in closed areas without adequate windows efficient lighting system is must
- **Full use of Daylight**

If there are too many machineries omitting heat, it isn't a great idea to allow the natural heat to come in and add up to the temperature. The higher the window, the more light is in.

It is important to paint the walls in lighter shades which not just give a sense of space to a room, but the workstation would look illuminated. In a store we should have be very careful with the light as long time exposure to light can cause degradation of fabric color/shade.

Activities

Activity 1

Collect the data and make a report on risk and hazards of industry.

Material Required

- 1- Practical File
- 2- Coloured pens and pencils
- 3-Ruler
- 4-Eraser
- 5- Pictures of different hazards in an industry

Procedure

- 1- Search and collect the data and pictures of different types of hazards of an industry.
- 2- Place the pictures in the practical file and label the same.
- 3- Write the description and make a report.

Check Your Progress**A. Fill in the blanks**

1. is a potential source of harm that can cause temporary and permanent damage or even death in severe case.
2. hazards create unsafe working conditions.
3. Psychosocial hazards include those that can have an adverse effect on an employee's..... and.....
4. should only be considered as a means of reducing chemical hazards when other means have failed.

B. Write short answers for the following –

1. What do you mean by potential hazards? Name any three.
2. Describe any two measures for keeping the work area free from potential hazards.

Session 2: Safe Handling of Equipment**Safe and correct procedure of handling equipment and machinery –**

It is very important to handle the equipment carefully and safely in the garment industry and train all workers in a manufacturing unit to use the same effectively and avoid any hazards. Following are the suggested ways of handling the equipment safely:

1- Clothing and Personal Protection

Clothing and personal protection must be worn wherever they are prescribed. Close fitting clothing should be worn near machinery with moving parts. Loosely, draped garments like scarves, dupatta, bows, ribbons and loose sleeves are dangerous. Long hair should be tied up tightly and covered with Cap. Jewellery, watches and rings should not be worn. There are personal protection equipment's such as hair protectors, ear protectors, gloves, safety glasses and shoes.

Types of Personal protective equipment's

- **Latex Gloves**
Purpose: - To avoid any chemical contamination while handling Chemicals.
- **Acid-Alkali Hand Gloves**
Purpose: - Used for handling Acid/Alkali
- **Chemical Splash Safety Goggle / Mechanical Safety Goggle**
Purpose: -For protection of eyes against chemicals.
- **Different types of Masks:**
 - **Organic Vapour Mask**
Purpose: - For protection against Organic Chemical vapours.
 - **Particulate Respirator**
Purpose: - For protection against chemical Dust.
 - **Chemical Mask**

Purpose: -Used for protection against high concentration of organic vapours.

➤ **Dust Mask**

Purpose: - For protection against normal repairable Dust.

• **Gum Boot**

Purpose: -For protection of foot while working in wet process. (For Washing & ETP operators)

• **Ear Muff**

Purpose: - For protection of ears while working in high noise areas like in the sound of embroidery machines

• **Ear Plug**

Purpose: - For protection of ears while working in high noise areas around automatic machines.

• **Leather Apron**

Purpose: - For protection of body while working at heat. (For Boiler Operator)

• **Safety Helmet**

Purpose: - For protection of head against falling objects.



Fig.:ure 5.1 Protective Equipment

2- Clear demarcations and sign boards:

Clear demarcation of areas is required at places where there is possibility of hazards or accidents.

Prohibited areas which are marked are as follows-

1. Storage of chemicals
2. Cutting and sewing tools store
3. Operation of machinery
4. Presence of water on the floor
5. Loud noise areas
6. High voltage current
7. Release of poisonous fumes

There are threats based on the nature of the operations and workers have to be trained to understand these hazards and take proper precautions.

Exercise 1: Visit a factory and make a list of sign boards seen on the Designing and production floor.

3- Compliance towards – Noise Protection, Cleanliness and maintenance

a- Technical measures should be taken to reduce noise generation. In case noise level cannot be reduced then wearing of ear protectors should be a must.

b- For maintaining cleanliness waste should be placed in the bins provided. Traffic lanes, fire appliances and emergency exits should not be obstructed and kept free.

c- Ladder should be secured and kept in a proper tilting position to avoid slipping. Do not use damaged ladders.

d- When transporting hot water in a bucket, use apron and boots and do not fill bucket to its full capacity.

e- Maintenance of the equipment should be regularly done to avoid hazards.

4- Reporting an Accident

All the employees should be aware of potential hazards and correct reporting processes. If a potentially hazardous situation is noticed, e.g.: a client expressing violent behaviour, it is important to report it immediately to the management and fill out the appropriate forms as legally required by you.

If injured at work, one must:

Report the injury to the management as soon as possible, maximum within 24 hours and seek proper treatment for the same.

Always work in a safe manner to prevent accidents from occurring in the first place. Make sure that you have been given adequate information and on-the-job training about the first aid facilities and services available at the workplace, including:

- Location of first aid rooms and first aid kits.
- Complete, up-to-date contact details of trained first aid officers in the workplace procedures for critical accidents – such as who should be responsible for calling.
- The ambulance/doctor/nurse and what is the best method of contact, measures for evacuation of the injured person/s.

5-Essential facilities required at the workplace:

Drinking water –

Drinking water is indispensable for all workers; if not provided, they become thirsty and gradually dehydrated. This greatly increases fatigue and lowers productivity, especially in a hot environment.

Water vessels should be placed near each group of workers or provide taps or cascades with clean water in a central place.

Sanitary Facilities-

Like water facilities, sanitation facilities are also very important. The importance of proper sanitation facilities increases in the public context as improper facilities or unhygienic conditions can deteriorate the health of the employees by being breeding ground for several diseases.

- The toilet bowl should be free from stain or odour and function properly.
- The walls of the toilet should be clean and tiles should be unstained.
- The ceiling of the toilet should be free from cobwebs and dust.
- Floors should be clean and safe (no broken tiles, nor slippery surface).
- Proper illumination should be provided inside the toilet.
- Toilets must have a continuous supply of water; in case water is limited in the area, water should be stocked in containers and refilled regularly.
- Mirrors and rubbish bins should be provided in the washroom.
- Soap and toilet paper should be provided.
- The washroom should provide complete privacy to users and should be fully ventilated.

6- Follow Proper Rules and Regulations –

Workers should read the manuals provided with the machinery and equipment and follow safety principles efficiently. They should also follow the rules and regulations set up by the company like not using the machinery with wet hands, avoiding use of mobile phones during working hours etc.

POTENTIAL HAZARDS RISKS AND THREATS BASED ON NATURE OF OPERATIONS

Identifying potential hazards and risks at workplace involves finding things and situations that could potentially cause harm to people based on the nature of operations. Hazards generally arise from the following aspects of work –

- Physical work environment
- Equipment and Materials
- Working tasks and how the way they are performed

In a manufacturing unit the work process may have to face different types of hazards. All of these hazards should be identified in time. For example, an employee at workplace may encounter some physical hazards like hearing loss due to noise, or hazards associated with manual tasks and some psychological hazards due to the work stress. Some of them can be explained as follows-

Hazard / Risk	Potential Harm/Loss
Manual Task	Overexertion or repetitive movement can cause muscular strain and Back problems
Electricity	Exposure to live electrical wires can cause shock, burns or death from electrocution.
Machinery and Equipment	Being caught by moving parts of machinery can cause fractures, bruises, lacerations, dislocations, permanent injuries or death.
NOISE	Exposure to loud noise can cause temporary/permanent hearing damage

Working Environment	Falling objects, slipping of people can cause fractures, bruises, wounds, dislocation of bones, permanent injuries or death.
Extreme Conditions	Heat can cause burns; heat stroke or fatigue Cold can cause hypothermia or frost bite.
Psychosocial hazards	Effects of work-related stress, bullying, violence and work related fatigue.
Vision	Long work hours on sewing machines causes strain on the eyes and can cause eye problems like refractive errors, myopia, cataract, blurred vision
Back Problems	Long working hours can back problems like Spondilitis, slip disk, sprains and aches

Activities

Activity 1

Visit an industry and check the requirement of equipment for ensuring no faults/defects and efficient working.

