DRAFT STUDY MATERIAL

INLINE CHECKER

(Qualification Pack: Ref. Id. AMH/Q0102)
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 Overview

In-line inspection in an Apparel Industry includes checking of partly stitched garments while pieces are still in joining process with sewing operations. Inline inspection is done either for cent percent of garments or randomly.

In-line checking means inspecting garments at the time of construction process, so that defects if any can be identified in the initial stage of garment construction rather than checking at the end of the process when product is completely made. Thus, if any defect is found, repair becomes easy and defects rate remains at minimal**.** In-line inspection is also called as roving quality checking or roaming quality checking.

Different types of inspections are done to improve garments quality. To ensure quality, four types of inspection process applied are,

1. In line inspection
2. Table inspection
3. Pre-final inspection
4. Pre shipment inspection

Various stages of in-line checking in the garment stitching are as follows-

1. In-line checking at check points

Semi-stitched garment are checked at fixed workstation inside the sewing line at critical constructions only. This checking station is known as checkpoint. At this checkpoint all operations done up to that point are checked thoroughly. 100 per cent garments are checked at this check points.

2. Roving quality checking

Garments at all workstations in a sewing line are checked randomly. In-line checker randomly picks up bundles and checks few pieces.

3. Traffic light System (TLS)

Traffic light system is the most effective inspection tool used to reduce defects of the garment. It is designed to ensign the problem at source and allows immediate corrective action rather than all potentially defective product to continue to be manufactured. In each visit to an operation, in-line checker selects pieces/components and end-line checker carries out cent percent garment inspection at the end of the line. At the time of inspection, an in-line checker picks up the garment pieces at random to check all the quality parameters that are required for particular operation like stitches per inch, seam width, seam allowances, measurements, choice of correct trims and their placement in correct location etc. Based upon the quality level, colour cards are placed on individual operator's machine. Three colour cards are placed in each of the operators place. Green colour card indicates that quality meets the customer's standards or requirements. Yellow colour card indicates minor fault has been found and caution is required. Red colour indicates that the quality standard do not meet the customers standards and requirements. The format of marking the defects in this system is as follows –

- Red Colour – 5 or More defects per ten pieces inspected
- Yellow Colour – 2 to 5 defects per ten pieces inspected
- Green Colour – No defect
-

4. Mid-line inspection

Some buyers send their quality personnel to check garments in the initial days of production start and middle of the production. This inspection process is also known as mid-line inspection. Quality checker checks the garment following AQL (Accepted Quality Level) at early stage in the starting operations and prepare reports and give feedback to the unit representative. The factory takes corrective actions based on the comments. Inspection at this point helps to improve the garment stitching quality and reduces defects.

Purpose of in-line garment inspection

1. **To stop defect generation:** Early detection of defective garment can save time and money for repair work. Defect may become more critical if it is not detected during the processes and makes more difficult to open the seams after complete stitching and construction of the garment. Thus repair cost would be high.
2. **To improve productivity:** As the in line checking processes are conducted while the construction of garment in line, the chances of generation of defects are minimized. This will result in smooth flow of production cycle without causing any delay or hindrances in the operations.
3. **Early feedback to cutting department:** Sewing floor can inform the cutting department about the cutting issues at the initial 2 to 3

operations. Based on the feedback from the sewing line, cutting department takes immediate actions and cut the layers accordingly.

4. Reduce the workload of the end-of-line checker:

For garments styles that include complex operations and more numbers of operations, in-line inspection is followed meticulously at every construction process which further reduces workload at the end of production line for end line checkers.

Learning Outcomes
After completing this module, you will be able to: • Orientation to Garment Industry and its different department • To study tools and equipment of garment industry • Introduction to different types of industrial cutting and sewing machine
Module Structure
Session-1 Orientation to apparel industry and its different departments
Session-2 Basic tools used in garment industry
Session-3 Introduction to different types of industrial cutting and sewing machine

Session 1: Orientation to Apparel Industry and Its Different Departments

Apparel manufacturing includes series of processes, beginning with sample development and ending with shipping the finished garments to the buyers. Different departments are set-up based on the activities to be performed by a group of people .Thus it includes layout, cutting, bundling, sewing, repairing, assembling, finishing, and preparing any garment to be worn by any individual. Hence, garments industries are equipped with many departments. Starting from fabric store to dispatch centre there are at least 12-15 departments that work together to ensure smooth operation.

1. Different departments of a garment industry

These departments mainly include the pre-production departments, production and post-production departments.

1. Marketing and business development
2. Merchandising
3. Fabric sourcing and store department
4. Design
5. Pattern Making, CAD
6. Sampling department
7. Fabric Testing
8. Production Planning and Control
9. Cutting
10. Sewing
11. Quality Control
12. Machine Maintenance
13. Garment Washing
14. Printing
15. Embroidery
16. Finishing
17. Packing and Shipping

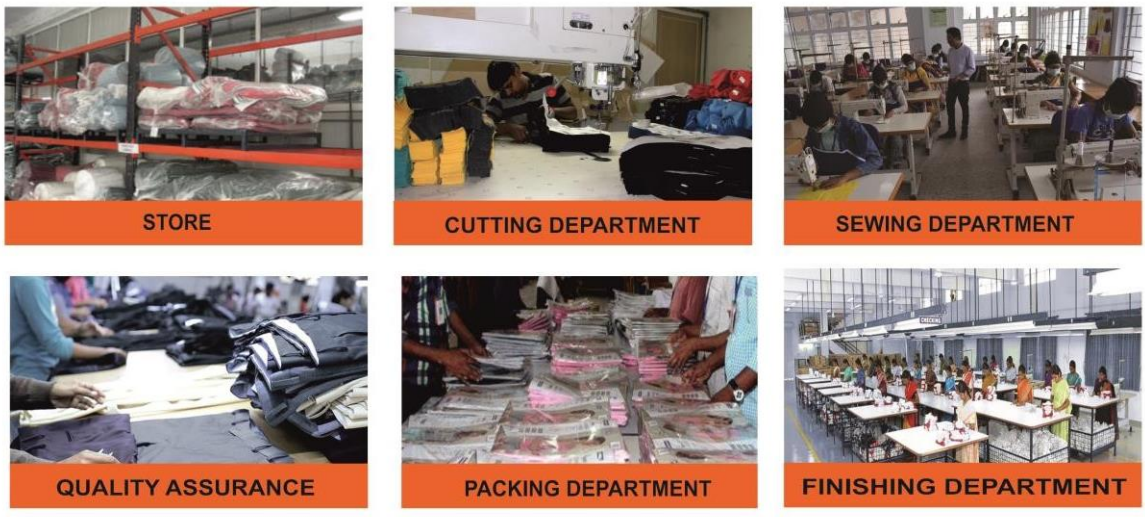


Fig 1.1 Different departments of Garment Industry

2. Supporting departments in a garment industry

With production departments, one needs to setup some auxiliary departments to run the industry smoothly. Supporting departments of a garment manufacturing industry are,

1. Industrial Engineering
2. Information Technology
3. Finance (Accounts)
4. Human Resource and Administration
5. Shipping and documentation (Logistics)

Introduction of apparel industry

The apparel industry is the similar as the fashion, garment, or clothing industry. Apparel sector encompasses concerns or firms that design and sell clothing items, footwear and accessories, from basic to luxury items. The history of textiles in India dates back to 3000 B.C.. India has biggest growth potential after China where the operating efficiency of the apparel industry and its ability to capture markets are the key factors for its success in national and international level. Indian apparel industry is now undergoing a rapid change with its rich resources of natural fibres, skilled manpower, fabric varieties and organic dyes have attracted buyers from all over the world and is becoming an integral part of the global supply chain.

Industry Composition

The apparel and textile industry comprises of two major segments such as production of textile materials or fabrics(raw material into yarn / fabric) and conversion of fabrics into apparel/accessories (cutting and sewing of fabrics or other materials into outer wears, footwear, undergarments etc.).

History

The textile industry is very ancient and exist as far back as 30,000 B.C. during which bone needles were found and majority of clothing was prepared using animal skins and vegetable fibres. Until industrial revolution the development of the industry was very minimum and slowly got progressed by technology which includes cotton ginning and pedal powered sewing machines. Due to many technological advances, the textile industry got mechanized and the use of automation have limited the number of labours involved in production of textiles whereas the apparel industry is still human intensive.

Trends

Current trends in textile and apparel industry focus towards-

- ✓ Low labour cost

- ✓ Maintaining production efficiency
- ✓ Sufficient product varieties as per consumer preference
- ✓ Global branding
- ✓ Faster and efficient supply chains
- ✓ Industry modernization
- ✓ Responsible and sustainable manufacturing

Indian Manufacturing zones

The below figure shows the textile and apparel manufacturing zones in India.

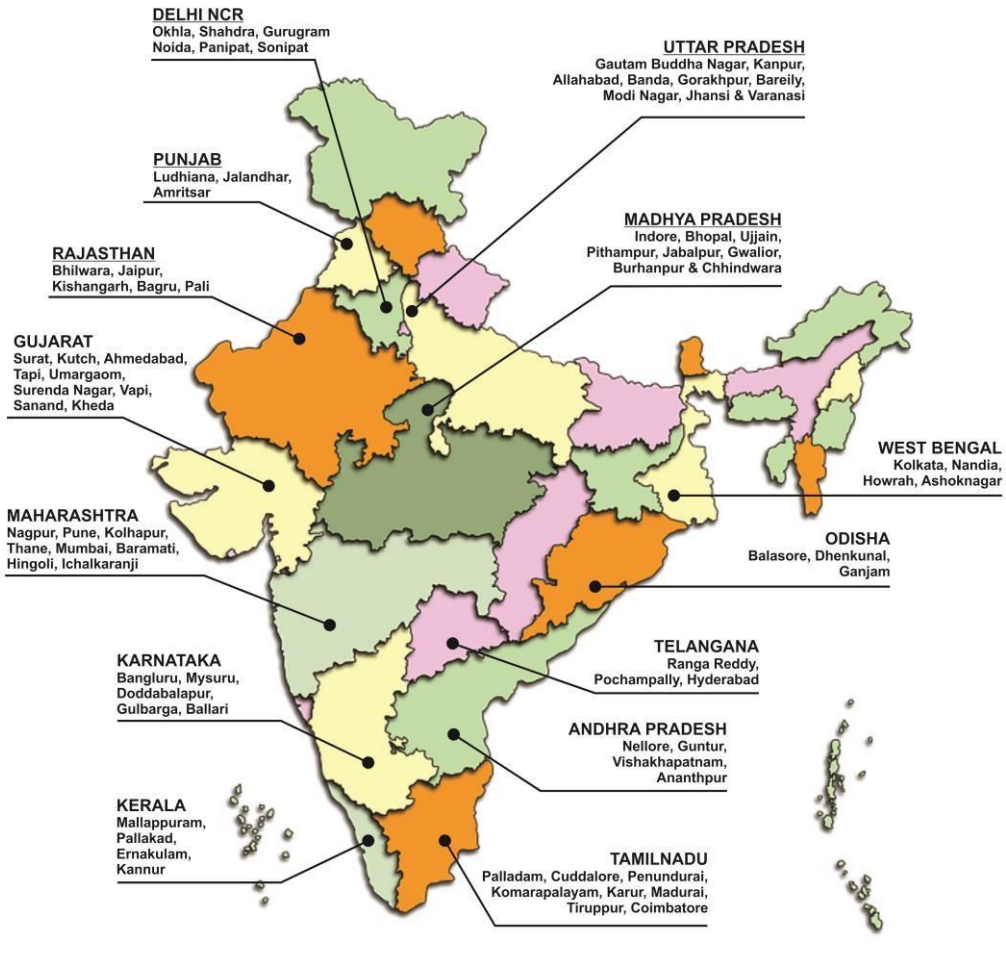


Fig 1.2 Different Manufacturing Zones in India

Readymade garment industry

Readymade garment industry is very significant, has occupied a unique place due to substantial export earnings. This industry is highly labour-intensive and creates lot of employment opportunities for millions of people which is

very much suitable for the Indian scenario. The change in consumers lifestyle, their increase in income level and affinity towards fashion has witnessed the growth of readymade garment industry. Till 21st century, the largest export of readymade garments was Europe and during early 2000s the production of readymade garments shifted to countries such as India, Vietnam, Bangladesh, and China to reduce labour cost in production and to make opportunities for jobs.

The global readymade garment market has been segmented based on-

- ✓ Product type such as inner and outer clothing,
- ✓ Applications - casualwear, formalwear, sportswear, functional wear
- ✓ Fabric type -knit, non-woven and woven
- ✓ Age group - toddler, kids, adult etc.,
- ✓ Sales channel - speciality stores, super market and others ✓ Region

Indian readymade garments/apparels (RMG) industry accounts for approximately 50 per cent of the total industry which is the largest segment of the Indian Textile and Apparel Industry. The domestic RMG sector accounts for approximately three-fourths of the total Indian RMG industry and due to its low cost of plant and machinery the manufacturing units exist from small to large. The RMG sector continues to be dominated by unorganized players but still the branded apparel market has made steady in the past few years.

Market Potential

The Readymade garments are the choice of urban people and recently gaining extensive acceptance. The huge delay in delivery of tailored garments have made people to shift to readymade garments. Due to changes of fashion in daily life, the readymade garments industry is increasing day-by-day. In India, the active centres of production are Tripura, Ludhiana, Bangalore, Delhi, Pune, Mumbai and Chennai.

Readymade garments produced on commercial scale are explained below:

S. No.	Men	Women	Boys/Girls
1.	Shirts, T-shirts	Shirts, T-shirts	Shorts
2.	Trousers	Slacks	Frocks
3.	Shorts	Jeans	Slacks
4.	Jackets	Salwar Kameez	Shirts
5.	Blazers	Night dresses	Skirt

6.	Jeans	Under garments	Trouser

Ready-made garments are generally divided into the following types-

1. **Outer clothing:** includes work wear and uniforms, leisure wear, and sportswear (e.g., suits, pants, dresses, ladies' suits, blouses, blazers, jackets, cardigans, pullovers, coats, sports jackets, skirts, shirts, ties, jeans, shorts, T-shirts, polo shirts, sports shirts, tracksuits).
2. **Bathing clothes:** includes shorts, bathing suits, and bikinis.
3. **Undergarments:** includes lingerie e.g. underpants, undershirts, briefs, vests, socks, stockings, and pantyhose etc..

Different departments of apparel industry and their functions

Garment manufacturing process includes number of processes from order receiving to dispatching shipment of the finished garments. Apparel industry is the final stage of textile manufacturing where cloth is cut into different parts and sewn to make various types of apparel. All the process of garment manufacturing is done in different departments in garment industry.

1. Marketing

The marketing department is responsible for marketing produced products, finding new customers and get more orders for the industry with the help of supported marketing team.

- Marketing team approach existing buyers with forecast and latest design developed by the design department. They illustrate their latest product designs to the buyer. They are given responsibility for business development for the industry.
- This department showcases industry's ability for developing new designs, compliance, and quality policies and performance.
- Produced garments are displayed during international apparel shows and exhibitions, where buyers selects designs and place orders.
- Garment industries build websites to increase their visibility to potential customers. Social Media like Facebook, LinkedIn and Twitter are used as marketing tools.
- More than just developing new clients, retaining the existing customer is also important which can be done by providing quality products and services.

2. Design

Apparel design department is responsible for sampling and product development. They focus on developing garment designs in similar product categories of which the company does its business. Designers develop new

design collection every season. They also develop a library for fabrics, trims, accessories and selected pieces of garments. Designers make designs as per the latest trends and buyer's taste and preferences. The designing department retain their customers by showing new designs to their buyers frequently.

3. Merchandising

Merchandising department works as a mediator in between industry and buyers. They coordinate with buyers for orders, send garment samples for buyer approval and receive comments on samples and other approvals.

Merchandiser prepares the bill of materials, prepares garment costing sheet and follows up of production activities.

Activities of merchandising department are as follows-

- Communicate with buyers
- Review the garment sample
- Develop garment sample
- Product costing
- Develop good relationship with customers
- Scheduling of pre-production and production activities
- Preparing Bill of Material and fabric indent
- Source raw materials
- Provide quality approval
- Prepare Production File
- Conduct Pre-Production Meeting
- Execute orders
- Providing after sales services

4. Pattern Making

Pattern master makes garment patterns and digitize the patterns using CAD software. Major activities of Pattern Making Department are,

- Pattern Making
- Pattern Grading
- Sample Development
- Checking fit and correction of patterns
- Incorporate buyer's comments on samples
- Making production viable sample
- Fabric Consumption Calculation
- Marker planning

5. Sampling

Sampling department makes all kind of samples that have to be displayed, stored and submitted to the buyer. This unit checks fit of the sample and communicates problems related to orders to the production department for bulk production of approved samples.

Sampling department's activities are,

- Constructing garment specifications and understanding workmanship of the garment.
- Making garment samples.
- Calculating fabric consumption.
- Assisting in preparing bill of material for the sample.
- Prepare quality inspection report for measurement and visuals.
- Coordinate with production team for construction and handling of a style.

6. Fabric Store and fabric sourcing department

Fabric department receives and stores all kind of fabrics. Loading and unloading and issuing of fabric to cutting department are done with the help of team of helpers.

Major activities of the fabric store are,

- Sourcing of Fabrics
- Receive Raw Materials
- Checking finished fabric
- Prepare shade band for dyed and printed fabrics
- Basic Testing of physical properties of fabrics
- Maintain inventory record for fabrics
- Fabric Issue
- Fabric printing
- Fabric Reconciliation
- Communication with fabric supplier

7. Trims and Accessory Store

This store receives all kind of trims and accessories and store in racks.

Activities of this department are,

- Sourcing trims like sewing thread and packing accessories
- Checking of trims and accessories
- Storing trims and inventory maintenance

- Issue of trim and accessory

8. Production Planning and Control

This unit does the planning and scheduling of orders and execute production processes. Production planning and scheduling of activities are essential to procure raw material on time, complete production activities on time and able hand over shipment on time.

Major activities are as follows-

- Task Scheduling
- Material Requirement Planning
- Loading Production
- Process selection and planning
- Facility location
- Estimating quantity and costs of production
- Capacity planning
- Line planning
- Production follow up and execution

9. Cutting

The cutting department normally receives the order from the production manager who has approved the cutting order to cut a given quantity of garment styles. Cutting department have a cutting department head, cutters, spreaders, quality checkers, and helpers for sorting, ply numbering and bundling.

The cutting order sheet includes the following-

- Average Sampling, garment weight and other trims
- Measurement sheet
- Garment Design
- Purchase order
- Fabric request sheet
- Marker planning –layout, size ratio, colours etc.

Major activities of cutting department are as follows-

- Fabric receiving from the fabric store
- Fabric relaxation
- Cut planning
- Fabric spreading/layering on the cutting table

- Marker Planning
- Marker making
- Cutting of fabrics
- Sorting, Bundling and numbering of garment
- Inspection of cut components
- Sorting of printed and embroidery panels
- Fusing Garment Components

10. Sewing

Sewing section is responsible for sewing of various cut pieces of fabric together as per the buyer's specifications. Workers either work in an assembly line or group system.

Details of Garment obtained are as follows-

- The garment style
- Number of operators required
- The batch for which the style has to be installed
- Target for each day
- Production quantity

After collecting the aforesaid details, the Sewing unit collects the cut parts from the cutting section. As per design styles assembling of the components are done where the shade matching and the measurements are also checked.

Major activities of sewing department are as follows-

- Line setting
- Garment stitching
- Marking parts
- Ironing garment components
- Checking of stitched garments
- Stitching Alteration
- Documentation

11. Machine Maintenance Department

This unit repair and look after the maintenance of sewing machines.

Major activities of this department are as follows-

- Machine set up
- Repairing sewing machines

- Maintaining inventory of machine parts
- Maintenance of machines and equipment

12. Industrial Engineering Department

This unit assists in setting line of production department, improving and measuring production performance.

Major activities of this department are as follows-

- Product analysis
- Making operation bulletin
- Line layout and workstation layout Daily production report.
- Estimating the Standard Allowed Minute (SAM) of the garment for a new style for costing
- Calculating thread consumption for garments
- Providing operational breakdown with SAM and target for each operation for an order (style)
- Capacity Study of operators
- Line Balancing
- Calculating direct labour cost
- Operator performance improvement
- Operator training program
- Production Control system

13. Washing department

This unit washes the produced garments, cut panels (if required), wash samples as required.

14. Finishing department

This unit checks the garment's measurements and style to ensure that garments are being made as per buyer quality standards. Stitched garments are checked for visual appearance and measurement prior to packing into poly bag.

Packing department in an industry works side by side of the finishing department namely, folding, tagging and packing of garments. Based on product categories finishing room activities may vary.

Major activities of finishing department are as follows-

- Thread trimming
- Attach button and button hole making

- Stain removing
- Garment Pressing
- Folding and Tagging - size labels, price tags and miscellaneous labels if any
- Packing
- Communicate with internal department

15. Quality Control

Responsibilities of this may vary industry to industry but main activities almost remain the same.

Major activities of quality control department are as follows-

- Setting up Quality Standards
- Establishing Quality Standard Operating Procedures (SOP)
- Quality Assurance
- Checking fabric and trims quality
- Preparing the audit report of the fabric and trims quality.
- Conducting pre-production meeting.
- Checking of garments during production and pre shipment

Fig 1.3 Garment Inspection

16. Supporting departments and their activities

Supporting departments of a garment industry are not directly involved in garment production but support garment production team to perform their work smoothly. Main supporting departments are Accounting, Human

resource and Administration, Electronic Data Processing (EDP) and Shipping and documentation.

1. Accounts department

- This department is involved in all kind payment and cash management.
- Prepares payroll for employees, give payments to workers, staff and maintain accounts of the industry.
- Maintain records of supplier payment and follow up for pending payment.

2. Human Resource and Administration

- They look after recruiting and employee welfare.
- Maintains employee attendance and absentees records.
- Handle labour issues
- Industry and social compliance
- New employee orientation

3. Electronic Data Processing (EDP)

Garment industries use many electronics items such as computers, printer, Barcode systems etc. An EDP department is necessary for troubleshooting of the computers and software. Computers are used for daily activities like mailing, making reports and accounting software, Extender Producer Responsibility (EPRs) etc.

Major activities are,

- Purchasing electronic items
- Maintenance of computers and other hardware
- Supporting internet and mailing activities
- Database maintenance
- Report generating

4. Shipping and documentation (Logistics)

This unit prepare and maintain shipment related documents. They communicate with buyer for shipment dispatch and send shipment to buyer.

Activities

Activity 1

Visit an apparel industry and study the departments and their functions. Make a report of your visit.

Materials Required:

1. Pen
2. A4 size sheets
3. Coloured pens/ pencils
4. Eraser and Sharpener

Procedure:

1. Visit an apparel manufacturing unit and closely observe the working and functions of all the departments.
2. Based on your observations prepare a report about the departments of the industry.

Check Your Progress

A. Fill in the blanks with appropriate words-

1. _____ clothing includes work wear and uniforms, leisurewear, and sportswear.
2. The _____department is responsible for marketing produced products, finding new customers and get more orders for the industry with the help of supported marketing team.
3. _____department works as a mediator in between industry and buyers.
4. Making garment samples is one of the activities of _____ department.

B. Briefly answer the following questions-

1. Enlist major activities of cutting department.
2. Explain functions of quality control department in an apparel industry.

Session 2: Basic Tools Used in Garment Industry

In today's fashion era greater importance is given to well fitted comfortable garments. Garment production begin with measurements, drafting patterns, cutting, assembling, joining and stitching the fabric. Each of these steps requires few tools and equipment for accurate work. Knowledge of the equipment is very essential to communicate effectively in the workroom to minimize errors.

Patternmaking, cutting and stitching are the most active units in the garment industry. All fabric cut panels are sorted out, bundled and later those cutting parts are joined together to produce a quality garment for the buyer with the help of various types of sewing machines, equipment, threads, needles, tools, trims and accessories. Sewing operators, technician, merchandiser and quality control checkers play an important role to make a complete garment as per the buyer's specifications.

Tools required for drafting, cutting and stitching

Basic tools and equipment's for in-line quality inspection are as follows:

- A medium size table with proper lighting facilities
- Measurement tape
- Good quality scissor
- Alter Sticker

A. Drafting tools

Measuring tools used for garment construction are as follows:

1. Measuring tape

Tape should be of good quality with a smooth surface and with metal tipped ends that prevent the tapes from ravelling. At one end of the tape the metal tip is extended (3") and is used when vertical measurements are taken. The other end has a short metal tip with a small hole at the centre. This side is used in taking circumference measurements. The small hole aids in drawing circle of perfect measure. Tape is marked with centimetres as well as inches to facilitate the conversion from one system to another. Generally tapes are of 150 centimetres (60 inches) long. The best tape choice is a flexible synthetic or fibreglass, which will not tear or stretch permitting, accurate, measurements over curved areas.

Fig 1.4 Measuring

2. Ruler or yard stick

Ruler is used for taking straight measurements on paper. Good quality sticks of smooth finished edge with markings of inches on one edge and centimetres on other side are used. Ruler of 15 cm to 30 cm long and yard stick of 1.5 meter scale marked in centimetres and inches are used.

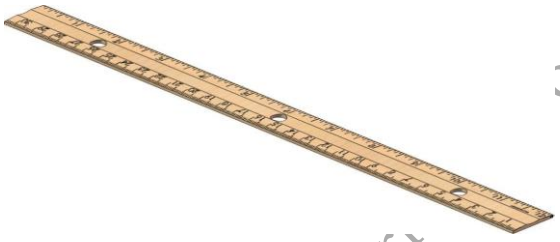


Fig 1.5 Ruler or Yard stick

3. L -square

It resembles the letter L – with perfect right angled corner. It is more accurate than ruler and convenient for measuring skirt lengths or straight lines of material before starting pattern layout. It is made of good quality, light weight, smoothly finished hardwood. Sometimes it is available with French curve, useful to mark corners, perpendiculars and curves of the pattern.

Fig 1.6 L-square with French Curve

4. Gauge

A gauge is useful to mark areas where constant measurement is desired. It is ideal for marking hems, tucks, top stitching lines, pleats, buttonhole

placements and lengths. It can also be used as stitching gauge for measuring distances that are not marked on the sewing machine. A gauge can be made for any measurements according to the pattern requirement. Notches can be cut on the gauge for marking on the fabric.

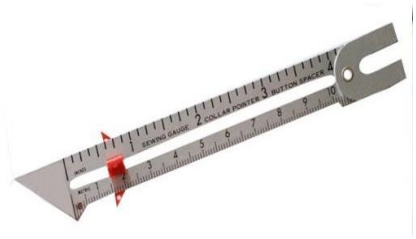


Fig 1.7 Gauge

5. Tailor's chalk

Most commonly used dress maker's marking tool is tailors chalk and made of either clay or wax. It is available in various colours like white, yellow, blue, red etc. with different sizes and shapes which facilitates quick and efficient marking. Wax based tailor's chalks are available in a 2 inch square white colour piece, mainly used for marking woollen fabrics. Tailors chalk is very safe because it does not leave any stain or permanent marking on the material. Light brushing is sufficient to rub off the marked lines completely.

Fig 1.8 Tailor's chalk

6. Marking Pencils

These are convenient and precise tools for marking cutting and stitching lines. These are available in white and pastel colours. Since the marking pencil is made of wax, the coloured lines can be removed by simple washing.

Fig 1.9 Marking Pencils

7. Tracing Wheel

It is used with or without dressmaker's carbon paper to transfer pattern marking onto the fabric. Tracing wheel is about 15 cm in length, having a wheel with saw-like periphery, which is connected by means of stem and at the rear end with a convenient handle.

Fig 1.10 Tracing Wheel

Tracing wheels are available in variety of edges:

1) Needle-point wheel, makes a faint line that is desirable on fine thin fabrics.
2) A serrated edge produces a prominent line that is good for marking heavy, loosely woven fabrics; deep points are more effective on thicker fabrics.
3) A smooth wheel is recommended for delicate fabrics such as velvet and knit that are subjected to snagging and are damaged by other types of wheels.

Use of tracing wheel in conjunction with a carbon paper is very safe, because it does not leave any coloured markings, but a line of tiny dots remain which are temporary.

8. Dress Maker's Carbon Paper

Carbon paper is used for making multiple copies of original constructional details such as shape of the pattern; cutting and stitching line can easily be transferred on the material. These are available in white and several colours.

Fig 1.11 Dress Maker's Carbon Paper

B. Cutting tools

Scissors and shears are the important tools to the dress maker. Various types and sizes of scissors and shears are designed to perform different constructional work. Common working principles of scissors and shears are similar while they differ in their application. Shears have one finger ring bigger than the other for better grip while cutting thick or several layers of patterns. Whereas scissors have identical round finger rings. A separate pair of scissors or shears should be kept for cutting the cloth and the paper pattern.

The following types of shears and scissors that are used in clothing construction:

1. Shears

i. **Dress making shear-** These are heavy duty scissors which are designed specifically with the needs of seamstresses in mind. The handle of shear is counter balance from the blades, feasible to cut fabric against a flat surface without distortion. In shears, one of the finger rings is larger than the other. The finger rings on scissors and shears are known as "bows". The length of the blade varies from 25 to 30 cm.

The edges of shears are round with a bevelled edge and sharp. Shears are available in different materials from heavy brass to very light weight materials and are comfortable in handling.

Fig 1.12 Dress making shear

ii. **Bent-handle shears-**These shears have straight blades with a handle that is off-set at an angle allowing the lower blade to stay flat on a cutting surface. The design of the handle allows the bottom blade to rest on the flat surface below the fabric without lifting the fabric from the flat surface. The blade size is less than 15 cm long. Sharp shears are the key to prevent hand fatigue and accurate cutting along pattern lines.

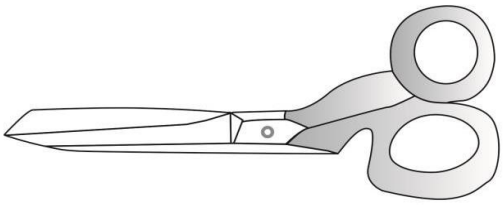


Fig 1.13 Bent-handle shears

iii. **Electric shears-**These are used mostly in sample section or sampling department. Electric shear is a type of hand tool suitable for a variety of cutting applications. They are powered shears. Most varieties are powered by alkaline batteries or rechargeable batteries. They are suitable for cutting silk, nylon, and soft, hard-to-cut fabric.

Fig 1.14 Electric shears

iv. **Pinking shear**-These shears have saw tooth blades. Hence they produce a notched cutting edge (zig zag) which gives a neat appearance to the inside of garments.

These shears are used for pinking seams or decorative edges on felt, suede, chintz, etc. and helps to prevent ravelling of seam finishes. It automatically notches and reduces bulk in seams and creates a decorative finish. Blade length range from 7" to 10.5".

Fig 1.15 Pinking shear

v. **Serrated blade shear-**Serrated blade shears range in size from 7 to 8 inches with offset blunt-shaped blades, one of which is serrated. Blades are joined by an adjustable tiny bolt and designed with equally sized ring handles. These shears are suitable for cutting polyester and other synthetics, knits, lingerie, silk, rayon and other slippery fabrics.

2. Scissors

Scissors are hand operated cutting tool. They are 5 to 6 inches long, used for light cutting, trimming, clipping corners, cutting curves, snipping threads and trimming seams and various thin materials, such as paper, cardboard, metal foil, thin plastic, cloth, rope and wire etc.. Following types of scissors are used in garment construction:

i. **Embroidery Scissors-** These are light weight cutting scissors with 3 to 4 inches in size with narrow blade tapering into two sharp points. Blades are fixed by a pin, screw or rivet and designed with two evenly sized ring handles. These scissors are ideal for clipping and notching, trimming fabric from delicate appliques, embroidery and snipping thread tails.

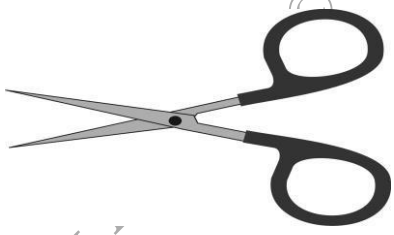


Fig 1.16 Embroidery Scissor

ii. **Button Hole Scissors-**These scissors are adjusted to cut button holes of required length. They are greatly used when many button holes are to be made. Buttonhole scissors have a special adjustable screw for securing them partially open as per the length of buttonhole required usually between 1/2" and $1^1/_4$"that prevents cutting of the stitches at the buttonhole end.

iii. **Trimming Scissors-**These are used for trimming or clipping seams and cutting corners, and are generally 15 to 17.5 cm long with narrow blades and tapered sharp points.

iv. **Snipping Scissors-**These are spring-action clippers with a finger loop featuring very short blades for cutting thread tails and clipping seams.

Guidelines while using shears and scissors are as follows:

1. Take long strokes using the length of the blades.
2. Do not use fabric-cutting scissors for cutting paper or other non-fabric materials.

3. Wipe scissors with dry lint free cloth after each use.
4. Keep the cutting blades sharp.
5. Oil the pivot screw with a tiny drop of sewing machine oil regularly.
6. Don't force a cut -this can deform the blades or spread them permanently.
7. Store scissors or shears in a box or pouch.
8. Never drop shears on the floor, it loses its sharpness.

C. Sewing tools

The correct selection of sewing thread and needle prior to garment assembly is essential to attain required finish to the garment. i.e. forming of stitches and subsequently joining of seams. Without hand and machine needle the construction work is incomplete.

The main three sewing tools are as follows:

1. Needle
2. Sewing threads
3. Sewing aids

1. Needles

A. Hand sewing needles- A hand sewing needle is a long, slender steel shaft, with an eye at one end. The shaft tapers to a fine ball point tip or wedge end. These needles function to carry the thread through the fabric while hand sewing. Needles are designed in a range of sizes, types, and classifications developed according to specific use.

For each needle type, sizes range from a low number, (coarse needle) to higher number (finer needle). Diameter of the needle shaft increases proportionately at the eye end as per the length and size.

The factors considered for the selection of hand needles are as follows:

a. Structure of fabric
b. Weight and type of fabric
c. Type of thread
d. Size and weight of thread and
e. Intended use

The needles available for hand sewing are as follows:

i. Ball point needle-A ball point needle is designed with a rounded tip and is very fine, long with a small round eye, designated as medium length, sizes range from 5 to 10 for knits and lingerie fabrics. Ball point needle slides between the yarns instead of piercing as it penetrates the fabric. It reduces occurrence of holes and runs in

fabrics such as jersey and tricot. Used for beadwork, sewing sequins, pearls, etc.

ii. **Crewels-**A needle is designed with a long oval eye and designated as medium length; sizes range from 1 to 12 to carry multiple strands of thread for embroidery. 1 to 10 number sizes are sharp pointed, medium – length needles with large eyes for easy threading. They are used for most standard embroidery stitches.

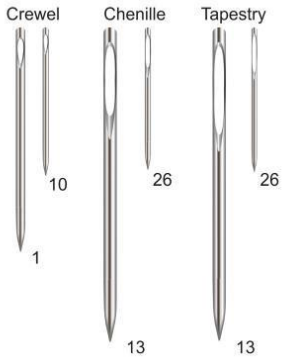


Fig 1.17 Crewel, Chenille, tapestry

iii. **Chenille-**Large-eye needle with sharp point for ribbon embroidery. Chenille needle come in different sizes ranging from 13 to 26 number that are sharp pointed, thicker and longer with large eyes. They are used for embroidery work with heavier yarns

iv. **Tapestry-**Large-eyed needle to hold multiple stands of threads with a blunt point is used for making cross stich, for sewing knitted fabrics and crochet materials.

v. **Sharps-** A needle with a small rounded eye and of medium length is called the sharp. Sizes range from 1 to 12. These are general purpose needles with sharp point for sewing and appliqué.

vi. **Darners-**A coarse needle designed with a large, long oval eye. Designated as long length, the sizes range from 14 to 18. It can carry multiple strands of thread for weaving on loosely woven woollen and open weave knit fabrics

B. **Machine sewing needles-**Sewing machine needles are made up of steel, available in different sizes and types for both industrial and home sewing machines. Size varies from fine to coarse. Higher numbers indicate thicker points and coarser needles. Needles are standardized and classified as per the model number of machine.

Majority of sewing needles are as follows:

i. **Ball-point needles** are used for sewing knits and meshes. **ii. Sharp-point needles** are used for sewing fine woven fabrics.

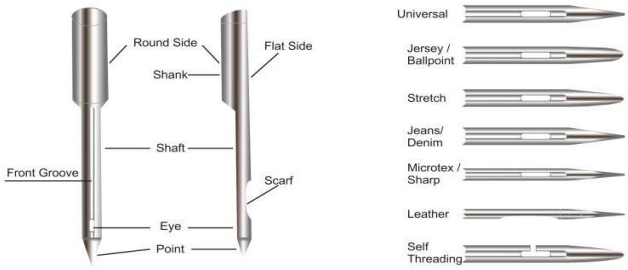


Fig 1.18 Types of needles

iii. Universal point needles are used for sewing both knits and woven. **iv. Denim needles** are used for sewing heavy, dense denim fabrics.

v. Leather needles have a wedge-shaped tip for punching through leather, even for heavy vinyl and similar fabrics.

2. Sewing threads

Sewing thread is an integral component of the garment. A wide variety of threads namely, cotton, polyester, polycot and rayon are available for varied end uses.

Fig 1.19 Sewing threads

3. Sewing aids

i. **Dressmaker's Pins-** They are available in different sizes for use in different fabrics for holding of fabrics together temporarily before machining. These are long slender pins with highly polished finish and a fine tip for easy penetration into fabric without puckering it. They must be rust proof.

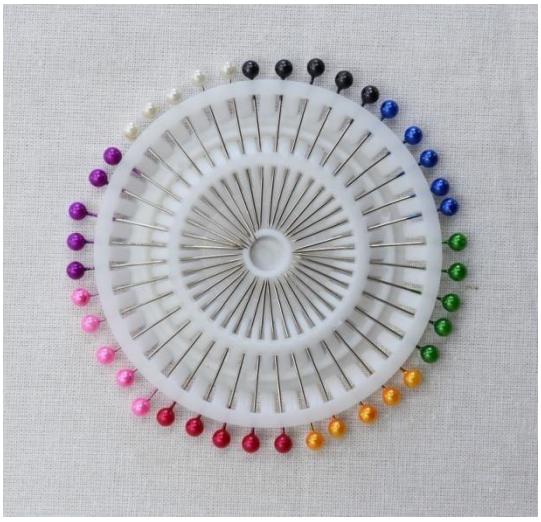


Fig 1.20 Dressmaker's Pins

ii. **Thimble-** A sewing thimble safeguard the index finger or the middle finger of the right hand while hand sewing. Helps to push needles through the material being sewn and to prevent fingers from getting pierced by the needle. It helps to protect the index finger or the middle finger while working with embroidery stitches. They are available in small (6) to large (12) sizes.

Fig 1.21 Thimble

iii. **Seam Ripper-**A seam ripper is used to open and pick out unwanted stitches/threads. The fine tip of a seam ripper picks out single thread and cuts it.

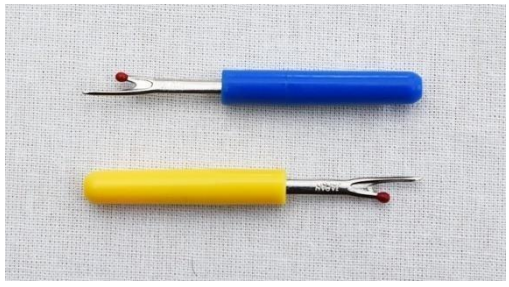


Fig 1.22 Seam Ripper

iv. **Needle Threader-**It is used for both hand and machine needles to push the thread through needle eye. It is available in different sizes. Helps for easier threading of both yarn and thread of different sizes.