Material Required

- 1- Practical File
- 2- Coloured pens and pencils
- 3- Ruler
- 4- Eraser
- 5- Report of daily checks and condition of equipment.

Procedure

- 1- Search and collect the data and pictures of checklist of equipment.
- 2- Place the pictures in the practical file and label the same.
- 3- Write the description of checklist of equipment and make a report.

Check Your Progress**A. Fill in the blanks-**

- 1- clothing should be worn near machinery with moving parts.
- 2- In cases of high noise level, wearing of should be a must.
- 3- Injury should be reported to the..... as soon as possible.
- 4- Effects of work-related stress, bullying, violence and work related Fatigue leads to

B. Write short answers for the following –

- 1- Describe about any five types of protective equipment.
- 2- Describe any five potential hazards, risks based on nature of operations.

Session 3: Benefits of a Healthy Lifestyle

The World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being”. It’s not an exaggeration when we say that health is wealth because it affects a person’s productivity, efficiency, energy and hence behaviour. Some of the benefits of a healthy lifestyle are increased concentration, sharp memory and also gives an emotional boost.

Minimizing health and safety risks to self and others by our own actions

1- Identify and reduce the risks – Once one is aware about the particular hazards of their job or workplace, one can take steps to minimize the risk of injury or illness.

2-Reducing workplace stress - Common causes of workplace stress includes long working hours, heavy workload, job insecurity and conflicts with co-workers and seniors. Stress can lead to depression, sleeping difficulties and often lowers the ability to concentrate.

3-Using correct tools and equipment - Use ergonomically designed furniture, tools and equipment, and arrange your work area in a manner that everything you need is well within your reach.

4- Wear suitable protective equipment – Correctly worn equipment such as earplugs, earmuffs, hard hat, safety goggles, gloves or full-face mask can dramatically reduce risk of injury.

5- Staying sober - Alcohol and drugs are a contributing factor in around three per cent of workplace fatalities. Workers should avoid indulging in such unethical practices at work.

The value of Physical fitness, Personal Hygiene and good habits

Performance of a worker is directly related to the health of the worker. Hence it is important to train and educate the workers on good health and hygienic habits.

1- Physical Fitness - Physical activities have many health benefits for workers, regardless of whether or not physical fitness is a requirement for their jobs. However, a fit and healthy workforce is one of the most valuable

assets of the company. Therefore, employers need to make more effort to encourage physical activity. Periodical health check-ups and workshops should be arranged by the company to maintain good health of the employees.

2- Personal Hygiene and Good Habits – Personal hygiene refers to the cleanliness, appearance and habits of employees. Personal hygiene and good habits doesn't only make workers look and feel good, but also makes their co-workers feel safe and comfortable. Personal hygiene improves employee's confidence and helps in maintaining employee productivity. It promotes a safe and healthy environment at the work place.

Do and Don'ts of Personal Hygiene at the Workplace –

- Workers should clean after themselves and should not indulge in littering
- Workstations should be kept clean and dust free by wiping by wiping them regularly.
- Tea and food should always be consumed in designated spaces and all the utensils and crockery should be cleaned immediately and regularly.
- Workers should be trained in proper hygiene and practices and should follow it too sincerely.
- All the workers and employees should adhere to organisational hygiene policy
- Unhygienic practices like sneezing and coughing in open should be avoided.
- Washrooms must be kept clean and workers must wash their hands thoroughly after using wash rooms.

Ill effects of tobacco

Consumption of tobacco in any form is injurious to health. Inhaling tobacco smoke can cause a person exposure to about 7000 toxicants and at least 70 carcinogens. All these can damage the body and result in critical illnesses like cancer, respiratory disorders etc. Both smokers as well as passive smokers are at equal risk. Passive smokers are people who don't smoke but are present near the people who smoke and thus get affected by the smoke.

Tobacco use is one of the most important preventable causes of premature death in the world. Limiting use of tobacco can save a lot of lives and improve well being of the workers as well as their families.

Effect of smoking on the body

Smoking cigarettes and *beedis* is very common among workers. It not only costs money for buying cigarettes but can result in many adverse effects on the body. Smoking can also lead to life-threatening complications such as:

1. Lung damage

Smoking is linked to chronic bronchitis and can also trigger or exacerbate an asthma attack besides lung cancer.

2. Heart disease

Vital body parts such as the heart, blood vessels, and blood cells are damaged by smoking and this may also result in heart diseases. Smoking can also increase the risk of peripheral artery disease (PAD), that is narrowing the arteries of the arms and legs. This may result in restriction of blood flow and can also cause blood clots. Some of the diseases related to smoking are angina, or chest pain, stroke, heart attack.

3. Risk of type 2 diabetes

As per the doctors, people who smoke regularly have a 30–40 percent higher risk of developing type 2 diabetes than those who do not. The condition of people having diabetes and smoking along with it, can deteriorate their health to a great extent.

4. Weakened immune system

Smoking not only results in severe diseases but it can also weaken a person's immune system permanently making them more susceptible to various illnesses.

It can also result in additional inflammation in the body.

5. Vision problems

Smoking can also result in eye problems. Some of the eye problems that can happen in smokers include greater risk of cataracts and age-related macular degeneration.

Other vision problems related to smoking include:

- dry eyes
- glaucoma
- diabetic retinopathy

6. Poor oral hygiene

Poor oral hygiene is one of the ill effects of smoking and is directly related to incidences of gum diseases. People who smoke suffer from higher risk of gum disease. Smoking can cause swollen and tender gums, foul breath, discolouration of teeth and rashes in the oral cavity. It can also make the teeth sensitive.

Smoking tobacco can limit a person's ability to taste and smell things properly.

7. Unhealthy skin and hair

Smoking tobacco can affect a person's skin and hair. A person who smokes may experience premature aging, wrinkled skin. They suffer higher risk of skin cancer. Smoking can cause hair loss and balding.

8. Risk of other cancers

Continuous Smoking also increases the risk of cancers like lung cancer, pancreatic cancer, mouth cancers, etc.

Ill -Effects of drugs and Alcohol

Problems such as work pressures, family tension, financial problems etc. many a times lead to consumption of drugs and alcohol. However, drugs and alcohol consumption has its own ill effects. It may lead to life threatening diseases such as abnormal heart rates and heart attacks. Injecting drugs can result in collapsed veins and infections in heart valves.

Some drugs can even result in severe muscle cramping and general weakness leading to reduced work efficiency. Prolonged use of substances like drugs and alcohol can lead to kidney and liver damage.

Infections

Sharing the needles used to inject certain drugs can lead to diseases like hepatitis C, hepatitis B, and HIV. One can also spread common colds, the flu, and mono from sharing pipes and bongs.

Legal Consequences

Drug and alcohol usage not only have negative effects on the health but can also have legal consequence that one might have to bear for the rest of the

life. In many organizations, employers need to take a drug test before being recruited for the job. In many other organizations, random drug tests are conducted even after one becomes an employee. Those who do not give up drugs, remain unemployed, which creates many other issues in their lives. Driving vehicles under the influence of drugs or alcohol can lead to a suspension of the driving license, usually for 6 months to 2 years. Sometime also need to pay heavy fines and may even spend some time in jail.

Financial Problems

Drugs and alcohol are expensive, one cannot meet out the quality life especially when the consumption is more and constantly. Substance abuse also impacts your productivity and success at work and in school. The time spent to search, use and recover from the effect of drugs can be better spent more productively to learn new skills to upgrade ones career.

Injuries and Death

Use of drugs and alcohol lead to physical injury, car accidents and even death.

Drug-related deaths are on the rise, doubling since early 1980s. Alcohol consumption leads to 5.2 million accidental injuries and 1.8 million deaths per year. It is estimated that 1 out of every 4 deaths is caused by drugs and alcohol, according to the World Health Organization.

The short-term effects of alcohol

The short-term effects of a single occasion of drinking too much alcohol can include:

- lowered inhibitions
- interpersonal conflict
- falls and accidents
- altered behaviour – including risky or violent behaviour
- hangover
- Alcohol poisoning

The long-term effects of alcohol

The World Health Organization (WHO) says alcohol contributes to more than 200 different types of disease and injury.

Some of the most common alcohol-related harms include:

- road and other accidents

- domestic and public violence
- crime
- family breakdown
- social dysfunction
- cardiovascular disease
- cancers, including of the oral cavity, pharynx, larynx, oesophagus, liver, colorectal and female breast
- diabetes
- nutrition-related conditions, such as folate deficiency and malnutrition
- overweight and obesity
- risks to unborn babies
- liver diseases
- mental health conditions, such as anxiety and depression, and interference with antidepressant medication
- alcohol tolerance and alcohol dependence or addiction
- long-term cognitive impairment
- Self-harm (suicide).

The WHO reports that in 2012, nearly 6 per cent of all deaths globally were caused by alcohol consumption. Worldwide, more men die as a result of alcohol consumption than women.

In the long term, alcohol consumption can affect all aspects of a person's life: their physical and mental health, work, finances and relationships.

Activities

Activity 1

Prepare a report after interviewing the apparel industry workers regarding their personal health and hygiene.

Materials Required –

- 1- Practical File
- 2- Coloured pens and pencils
- 3- Ruler
- 4- Eraser

Procedure –

- 1- Prepare a questionnaire on health and hygiene practices.

- 2- Interview the industry workers on their views about health and hygiene.
- 3- Prepare a report on the same.

Check Your Progress

A - Fill in the following blanks -

- 1-of a worker is directly related to the health of the worker.
- 2-.....promotes a safe and healthy environment at the work place.
- 3-A workforce is one of the most valuable assets of the company.
- 4-Inhalingexposes users to more than 7000 toxicants and at least 70 carcinogens.
- 5- consumption leads to 5.2 million accidental injuries and 1.8 million deaths each year.

B- Write long type answers for the following-

- Q1- Write about the benefits of personal hygiene.
- Q2- Write in detail about the ill effects of alcohol consumption.

Session 4: Environmental Management Procedures, Security Details, Potential Accidents and Emergencies**Environmental management system related procedures at the workplace-**

Every organization has an Environmental Management System (EMS) that helps it in achieving its environmental goals. This is done through consistent reviewing, evaluation, and improvement of its environmental performance. This approach reduces the risk of non-compliance and improves health and safety practices of the workers. Basic procedures followed under EMS are as follows –

- Review of the environmental goals of the organization.
- Analyzing its environmental impacts and legal requirements.
- Setting environmental objectives and targets to reduce environmental impacts and comply with legal requirements.
- Establishing programs to meet these objectives and targets.
- Monitoring and measuring progress in achieving the objectives.
- Ensuring employees' environmental awareness and competence.
- Reviewing progress of the EMS and making improvements.

Potential Benefits of implementing EMS -

- Improved environmental performance.
- Enhanced compliance
- Pollution prevention
- Resource conservation
- Increased efficiency leads to reduced costs.
- Enhanced morale of workers
- Enhanced image with public, regulators, lenders and investors.
- Employee awareness of environmental issues and responsibilities.

LAYOUT OF THE PLANT AND DETAILS OF EMERGENCY EXITS/ROUTES, EMERGENCY EQUIPMENT AND ASSEMBLY POINTS -

Plant layout is the most effective physical arrangements of machines, processing equipment and service departments. A good plant layout helps in achieving proper coordination of men, materials and machines. The adequacy of layout affects the efficiency of daily operations in any company/organisation. A plant layout involves the allocation of space and the arrangements of equipment in such a manner that overall operating costs are minimised. Plant layout is planning the path each component/part of the product is to follow through the plant.

Plant layout also affects the security and stability of the company. While deciding the layout of the plant and allocating space for various machines and operations, security should never be compromised. It should utilise the space most effectively while maintaining the security of the men, machines and the premises. It should provide workers convenience, promote job satisfaction and safety for them. A well-designed plant layout helps in achieving the following objectives-

- Proper utilisation of available floor space.
- Ease of transportation.
- Efficient utilisation of production capacity.
- Reduction in material handling cost.
- Reduction in number of accidents.
- Provide ease of supervision and control.
- Ensures employee safety and health.

Plant layout ensures the following measures of safety at the workplace-

- Fire fighting equipment list and its placement.
- Fire safety plan for evacuation in case of emergency.
- Emergency evacuation diagrams (details of emergency escape/exit routes).
- Assembly points at the time of emergency.
- Appropriate placement of machineries.
- Allocation of proper space for waste disposal.
- Proper placement of First Aid Boxes in case of medical emergencies.
- Allocation of proper space for drinking water and sanitisation facilities.



Fig.: 5.2 Fire Extinguishers symbol and equipment

POTENTIAL ACCIDENTS AND EMERGENCIES, AND RESPONSE TO THESE SCENARIOS

Emergencies or disasters are not at all welcome in any organization as they affect the health and life of employees and in turn also affect the business. However, the truth is that despite all the precautions and safety measures, emergencies and disaster can occur any time and anywhere. Sometimes these emergencies and disaster occur at a time when they are least expected. At such difficult times the corrective measures are necessary to overcome such situations.

An incident/potential accident that can occur during the process of production or services if left unintended can lead to injuries, complication leading to disability, death, or prolonged hospital stay for a worker. Awareness of high potential incidents at other workplaces is a key factor in preventing them at yours. Following are some of the most common causes of accidents at the workplace:

- 1) Heavy Lifting
- 2) Fatigue
- 3) Dehydration
- 4) Poor Lighting
- 5) Hazardous Materials
- 6) Fire Accidents
- 7) Acts of Workplace Violence
- 8) Trips and fall

- 9) Stress
- 10) Explosions
- 11) Chemical spills
- 12) Heat Waves

The best way is to prepare ourselves to respond to an emergency before it happens. Few people can think clearly and logically in a crisis, so it is important to do so in advance, when we have time to prevent any crisis as rightly said “prevention is better than cure”.

Emergency Response Plan

The initial minutes of an emergency are very critical and require immediate action. Promptness in announcing warnings and instructions to employees for evacuation, shelter or lockdown can save their lives. Public emergency services such as police, fire department, hospitals should also be called for immediate action. All employees must be trained in first aid, emergency evacuation, fire drills etc.

Proper risk assessment should be done for developing an emergency response plan for this all potential emergency scenarios should be clearly identified. An understanding of potential emergency scenarios can also help us to plan an arrange all resources and procedures required to prevent them in the first place. The emergency plan should be consistent with our performance objectives.

Development and implementation of an emergency plan is vital for every industry. This is specially required for protection of all the employees, visitors, contractors and anyone else visiting and working in the organization. This emergency plan also includes building evacuation through fire drills, sheltering practice from severe weather such as lightning, floods etc. There should also be a provision for shelter - in - place from air borne hazards such as a chemical release. Safety of life should always be the first priority in case of emergencies. Stabilization of the incident and normalization of the situation should be the second priority. Employees should be aware of the action that should be taken to stabilize untoward incident.

For example - Employees should be trained to use the fire extinguisher efficiently for controlling small fire accidents. Containment of a small chemical spill and supervision of building utilities and systems can minimize damage to a building and can help prevent any environmental damage. A plan should be well established and resources should be on hand, or quickly available as response to any potential accident or emergency.

Activities

Activity 1

Study and make a layout of the factory by visiting an industry.

Materials Required –

- 1- Practical File
- 2- Coloured pens and pencils
- 3- Ruler
- 4- Eraser

Procedure –

- 1- Visit an industry.
- 2- Study the layout of a factory.
- 3- Make the layout in a practical file and label the details.

Check Your Progress

A. Fill in the following blanks –

1. Anis a framework that helps an organization in achieving its environmental goals through consistent reviewing, evaluation, and improvement of its environmental performance.
2. is the most effective physical arrangements of machines, processing equipment and service departments.
3. A good plant layout helps in achieving proper coordination of, and

B. Write short answers for the following questions-

1. State some potential benefits of implementing EMS.
2. State measures of safety at the workplace ensured by a plant layout.