Fig 1.23 Needle Threader

4. General Tools

i. **Pin Cushion -** Pin cushions are useful to store needles before and after they are removed from the fabric. They can be made at home by using soft fabric and filling it with cotton. Some pin cushions have an emery pack for cleaning and sharpening pins and needles and some cushions can fit on the wrist for handy use. Pin cushions are available in different styles like a tomato pin cushion, a wristband pin cushion and magnetic type.

Fig 1.24 Pin Cushion

ii. **Awl -** It is a small, sharp-pointed tool used to punch small, round holes for marking in paper or leathers

Fig 1.25 Awl

iii. **Loop Turner -** It is a long wire with a latch hook, used for turning bias strips to make spaghetti straps and narrow belts.

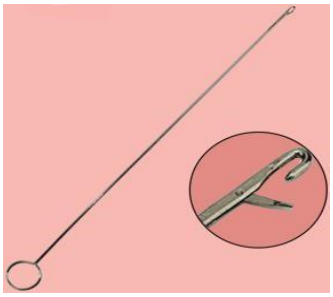


Fig 1.26 Loop Turner

iv. **Bodkin -** It is used for drawing elastic, cord or ribbon through a fabric casing. They are basically large needles with large eyes meant for easy threading.

Fig 1.27 Bodkin

v. **Point Turner -** This is a long wooden tool whose point can be inserted into the corners of collars, seams, etc., so as to give a neat pointed appearance.

Fig 1.28 Point Turner

vi. **Stiletto -** This is a pointed metal with a wooden handle and is used to make eyelet holes or openings.

vii. **Dress Form -** It is a padded form of body and may be made of wood, cardboard, plaster, reinforced plastic. It is an essential necessity in all sample rooms for designing and fitting.

Fig 1.29 Dress Form

Activities

ACTIVITY 1

Visit drafting and patternmaking department of an apparel manufacturing unit and collect pictures of the tools used in the department. With the pictures prepare a report about the tools used in drafting department.

Materials Required:

1. Pen
2. Pencil
3. Scale
4. Eraser and sharpener
5. A4 size sheets and practical file

6. Coloured pens and pencils
7. Glue

Procedure:

1. Plan a visit to apparel manufacturing unit.
2. Visit drafting and patternmaking department of the factory.
3. Observe all the tools used in the department.
4. Click photographs of the tools used in the department.
5. Paste the pictures of tools used in your practical file and write functions of each tool.

ACTIVITY 2

Make a collage of pictures of tools used for cutting and sewing.

Materials Required:

1. Pen
2. Pencil
3. Scale
4. Eraser and sharpener
5. Chart paper
6. Coloured pens and pencils
7. Glue

Procedure:

1. Using internet and available books collect pictures of tools used in cutting and sewing department.
2. Make a collage with the pictures of tools used in cutting department on a chart paper.
3. Label all the tools in the collage.
4. On another chart paper make a collage of pictures of tools used for sewing.
5. Label all the tools in the collage.

Check Your Progress

A. Fill in the blanks with appropriate words-

1. _____ is used to take straight measurements on paper.

2. A _____ is used to mark areas where constant measurement is desired.
3. _____ have one finger ring bigger than the other for better grip while cutting thick or several layers of patterns.
4. _____ shears helps to prevent ravelling of seam finishes.
5. Trimming scissors are used for _____ or _____ seams and cutting corners.
6. A ball point needle is designed with a _____ tip and is very fine.
7. Higher needle number of machine sewing needle indicates _____ points and _____ needle.
8. A _____is a long wire with a latch hook, used for turning bias strips.

B. Briefly answer the following questions-

1. Enlist tools used for drafting and pattern making.
2. Explain any two tools used in cutting.
3. Write uses of ball point and crewels needle for hand sewing.

Session 3 : Introduction to Different Types of Industrial Cutting and Sewing Machine

Introduction

Textile production is a global industry that has been a part of human civilization since the evolution of clothing in the society. The textile industry uses a wide-range of machines to produce clothes and other textile products, available in the market. These equipments vary in size from heavy-duty industrial machines that are used in major textile industries to small sized consumer sewing machines.

The different textile industry machineries are,

- Cloth measuring machine
- Cloth cutting machine
- Industrial sewing machine
- Laundry dryers
- Textile bleaching machine
- Embroidery machine
- Textile folding machine
- Textile trimmer machine

Machinery industry is a subsector of the industry that produces and maintains machines for consumers, the industry, and most other industries in the economy.

Different types of industrial cutting machines

In readymade garment industry where garments are mass produced, multiple layers of fabric are cut together to save time and energy. Cutting these multiple layers together with precision can be a challenging task which cannot be done with manual scissors, hence, an industrial cutting machine is used. These machines cut fabric with precision and ease irrespective of the properties of fabric (weight, thickness etc.

Cutting equipments and machines can be classified as follows-

1. Manual cutting
2. Semi-automatic cutting machine
3. Automatic/ computerized machine

1. Manual Cutting

Hand scissors and shears are used to cut fabric manually. Due to high requisition of manpower the use of these scissors and shears gets restricted to single or double ply of fabric. Hand scissors and shears are generally used for cutting samples.

2. Semi-automatic cutting machines

A number of semi-automatic machines are used for cutting multiple plies of fabric with precision and ease. These machines are motorized and require manual operation for cutting. Following are some commonly used semi-automatic cutting machines:

i. Straight Knife cutting machine

A straight knife cutting machine is one of the most common cutting machines used in cutting department to cut multiple plies of fabric together. As the name suggests, a straight knife cutting machine comprises of a straight knife mechanism which cuts curves accurately. This type of machine is very versatile, portable and effective.

Fig 1.30 Straight Knife cutting machine

ii. Band Knife cutting machines

A band knife cutting machine is similar to a machine used for cutting wood. It works automatically according to the height of the fabric plies. A band knife cutting machine cuts fabric plies more precisely as compared to a straight knife cutting machine.

Fig 1.31 Band Knife cutting machines

iii. Round Knife cutting machine

A round knife cutting machine helps in cutting more than five layers of fabric at a time. It is electrically operated having a round circular shaped blade with a guard in the front of the blade. It is generally used in small garment manufacturing units. There are several sizes and types of rotary cutters available. Smaller diameter blades make cutting out curves and details much easier; whereas the largerdiameter blades make quick work of long, straight cuts.

Fig 1.32 Round Knife cutting machine

iv. Die cutting machine

A die cutting machine cuts fabric lays by pressing a rigid blade through the lay of the fabric. It is used when small motifs and parts with a particular shape and pattern needs to be cut.

Fig 1.33 Die cutting machine

v. Notcher cutting machine

A notcher cutting machine is a specialized cutting machine used to cut notch in the fabric layers. Cutting notch using this machine makes the notches consistent throughout the fabric plies.

Fig 1.34 Notcher cutting machine

vi. Drill cutting machine

Sometimes, to mark end of components in a dress, specially position of pockets, darts, tucks, etc., a small hole is often drilled throughout the plies of fabric using a drill cutting machine.

Fig 1.35 Drill cutting machine

3. Automatic/ computerized cutting machines

Different types of fully automatic/ computerized cutting machines are used for cutting a very high number of fabric plies together. Following are the most common automatic machines used in industry:

i. Computer controlled knife cutting machine

In a computer controlled knife cutting machine, the marker is fed into the machine and the machine cuts exactly on the marker lines. This machine cuts the fabric as per the command given in computer system. This machine is used for large scale production where a very high number of fabric plies need to be cut at a given time.

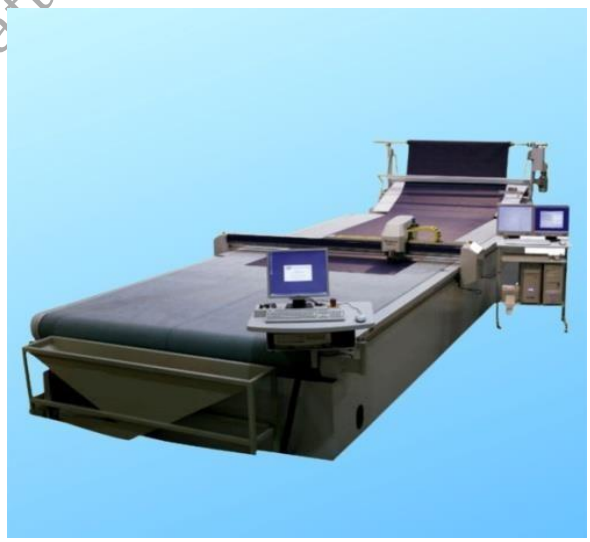


Fig 1.36 Computer controlled knife cutting machine

ii. Laser cutting machine

In a laser cutting machine, a ray of laser light is used to cut fabric lays. This machine cuts parts very precisely and is computer controlled.

iii. Water Jet cutting machine

A water jet cutting machine uses a stream of high pressure water to cut fabric lays. This type of machine cuts fabric plies precisely as the water-jet tears apart the fibers when it hits the fabric surface.

iv. Rib cutting machine

Rib cutting machine is a specialized cutting machine used to cut ribs or narrow strips of fabric from a tubular knit fabric.

Fig 1.37 Rib cutting machine

Industrial sewing machines

An industrial sewing machine is constructed with superior durability, parts and motors. Gears, connecting rods, housings and body are constructed with high-quality metals, such as cast iron or aluminium. The sewing machine has greatly improved the efficiency and productivity of the apparel industry by automating the process of stitching and saving time. Industrial sewing machines are larger, faster, and more varied in their size, cost, appearance, and task.

Industrial Sewing equipment is designed to sew the desired operation as quickly and effectively as possible.

1. Heavy Duty walking foot machines for Upholstery - Canvas - Vinyl
2. Chain stitch Machines including Over locks and Cover seams for stretchy materials
3. General Purpose Sewing Machines, various Lockstitch drop feed and needle feed
4. Special Purpose Machinery including Bar-tack, Buttonhole and Pattern tackers
5. Blind hem machines for trousers/skirts and curtains

Types of Sewing machine bed types:

Four main types of machine beds are available to allow easy access or movement of garment components that are being sewn. Appropriate selection of machine beds aids operator to work easily with minimum wastage of time. Following are the types of sewing beds available for industrial sewing machines:

1. **Flatbed -** The most common type, resemble traditional sewing machines with the arm and needle extend to the flat base of the machine used for sewing flat pieces of fabric together.

Fig 1.38 Flatbed Machine

2. **Cylinder bed -** These machines have a narrow, horizontal column which allows fabric to pass around and under the column. The diameter of the cylinder-bed varies from 5 cm to 16 cm. It allows easy rotation of tubular or cylindrical pieces such as cuffs.

Fig 1.39 Flatbed Machine

3. **Post bed -** These machines includes bobbins, feed dogs in a vertical column that rises above the flat base of the machine. The height of column ranges from 10 cm to 45 cm, that make access to the sewing area.

Fig 1.40 Post Bed

4. **Feed of the arm -** Material is fed along the axis of a horizontal column. The design limits the length of the seam sewn to the length of the column, used for stitching of sleeve and shoulder seams.

Fig 1.41 Feed of the arm

Types of feed mechanisms

The main types of feed mechanisms are as follows:

- **Drop feed**: The feed mechanism lies below the machine's sewing surface.
- **Needle feed**: The needle itself acts as the feed mechanism, which minimizes slippage and allows workers to sew multiple layers of fabric.

- **Walking foot**: The presser foot moves with the feed, allows easier performance on thick, spongy or cushioned materials.
- **Puller feed**: The machine grips and pulls straight-seemed material while sewing and can perform on canvas materials.
- **Manual feed**: The feed is controlled manually. Helps to produce delicate work such as embroidery and quilting.

Different types of industrial sewing machines

1. Single needle lock stitch machine

Lockstitch sewing machines are the most used type of sewing machines. A lock stitch is a stitch pattern where the threads passing over each other "lock" together in the hole of the fabric which they pass through.

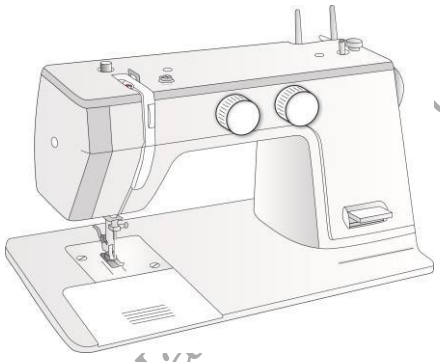


Fig 1.42 Single needle lock stitch machine

Working Mechanism

These kinds of sewing machines are generally used for sewing fabric, leather, etc. The term “single needle stitch” refers to a lockstitch. A lockstitch sewing machine uses two threads, one in the needle and the other in a bobbin. The motion of the needle and the hook correctly timed makes each stitch to be locked. The main function of the take-up mechanism of the lockstitch sewing machine is to create a stitch, together with the needle and the bobbin hook. Then the feed dogs pull the material along one stitch length, and the cycle repeats.

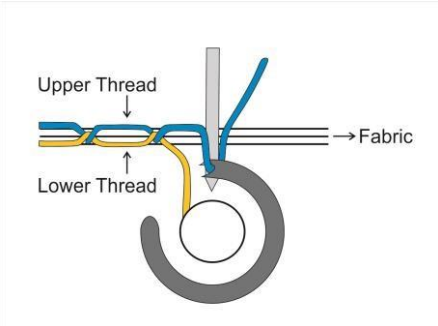


Fig 1.43 Working Mechanism

The five steps of a lock stitch formation are,

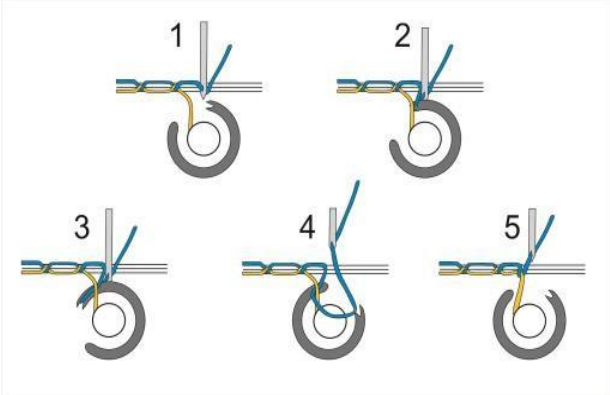


Fig 1.44 five steps of a lock stitch

Step 1: Needle penetrates the fabric to bring top thread into bobbin area.

Step 2: The needle begins to lift and as the needle rises, top thread forms a loop for shuttle hook to catch.

Step 3: Shuttle hook carries the thread loop around and under the bobbin case.

Step 4: Loop slides off hook and bobbin case, goes around bobbin thread.

Step 5: The threads are pulled up and are set into the fabric as a lock stitch.

Finally, the take up lever tightens the stitch into the material and the material is fed forward. Lock stitch is formed by the above stitching techniques of plain sewing machine.

2. Double needle lock stitch sewing machine

A double needle lockstitch machine works on the same principle as the single needle machine by using two needles and two bobbins thus resulting in two parallel rows of lockstitch. This technique of twin needle sewing is also popularly known as double needle sewing. Double needle is a needle with a single shank and two shafts. The two needle shafts have an eye each through which two threads are threaded. With the double stitching shows two parallel rows on the face of the fabric and a zig-zag stitch on the back of the fabric.

Fig 1.45 Double needle lock stitch sewing machine

Working Mechanism

1. Thread the left needle using regular upper thread.
2. Thread the right needle using extra spool of thread.
3. When the stitch forms, upper and lower threads interlock in the center of the fabric.

The double needle lock stitch is the tightest and most secure stitch. Suitable for sewing shirts, uniforms, jeans and women underwear, inseam of the trouser, etc.

3. Embroidery stitching machine

Embroidery machines involve creating designs on fabric to make a stunning work of art. Normally, highly specialized machines offer the ability to create embroidery stitches. An embroidery machine can be specialized to use different stitches such as loop stitch, chain stitch, darning stitch, chenille stitch, running stitch etc.. These stitches can be manipulated to create intrinsic designs. Usually more than one of these stitches are used to create a pattern.

Different types of embroidery machines are used to create different patterns and designs on fabric. Each of these use different mechanism and stitches. Following are types of embroidery machines used in industry-

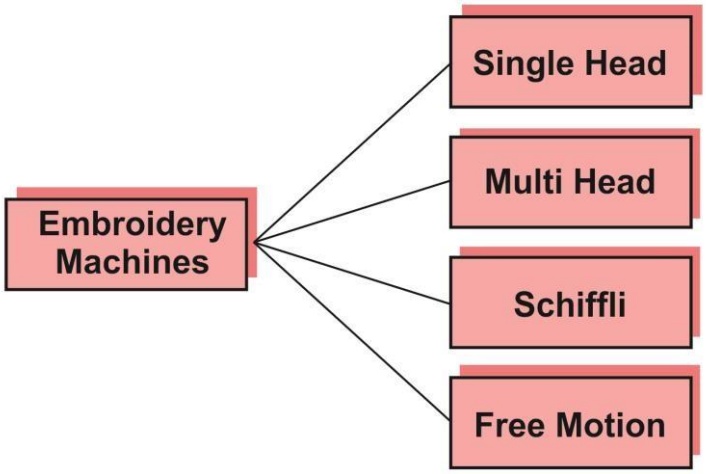


Fig 1.46 Various Embroidery Machines

i. Free Motion Embroidery Machines

A free motion embroidery machine is a basic zigzag machine which is used to create different designs. This machine is primarily used for tailoring and is manual. To create designs using this type of machine the fabric is moved manually by the machine operator. The operator uses his skills to create design.

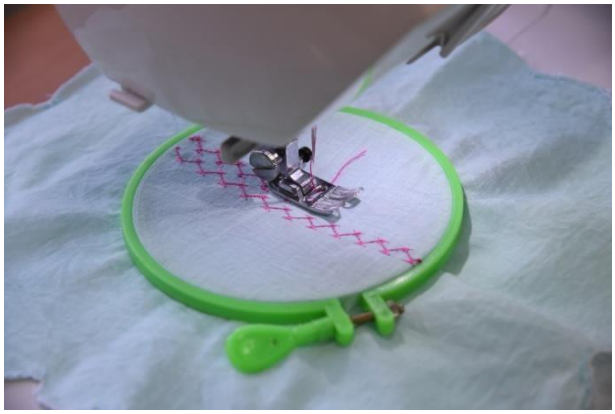


Fig 1.47 Free Motion Embroidery Machines

ii. Single Head Embroidery Machine

These machines resemble basic lockstitch sewing machine. Single head machines can be automated or manually controlled. These machines are used to create custom designs and monograms.

Fig 1.48 Single Head Embroidery Machine

iii. Multi-head Embroidery Machine

These machines are similar to single head embroidery machine. These machines contain two or more heads to create embroidery stitches. With the use of such machines, same pattern can be simultaneously created in multiple numbers depending on the number of heads.

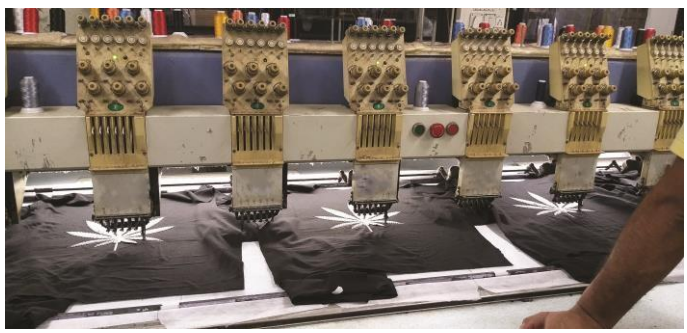


Fig 1.49 Multi-head Embroidery Machine

iv. Schiffli Embroidery Machines

Schiffli embroidery machines are similar to a loom and are used to create designs on length piece goods, laces etc. In this type of machines needles are mounted on two horizontal fixed tracks that travel to the length of the frame to create design.