Session 5: Safety Measures at Workplace

Different type of safety measures at workplace and their application -

At any workplace, there are certain rules and regulations which have to be followed –Rules regarding organizational hierarchy, process flow chart, safety SOP's (Standard Operating Procedures).

Every organization adapts different safety measures which are generally displayed as Safety Signs and Signboards. These signs include:



Fig.: 5.3 safety signs

Safety Signs: These are the signs or simple visuals which provide information or instruction about safety and health at workplace. All safety signs have a fixed sign board, a fixed color and an illuminated sign. They can also have an acoustic signal, a verbal communication or a hand signal.

Signboard: A typical signboards combination of a shape, color and a symbol or pictogram. A sign board is always accompanied with lighting of sufficient intensity to make it clearly visible.

SIGNBOARDS CAN BE OF THE FOLLOWING FOUR TYPES:

Prohibition sign:

This sign is generally meant for warning against dangerous situations or for safeguarding privacy.

Warning sign:

A sign giving warning of a hazard or danger (example - 'danger: electricity').

Mandatory sign:

A sign prescribing specific behaviour for example “Staying away from hazardous chemicals stored in the store area.”

Emergency escape, Fire and First-aid signs:

A sign giving information on emergency exits, first aid, or rescue facilities (example ‘emergency exit/escape route’.



Fig.: 5.4 Warning Signs

Orientation and training on safety measures at workplace/ Action to be taken -

Mock Drills/ Evacuations -

In case of an accident notify the health and safety office immediately. All employees must be trained to recognise work hazards and to know what to do in an emergency. They should know whom to inform. Staff duties and responsibilities should be clearly defined for emergency situation.

Regular training is required to help safeguard the employees those who are conscious of those duties and responsibilities.

Fire safety and evacuation plans sketch should be placed at proper exit locations. Fire drill should be performed and workers should be trained to handle fire extinguishing equipment.

Fire fighting trainings serve as a prospect for staff members to validate, under replicated fire conditions, that they can perform those duties and responsibilities safely and efficiently.

First Aid Measures

- Get help.
- You can call on emergency numbers
- Reassure and comfort the people
- Check critical life functions
- Remove casualty from dangerous zone
- Place blanket under and /or over
- Check critical life functions

General recovery Position

Removing the casualty from Dangerous Zone





Postures	Evacuation from surface area
	<p>Casualty is too heavy to be lifted</p>
	<p>An upright position will reduce intracranial pressure, essential for head injuries, and assist breathing.</p>
	<p>In case of injury on the back, make sure the injured area is covered and taken care of.</p>
	<p>In case of burns keep the head low and make sure the injured area is completely covered.</p>

Fig.: 5.5 Recovery Position

Emergency situations (First Aid)

A typical basic First- Aid kit may include the following items in a dustproof and waterproof box:

- Bandages and medicinal gauges of various sizes in sufficient quantities of the different sizes should be made available at all times to treat small cuts and burns.
- Scissors, tweezers (for splinters) and safety pins
- Eye bath and eye wash bottle
- Antiseptic solution and creams.
- Simple over-the-counter medicines such as aspirin and antacid.
- A booklet or leaflet giving advice on first-aid treatment.

Health and Safety measures at workplace and their application

–

Health and safety play a vital role in the garment industry. To summarise the whole chapter, these are the some of the important areas where safety measures are of utmost priority to safeguard from hazards in the day-to-day practices in an organisation.

Here are some of the examples of these conditions:

Hazards	Safety Measures
Spreading and Cutting	
Finger and hand injuries from spreading machines	Disengage the spreader carriage when doing correcting work on the lay
Finger and hand injury from moving or idle cutting devices	Ensure that the finger guard is adjusted to the correct height of the fabric layers before starting to cut. Learn and use the correct handling techniques for the tool.
Finger and hand injury at swinging arm or flat punch machines	Ensure that the two handed control system is functioning properly. A light sensor should stop the machines when the working area is transgressed



Fig.: 5.6 Fusing Machine

Finger and hand injury in the press	Safety guards should be checked daily for correct operation
Burns from hot beds	Never attempt to retrieve, or adjust the position of components whilst they are being fed, or are on the bed
Finger and hands injury in feeding and unloading	A press which has to be controlled using both hands must be operated by the one person. Operators must be well trained and practiced in laying the parts on the feeding belt conveyor
Inhalation of a healthy weapons	The manufacturer's handling recommendations should be followed. Vapors should be exhausted safely



Fig.:ure 5.7 Sewing/Embroidering

Finger and hand injury during cleaning and repair work	The machine must be switched off, with plug removed and must be
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	stationary before any cleaning or repair work is started
Finger injury from the needle	Correct setting of the finger guard should be checked before work starts
Pulled hair and face injury from the yarn feeder	Long hair should be gathered and pinned up or a hairnet should be worn. A safety guard should be provided for the yarn feeder
Hand and finger injury from fastening devices on hook, eyelet and rivet machines.	Correct setting of the safety guards should be checked. Training must be given in the correct handling techniques for holding and feeding materials
Eye injury from breaking needles or buttons at the button sewer, or breaking needles at the loop sewer	Proper adjustment of eye shield should be checked before work starts. Cracked or obscured shields should be replaced, or safety glasses should be issued.
Contact with Scissors and Needles	
Cuts and pricks from sharp points	Sharp pointed scissors should not be left unprotected. They should be kept in special holders (leather holsters cases) carried e.g. on a belt and stowed away properly after use.
Internal injury from swallowed items	Never store items temporarily in the mouth. There is a danger of swallowing them as a result of coughing sneezing or being startled. Place needles in the proper container or in a needle cushion.



Fig.:ure 5.8 Ironing/Pressing

Burns from hand irons

Hand irons should be protected from overheating by a thermostat. Non-flammable material should be used for the working area.

Scalding from steam


Steam must not be supplied until after the place is closed


Finger and hand injury from the press

A machine which requires two hands to operate it must never be operated by two people never attempt to adjust the position of parts after the closing process has started a safety bar must be fitted which stops and raises the head when it is touched



Fig.:ure 5.9 Cleaning, Stain Removal

Inhalation of solvent vapors, skin damage or reaction to contact with solvents	Ensure adequate ventilation only the equipment in materials actually required for a given working shift should be present
Fire hazard	An adequate distance must be maintained at least 5 meters from any potential ignition source
Hazardous chemicals	Safety warning instructions on the container should be observed and appropriate working method adopted
 <p>Fig.:ure 5.10 . Material Handling</p>	
Head injury from overhead transport systems with suspended carriers	Head protection (padded hard hats) should be provided with the transporter rails pass over a walkway the floor should be marked with black and yellow warning strips
Trapped fingers when maneuvering careers over points	Safety guards should be fitted and proper training in handling method should be given
Falling from raised service platform and access points	Safety guards have to be in place. Specialized equipment should be used for servicing trolleys and proper handling procedures observed

Hand and finger injury from conveyors	Equipment must be guarded, and the safety guards must never be removed
Accidental injuries from tripping over the feet of movable hanger stands	Movable hanger stand should be found only in designated areas. They should not encroach on to marked walkways
 <p>Fig.:ure 5.11 Packaging Machinery</p>	
Hand and finger injury at packaging, welding, cutting and folding stations.	Safety devices (two handed operation) should be check every day. Whenever a machine has to be adjusted whilst it is running e.g. for setting up, servicing or clearing of faults, only the engine control should be used.

Activities

Activity 1

Prepare a detailed report on personnel trained in first aid, fire fighting and emergency response.

Materials Required –

- 1- Practical File
- 2- Coloured pens and pencils

- 3- Ruler
- 4- Eraser

Procedure –

- 1- Visit an industry.
- 2- Prepare a questionnaire.
- 3- Interview people trained for emergency services.
- 4- Document it and prepare a detailed report of the same.

Check Your Progress

A. Questions

- 1. Explain any two types of Signboards that are used (with diagrams).**

.....
.....
.....

- 2. Describe health and safety measures taken in a garment industry.**

.....
.....
.....
.....

Module 6**Compliance to Legal, Regulatory and Ethical Requirements****Module Overview**

In general, compliance means conforming to a rule, such as a specification, policy standard or law. Simply speaking compliance means obeying the law. Compliance can also be defined as conformity to a given standard. All the industries, organizations, offices and manufacturing units are required to follow regulations and compliances as decided by the respective governments and countries they operate in. Garment and textile industries are no exception to this. These are also expected to maintain certain standards to operate. Compliances promote honesty and integrity within the organization and help in maintaining standards. Apart from this, compliances also ensure safety of the men, material, machines and environment. Compliance adherence in industries is also essential as it ensures an amicable working environment. Adherence to compliances is also essential for business growth, safety and wellbeing of employees and customer satisfaction. Some of the common compliances required in garment industry include working hour policy, drug and alcohol policy, child care policy, prevention of sexual harassment policy, holiday compensation, wage for leaves, equal remuneration policy, antidiscrimination policy, no child labour, health, and safety policy etc.

Legal is something which is allowed by the law and is in accordance with various laws. Legal regulations are set by the government to prevent the rights and safety of a common man and society. **Ethical** means something which is morally correct. Ethical regulations are based on human perception of right and wrong. It also means avoiding activities which are harmful for people, organization and environment. For example, in recent years customers have started demanding ethical products. **Regulatory** compliance means adherence to various laws, guidelines and specifications issued by the government. **Regulatory compliance** means following relevant laws, policies, and regulations. These differ from business to business and from country to country.

Whether a business organization / company is following these legal, ethical and regulatory compliances or not is checked at regular intervals through audits and inspections. Violating compliances is a punishable offence and

may result in legal punishment such as cancellation of business license, fine, jail or any other punishment as decide by the law and the government.

Learning Outcomes
After completing this module, you will be able to: <ul style="list-style-type: none"> • Describe the importance and benefits of ethical and value-based approach to management; • Explain company policies, procedures and their benefits; • Demonstrate teamwork and support to supervisor.
Module Structure
Session 1: Importance of ethics and values
Session 2: Company policies, procedures and its benefits
Session 3: Teamwork and support to supervisor

Session 1: Importance of Ethics and Values

Ethics are a form of self-regulation and normally contain general principles to guide behaviour. Ethics is also known as moral philosophy. It is a system of moral principles and simply means what is morally right or wrong. We can also say that ethics mean the intention of doing the right or correct thing. The term ethics is derived from the Greek word *ethos* which can mean custom, habit, character or disposition. Honesty, Integrity, Loyalty, Keeping your promises are all examples of Ethics. Ethics help us in:

- living an honest and good life
- making decisions which are morally correct
- thinking about others and the society
- prevent frauds and corruption in the organization.

It's not easy to explain what values are though most people would claim to have values. There are cultural and individual differences in value. A value is something we hold dear, something we see as important and worthy of safeguarding. Values are closely related to ethics. Values are basic and fundamental beliefs that motivate or guide actions of people and can be personal, cultural or professional. Generally speaking, 'values' mean desirable, good or worthwhile and are principles and ideals, which help us in making the judgment of right and wrong. Values determine what action is best to do. For ex. If the support staff gets sick while on duty and the assistant

fashion designer takes on the duty, then it shows good values of him that he/she is worried about the task completion and deadlines. This will specially help when some deadline is approaching.

Ethics and values are important because they are central to any company or organization and govern business operations and transactions. Together these two forms the foundation of trust. Ethics and values help businesses and organizations in achieving their goals, without compromising on security, peace and well-being of the society and people at large.

Benefits of Ethical and Value-based approach to Management for the Company and its Workers:

Ethical and value – based approach to management is beneficial for both, the company as well as the workers. A company which is ethical and value based is able to build an image of trust whereas the workers who follow this approach enjoy the trust and goodwill of their employers. Both these things lead to positive business environment and hence growth in business too.

Workers who have good ethics and values have very good productivity and hence contribute more to the organisation. Such workers also respect company property and don't indulge in unions, strike etc. Workers who follow ethical and value based approach are self motivated and hence perform better.

An ethical and value based approach also results in effective organizational control and hence better productivity and efficiency of employees. Companies that follow an ethical and “values-based” approach to ethics may have an advantage in the marketplace. They enjoy healthy returns through employee and customer loyalty as well as public respect for their brand. This in turn will help in smoothly achieving business goals. It also helps in avoiding breaking of regulations and associated punishments. It helps in achieving customers' and employees' trust and loyalty. It creates an environment of respect and faith.

Activities

Activity 1

Visit any industry or company. Talk to its employees and observe the working and employees. Prepare a report on the ethics and values being followed in that organisation / industry

Material Required:

A4 papers or file
Coloured pen, pencils, permanent marker etc.
Scale
Eraser and sharpner

Procedure:

1. Visit any industry, organisation or head office in your vicinity.
2. Observe the sign boards, working of the employees and also talk to the employees to find out the working environment, various ethics and regulations followed there.
3. Prepare a report and write in your file.

Check Your Progress**A. Fill in the Blanks:**

1. _____ simply means what is right or wrong.
2. Together _____ and _____ form the foundation of trust.
3. _____ and _____ are examples of ethics.
4. _____ are closely related to ethics.
5. Ethics and values help businesses and organizations in achieving their _____, without compromising on _____, _____ and well being of the society and people at large.

B. Short Question Answers:

1. What do you mean by ethics? Give one example also.
2. What are the benefits of following an ethical and value based approach to management?
3. What are values? Give one example?
4. What are the benefits of following an ethical and value based approach to workers?

Session 2: Company Policies, Procedures and Its Benefits



Fig.: 6.1 Policies and procedures

Introduction to Company Policies and Procedures

Policies are rules and guidelines formulated or adopted by an organization or a company to reach its long-term goals.

Policies are typically published in a booklet, manual or in any other form such as a presentation that is widely and easily accessible. Company policies are guidelines which help the management and employer in ensuring employee accountability. Company policies also help in achieving health and safety of employees and provide necessary guidelines for customer interaction.

These also act as guidelines for various legal issues and regulatory requirements. Company policies help in effectively tackling of any situation that could lead to serious consequences. Example - Every company has policy for substance abuse because constant substance abuse in employees if not tackled can lead to scuffles, daily fights and reduce work efficiency.

A company policy helps achieve employee wellness, fair treatment and also ensures that a company is following laws and regulations. Procedure is a fixed manner or way in which something is done. Procedures are the specific methods which inform employees as to how the daily duties should be performed. Every department in a company or an organisation has an SOP or standard Operating Procedure. This can be in the form of a manual, file or a booklet and is followed by all the staff member including senior management, middle management and all the other workers. Most of the company decisions and working is governed by the standard operating procedure. Any deviation in SOP has to be informed and is scrutinised carefully.

Together, policies and procedures ensure that the company /or the organisation is able to achieve its goals and mission in the most efficient and smooth way.

Policies and procedures are different from each other. We can understand the difference between the two by following points:

Policies	Procedures
Policies are the guiding principles.	Procedures means how a particular task will be done, what steps to follow while doing a task.
It is general in nature and relates to overall activities in the company.	It is very specific and related to particular tasks.
It is formulated by top management in the company	It is formulated by middle and lower management in the company
Policies tell us why a thing needs to be done	Procedures tell us how a thing needs to be done

Every company has different policies and procedures which govern their daily business operations. Company policies and procedures also protect their business interests and employees. Procedures for each business can differ depending on the products and/or services provided. Organizations need policies and procedures for a wide range of HR topics.

Some policies which are critical for businesses and are mostly followed by almost all the organizations are as follows:

1. Quality Assurance Policy:

Businesses should strive to offer quality goods and services to the clients. Products offered should meet the customers' expectations and even surpass their expectations. Quality services and products establish a good reputation and will build a successful business.