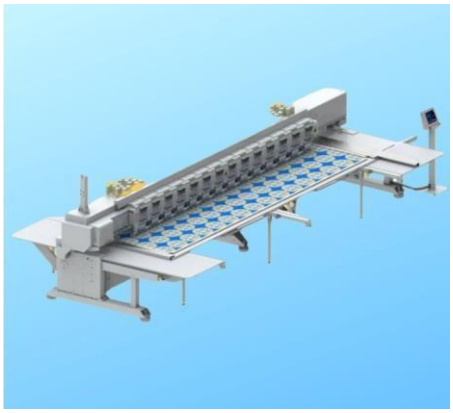


Fig 1.50 Schiffli Embroidery Machines

4. Buttonhole machine

Buttonholes are reinforced holes in fabric that enables buttons pass through, allowing one piece of fabric to be secured to another. The raw edges of a buttonhole are usually finished with stitching done either by hand or by a sewing machine.

Buttonholes often have a bar of stitches at either side of themto reinforce the raw edges of the fabric, and to prevent it from fraying.A machine-made buttonhole is usually sewn with two parallel rows of machine sewing in a narrow zig-zag stitch, with the ends finished in a bar tack created using a broader zig-zag stitch. One of the first automatic buttonhole machines was invented by Henry Alonzo House in 1862.

Fig 1.51 Buttonhole machine

A button hole machine is a type of zigzag sewing machine, with a clam feed system. These machines are either semi or fully automated. The latter being

capable of lifting, cutting and creating different shapes of buttonholes. The feed mechanism of these machines is such that it has movable plate with clamped piece of cloth.

5. Button Attaching machine

Button attaching machine is closely related with Button Hole Machine. Specially used for attaching buttons on polo shirts and woven shirts. This type of machine works in a cycle and so these are called simple automatic machine.

Fig 1.52 Button Attaching machine

Features of Buttons attaching Machine:

- Button positioning can be automatic.
- Sewing is according to the hole in button & may be cross or parallel.
- Automatic feeding of the shirt buttons
- Lock stitch or chain stitch are used.

There are different types of button attaching machine and different types of clamps are required for different types and sizes of buttons.

6. Bar-tacking Machine

Bar tack machine is a lockstitch machine. A very high density lockstitch is produced in very short length with increase in the strength of that particular place. These machines are used for sewing both woven and knitted garments.

For thin fabrics lower needle size and for thick weight fabric, high needle size is used. Bar-tracking sewing machine is used to secure pocket corners, belt loops, the open end of a button hole, zipper flies, small decorative tracks and shapes.

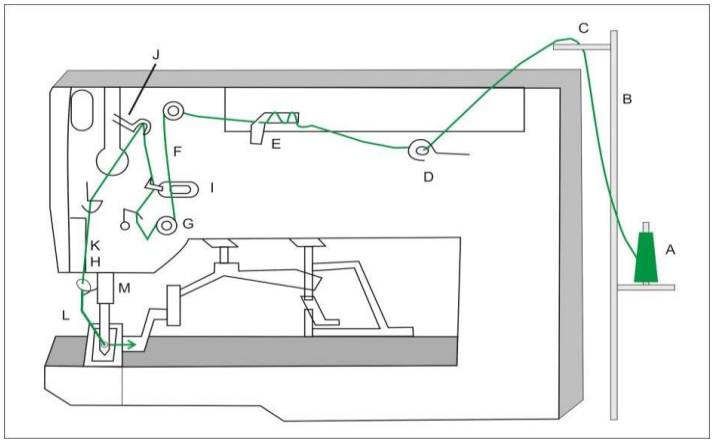


Fig 1.53 Bar-tacking Machine

A - Cone Package	F - Tensioner	K - Guide
B - Thread	G - Tensioner	L - Guide
C - Guide	H - Guide	M - Needle
D - Guide	I - Guide	
E - Guide	J - Thread take up lever	

Different parts and their functions:

- Cone - supply needle thread.
- Cone Holder - supports the cone.
- Cone Stand - supports the cone and holder.
- Stitch Density controller - controls the number of stitch per inch.
- Motor - controls the speed of the machine (rpm).
- Needle - Needle under goes accurate setting to ensure proper sewing..
- Needle Bar - holds the needle.
- Thread take up lever - controls the movement of the yarn during sewing.
- Presser foot and Feed dog - grip the fabric with proper pressure and moved the fabric in forward position smoothly.
- Working principle

This machine produces tack stitches in a small length of 1-2 cm and then sews covering stitches over and at right angles to the first stitches. Strength of stitches depends on the number of tacking stitches and the number of covering stitches.

7. Zigzag Sewing machine

A zigzag stitch is an alternative stitch used in place of lockstitch. It is a backand-forth stitch used for stitching stretchable fabrics, and joining two work pieces edge-to-edge. An Industrial zigzag sewing machine stitch moves from side to side and sewing machine's needle is controlled by a cam.

As the cam rotates, a finger like follower, connected to the needle bar, rides along the cam and tracks its indentations. As the follower moves in and out, the needle bar is moved from side to side.

Zigzag sewing machines are designed with the option to increase or decrease the length and width of zigzag stitch to create interesting effects.

Activities

ACTIVITY 1

Visit an apparel industry to study and make a report on different sewing machine used.

Materials Required:

1. Pen
2. A4 size sheets
3. Coloured pens/ pencils
4. Eraser and sharpener
5. Fevicol

Procedure:

1. Visit an apparel industry.
2. Observe and study all the sewing machine in the departments.
3. With the help of the photographs, make a report on the working and use of machines observed.

ACTIVITY 2

Prepare a collage with describing different sewing machine used.

Materials Required:

1. Pen
2. Chart paper
3. Coloured pens/ pencils
4. Eraser and sharpener
5. Fevicol

Procedure:

1. Collect images of different cutting machines used in industry.
2. Using the images, make a collage of the machines on a chart paper describing use and function of the machine.
3. Place the chart in your classroom.

Check Your Progress

A. Fill in the blanks with appropriate words-

1. A _____cutting machine comprises of a straight knife mechanism which cuts curves accurately.

2. A die cutting machine is used when _____motifs and parts with a particular shape and pattern needs to be cut.

3. _____ bed machines includes bobbins, feed dogs in a vertical column that rises above the flat base of the machine.

4. Double needle is a needle with a _____ shank and _____ shafts.

B. Briefly answer the following questions-

1. Enlist different types of industrial cutting machines.

2. Briefly explain the working of single needle lock stitch machine.

3. Classify different types of industrial embroidery machines.

Module 2 Role and Responsibilities of In-Line Checker

Module Overview

In-line checking is an important job role associated with the quality control of the apparel industry. The main responsibility of an in-line checker is to identify the defects in the fabric, cut components of the garments parts and stitching through a process of visual inspection.

The in-line quality checker checks the garments during in-process sewing and finishing production line. The quality of the end products depends on in-line quality control which is done during the production processes. If in-line quality checker identifies a defect, the product never goes to the next process without rectification.

Learning Outcomes
After completing this module, you will be able to: • Identify and understand the roles and responsibilities of an In-Line Checker • Understanding of various fibres, yarns, fabrics and fabric blends.
Module Structure
Session-1 Introduction to in-line checking and in-line checker
Session-2 Understanding of various fibres, yarns, fabrics and fabric blends

Session 1: Introduction to In-Line Checking and In-Line Checker

Introduction

In-line checker holds an important responsibility of checking the quality of the product in the process. In-line inspection in a garment industry includes

checking of partially stitched garment components and panels while pieces are still inside the line.

In-line inspection is done for 100 per cent of garments or at random of total stitched pieces. Various format of in-line checking exits in the garment stitching. In-line inspection is done thoroughly for styles with complex operations and having many numbers of operations.

Introduction of in-line checking

Inspection refers to the physical checking of merchandise for any faults and defects before it gets to the customer. Inspection in a garment industry are done at different stages of production. These stages are-

- In-process Inspection / In-line inspection
- Final inspection
- Pre-shipment inspection

In-process/ in-line inspection refers to inspection of garment parts and panels while they are in process of production. This inspection can be done at any stage before the garment gets fully finished. In-line inspection can be done for cut panels, sewn components, unfinished panels etc.. In-process or in-line inspection helps in identifying workmanship flaws and machine malfunctioning at an early stage of production. This early identification of flaws and faults helps in reducing rectification costs, increases efficiency of production and workmanship.

In-line checking or inspection is an integral part of garment production process which is carried out by an in-line checker of the company who is a part of quality team. The quality team is authorized to stop or hold the production cycle at any given point in case of identification of faults or defects. Efficiency of in-line checking process depends on the garments quality team who works for control quality and are responsible for Quality Control (QC) and Quality Assurance (QA). Garments quality department should be familiar with garment construction, specifications, workmanship and manufacturing process flows, extensive background in sample evaluation and checking and follow up. In-line Checker should have knowledge in quality control process from development stage to finished products.

Role and responsibilities of an in-line checker

In-line checking plays an important part in apparel production to ensure quality checks at different stages of production. The primary responsibility of a checker is to identify the faults in the fabrics, cut components and garment parts through visual inspection. An in-line checker is responsible for taking care of the quality of final garment at the end of each production cycle. His duty is to check for quality at early stage of production and to get defects rectified if detected. He is answerable to the company if any defective product

gets packed for shipment to the buyer. An in-line checker should have knowledge of garment components, production process, fabric and style specifications, working and use of different machines etc..

The major responsibilities of an in-line checker are as follows-

1. An in-line checker is majorly responsible for Quality Control in an apparel company. He follows a specific inspection procedure for this purpose. By following this inspection procedure, an in-line checker physically inspects garments parts , components, cuttings and unfinished panels for quality control. Visual inspection ofdetails of inspected goods/ parts is the main function of an in-line checker.
2. An in-line checker should be able to correspond with buyer for any technical and approval information or approval issue or any other required issue.
3. In-line checker should always aim at latest technology for highest quality, effective follow-up, coordination and liaison the buyer-sample department-merchandiser-industries.
4. In-line checker follows buyer's requirements and their comments.
5. Develops workbook for buyer for easy understanding of sample status.
6. Implement various types of inspection to ensure quality standards and all technical specifications are followed.
7. In-line checker should be able to support technical and quality team to resolve/re-grade technical issues.
8. To attend buyer's meeting to educate operators about technical and buyer standard.
9. Check industry in-house quality procedure and advice to follow required criteria.
10. To work and coordinate with merchandising team, buyer and supplier.
11. To follow-up all kind of customer required garments test.
12. To follow-up of quality system of daily production and report to office.
13. Check trial quantity output and give performance report to get permission for bulk.
14. Check in-line production garments in process wise and make minimum 3 in-line report per style.

The key attributes of in-line checker

In-line Checker should have good eyesight, hand-eye coordination, basic math skills and vision including near vision, distance vision, colour vision, peripheral vision, depth perception and ability to change focus.

i. Good eyesight is required to perform following duties-

- Fabric inspection, accessories inspection, cutting plan, sewing plan, finishing plan, work ticketing, bundling and in-line/ end-line. Checking reports for which good eyesight is required to perform all aforesaid activitiesby in-line checker.
- To read blueprints and specifications, measure products with tiny prints on ruler and callipers also require good eyesight.
- To record the results of their inspections through test reports.
- To report inspection and test data.

ii. Hand-eye coordination

- In-line checker may operate electronic inspection equipment's, such as coordinate-measuring machines namely fabric inspection machine, to test fabric quality, shrinkage tester to test dimensional stability of fabrics, and crease resistance, etc.. Simultaneous hand-eye coordination is required to run the machines and Equipments, to visually read and record the test data.
- Inspect, test, or measure materials or produced products.
- Examine products and materials for defects or deviations from specifications.

For all above tests and measurements and data recording hand-eye coordination of in-line checker is essential to produce good quality garments.

iii. Motor skills

Muscle coordination of any parts of the body is called motor skills. For all above activities of fingers, parts of hand and legs with to and fro and circular/upward/downward/multi directional movements to reach/lift/ carry / load and unload the materials, sorting, tying and opening of cut components and bundles is very essential in day to day activities.

- Weigh quantities of materials for use in production.
- Measure products with rulers, callipers, gauges, or micrometres.
- Test or inspect a sample for malfunctions or defects during a batch or production run.
- Remove all products and materials that fail to meet specifications
- Generally verify the parts to fit, move correctly, and are properly lubricated. Vision including near vision, distance vision, colour vision, peripheral vision, depth perception and ability to change focus
- Check products by sight, sound, or feel to locate imperfections such as cuts, scratches, missing pieces, or crooked seams. One

should have good distance vision, colour vision, peripheral vision and depth perception

- In some garment industries, the inspection process is completely automated, in-line checkers monitor the equipment, review output, and conduct random product checks. In this work process also vision including near vision, distance vision, colour vision, peripheral vision, depth perception and ability to change focus is very much required.
- Good vision is require for speedy way of separating materials, cut components, stitched garments according to length, size, fabric type, or colour during all stages of inspection processes.

v. Other specific qualities are as follows:

1. Dexterity - Able to remove sample parts or products quickly during the manufacturing process.
2. Math skills - Knowledge of basic math and computer skills are measuring, calibrating, and calculating specifications.
3. Mechanical skills - Able to operate specialized tools and machinery for testing products.
4. Physical strength - Good physical condition, to lift heavy objects.
5. Technical skills - Understand blueprints, technical documents, and manuals, ensuring that products and parts meet quality standards.
6. Confidence - A confident person with solid self-esteem able to deal with other personnel in the industry.
7. Critical Thinking - Proactive and with critical thinking skills can come up with solutions and new ways of working that can help to streamline in-line process, save money and provide a better service to the industry.

Activities

ACTIVITY 1

Make a short report on roles and responsibilities of an in-line checker.

Materials Required:

1. Pen
2. A4 size sheets
3. Coloured pens/ pencil
4. Eraser and sharpener

Procedure:

1. Based on your study collect information on roles and responsibilities of an in-line checker.
2. Categorize and arrange the date in form of a report.
3. Submit your report in classroom.

Check Your Progress

A. Write true or false for statements that follow-

1. Early identification of flaws and faults helps in increasing rectification costs, decreases efficiency of production and workmanship.
2. The primary responsibility of a checker is to identify the faults in the fabrics, cut components and garment parts through visual inspection.
3. In-line checker follows buyer's requirements and their comments.
4. Muscle coordination of any parts of the body is called hand eye coordination.

B. Briefly answer the following questions-

1. What is inspection? Enlist stages of garment production at which inspection is carried out.
2. Briefly explain key attributes of in-line checker.

Session 2: Understanding of Various Fibres, Yarns, Fabrics and Fabric Blends

A fabric is a network of yarns which in turn are made of small fibres. A number of techniques are used to convert a fibre/yarn into a fabric namely weaving, knitting, braiding, crocheting, twisting, knotting, felting, bonding etc..

There are two main types of fabrics, natural and synthetic. Natural fabrics such as wool, cotton, silk, and linen are produced from animal hair, cotton plant seed pods, fibres from silkworm cocoons, and flax fibre from the stalk of a plant, respectively. Textile fabrics are mainly used in clothing, furnishing and tapestry. Fabrics are classified based on the origin of fibres and its processes.

Textiles are made from many materials, with four main sources: animal wool, silk, plant - cotton, flax, jute, bamboo, banana, mineral-asbestos, glass fibre, and synthetic – rayon, nylon, polyester acrylic etc..

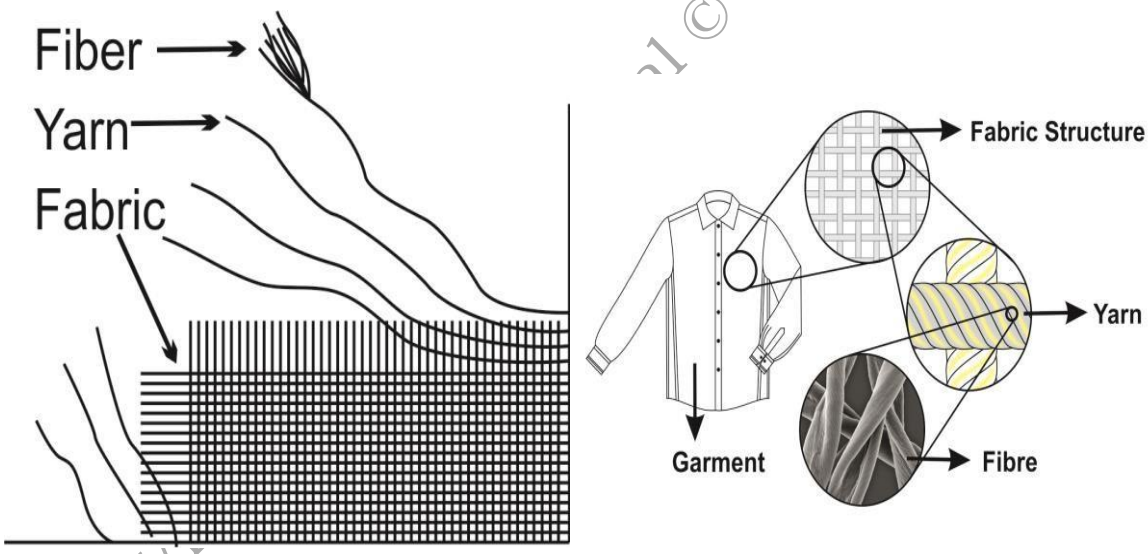


Fig 2.1 Fibre, Yarn and Fabric

Types of fibres/yarn/ fabric

Fabric is the primary source used for the production of finished good. Most of the times fabrics are sourced from natural resources such as cotton, linen, jute, wool, silk etc..

The textile industries use different types of fibres derived from nature or are manually produced. The factors influencing the development and utilization of all these fibres include their ability to be spun, their availability in sufficient quantity, the cost of production, and the desirability of their properties to consumers.

I. Classification of fibres

Fibres can be broadly classified into two types –

- **Natural Fiber** - These fibres are obtained from natural sources like plants, animal or minerals. These fibres are sustainable, biodegradable and lightweight.
- **Man Made Fiber** – These fibres are converted into fibre form through a chemical process produced in manufacturing facilities. The manmade or artificial fibres can be further classified as re-generated and synthetic fibres based on their raw material. The raw material for regenerated fibres is natural and that for synthetic fibres is chemicals.

Classification of fibres based on their origin

The common fibres that are used to make fabrics are obtained from different sources as explained below:

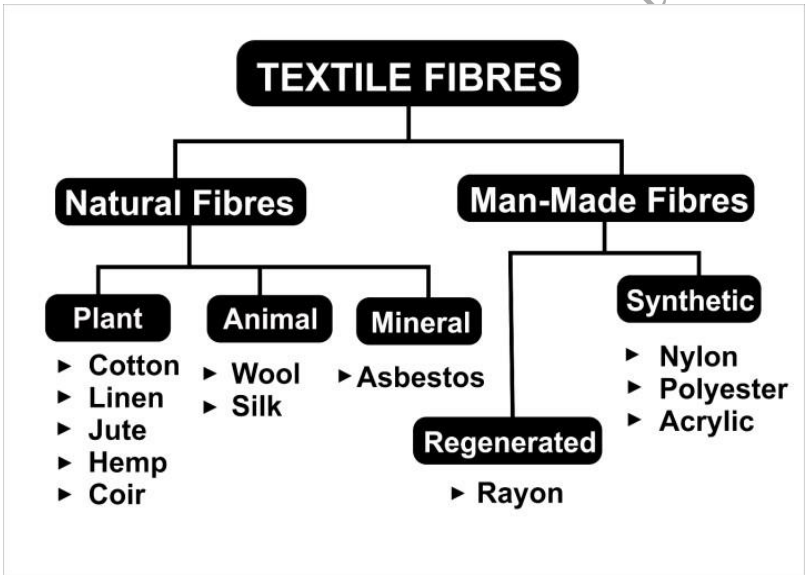


Fig 2.2 Classification of fibres

1. Natural Fibres

Plant Fibres – These fibres are derived from plant sources. There basic foundational material is cellulose. Cellulose is made up of elements like carbon, hydrogen and oxygen. Cellulosic fibres have properties like low resistance, high density, high absorbency and are strong conductors of heat. These fibres are naturally cream or tan in colour with staple length of ½ to 2 ½ inches. The natural cellulose fibres commonly encountered in consumer goods includes cotton, linen, jute, ramie and hemp. These are used in different part of world, depending on availability, cost, appearance and comfort.

- **Cotton-** Cotton is a cellulosic seed hair fibre obtained from cotton plant.It grows in a pod or protective case around the seed of cotton plant. It is soft, fluffy, absorbent, breathable and comfortable fibre.

The length of the fibres is short, hence it is characterized as a staple fibre. Cotton is suitable for high temperature and high moisture conditions due to its absorbency. Cotton has a low tensile strength but the strength increases when wet. It is a dull, non-resilient fabric and creases very easily. To improve resiliency, strength and appearance cotton is often blended with different fibres such as polyester, terrylene, etc.

- **Linen-** Linen is a bast fibre obtained from flax plant. It is strong, absorbent, conducts heat and breathable.
- **Coir, Jute, Hemp-** These fibres are obtained from plant sources and exhibit similar properties such as short fibre lengths, conducts heat etc.. Coir is a strong, short and coarse fibre obtained from coconut shell. Jute is softer and longer than coir and coarser than cotton. Hemp exhibits qualities similar to cotton.

2. Animal Fibres – These fibres are obtained from animal sources. Most common animal fibres are wool and silk. They are made from protein molecules and their essential elements are carbon, hydrogen, oxygen and nitrogen. Their basic properties are high resiliency, good elastic recovery, and low wet strength. Fibres in this group also have excellent moisture absorbency. Protein fibres are bad conductors of heat and tend to be warmer than natural cellulosic fibres.

Silk- Silk is a protein fibre obtained from the larvae of silkworms. It is a smooth, lustrous, rich fibre. The silkworm extrudes long filament silk fibres. There are majorly four types of silks-

- Mulberry Silk-Mulberry silk comes from the silkworm which solely feeds on the leaves of mulberry plant. The fibres are long and pure white in colour with high lustre.
- Eri Silk-These belong to silkworms who feed on castor oil plant leaves. The fibres are fine and short, white or cream in colour.
- Tassar Silk-The tassar silkworms are wild silkworms who feed on leaves of Terminalia and several other minor host plants.Tassar silk has a rich course texture. It is porous and breathable.
- Muga silk- Muga silk is unusual golden-yellow and has been proclaimed as “royal golden silk” of Assam. It is durable and has glossy fine texture.

Silk being an expensive fiber it is generally mixed/blended with different types of fibres such as cotton, rayon.

Wool-Wool is a protein fiber obtained from hair of sheep and other animals like goat, rabbits and yaks. The fiber is soft wavy or curly. Wool is dull and warm fabric. Wool has high resiliency and low drapability. It is generally blended with different fibres such as acrylic to provide strength and improve tactile properties.

3. **Mineral Fibres** – Mineral fibres are non-metallic, inorganic fibres. Asbestos, graphite and glass are examples of mineral fibres. These are used in thermal insulation and fireproofing materials as fillers. They are inorganic materials moulded into fibres and are used mostly in fireproof fabric. These fibres are fireproof, acid resistant and are mostly used in industrial applications.

4. **Manmade Fibres**

Manmade fibres are classified as regenerated and synthetic fibres.

Regenerated Fibres – These are manufactured using natural cellulose or protein materials which are converted into filament form chemically. Regenerated fibres are widely used in clothing industry and can be given various finishes to make them smooth and lustrous.

- **Rayon-** Rayon is a cellulosic fibre which is obtained from plant sources. The length of the fibre is such that for producing fabric from the fibres they require some chemical action. Hence, these are regenerated by converting the short fibres into liquid compound which is passed through spinnerets in the spinning process. Rayon fibres are smooth, breathable, absorbent and exhibit shine and lustre similar to silk.

5. **Synthetic Fibres-**These fibres are 100 percent chemical based. Their source of material to process of formation is all chemical based (manmade).These fibres are very strong and durable in nature and have high resistance against wear and tear. Nylon, polyester and acrylic are major synthetic fibres used in the textile industry.

- **Nylon-** Nylon is a synthetic fibre which is long chain of polymer consisting of various monomers. There are various types of nylon, but most of them consists of chains of polyamide monomers. Nylon is strong, lustrous, filament, non-absorbent, resilient, durable fibre.
- **Polyester-** Polyester is a synthetic fibre which is derived from several ester monomers that form long chain polymers.It is strong, lustrous, filament, non-absorbent, resilient, durable fibre which is used as an alternative of silk due to its sheen.
- **Acrylic-** Acrylic is a synthetic fibre which is a long chain polymer polyacrylonitrile. It is a soft, lightweight, resilient, warm fibre which is used as an alternative of wool.

Classification of fibres based on their length

Fibres can be classified as staple fibres and filament fibres based on their length. Length of the fiber enforces strength, durability & comfort properties to the yarn.

- Short Fibres- Staple Fibres
- Long Fibres- Filament Fibres

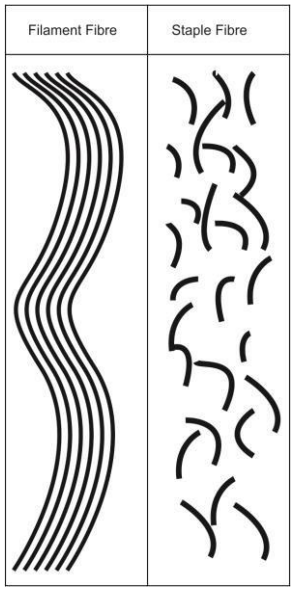


Fig 2.3 Filament and staple fibres

1. **Staple Fibres –** These fibres are short length and non-uniform in nature. All natural fibres are staple fibres except silk. Silk is the only natural filament fibre.
2. **Filament Fibres –** Filament fibres are long, continuous, uniform fibres. These fibres have higher tensile strength, lustre and durability. All man-made/synthetic fibres are filament fibres.

II. Classification of yarns

A yarn is a strand of natural or synthetic fibres spun together. It can be manufactured with natural fibres such as wool from sheep, silk from silkworms, or cotton and linen from plants. It can also be made with synthetic or man-made fibres like nylon, acrylic, and polyester. The process of making yarn from fibre is called spinning. Spinning is the process of drawing out and twisting a group or bundles of fibres into a continuous thread or yarn of sufficient strength to be woven or knitted into fabrics.

Classification of yarns based on the length of fibres

According to the length of fibres, yarns are broadly classified as staple/spun yarns or filament yarn.

1. **Spun Yarn** – Spun yarns are made from short length staple fibres that are twisted together. They are characterized by protruding fibre ends. High twist is necessary to hold the fibres together and avoid slippage from the yarn. Staple fibres are

converted into yarns by mechanical process where we first make the fibres more or less parallel and then add twist.

2. **Filament Yarn** – Filament yarn is made from long length filament fibres. This yarn has no protruding ends and is long, continuous, smooth and closely packed in texture. Unlike spun yarns these are made up of fibres of long length and therefore, need not to be highly twisted. It is majorly produced by using man-made fibres. Silk in the only natural filament fibre used in producing filament yarns.

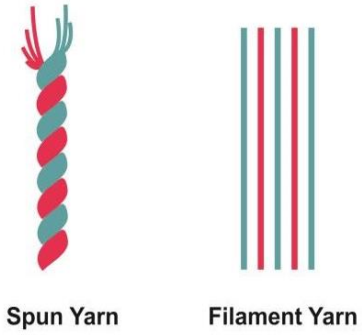


Fig 2.4 spun & filament yarn

Classification of yarns based on their twist

Fibres are converted into yarns by twisting them together. Twist is imparted to a structure of continuous fibre strand to impart strength. Twist can be defined as the relative rotation of the two ends of a yarn. The amount of twist imparted can be denoted as by turns per inch (TPI).The direction of twist can either be in a clock wise or anti clock wise and accordingly the twist is referred to as "S" or "Z" twists.

Depending upon the direction of the fibres lying along the axis of the yarn, twist can be classified into two categories:

- **S-twist-** Staple or spun yarns are twisted in clockwise direction.
- **Z twist-** Staple or spun yarns are twisted in anti-clockwise direction.

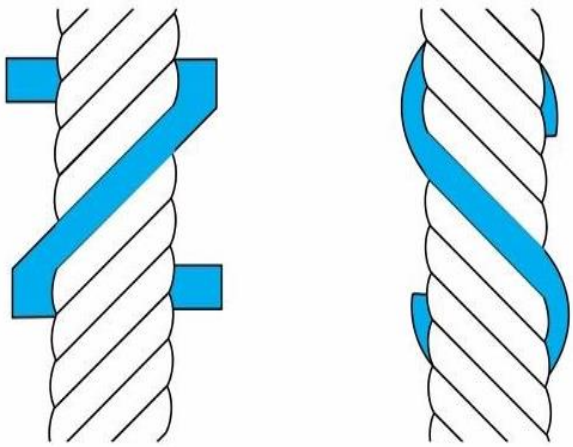


Fig 2.5 S Twist & Z Twist

Classification of fibres based on the number of yarn plies

Yarns are categorized into following categories based on the number of yarn plies:

- **Single yarn**- It is a combination of fibres or filaments which are twisted to form a yarn.
- **Plied yarns**- When two or more single twisted yarns are twisted further they form a combined/plied yarn.

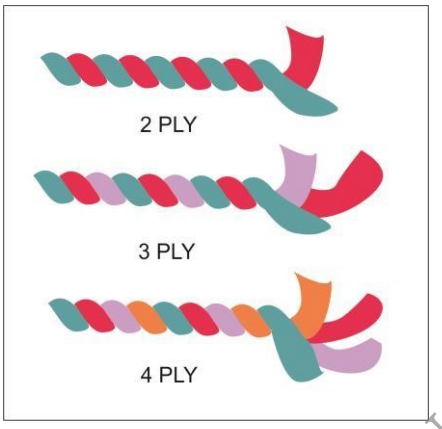


Fig 2.6 Single & Ply yarn

Single yarns are used in the majority of fabrics for normal textile and clothing applications, but in order to obtain special yarn features, particularly like high strength and for technical and industrial applications, plied yarns are often required.

- **Novelty yarns**

  A novelty/fancy yarn can be defined as one that differs from the normal construction of single or plied yarns by deliberately introducing irregularities in its construction. These yarns give different textures and effects in the fabrics. Novelty yarns can be made from all natural fibres, all man-made fibres and their blends.

  Fabrics containing novelty yarns can be used for many textile uses, like apparel such as dress fabrics, or home furnishings such as curtains and upholstery.

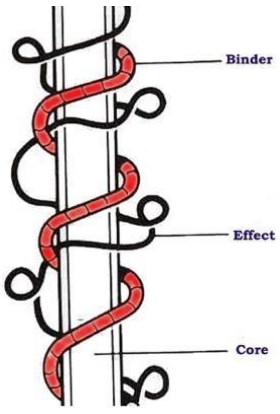


Fig 2.7 Novelty yarn

III. Classification of fabrics

Fabric is a textile structure produced by a network of yarns. Two or more yarns are interlaced or interlocked to produce a textile material. Most fabrics are produced through weaving or knitting, some are produced by non-woven processes namely, braiding, felting, bonding and twisting. There are certain features which are necessary to consider; breathability, weight, drape, durability, softness, construction and water-repellency of fabric. Most fabrics fall into woven and non- woven groups but as per construction properties woven and knitted are taken into consideration.

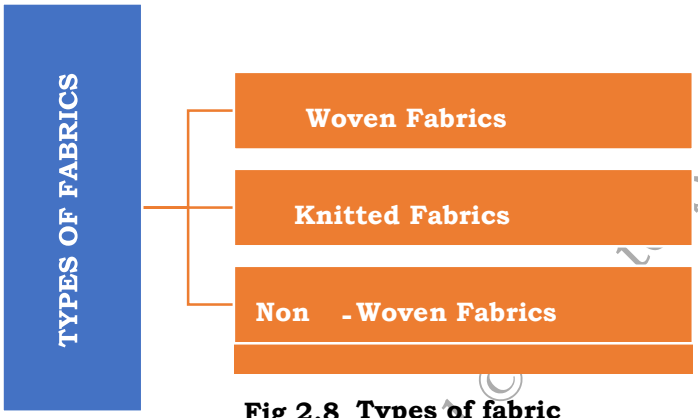


Fig 2.8 Types of fabric

1- Woven Fabrics

Woven fabrics are made by interlacing two sets of yarn. These are called warp and weft and they interlace each other at right angles. The length wise yarn are known as warp or ends, and the width wise yarns are known as weft or picks. Woven fabrics are generally more durable in nature and can be easily cut into different shapes and are excellent for making various styles of apparels. Woven fabrics are manufactured in different widths depending on the end use. The fabrics used for apparels usually contain 90 cm width. Examples of woven fabrics are – cambric fabric, casement fabric, cheese cloth, chiffon fabric, corduroy fabric, crepe fabric, denim fabric, georgette fabric, khadi fabric, muslin fabric etc..

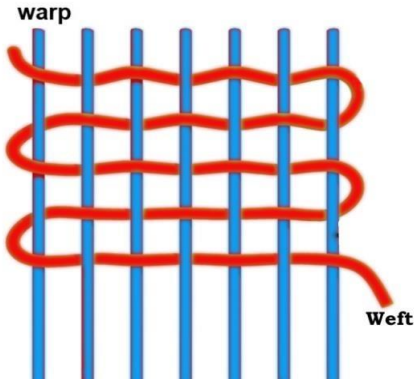


Fig 2.9 Woven fabric

2- **Knitted Fabrics**

Knitted fabrics are constructed by interloping the yarns. And it is because of this inter looping knitted fabrics are more elastic than woven fabrics. In actual construction of the fabric, loops are formed and then new loops are drawn through previously drawn loops. The continuous addition of new loops creates the knitted fabric. The loops in the knitted fabrics impart stretch in knits. Knitted fabric consists of horizontal, parallel "course" and vertical "wale". Knitted fabrics are generally light in weight and comfortable in wear. The property of knits to resist wrinkling is another factor to boost their popularity and use. Knitted fabrics are also used for designing active wear clothing due to their elastic property. Knitted fabrics are produced generally by two methods – warp knitting, and weft knitting, and each method produces a variety of types of knitted fabrics. Some examples of knitted fabrics are - Jersey knit fabric, Interlock knit fabric, Raschel knits, Milanese knit etc..

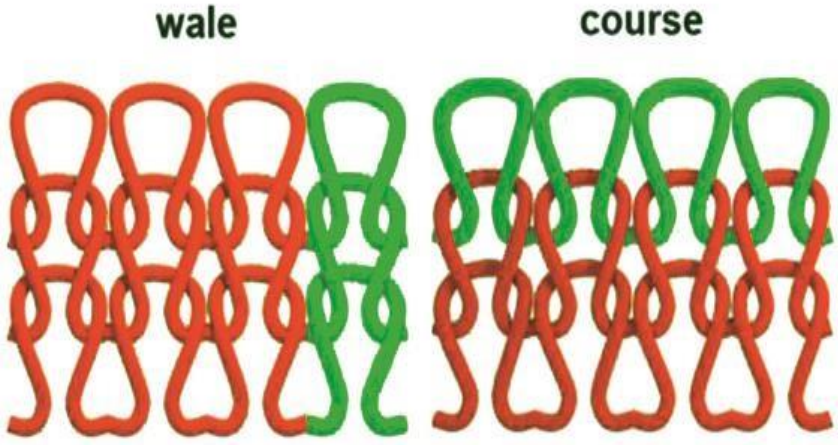


Fig 2.10 Knitted fabric

3- **Non-Woven Fabrics**

Non-woven fabric are those fabric which are made by techniques other than weaving or knitting. These include bonding, netting, knotting, braiding, macrame etc..

- **Bonded Fabric-**These are made by entanglement of fibres, using adhesives and ultimately creating a compact structure.The art of producing fabrics directly from fibres matted together began before spinning and weaving were invented. Felting is the process of making fabric by the entanglement of fibres in the presence of heat, pressure and moisture.

  These are adhesive bonded fabrics, in which the fibres are held together by a binder such as synthetic rubber, heat bonded fabrics using a mixture of manmade fibres with different melting points and needle punched fabrics, in which the fibres have been entangled by barded needles.The best known non-woven fabrics are: waddings and interfacings.

Fig 2.11 Non-woven fabric

- **Other Fabrics-**Other techniques can bebraiding or macrame. Braiding is a simple form of narrow fabric construction. The braid is created from a number of interlacing yarns. Braiding is used to create tubular structures such as hose pipes, shoe laces, cords or ropes. The simplest form of braiding is the plaiting of three strands. Whereas, macrame is created through a technique of knotting, macramé differs from other laces in texture and appearance. It is generally made of heavy yarn knotted into relatively large designs.

  Other than braiding and macramé there are various other methods of producing fabrics.These include lace fabrics, netted fabrics etc..Mostly, decorative designs on a net-like open background made by intertwining, knotting or looping of threads. Netting is an open mesh form of fabric construction that is held together by knots or fused thermoplastic yarns at each point where the yarns cross each other. Lace is a derivative of netting. The technique of lace making involve looping, knotting, braiding, twisting or stitching thread into decorative open work patterns. Example-Artificial laces, Nottingham laces, ribbon hole laces etc.

BLENDED FABRICS

Generally, a set number of yarns are used for the formation of fabrics. The type of fabrics depends on the fibres, the fabric formation techniques, machinery used for formation and finishing techniques. Fabrics are also produced based on the end-use.

Fabrics are classified based on the origin of fibres or raw materials and its processes. Each fabric carries a unique name based on their source, origin, textures, designs, weaving patterns, aesthetic values, etc..

Blended fabrics are mixture of two or more fibres or yarns spun or interconnected together in a blend. Blending can be done at two stages-

- **Fibre stage-** At this stage two or more different types of fibres are mixed together and later spun together in a single yarn.
- **Yarn Stage-** While constructing a fabric two or more types of yarns can be used to create a network, resulting in a blended fabric.

The purpose of constructing blended fabric is to combine two complementing fibres so that the resultant fabric can have favourable properties of both the fibres. For this reason the purpose of blending natural fibres with man-made fibres is to improve the characteristics of fabric.

Characteristics of blended yarn and fabric

The most popular blended fabrics are terrycot, terrywool, polyviscose. Polyester cotton viscose blends are most common. Various effects and combinations of properties are produced from these blends depending on the fibres used and the percentage of these fibres used in each blend.

a. Poly Cotton

A blend of 65% polyester and 35% cotton is common. The other blend ratios are 67/33, 70/30, 50/50, 45/55, 52/48, 80/20 polyester and cotton respectively.

A blend of 65/35 polyester and cotton produces satisfactorily a fabric for daily wear. 50/50 blend produces softer and more absorbent fabric. Polyester, when blended with cotton, contributes more strength wrinkle resistance and shape retention, cotton gives comfort as it provides absorbency and heat conduction.

b. Poly wool

The excellent shape retention of polyester is the foremost contribution to worsted fabrics which show poor shape retention. Depending on the blend ratio polyester increases the strength of wool fabrics. Wool provides warmth resiliency, drapability, and absorbency depending on the blend ratio.

Blends of polyester and wool are 65/35, 60/50, 55/45 and 50/50 respectively. A blend of 65/35 is suitable to produce a light weight, all season suiting. For medium worsted 60/40 blend is suitable. For more warmth 50/50 blends are suitable.

c. Polyester Viscose Rayon

The blend of polyester with viscose improves the durability, resiliency and shape retention. Viscose provides absorbency, soft texture, and variety of colour. A blend of polyester and viscose ranges from 65/35 ,55/45, 45/55, 48/52 respectively. Among these blend levels, 48/52 and 65/35 are used for school uniforms and suiting materials.