2. Environment Policy

All business organization should have commitment towards preservation of environment and should have practices to minimize their organization ill impacts on the environment. These practices include simple recycling process as well sophisticated practices such as water treatment, waste management techniques etc. Some of these Businesses should invest in projects that are aimed to improve the environment.

3. Code of conduct

Employees should act legally, ethically, and work for the best interest of the business. A code of conduct within the business should guide employees on how to deal with a wide variety of ethical situations. A code of conduct directs employees on how to relate to each other, customers and potential business partners and networks. Code of conduct is a very broad topic and may require many separate policies. These can include guidelines on drugs and alcohol use, smoking, performance management and discipline. Code of conduct helps employees in knowing what is acceptable and what is not acceptable behavior at work place in terms of behaviour.

4. Corporate social responsibility

This is a strategic decision where businesses undertake an obligation to the society. For instance, a business may offer sponsorship to the community, take care of the environment. This is not necessary for profit maximisation, but to better the welfare of the public.

5. Employment

Managing your employees and ensuring they understand the position within the business is of critical importance. Employees need to understand how Performance Reviews are conducted, the process for rehabilitation, safe working conditions, compensation to workers injured at work, non-discrimination at workplaces, and termination conditions.

6. Purchasing Policy

All Businesses organizations depend on suppliers and vendors for their raw materials and supplies. Therefore, they must value their suppliers and treat them fairly. They must also offer fair and honest tenders to their suppliers as well as offer reasonable terms of payment. Purchasing policy helps in formalizing all these details. Employees also need to understand what are considered work expenses, how goods for the business are purchased and what is the purchasing process?

7. Use of Internet and E-mail Policy

Internet and email is a necessary part of our daily business. Having internet and email policies and procedures provide employees with guidance on what is expected behaviour and acceptable use. Business should also consider having guidelines on Social Media usage within the business. Employees should be advised against use of internet at workplace as it affects the work output.

They should be urged to limit personal internet use and ensure everything they do online in the workplace is legal, ethical and appropriate (and explain what these mean). It is the duty of the organizations to add guidelines about what should and what should not be posted on social media regarding the organization in particular and events in general.

Add guidelines about what is and is not appropriate to post on social media regarding your organization as well.

8. Equal opportunities Policy

Businesses should offer equal employment opportunities. When hiring employees, there should be no discrimination because of color, gender, race, or disability. Guidelines should also include on how your business handles situations that include a Handicap, Pregnancy, or overall Diversity.

9. Policies and Procedures for Attendance

These documents can include guidelines on absenteeism, vacation time, sick leave, appointments and overtime. This can also include the amount of notice required before applying for time off or leaves. Organisational culture should be taken into consideration when developing these rules.

10. Customer service Policy

High quality customer service is the core of every successful business. Good customer service helps businesses prosper and loyal customers often return time and time again, hence increasing sales.

11. Policies and Procedures for Use of Company Property

Employees are required to use company property like electronics, medical equipment, vehicles, tools and uniforms in order to perform their duties. To avoid loss and damage to company property due to misuse and mishandling by the staff many companies include guidelines on how to care for company property. These policies also include how much (if any) and what types of personal use are permitted while using company property.

12. Policies and Procedures for Harassment and Discrimination

Harassment at workplace includes bullying, stocking, verbal and physical harassment, sexual harassment and workplace discrimination. All this can negatively affect the motivation and efficiency of employees. Thus, most of the companies nowadays have policies on harassment and discrimination. These help in keeping employees safe and guarantee fair treatment by developing policies and procedures that prohibit behaviors such as:

- Sexual harassment
- Bullying

- Verbal and physical harassment
- Stalking
- Hiring discrimination
- Workplace discrimination

Include information on how to report harassment and discrimination and explain that the company will not retaliate for reporting.

13. Policies and Procedures for Expenses

Employees need to tour and travel for company assignments. They also need to purchase things for work. Thus, having an expense reimbursement policy is very crucial for all the organizations. This type of policy has details such as acceptable expenses, reimbursement of transportation and meals, medical reimbursements etc. This type of policies also have procedures to submit reimbursement claims, time limit for submitting reimbursements.

or purchase things for work, having an expense reimbursement policy in place is essential. Explain what types of expenses are acceptable for reimbursement (airfare class, transportation, meals, etc.). Include procedures on how to submit a reimbursement claim.

14. Drug and alcohol policy:

Workload, family tensions, anxieties can lead employees to indulge in drug and alcohol consumption. If it becomes a regular affair then employee gets habituated and his/her work efficiency is greatly reduces and may negatively affect the output and culture of the organization. Thus, most of the company nowadays has policies against such practices.

15. Policies and Procedures for Health and Safety

Employees' safety and well-being should be every organization's top priority. Information like how to deal with illness or injury at work, equipment safety guidelines and how to report a health or safety concern are included in policies for health and safety. It also includes procedures to follow in the event of a fire or natural disaster.

Policies help in developing a good working operational model and this in turn motivates employees to perform and develop company standards. Business policies drive home what is important to the company and allows business owners and managers to communicate and enforce company policy. Employees need consistent company policies to guide them on their roles and responsibilities, as well as the company's overarching business principles, ethics and beliefs — for compliance reasons and to ensure a healthy company culture. Written policies and procedures also help protect your company from

potential legal action. After investing time and resources creating these policies, make sure employees read, understand and apply them to their daily job responsibilities.

Policies and procedures play a very important role. They define an organization's guiding principles and providing detailed task instructions. Policies and procedures form the basic structure of business operations. It's important to have clear policies, procedures and processes.

Business processes, procedures and standards are vital for training staff. Having formalised procedures for your business can save you time and money by increasing efficiency of the employees. Processes and procedures guide and help employees in giving more output in lesser time. Thus, less time is required by management for overseeing the day-to-day running of the business.

Procedures can also improve the consistency of product and service delivery by your staff. It helps in achieving optimum staff performance. These create standards and help everyone to know how to operate. For ex. If a store catches fire then what procedure would be followed for evacuation and safety or what procedure would be followed for registering vendor complaints. Developing formal policies and procedures can make it run much more smoothly and efficiently.

Policies and procedures save time and stress while handling HR issues. The lack of written policies results in unnecessary time and effort spent trying to agree on a course of action. With strict guidelines already in place, employees simply have to follow the procedures and managers just have to enforce the policies. It also reveals that organizations are efficient, professional and stable. This can lead to stronger business relationships and a better public reputation.

REVIEWING POLICIES AND PROCEDURES:

Policies and procedures should not be written once and left alone for decades. Reviewing these documents regularly and updating them when necessary is the key to their success. Various laws and guidelines are amended from time to time by government and hence it becomes important for organizations too to make necessary changes in their policies and procedure to conform to amendments and latest developments.

Thus, to summarise we can say that:

Policies

- Are general in nature
- Identify company rules
- Explain why they exist
- Tells when the rule applies
- Describe who it covers
- Shows how the rule is enforced
- Describes the consequences
- Are normally described using simple sentences and paragraphs

Procedures

- Identify specific actions
- Explain when to take actions
- Describe alternatives
- Shows emergency procedures
- Includes warning and cautions
- Gives examples
- Shows how to complete forms
- Are normally written using and outline format

Policies and procedures are required when there is a need for consistency in your day-to-day operational activities. Policies and procedures also provide clarity to the reader when dealing with accountability issues or activities that are of critical importance to the company, such as, health and safety, legal liabilities, regulatory requirements or issues that have serious consequences.

Benefits of Following Company Policies and Procedures:

Policies and procedures protect business interests of the company on one hand and they also protect workers rights on the other hand. They also provide a vision and mission to the company and thus in turn help in achieving standards of customer service. Together the two make sure that the company achieves the desired outcome in the most efficient way.

Benefits of Policies and Procedures

Major benefits of policies and procedures:

- Employees understand the constraints of their job without using a ‘trial and error’ approach, as key points are visible in well-written policies and procedures.
- Policies and procedures enable the workforce to clearly understand individual and team responsibilities, thus saving time and resources. Everyone is working off the same page; employees can get the “official” word on how they should go about their tasks quickly and easily.
- Clearly written policies and procedures allow managers to exercise control by exception rather than ‘micro-manage’ their staff.
- Clearly written policies and procedures provide legal protection. Juries apply the ‘common person’ standard. If written clearly so that outsiders understand, the company has better legal footing if challenged in court.