1. **Cotton blends**

   Cotton blends can be of many combinations. Cotton blends can either be knit or woven. They can be a plain weave, dobby, twill, corduroy, broadcloth, jacquard etc. A common blend is cotton/poly, or poly/cotton plain weave. Whichever is the higher fabric content is what's named first. Poly/cotton is used for draperies, scrubs, uniforms and trousers, made for ease of laundering and wrinkle free

qualities. Other combinations might be cotton/rayon that gives the durability of cotton along with the drapability of rayon - always a good combination, or cotton/silk which has a luxurious sheen. Cotton/linen -adds wrinkle resistance as compared to 100 per cent linen. Cotton blends are engineered for different purposes - sometimes for utility and for aesthetics. Cotton can be blended with almost any other fibre to form a useful textile and are as follows:

- cotton + polyester
- cotton + wool
- cotton + spandex
- cotton + nylons
- cotton + silk
- cotton + linen
- cotton + nylon + spandex
- cotton + nylon + wool

Merits of blending cotton with other fibres are as follows:

1. **To produce better performance -** If the properties are unfavourable in one fibre, by blending it with another type of fibre excel in all the characteristics. For example polyester when blended with cotton, the resultant fabric has moderate absorbency which is almost absent in polyester.
2. **To improve the texture –**Fibres are blended to improve handfeel and appearance of fabrics. Blending of wool fibres with polyester produce the desired texture for suiting materials. Viscose, when blended with cotton, improves its lustre and softness and thereby enhances its appearance.
3. **To reduce the cost -** The cost of a very expensive fabric can often be reduced by blending with another cheap fibre. Expensive wool is blended with cheaper polyester to reduce the cost.
4. **To produce cross-dyed effects -** Fibres with different dye affinity are combined and dyed together so that it produces interesting cross dyes effects as one fibre take up the colour and the other retains its original colour.
5. **To improve the spinning, weaving and finishing efficiency -** Spinning efficiency of polyester is improved by blending with cotton to produce spun yarns.

2. Silk blends

Silk is a natural protein fibre. It is lustrous and rich in appearance. Silk is known for its strength, appearance, lustre and wrinkle resistance.

However natural silk is degraded by sunlight, perspiration, perfumes, moisture etc.. To improve these characteristics silk is blended with different cheaper fibres. Silk is often blended with cotton to improve absorbency and to reduce cost of the resultant fabric. It is sometimes blended with polyester to aid in strength properties and to improve performance of resultant fabric against atmospheric conditions.

3. Wool blends

Wool is the textile fibre obtained from sheep and other animal hair. Wool consists of protein component Keratin, together with a small percentage of lipids. Wool fabrics have greater bulk because of high crimp, and entrap air within overlapped scales in structure, which causes the fabric to retain heat. Wool has a high thermal insulation value which yields high warmness.

Wool is blended with different fibres to improve its absorbency and drapability. It is often blended with cotton for increased absorbency and with polyester for improved drapability. Wool is also blended with acrylic to make the reduce the cost of the product. Wool blends are majorly used for suiting materials.

Activities

ACTIVITY 1

Check fabric samples and report your observations about the type of fibre, yarn and fabric properties.

Materials Required:

1. Pen
2. A4 size sheets
3. Coloured pens/ pencil
4. Eraser and sharpener

Procedure:

1. Observe and study samples of Cotton, Wool and Silk.
2. Identify the type of fibre(Natural/Man-made, Staple/Filament), yarn (Spun/ Filament, S-twist/Z-twist, Single/Ply) and type of fabric (Woven, Knitted or Non-Woven)
3. Based on your observation prepare a report.

Check Your Progress

A. Write true or false for statements that follow-

1. Man-made fibres are obtained from natural sources like plants, animal or minerals.
2. The basic foundational material of animal fibres is cellulose.
3. Spun yarns are made from short length staple fibers that are twisted together.
4. Knitted fabrics are made by interlacing two sets of yarn.
5. Fibres are blended to improve hand feel and appearance of fabrics.

B. Briefly answer the following questions-

1. What are fibres? Explain classification of fibres based on their origin.
2. Briefly explain classification of fabrics.
3. What are blended fabrics? Enlist cotton blends.

Module 3 Garment Inspection Techniques

Module Overview

An In-line checker is responsible for visually examining the raw material, partially finished components of garments and completely finished garments to check if they meet the required specifications and measurements.

These techniques should ensure that all materials and stitching methods are according to the specification provided by the buyer and meet the desired quality standards.

In-line checker should be able to identify and analyse various garment components and types of defects that might occur during the process of manufacturing, and be able to find potential solution for rectifying identified faults/defects.

Learning Outcomes

After completing this module, you will be able to:

- Evaluation of material suitability as per specifications and implementation of specification details
- Identification and analysis of various garment components
- Understand and demonstrate quality in garments

Module Structure

Session-1 Evaluation of material suitability as per specifications and implementation of specification details
Session-2 Identification and analysis of various garment components
Session-3 Understand and demonstrate quality in garments

Session 1: Evaluation of Material Suitability as per Specifications and Implementation of Specification Details

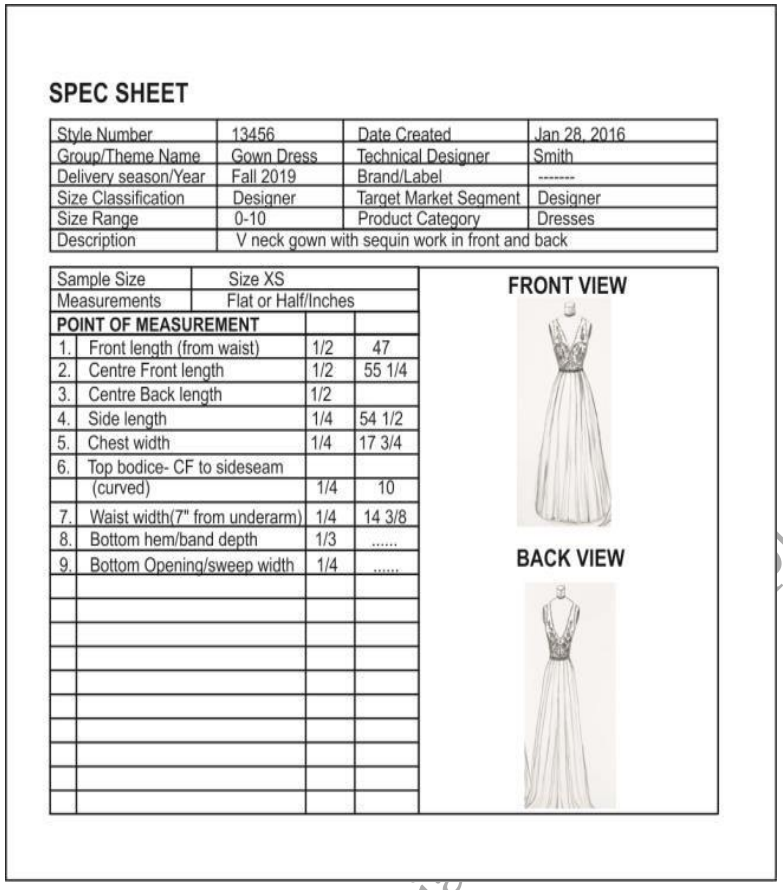
Garment specification refers to a set of document that defines all the requirements to be fulfilled to produce a garment of particular design. Specifications in apparel industry are graphic representations and written description of styling, materials, dimension, production, procedure and finishing instruction for a garment style.

The specs communicate desired visual and physical outcomes and the methods of production required in order to meet product standards. They make provisions for control of products throughout the production process. The specs for each style contain complete product style description and expectation. They provide a basis of communication with everyone involved in the product development chain including creative design, technical design, production, merchandising and marketing department that help to develop, produce, promote and sell the product as well as suppliers and vendors that provide materials and help in distribution.

Spec Sheet: A document that contains sketch of the garment design and garment construction details is called specification sheet or spec sheet or simply garment spec. Designer makes the spec sheet to communicate design detailing and how the garment to be constructed. A spec sheet includes measurements of point of measures (POM) of the apparel product/design. **Key Points of a Garments Spec Sheet:**

Normally garments specification sheet contains the following key points:

1. Sketch or design of the product,
2. Measurement chart,
3. Printing/ Embroidery instruction,
4. Stitching instruction,
5. Garments washing instruction,
6. Accessories instruction,
7. Different label instruction,
8. Necessary comments related to the product.



SPEC SHEET

Style Number	13456	Date Created	Jan 28, 2016
Group/Theme Name	Gown Dress	Technical Designer	Smith
Delivery season/Year	Fall 2019	Brand/Label	-------
Size Classification	Designer	Target Market Segment	Designer
Size Range	0-10	Product Category	Dresses
Description	V neck gown with sequin work in front and back		

Sample Size	Size XS	
Measurements	Flat or Half/Inches	
POINT OF MEASUREMENT		
1. Front length (from waist)	1/2	47
2. Centre Front length	1/2	55 1/4
3. Centre Back length	1/2	
4. Side length	1/4	54 1/2
5. Chest width	1/4	17 3/4
6. Top bodice- CF to sideseam (curved)	1/4	10
7. Waist width(7" from underarm)	1/4	14 3/8
8. Bottom hem/band depth	1/3	.....
9. Bottom Opening/sweep width	1/4	.....

FRONT VIEW

BACK VIEW

Fig 3.1 Garments Spec Sheet

For a garment to be finished as expected , the specifications should be followed at each step. It is the duty of the in-line checker to verify that the material, components and unfinished parts and panel meet the desired specifications. The in-line checker evaluates the material, cut parts and panels, unfinished or under production components of garment according to the spec sheet.

Evaluation of material suitability to specification

The in-line checker must ensure that all the material correspond to the specifications. For this, the in-line checker verifies following material and components as per specifications through visual inspection.

1. **Fabric evaluation–** In apparel industry, fabric material is a key component of garments. The in-line checker must inspect the fabric before it gets issued to the cutting department for marking and cutting parts and panels. He must make sure that the fabric received matches the specifications. For inspecting fabric visually, a fabric checking machine is used to identify visual physical defects and damages in fabric such as weaving/ knitting defects, variation in colour in a fabric role, variation in colour within a fabric lot, variation in colour as per specification sheet etc.. After visual inspection of fabric following physical properties of fabric must be inspected-

- **Thread Count (Thread per inch (TPI)-** Thread count refers to the number of threads per unit length in warp direction (ends per inch (EPI)) and weft direction (picks per inch (PPI)). The TPI evaluates the compactness of fabric which in turn evaluates the drapability, strength and other properties of fabric. The in-line checker must ensure that the TPI for the fabric coincides with the specifications of fabric.
- **GSM (Grams per Meter)-** GSM refers to the fabric weight. It is measured in grams per meter. The GSM of fabric evaluates the cover factor, drapability, compactness and overall physical properties of fabric. Fabric weight is the major deciding factor for choice of fabric for a particular design. The in-line checker must ensure that the weight of the fabric is as per the specifications.
- **Fabric Width-** Textile fabrics come in a range of widths depending on the manufacturing process of the fabric and end use. The width of the fabric is taken in consideration while preparing and implementing a garment design. Maker planning for cutting is followed as per the width of the fabric. The in-line checker must ensure that the received fabric has the desired width as per specifications and marker planning.
- **Fabric thickness –** Similar to fabric weight, fabric thickness decides the drapability, cover factor and other physical properties. The thickness of fabric decides the overall look of a garment design. The inline checker must check that the thickness of fabric matches the requirements of design.

2. **Evaluation of trims and accessories-**Various types of trims and accessories are used for making the garments aesthetic, functional and commercially required. Various kinds of trims and accessories are used on garments such as thread, buttons, zippers, laces, interlining, fusing, labels, shoulder pads, pipping cords etc.. These trims and accessories form an integral part of the garment. It is the duty of the in-line checker to inspect the trims and accessories as received before the production department gets them issued from store. For inspecting these trims and accessories the in-line checker visually examines the material as per the specification sheet. Following points should be taken into consideration while inspecting different trims and accessories-

- **Buttons-** The size, shape, colour, quality of buttons must coincide the specifications. The in-line checker must visually examine the buttons for these parameters.
- **Zippers-** Quality, size, colour, ease of movement of runner, teeth of the zipper must be checked for any defects or damages in the zippers as received before using them.
- **Shoulder pads, pipping cords, bust pads etc.**- The quality, size, comfort, shape, colour etc. of the supporting material, trims should be inspected keeping the specifications as base.
- **Labels-** A number of different labels are attached in the garment for unique identification and information about the garment. Size label, brand label, care label, fibre content label are major labels used in a

garment. Each of these labels must be inspected for quality of material, quality of print and durability of the label. Care labels and fibre content label must be given special care while inspecting. The in-line checker must ensure that the care label and the fibre content label has correct information printed on them. Care label must match with the specifications as listed in the specification sheet. All the spelling and grammatical mismatch must be carefully observed.

3. **Evaluation of cut panels-** After the planning of marker at initial stage of production, the cutting department cuts the parts and panels of the garment for sewing. For the finished garment to match the desired look, the cutting of panels must be accurate and as per measurement specifications. The in-line checker plays an important role in ensuring that the panels and parts of garment are cut accurately and correctly. To ensure this, he visits the cutting department at following three stages-

   - **While marker planning and marking of cutting lines on fabric-** The in-line checker makes sure that the marker planned includes all the parts and panels required to construct the garment. He must make sure that the cutting lines are correctly marked on the fabric before cutting.
   - **While the parts and panels are cut-** The in-line checker visually inspects all the cut parts and panels are accurately cut.
   - **While bundling and ticketing-** It is the duty of the in-line checker to inspect and make sure that the parts and panels are ticketed and bundled with their counterparts only.

4. **Evaluation of garment components in stitching line-** After bundling and ticketing the cut parts and panels of garments are pipelined in stitching line. At this stage the in-line checker must inspect that the components, panels and parts are correctly stitched. He must ensure that the sewing lines, sewing margins etc. does not deviate from tolerance level as specified in the spec sheet. He must make sure that the quality of stitch and components is maintained while in line. He visually inspects following parts, panels and components-

   - **Collars-** Collars are an integral part of a garment that finish the garment in an aesthetically pleasing manner. Generally, the collars are sewn and finished individually and later attached to the main body of the garment. While the collars are in-line, the in-line checker must check collar for quality and finish. The collar edges must be sharp or curved as per the specifications, the fall and fit of the collar must coincide with the specifications.
   - **Sleeves and cuffs–** Similar to collars, sleeves (particularly sew-in sleeves) are also sewn and finished individually and later attached to the body of garment. These must also be inspected for finish and quality as per specifications.

- **Yokes-** A yoke adds a lot of design interest in the garment. Yokes are finished individually and later attached with the main body of the garment. The in-line checker must make sure that the shape, size, finish of the yoke matches the specifications. While the yokes are attached to the main body of garment, the in-line checker must inspect the garment for measurement.
- **Parts and panels-** The parts, panels including front panel, back panel, upper panel, lower panel must be accurately attached with the counterparts. The in-line checker ensures this vital step at the initial stages of production.

Methods to receive work instructions and interpret them accurately

In an apparel industry the sequencing and planning of production line is done according to the specifications. It is the duty of the merchandiser and/or production manager to sequence the production line and instruct the workers to work accordingly.

Buyer's Name : A&C Fabrication : 100% Cotton Canvas Lable : A&C Color : White Pantone 13-5028TCX Season : Spring Summer Size : S-XXL		Designer : ABC (ID No. 123-456-7-890) Brand : A&C Date : 20-07-2020	
Description : Measurement Chart | Measurement Size : M | Developed From : Sketch | Order Qty. : 10000Pcs. Please follow our Sketch & specs for measurement.			
S.No.	**Flat Measurement**	**Marked Symbol**	**"Measurement (in inch)"**
	FRONT PART		
1	Front Length	A	30 3/6"
2	Center Front Length	B	27 1/2"
3	Side Length	C	18 3/8"
4	Chest Width	D	19 3/4"
5	Across Shoulder	E	18 ¼"
6	Across Chest	F	17 ½"
7	Bottom Opening	G	19 ½"
8	Sleeve Length	J	27"
9	Sleeve Length Underarm	K	20 ½"
10	Curve Armhole	L	8 ½"
11	Muscle Width	M	6 ½"
12	Elbow Width	N	5 ½"
13	Button to Button Position	O	3 ¼"
14	Button distance from first button	P	1 7/8"
15	Button Distance from Button Edge	Q	5 5/8"
16	Cuff Length	O	2 "
17	Cuff Width	P	3 7/8"

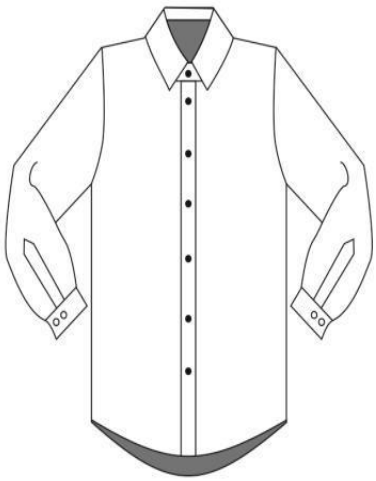


Fig 3.2 Spec sheet of shirt

For example: if a basic men's shirt (as per above specifications) has to be constructed the sequencing will be as follows-

1. The marker planning for all the garment components- front, back, sleeves, shoulder yoke, cuffs and collar will be done according to the width of the fabric.
2. Once the marker is prepared, all the garment components will be cut in cutting department . Each of these components must be bundled and ticketed.
3. The cut pieces after bundling and ticketing are sent to the production/ sewing department.
4. The merchandiser and/ or production manager select garment assembly system. Following are three commonly used assembly systems in India-

   - **Progressive bundle system-** In this system bundles of parts and panels are moved in sequence from one worker to another. Each worker in line is responsible to stitch and finish one part of the garment from the starting. The operators in the line, specialize in one operation, for example building of collars.
   - **Unit production system-** In this system a single garment is passed from one operator/ worker to anther after completion of operation that the operator specializes in. At the end of the cycle a single complete garment is unloaded. The transfer of parts of garment from one operator to another is doe through a carrier.
   - **Modular production system-** This system emphasizes on team method of assembly. Members of these teams are either responsible for entire garment or specific operation in the assembly line.

     After the selection of suitable garment assembly system the tasks are assigned to every operator in the line. Most suitable work flow for a basis men's shirt is-

     i. **Construct small parts-** Construction of collars, cuffs and sleeves

     ii. **Construct backs-** Attaching shoulder yoke with back panel

     of shirt

     iii. **Construct fronts-** Attaching plackets to front panels

     iv. **Join back and fronts-** Attaching back and front panels with side seam and shoulder seam.

     v. **Set collars and sleeves-** Sleeves and collars are set and attached with the shirt panels.

     vi. **Finish-** After the shirt is sewn, threads are clipped and the garment is sent to finishing department.

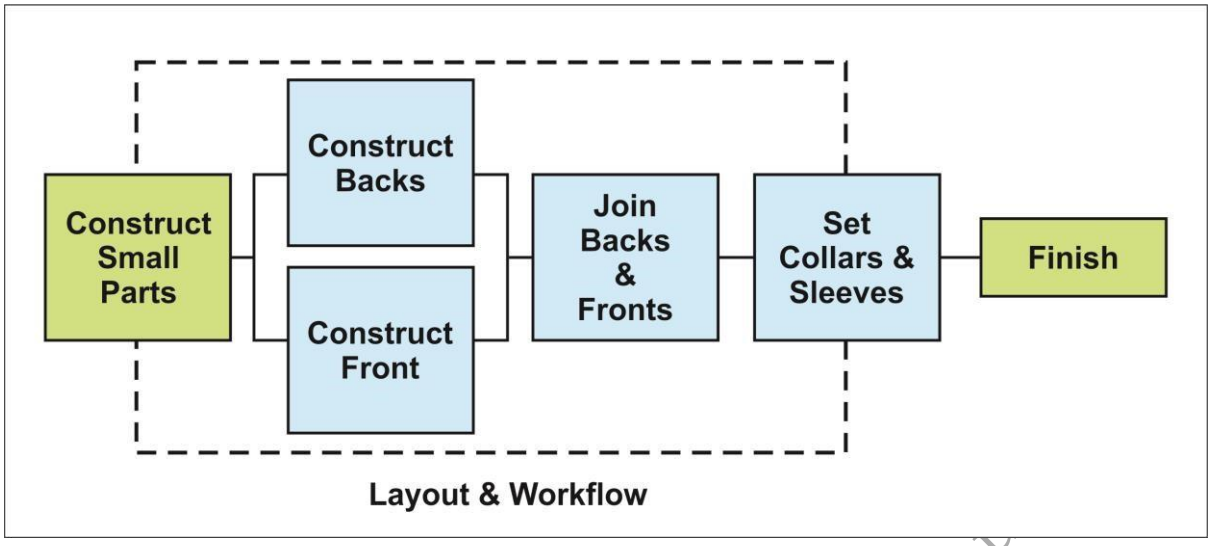


Fig 3.3 production system

Once the merchandiser and/or production manager decide the workflow and layout of work, it is conveyed to all the operators and workers in the assembly line. This information is conveyed and instructed to the in-line checker through his supervisor. A complete production plan with all the relevant information along with the process, flow and specifications are handed over to the in-line checker in form of a written document. All the critical assembly points are clearly marked and instructed to the in-line checker beforehand. The in-line checker must ensure that all the steps in the process of production are followed according to the production plan.