Activities

Activity 1:

Visit any industry and enquire and study about its policies. Prepare a detailed report of the policies followed by them.

Material Required:

- A4 size papers, chart papers and file covers
- Coloured pen and pencils, permanent markers
- Eraser and sharpener
- Scale / Ruler

Procedure:

1. Visit any nearby industry or a company.
2. Meet their human resources manager.
3. Discuss about various policies and procedures followed by their company and also read their policy manuals and presentations.
4. Prepare a detailed report.
5. Write your observations in the form of a report in your file.
6. Paste related photos and pictures.

Activity 2

Visit any organisation or company and enquire about the Procedure for applying for a house loan by an employee.

Material Required:

- A4 size papers, chart papers and file covers
- Coloured pen and pencils, permanent markers
- Eraser and sharpner
- Scale / Ruler

Procedure:

1. Visit any nearby industry or a company.
2. Meet their human resources manager.
3. Discuss about various policies and procedures followed by their company and also read their policy manuals and presentations.
4. Prepare a detailed report.
5. Write your observations in the form of a report in your file.
Paste related photos and pictures

Check Your Progress**A. Fill in the blanks:**

1. _____ are rules and guidelines formulated by a company or any organisation.
2. Policies tell us _____ something needs to be done.
3. _____ tell us how something needs to be done.
4. Policies and procedures enable the workforce to clearly understand _____ and _____ responsibilities.

B. Short question answer:

1. Name and briefly explain any two company policies.
2. What do you mean by Procedures?

C. Long question answers:

1. Write any 3 differences between policies and procedures.
2. Why it is important to have company policies and procedures?

Session 3: Teamwork and Support to Supervisor

Teamwork: Introduction and Importance

A team is a group of individuals working together to achieve a common goal. We can find teams in sports, business, offices, schools and so on. Ex. A cricket team, forensic team, quality assurance team. Members of a team collaborate and cooperate with each other for a common cause.



Fig.: 6.2 Teamwork in apparel industry

Teamwork is when a group of people work together to achieve a common goal. It is one of the most important attributes of present times. Ability to work in team is a key requirement for any employee. In teamwork individual strengths and skills are combined to achieve the vision and mission of the company. It requires overcoming personal conflicts and disagreements. Efficient teamwork is crucial to success of any business organisation or company.

We can hear the importance of teamwork in almost all business meetings, presentations and dealings. It is very crucial for success of any business task or operation. Almost all companies have teams. It is not only essential to perform well as individuals but also as a member of the team. To do well in a team requires patience, tolerance, and good social skills. Team efforts have many advantages for e.g work gets done faster and is more likely to get done when more people are involved, relations among employees improve, and members of the team learn from each other's characters, feedback and contributions to the team.

Providing Support to Supervisor and Team Members for enforcement of Company Policies and Procedures

A collaborative and supportive work environment is crucial for a successful organization. Implementation of policies and procedures cannot be done

without the support of employees. Every employee in turn must provide support and cooperation to the supervisor as well as other team members for effective implementation of company policies and procedures. This will go a long way in achieving the targets and goals set by the company / organisation. Apparel production companies have different departments such as store department, cutting department, stitching department, finishing and quality department, store etc. All these departments require supervisors to manage and motivate workers. A supervisor also takes care of work routines, attendance, adherence to company policies etc.

Supervisors are also responsible for training of new employees as well as continuous training of old staff as equipment, technology and processes keep getting renewed. They are also responsible for performance evaluation, maintaining discipline, creating and managing spreadsheets etc. However, a supervisor cannot do this alone. They need the support and cooperation of their teams and employees to achieve all this.

Committed employees bring added value to the organisation through their determination, proactive support, relatively high productivity and awareness of quality. These types of employees also display positive behaviour within organisations and thus are very sought after or in demand.

There are many direct and indirect ways of showing support to your supervisor. Direct ways relate to following policies and procedures, punctuality, adhering to shift timings and indirect ways of support include maintaining discipline, pitching in extra work or doing someone else's work when they are absent. Support to Supervisors can be given in following ways:

1. Maintaining Effective Communication with The Supervisor:

Always keep your supervisor informed about your work progress. If you need to take leave or arrive late due to some pressing commitment inform your supervisor so that the workflow can be managed and your duties can be assigned to some other employee during your absence. This is essential especially if some deadline is approaching.

If you are not happy with some policy or decision then also communicate politely to the supervisor and get things sorted.

It is best to confide in your manager in case stress interferes with your work. "If your stress is still not mitigated, it is time to talk to your boss. It is okay to ask for help and let them know your situation." Most of the times seniors extend their cooperation

2. Being an Effective Listener:

Pay attention and listen carefully whenever the supervisor assigns duties or takes training sessions. This will be helpful in understanding the requirements and hence in performing ones duties correctly.

3. Following all Policies and Procedures:

One of the ways of supporting your supervisor is to understand the company policies and procedures and to follow it also.

4. Be Responsible

If you notice that there is a task that needs to be done and the staff is less or not adequate and you have the skills to accomplish it then offer to do the task and complete it.

5. Be dependable –

Do your duties and assigned tasks seriously, efficiently and well within the time limit. This is one way of showing support to your supervisor and being a valuable employee too. Dependable employees respect deadlines, and make every effort to meet them. For this work hours should be used effectively and time should not be wasted in gossiping or taking longer than authorised lunch breaks. Help your supervisor by doing your share of the work and try to complete assignments in a timely fashion.

6. Prior sanction of leave/late arrival

Always inform your supervisor before taking leaves. Even if some last minute emergency comes up and you need to report late for the duty, do inform your supervisor. One must always inform supervisor about leaving early or late arrival. Keep him/her informed about your leave plan. This will help in assigning your duties or work to someone else. This is essential for meeting deadlines and maintaining the workflow and production cycle.

7. Be Punctual:

Always arrive and leave on scheduled time. Try to arrive and settle a little early then your shift timings as this will help in utilizing the shift time effectively. Do not over extend tea or lunch breaks. Punctuality helps in maintaining the production cycle and speed thus it is also a way of showing support to your supervisor.

8. Offer useful solutions

If the company or your division is facing a problem and you have a solution in mind, go to your supervisor with a rational decision-making model and a detailed action plan.

9. Learn to adapt and be open to learning

Individuals who are ready to accept change and are able to quickly adapt are seen as more valuable than those who stick to outdated principles and concepts that are past their expiry date. They should not be afraid of change but welcome it. Experiment with new ideas that are meant to improve productivity and performance.

10. Make your supervisor and team members' work easier:

Be ready to offer help and to do extra duties in case of emergencies and deadlines. Try to help not only your supervisor but also your team members if there is more work or if there is some situation which requires to put in extra effort. For ex. If a consignment has to be shipped by a certain date and your shift is over, you can voluntarily offer to stay longer and help so that shipping can be done on the date given.

This requires a pro-active approach, especially because this work is not part of your assigned duties.

11. Take charge and volunteer:

Many a times your supervisor and/or any of the team members may not be able to perform their duties due to factors such as unforeseen illness, stress, constant juggle between home and work, financial pressure or other factors such as marital discord. This may hamper their productivity and output on certain days. All this can lead to unmet work targets resulting in high anxiety levels, thus pulling down productivity at work. Such times require you to show your support and solidarity by taking charge of the situation and volunteering to do more than your share of duties.

12. Spot real problem

There are times that your anxiety over something at home gets spilled over at work place. You may never realise that the problem is not at work but back at home or vice versa. Identify the reason behind your anxiety.

13. Speak to your supervisor and team members

One of the best ways to deal with workplace anxiety is to actually talk to

someone close to you including your supervisor. They may offer useful solution and save you from stress and trauma and this will result in optimum work output and efficiency which in turn will be a way of supporting your supervisor.