The in-line checker has the authority to stop the assembly line in case of disruption in the production cycle. In this case he must report his supervisors about the issue and seek guidance. If there is a critical mistake in the predicted production assembly, the in-line checker must inform his supervisors and give relevant solutions for the same.

Activities

ACTIVITY 1

Make a power point presentation on points to be kept in mind while evaluating- □ Fabric

- Trims and accessories
- Cut panels
- Garment components in stitching line

Materials Required:

1. Pen
2. A4 size sheets
3. Coloured pens/ pencil
4. Eraser and sharpener
5. Computer

Procedure:

1. Study and collect information on evaluation of fabric, trims & accessories, cut panels and garment components in stitching line.
2. With the help of the information make a power point presentation.
3. Supports the points with the help of images.
4. Present in your classroom.

Check Your Progress

A. Fill in the blanks with appropriate words-

1. _____refers to a set of document that defines all the requirements to be fulfilled to produce a garment of particular design.
2. A _____includes measurements of point of measures (POM) of the apparel product/design.
3. _____refers to the number of threads per unit length in warp direction and weft direction.
4. In an apparel industry the sequencing and planning of production line is done according to the_____.

B. Briefly answer the following questions-

1. What are specifications? Enlist the contents of garment specification sheet.
2. Briefly explain commonly used assembling systems in India.

Session 2: Identification and Analysis of Various Garment Components

A garment is a piece of clothing which is used to cover the body. A garment may serve different purpose including protection of body from environment, modesty, identification of individual etc.. Garments are categorized into-

- **Upper Garments-** These include garments that cover the upper part of the body i.e. the torso. Shirts, tops, t-shirts etc. are examples of upper garments. Upper garments are constructed using basic bodice block which consists of 5 panels namely 2fronts, 2backs, and one sleeve.

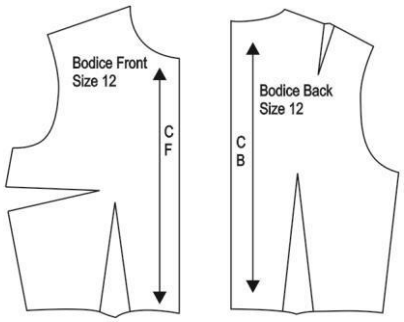


Fig 3.4 Shirt Basic Bodice Block

- **Lower Garments-** These include garments that cover the lower part of the body i.e. below abdomen. Pants, skirts, palazzo, shorts, etc. are examples of lower garments. Lower garments are constructed using basic skirt block which consists of 4 panels namely 2fronts and 2backs.

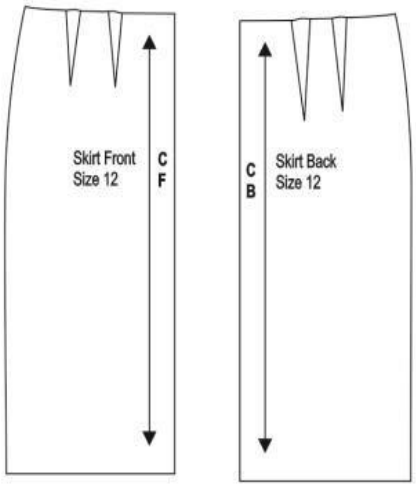


Fig 3.5 Skirt Basic Bodice Block

Components of a garment

A garment has following components-

1. **Bodice-** A bodice is a pattern that represents the upper part of the body. It closely fits the upper body without compromising with the comfort of movement of the wearer. Basic bodice covers the body till waistline while the length of the bodice may be longer or shorter than the waistline.
2. **Neckline-** A neckline is the opening in a garment that creates space for the wearer's head to slip into the garment.

Fig 3.6 Necklines

3. **Armhole-** It is a component that is used to take out arm of the wearer from the garment.
4. **Yoke-**A yoke is a component of a garment that controls fullness either within it or under or above it in a seam. Yokes can be seen in both upper body and lower body garments.

Fig 3.7 Yokes

5. **Placket openings/ closures-** A placket is the opening in the garment which aids in easy slip on and slip off garments on body.

Fig 3.8 Placket openings

6. **Sleeve-**A sleeve is the part of garment that covers the arm and is attached at or near the armhole, or armscye area of the garment. They are functional providing modesty, warmth, or protection but are equally important for providing aesthetic value to the style of the garment. A sleeve is categorized as-

   i. **Set-in Sleeve-** A set-in sleeve is a sleeve that is attached with the armhole of the body of the garment. For example- Plain sleeve, shirt maker sleeve, puffed sleeve etc.

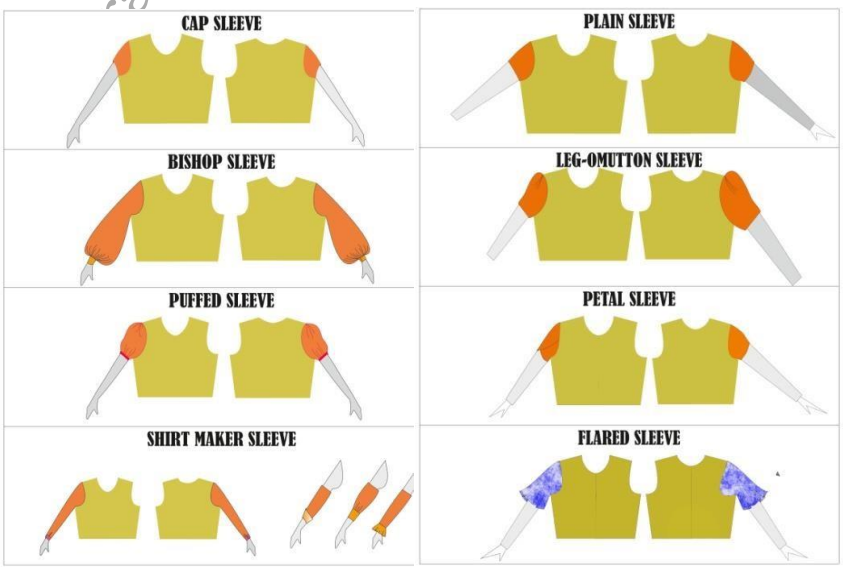


Fig 3.9 (a & b) Set-in Sleeves

ii. **Grown-on Sleeve-** These sleeves are those sleeves which are formed by creating the body of a garment and the sleeve from the same continuous piece of fabric rather than separate bodice and sleeve pieces. For example - kimono sleeve, magyar sleeve etc.

Fig 3.10 Grown-on Sleeve

iii. **Combination Sleeve-** A combination sleeve is a mix of both setin and grown-on sleeves. Either a part of bodice is cut with the sleeve and then the sleeve is attached to the remaining bodice or a part of sleeve is taken into bodice and then the sleeve and bodice are attached. For example -Raglan sleeve, saddler sleeve, dolman sleeve etc.

Fig 3.11 Combination Sleeve 7.

Cuffs- These are used to finish the sleeve ends.

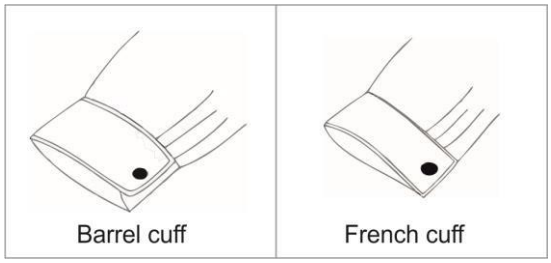


Fig 3.13 Cuffs

8. **Collar-** A collar is a component of garment which is used to finish the neckline. A collar has following parts-

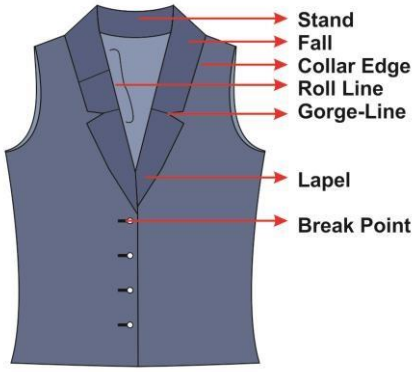


Fig 3.14 Collar

9. **Skirt-** A skirt is a lower garment which is worn from waist downwards.

Fig 3.15 Skirts

10. **Pocket-** It is a component of garment which is usually used to serves as a functional piece. It is used to house the hand and hold something in it. A pocket also serves as a decorative component in the garment.

Pockets are categorized as-

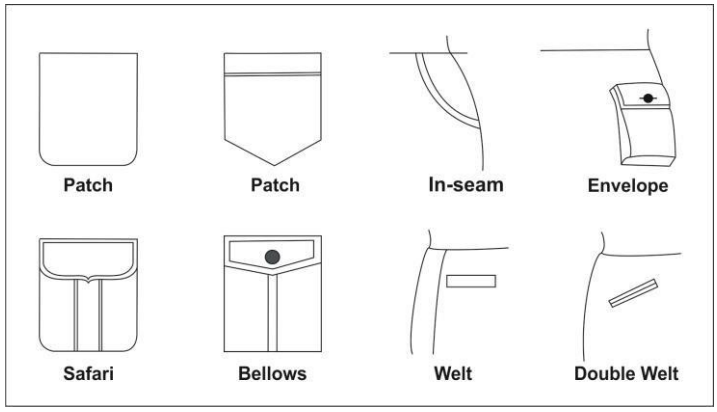


Fig 3.16 Pockets

i. **Applied or patch-** These pockets are patched or applied over the body of the garment. These are generally used in jeans back pocket, men's shirts etc..

ii. **In-seam-** These pockets are build inside seam of a garment. It is made with a pocket bag or pouch which hangs inside the garment. These are generally seen in side seams of kurta or skirts etc..

iii. **Slashed-** These pockets are created by making a cut on the garment surface and finishing the pocket opening. These are used in waist coats etc..

PARTS OF FORMAL SHIRT

A shirt is a garment that covers the upper body from neck to waist. More specifically a shirt is a garment with a collar, sleeves with cuffs, and a full vertical front opening with buttons.

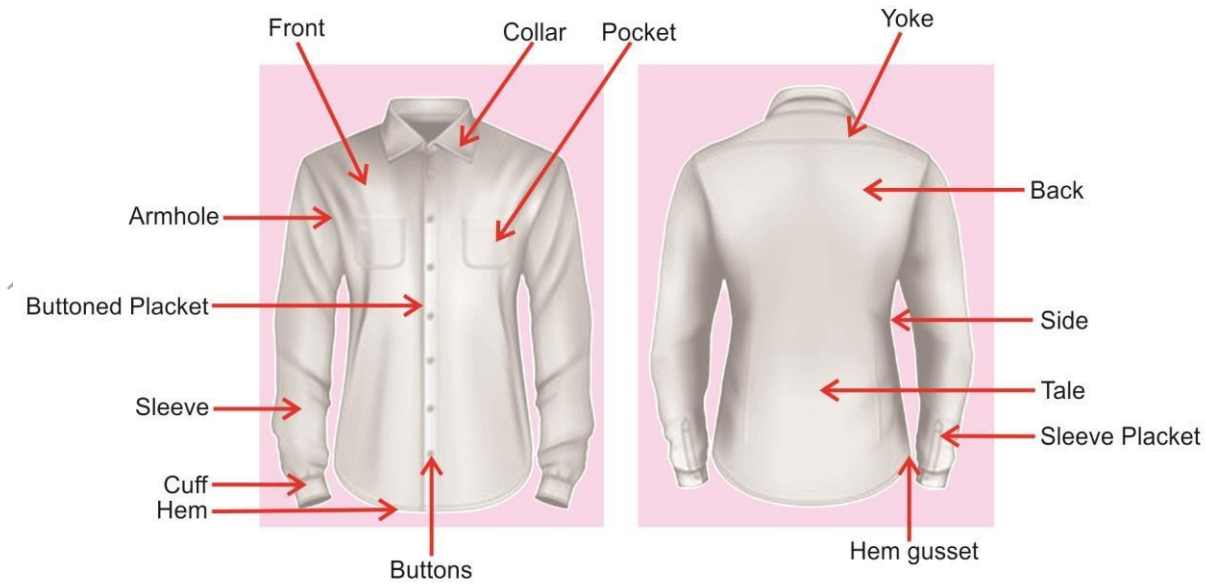


Fig 3.17 Parts of shirt

1. Body

The body of a shirt comprises of 2 fronts (fastened with buttons), 1 back and a yoke.

i. **Front-** A formal shirts comprises of 2 front panels which are fastened together with buttons. These buttons are attached on finished placket opening of the shirt.

ii. **Back-** The back panel of shirt is usually cut on fold of fabric which results in complete back panel of shirt. This back panel is then attached with the front panels by side seam.

iii. **Yoke-** The body of formal shirt generally comprises of a yoke. This yoke can be added in either front or back panels or it can be added on both front and back panels. A shoulder yoke or neck yoke are generally used in formal shirts. These yokes often control fullness in form of a pleat if attached on back shoulder. They are mostly cut in straight, 'U' or 'V' shapes.

2. Sleeve and Cuff

A formal shirt usually comprises of a shirt maker's sleeve. The sleeve edge is finished with cuffs fastened with buttons. The sleeve and cuff can be explained as-

i. **Shirt maker's sleeve-** A shirt maker sleeve is a full sleeve which closely fits the arm and has a cuff at the wrist. This type of sleeve is categorized as an add-on sleeve which is attached to the body of shirt through armhole.

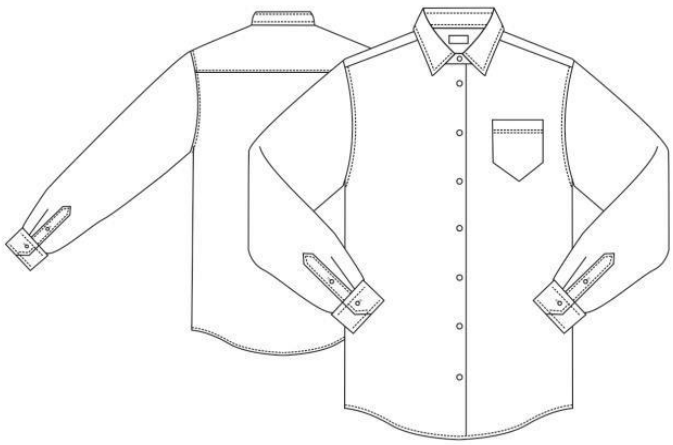


Fig 3.18 Shirt maker's sleeve

ii. **Cuff-** Cuffs are bands which are used to finish the sleeve edges. A formal shirt comprises of cuffs which are fastened with buttons. A barrel cuff is the most commonly used cuff in a formal shirt. Following are types of cuffs used in shirts to add both functional and aesthetic features-

- **Barrel cuff-**It is the most common type of cuff which is straight, openband cuff style. Long sleeved shirts and blouses usually feature barrel cuffs. The barrel cuff laps and buttons at the wrist.

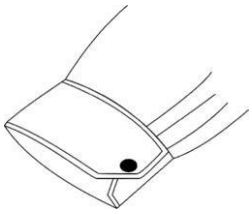


Fig 3.19 Barrel cuff

- **French/double cuff-** It is the most formal style of open- band cuff. The French cuff is constructed like the barrel cuff but twice as wide. The cuff is folded back on itself so the cuff is doubled. The opening edges are superimposed rather than lapped and fastened with cufflinks or studs through the buttonhole in each layer.

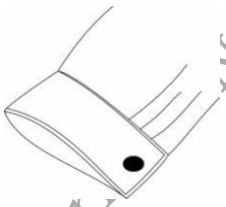


Fig 3.20 French/double cuff

- **Convertible cuff-** It is an open band that fastens with layers superimposed to resemble French cuff.

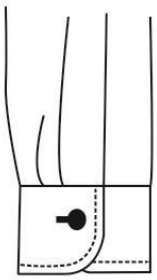


Fig 3.21 Convertible cuff

3. Neckline and Collar

A formal shirt has a basic neckline that coincide with the natural neckline of the wearer. This neckline is finished with different collars. The shirt or stand and fall collar is the most commonly used collar in a formal shirt.

Different collars used in shirts are –

- **Mandrin collar-** It is a raised collar which stands as a band on the neckline , hence also called as a band collar.

Fig 3.22 Mandrin collar

- **Stand and fall collar-** It is a collar with two pieces, a stand or a band with a shaped collar that folds back to lie flat on the body of the shirt.

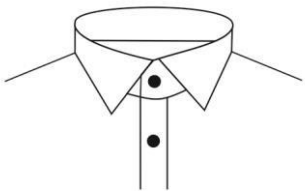


Fig 3.23 Stand and fall collar

4. Placket

Placket is the finished opening of shirt which helps in easy wearing and taking off. A formal shirt usually comprises of an even hem placket which is fastened by buttons.

Following are different plackets used in shirts-

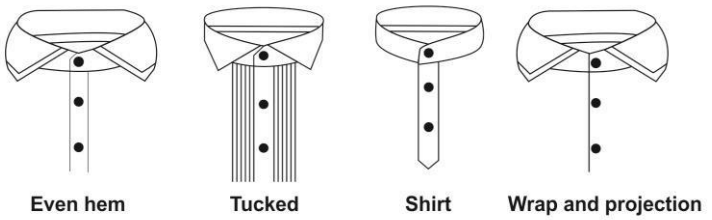


Fig 3.24 Types of shirt placket

- **Even Hem placket-** Even hem placket is the basic most placket. It is called even hem placket, because it is evenly hemmed on either side i.e. the left side and the right side both equally contribute to the placket formation.
- **Wrap and projection placket-** An even hem placket is usually seen in women blouses. As compared to even hem plackets, the fasteners are not visible in this type of placket. The opening or the edge of the placket lies exactly on the centre front or centre back. The edge of the placket lies exactly on the centre of body.
- **Shirt placket-** A shirt placket is usually seen in centre front and at the sleeve ends/cuffs in men's shirt. This placket adds value to the garment, it is the most attractive and most durable placket.

1. Pockets

A formal shirt comprises of a breast pocket. Patch pocket is the most commonly used pocket in shirts. These types of pockets are created by attaching a pre-cut piece of cloth onto the body of the garment as a patch. Flaps are added at the top of patch pockets to create design interest. These are also cut in different shapes and sizes to contribute to the aesthetics. Most of the pockets in in men's shirt are functional and aesthetic.

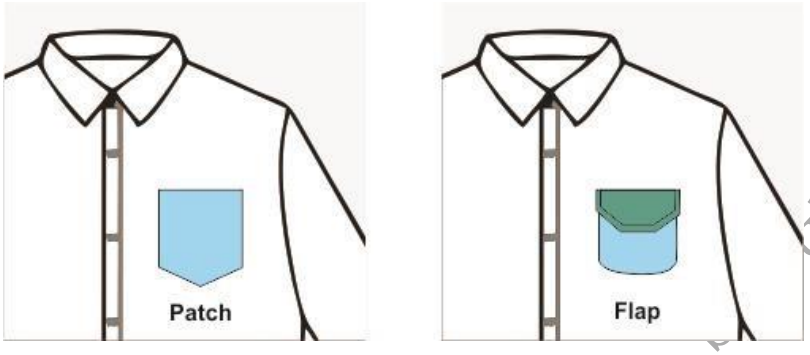


Fig 3.25 Pockets

2. Hem

The finishing at the bottom of the shirt is called hem. The hem of a shirt vary from straight to a scooped shape with hem gussets.