14. Priorities and organize

Doing the same task repeatedly over days, long commute to work, financial stress may take a toll on your work. This may result in low productivity, reduced efficiency and a pile of unmanaged work. Work can take a toll, especially when not managed well. If you don't do your duties well your supervisor will not be able to meet the target given to him/her by the senior management and will have to bear the brunt. So prioritise your time and organize your daily routine and work routine to avoid unmanaged work pile. Learn to do high priority tasks first.

Putting it simply, here are some of the ways in which you can show support to your supervisor:

- Reaching on time
- Keeping your work area clean and hygienic
- Understanding expectations of Supervisors and Seniors and working accordingly
- Understanding and maintaining acceptable behaviour
- Not indulging in negative behaviour, gossip and negative practices
- Not indulge in illegal or banned work practices
- Reporting any spurious or illegal activity to your supervisor immediately
- Following proper channel while reporting deviations in company policies and procedures
- Being cordial with your team members
- Reporting accidents, damages, faults immediately.

The workers should immediately alert the supervisor and management about any serious deviations such as lapse in safety and security, workplace harassment etc in the company. Proper channel and procedure should be followed while reporting such things.

All the workers and employees must conduct themselves as per the company's or organisation's vision and mission. In order to achieve the goals or targets set by the company it is also very important to follow the company's policies and procedures. Employees or workers should avoid breaking rules

Activities

Activity 1:

If there is suddenly a fire outbreak at the workplace, how will you support your supervisor in controlling the situation? Present a skit in your class on this situation.

Material Required:

1. Placards
2. Furniture
3. Costumes
4. Bags and boxes

Procedure:

1. Plan the script and dialogues.
2. Arrange for the setting of a workplace.
3. Enact the skit.

Check Your Progress

A. Fill in the blanks:

1. A _____ is a group of individuals working together to achieve a common goal.
2. _____ is very crucial for success of any business task or operation.
3. There are many _____ and _____ ways of showing support to your supervisor.
4. A collaborative and supportive work environment is crucial for a organization.

B. Short question answers:

1. What do you mean by teamwork?
2. What are the benefits of teamwork?
3. Briefly write some of the duties of a supervisor.
4. How can workers in any organisation provide support to their supervisor?
Write any 3 ways.

ANSWER KEYS**MODULE 1:****Session 1:**

1. Custom work and monogramming
2. Multi head embroidery machine.
3. Multi needle
4. Late 1990s
5. One

Session 2:

1. Once
2. Breaks
3. Three
4. 80/12
5. Chenille
6. Cording

Session 3:

1. Needle
2. Fly wheel
3. Thread take up lever
4. Overcast
5. Needle

Match the following:

(1-d), (2-c), (3-b), (4-e), (5-a)

Session 4:

1. Oil spills

2. Maintenance
3. Expensive
4. Breakdown
5. Machine
6. Threads

MODULE 2:

Session 1:

True/False:

1. False
2. True
3. False
4. True
5. True

Session 2:

- a) Pantone Matching System/ PMS
- b) Intensity
- c) Hue
- d) Graduated
- e) Emphasis

Session 3:

1. Light/Dark
2. Temporary /Permanent
3. Sharp craft knife/Scissors
4. Blocks/Glass
5. Carbon paper Method/ Transfer paper and sealing wax Method

MODULE 3:

Session 1:

1. Stipple Fill Stitch
2. Tatami
3. Motif
4. Simplest, outlining
5. Fill stitch
6. Feathering

Session 2:

1. Machine embroidery
2. Defects
3. Wet processing or Dyeing defects
4. Polyester
5. Gapping
6. Stray Threads

Session 3:

1. Textured
2. Vacuum
3. Wool
4. Shearing
5. Detergent
6. Finishing

MODULE 3:**Session-1****Fill in the blanks-**

- i. Material handling process
- ii. Clean and ventilated
- iii. Safe, comfortable
- iv. Tools and Material
- v. Cleaning and maintenance

Session-2**Fill in the blanks-**

- i. Safety Guards
- ii. Floor Space
- iii. Disposal of waste
- iv. Identified and segregated
- v. Economic advantage, Community relation

Session-3**Fill in the blanks-**

- i. Environment health and safety
- ii. Radiation Hazard

Session-4**Fill in the blanks-**

- i. Spillage, Seepage
- ii. Thread sucking machine
- iii. Protective gears

Session-5**Fill in the blanks-**

- i. Housekeeping
- ii. Inspection, Extinguishers
- iii. Clean, Systematic and Hazard free
- iv. Quality Assurance

MODULE 5:**Session-1****Fill in the blanks-**

- i. Hazard
- ii. Safety

- iii. Mental health and Well being
- iv. Local ventilation

Session-2

Fill in the blanks-

- i. Close fitting
- ii. Ear muff
- iii. Management
- iv. Psychological hazards

Session-3

Fill in the blanks-

- i. Performance
- ii. Personal hygiene
- iii. Fit and healthy
- iv. Tobacco smoke
- v. Alcohol

Session-4

Fill in the blanks-

- i. EMS
- ii. Plant layout
- iii. Men, Materials and Machine

Module 6:

Session-1

Fill in the blanks-

- i. Ethics
- ii. Ethics and Values
- iii. Honesty, Integrity, Loyalty, Keeping Promises
- iv. Values

- v. Goals
- vi. Security, Peace

Session-2

Fill in the blanks-

- i. Policies
- ii. Procedures
- iii. Policies
- iv. Individual, Team responsibilities

Session-2

Fill in the blanks-

- i. Team
- ii. Teamwork
- iii. Direct, Indirect

Session-3

Fill in the blanks-

- i. Routines
- ii. Professionalism
- iii. Attendance
- iv. Assigned goals
- v. Punctuality

GLOSSARY

Applique: Ornamental needlework in which pieces of fabric are sewn or stuck on to a larger piece to form a picture or pattern.

Backing: Woven or nonwoven material used underneath the item or fabric being embroidered to provide support and stability.

Bobbin Case: Small, round metal device for holding the bobbin. Used to tension the bobbin thread, it is inserted in the hook for sewing.

Bobbin: A spool that is inside of the hook. The bobbin thread forms the stitches on the underside of the garment. The bobbin on an embroidery machine works the same way as on a home sewing machine.

Boutiques: A small shop selling fashionable clothes or accessories.

Chain stitch: A series of looped stitches forming a chain like structure.

Colors: Colors in embroidery art can be chosen at the beginning of work or adjusted with embroidery machine.

Design library: A computer program which catalogs a collection to digitized designs kept by embroidery shops for embroiderers to access the design by subject, stitch count, etc.

Digitizing: A modern term for punching, it is a method of programming a design. Artwork is converted into a series of commands to be read by an embroidery machine's computer.

Finishing: Processes performed after embroidery is complete. Includes trimming loose threads, cutting or tearing away excess backing, removing topping, cleaning any stains, pressing or steaming to remove wrinkles or hoop marks and packaging for sale or shipment.

Hoop: Device made from wood, plastic or steel with which fabric is gripped tightly between an inner ring and an outer ring. Machine hoops are attached to the machine's pantograph and are designed to push the fabric to the bottom of the inner ring and hold it against the machine bed for embroidering.

Monograms: A motif of two or more interwoven letters, typically a person's initials, used to identify a personal possession or as a logo.

Motifs: A motif is an element of design.

Needle: Small, slender piece of steel with a hole for thread and a point for stitching fabric. A machine needle differs from a handwork needle; the machine needle's eye is found at its pointed end.

Pinking shear: Type of scissors which have zigzag pattern instead of a straight edge.

Presser Foot: Metal device that touches the goods being embroidered while the needle is in the goods. The main function of the presser foot is to hold the material being embroidered until the hook point catches the thread loop formed by the needle rise.

Satin stitch: A series of flat stitches placed closely to completely cover the design.

Sequins: Small shiny discs sewn on to clothing for decoration.

Thimble: A cover worn in the finger while embroidering.

Tweezers: Tweezers are small tools used for picking up objects too small to be easily handled with the fingers.

List of Credits

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