Fig 3.26 Hem & Hem Gusset

PARTS OF FORMAL TROUSER

Formal trousers are a garment that covers the lower part of the body, i.e. below the torso. More specifically, a trouser is a bifurcated lower garment which hands from the waist and provides room for both the legs to rest in the legs of the trousers. A formal trouser comprises of following parts-

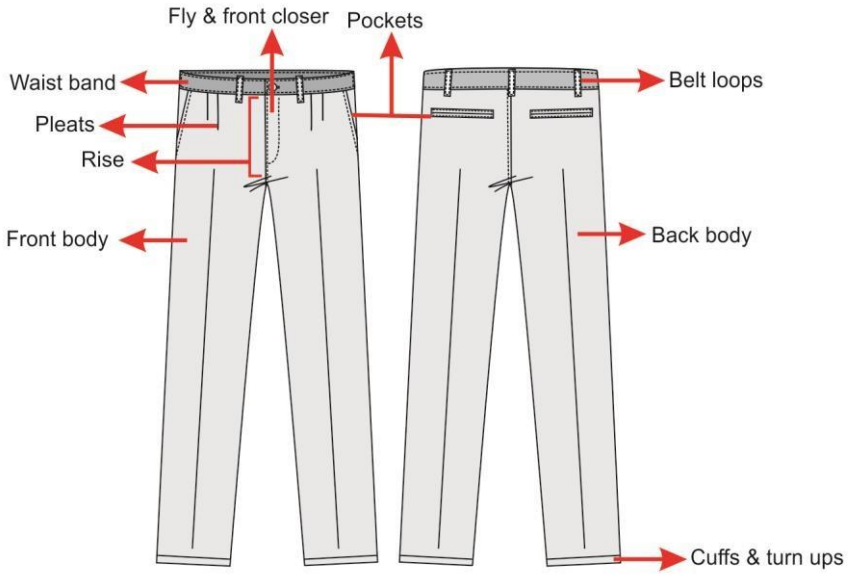


Fig 3.27 Parts of formal trouser

1. Body

The body of trousers comprises of the front panel and the back panel which are joined with side and inseam(the seam between the legs). The legs of the trousers can be straight, tapered ,wide or slim.

2. Waist band

A waistband is a thin strip of fabric that wraps around the waist and is used to finish the waist edge of trousers. The thickness of a waistband varies from a very narrow strip to a wider one. Standard width of a waistband is 1-2" wide. A waistband secures the fasteners to fasten the trousers on the body of the wearer.

3. Belt loops

Belt loops are attached to the waistband. These loops hold the belt in place. These are narrow strips of material attached to the outer side of waistband. Usually a minimum of 5 belt loops are added to the waistband.

4. Suspender buttons

Some trousers comprise of suspender buttons attached to the inside of waistband. These buttons help suspending the trouser upward creating a smooth line down the leg.

5. Side adjusters

For a perfect fit and smooth lines, trousers are constructed with side adjusters on them. These adjusters are added on the waistband. These adjusters have buckle system and are placed on each side at hip to clinch the waist of trousers.

6. Rise

The area below the waistband is called rise. It is measured from seam at the bottom of the crotch to waistband. The rise of a trouser determine the visual proportions of body.

7. Pleats

To incorporate the difference in size of the waist and the hips, some amount of fullness in form of pleats is added to the trouser which opens up at the hip area at front and/ or back. These pleats also add design interest in the trouser.

8. Pockets

A number of different pockets are added in trousers. These pockets are added on both front and back of the trousers. Different types of pockets that are added in formal trousers are-

- **Patch pocket-** Patch pockets of various shapes are generally added on the back side of the trousers at the hip area. These pockets are cut in different shapes to create design interest. Pocket flaps are sometimes added above the pocket opening.
- **In-seam pocket-** Pockets are added in the side seam of the trousers at the front. These pockets serve both functional and aesthetic purpose in a trouser.
- **Bound pocket-** Bound pockets are added at the hip area on back and sometimes at the front side of trousers. These pockets either have flaps or have button closures.

9. Fly and front closure

The taking on and off of the trousers is aided by the fly and button closure at the front side on the waistband of trousers. The fly opening usually has a zipper placket and a button closure is added at the top of the fly near the edge of the waistband.

10. Cuffs and turn ups

The hem edges of the legs of the trousers are finished either by turn ups or by addition of cuffs. Cuffs give a less formal look to the trousers, while the turned up hem gives a formal look to the trousers.

PARTS OF POLO NECK T- SHIRT

A polo neck t-shirt is a type of upper garment which is usually made from cotton jersey fabric which is medium to heavy in weight. These t-shirts are shirt sleeved and have collar and usually a breast pocket. Polo shirts have a half placket button band on the centre front, and a button band collar, sometimes in the same fabric as the body of the polo, or in contrast colour fabrics. Polo shirts often have side seam slits and tend to have a close to the body fit. Polo shirts slip on over the head.

Polo t-shirts are smart casual wear, informal garments worn by everyone regardless of age and gender.

A polo t-shirt has following parts-

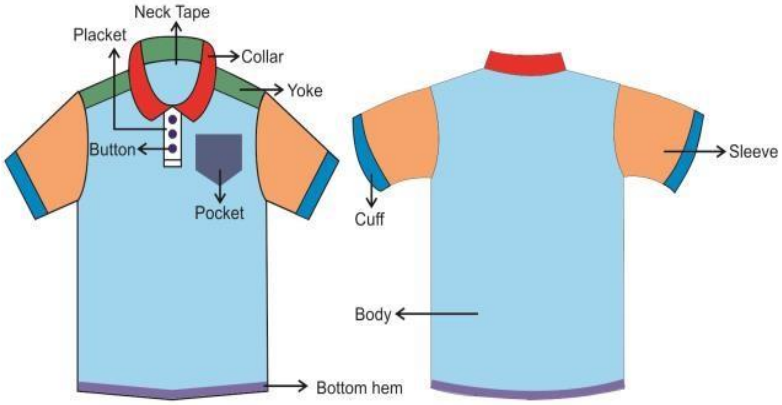


Fig 3.28 Parts of polo neck t-shirt

1. Body

The body of a polo neck t-shirt comprises of 1front, 1 back and yoke.

- **Front-** A polo neck t-shirt comprises of a front panel cut on fold of fabric. The front panel has a half placket at the neck area which is fastened by buttons.
- **Back-** Polo neck t-shirt comprises of one back panel cut on fold of fabric. The back panel is attached with the front panel with side seams.
- **Yoke-** The body of polo neck t-shirt may comprise of a yoke. This yoke can be added in either front or back panels or it can be added on both front and back panels. A shoulder yoke or neck yoke are generally used in polo t-shirts. They are mostly cut in straight, 'U' or 'V' shapes.

2. Neckline and collar

The neckline of a polo neck t-shirt usually coincides with the natural neckline. A collar is added to finish the neckline. A polo neck t-shirt comprises of a half placket that starts from the collar stand. Basic shirt collar defines a polo neck t-shirt. This collar has a collar stand which stabilises the collar and acts as a bridge between the collar and the body of the t-shirt.

3. Placket

A polo neck t-shirt has a half buttoned up even hem placket or a shirt placket which starts from the collar and ends somewhere between the chest and the waist.

4. Sleeve and cuff

This style of t-shirts generally have short plain sleeves with a turned sleeve band or cuff. However style variations can have Raglan, Saddler or long sleeves. The sleeves of a polo neck t-shirt can be explained as-

- **Plain sleeve-** A plain sleeve is a basic set-in sleeve which closely fits the arm of the wearer providing enough room for the movement of the arm. A polo neck t-shirt has a short sleeve.
- **Raglan sleeve-** A raglan sleeve is a combination sleeve in which part of bodice is cut as part of sleeve and then the sleeve is attached to the main body of garment. This type of sleeve gives a sporty look to the garment.
- **Saddler sleeve-** similar to raglan sleeve, saddler sleeve is combination sleeve in which part of bodice is cut as part of sleeve.

5. Pocket

A polo neck t-shirt comprises of a patch pocket at one side in front near the chest area. The pocket majorly serves functional purpose.

6. Bottom hem

Generally the hem of the polo t-shirt is folded inside and finished with two rows of machine stiches.

PARTS OF A BASIC JEANS

Jeans are a type of lower garments which is a variety of pants. It is a bifurcated garment which is durable and made of denim fabric. Jeans is worn by everyone irrespective of their age and gender.

A basic jeans has following parts-

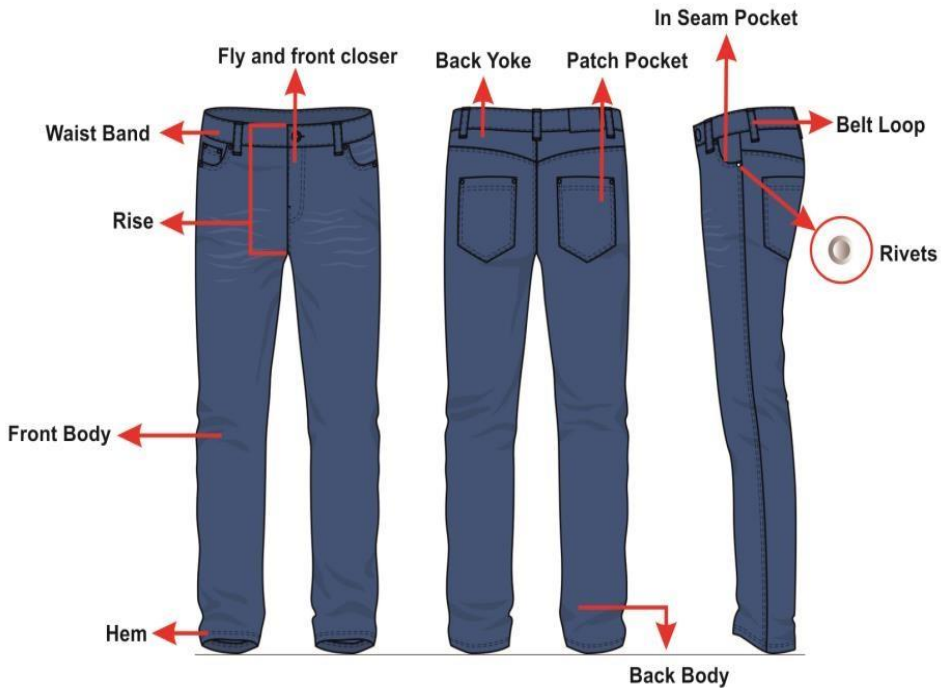


Fig 3.29 Parts of basic jeans

1. Body

The body of jeans comprises of the front panel and the back panel which are joined with side and inseam(the seam between the legs).A yoke is also added at the back panel of the jeans at hip area to provide strength at the hip area so that it doesn't get worn off easily. The yoke also ensures to provide good fit to the jeans. The legs of the jeans can be straight, tapered ,wide or slim.

2. Waist band

A waistband is a thin strip of fabric that wraps around the waist and is used to finish the waist edge of jeans. The thickness of a waistband varies from a very narrow strip to a wider one. Standard width of a waistband is 1-2" wide. A waistband secures the fasteners to fasten the trousers on the body of the wearer.

3. Belt loops

Belt loops are attached to the waistband. These loops hold the belt in place. These are narrow strips of material attached to the outer side of waistband. Usually a minimum of 5 belt loops are added to the waistband.

4. Fly and front closure

The taking on and off of the jeans is aided by the fly and button closure at the front side on the waistband. The fly opening usually has a zipper placket and a button closure is added at the top of the fly near the edge of the waistband. Usually a metal zipper is used in jeans to give a durable look to the garment.

5. Pockets

A number of different pockets are added in jeans. These pockets are added on both front and back of the garment. Different types of pockets that are added in jeans are-

- **Patch pocket-** Patch pockets of various shapes are generally added on the back side of the trousers at the hip area. These pockets are cut in different shapes to create design interest. A watch pocket (small pocket) which is a patch pocket is added inside the upper part of the front pocket at the right side of jeans is added to hold keys and to make jeans look more attractive.
- **In-seam pocket-** Pockets are added in the side seam of the jeans at the front. These pockets serve both functional and aesthetic purpose.
- **Bound pocket-** Bound pockets are added at the hip area on back and sometimes at the front side of trousers. These pockets either have flaps or have button closures.

6. Rivets

In a pair of jeans pants, metal rivets are added at the ends of pockets at the pocket openings to hold the layers of denim fabric together (denim being a thick fabric). Addition of these rivets also adds to the attractiveness of the design of jeans.

7. Rise

The area below the waistband is called rise. It is measured from seam at the bottom of the crotch to waistband. The rise of a jeans determine the visual proportions of body.

8. Hem

The hem of jeans is folded and finished by rows of machine stitching.

Activities

ACTIVITY 1

Analyse any one out of the following garments for its components-

1. Men's shirt
2. Formal trousers
3. T-shirt

Materials Required:

1. Pen
2. A4 size sheets
3. Coloured pens/ pencil
4. Eraser and sharpener

Procedure:

1. Analyse the garment and identify all the components.
2. Tabulate this information in a report.
3. Support the information with images.
4. Submit the report in your classroom.

Check Your Progress

A. Fill in the blanks with appropriate words-

1. Garments that cover the upper part of the body are called _____.
2. A yoke is a component of a garment that controls _____either within it or under or above it in a seam.
3. A _____ is a part of garment that covers the arm and is attached at or near the armhole, or armscye area of the garment.
4. A _____sleeve is a sleeve attached with the armhole of the body of the garment.
5. A formal shirt comprises of _____ front panels.

B. Briefly answer the following questions-

1. What is a garment? Briefly explain components of a garment.
2. Enlist parts of a formal shirt.
3. Classify sleeves on the basis of their attachment.

Session 3: Understand and Demonstrate Quality in Garments

Quality is the level of acceptance of a product or service. It is defined as the minimum level of performance and aesthetics that a garment is expected to reflect when it goes to the customer. Quality of a product is directly related to customer satisfaction which affects the sales of a product. Failure to maintain adequate quality can result in loss to the company and can become a barrier in achieving company goals. A number of factors determine the quality of a garment. These factors depend on the perceived image of the product that a manufacturer wants to offer to his customers. Following are few such factors that determine quality of a garment-

- **Performance-** A good quality garment must conform to its predetermined performance level. For example, if a t-shirt is designed for active wear it must easily absorb moisture, get easily dried, feel comfortable and breathable.
- **Reliability –** A good quality garment must be reliable in terms of performance, durability, aesthetics and price.
- **Durability –** Similar to performance, a good quality garment must be durable and must be able to withstand regular wear and tear.
- **Visual and perceived quality-** A good quality garment is expected to conform to perceived visual features such as the drape, fit, design etc.

Quality management is an important function in a garment industry. Total quality management (TQM) systems help an industry to achieve its quality goals and standards. TQM plays a vital role in maintaining quality, improving productivity and reducing cost by eliminating rework. Quality Assurance and Quality management are two essential aspects of TQM in an apparel industry.

QUALITY ASSURANCE AND QUALITY CONTROL

In an apparel industry, garments are assessed for quality in different phases of production. These garments are assessed in the preproduction phase (preproduction inspection), during production (in-line/ in-process inspection) and with a final inspection after the complete production and finishing of the garment.

Quality Assurance focuses on the process of manufacturing/ production. It builds and ensures quality in each step of manufacturing of a garment including, designing, production, shipment and retail.

Quality Control is a part of quality assurance which focusses on the product. It refers to the inspection of garment for quality at different stages of production. Quality of a garment is controlled at following different stages of garment production through inspection- Pre-production (Pre-production inspection)

- During Production (In-process / In-line inspection)
- Post Production (Final Inspection)

To maintain and control the quality of garment it is important to inspect the garment, keeping in mind the company standards, procedures and specifications.

INSPECTION AS A MEASURE FOR QUALITY CONTROL

Inspection of garments refers to visual analysis of a garment for different measures of quality. The main purpose of inspection is to make sure that the garment conforms to its predetermined specifications. Inspection is done to control the quality of garment at different stages of production. Checking of raw material, cut components, under stitch and under finished parts according to quality standards, specifications and procedures is known as inspection for quality control.

In-process or In-line inspection is an effective way to control quality of a product. Such type of inspection takes longer time as compared to final inspection. In-line inspection of a garment ensures total quality control of garments produced. It ensures that only good quality product reaches the customer.

Inspection at initial stages of production helps reduce cost of manufacturing by elimination rework and alterations. The acceptance or rejection of a garment depends on the predetermined tolerance levels. These levels are defined keeping in mind the AQL (Acceptable Quality Limit).

AQL SYSTEM AS A TOOL FOR QUALITY CONTROL WHILE INLINE CHECKING

AQL stands for acceptable quality limit which is defined as the percentage of defects accepted or tolerated while inspection. It is the level of quality that is least tolerable to deviate from specifications. The AQL defines defects into three categories-

- **Critical-** Critical defects define that the garment must be 100 per cent correct and must conform to the quality standards. Presence of critical defects makes the garment highly unacceptable.

- **Major-** Major defects define that the garment might be rejected by the end user, these defects can be rectified and hence can be acceptable to certain limit.
- **Minor-** These defects define that the garment slightly deviates from the specifications which the end user might not consider.
-

In-line checker works on the principles and conforms to the AQL system for inspection. In-process or in-line inspection of garments is done for parts and components of garments before sewing. This inspection starts from pattern and marker making, spreading of fabric, cutting of garment components, sewing of garment components, pressing and finishing and is done for all the in-process steps of production.

In-process inspection at different stages of production

I. Fabric Inspection

Fabric is the major raw material used for garment production. Any defect in fabric can affect the overall appearance and performance of a garment. Hence, inspection of fabric plays a very crucial role in garment production. For inspecting fabric for any defects four point inspection system is adopted by most of the organizations.

The four point system has received the widest acceptance in both the textile and garment industry. It is simple and easy to understand and execute. The amount to inspect is at least 30 per cent of the total fabric received. Rolls to be selected for inspection should be at least 3 roll from each lot.

The four point system classifies defects as follows:

Length/Size of the defect	Penalty
3" or less	1 point
Over 3", but not over 6"	2 point
Over 6", but not over 9"	3 point
Over 9"	4 point

A maximum of four points is charged to one linear yard. In this system the length of the defect is measured to determine the penalty points. The fourpoint system provides for the evaluation of the fabric on either a linear yard or

square yard basis. As the area of the fabric is more, will contain twice the number of defects. Formula for calculating the number of defect points per hundred square yards -

Defect points per hundred square yards = Total defect points found x 3600

Fabric width (inch)*fabric length(yard)

When rolls are checked according to this system and points are calculated.

II. Marker Inspection

For inspecting proper marker planning and layout following points must be considered to conform to the specifications-

- In-line checker must ensure that all the parts and components of garment are included in the marker.
- Proper labelling and coding of parts must be clearly identifiable in marker.
- Direction of patterns must be checked and the in-line checker must ensure that all the patterns fill the marker properly.
- Pattern grain-line must be incorporated while marker planning.
- Markers must consider the fabric width and length available.
- The marker must include notches and drill marks.
- The marker must provide space for free movement of cutting knife while cutting.

III. Spreading Inspection

For inspecting proper spreading of fabric for cutting following points must be considered to conform to the specifications-

- Fabric nature- While spreading of fabric the nature and texture of fabric must be considered. Crisp fabrics are easier to spread and ply while slippery fabrics are difficult to spread. The spreading methods must be chosen keeping in mind the nature of fabric.
- Ply alignment- In-line checker must ensure that the fabric ply/ layers are aligned properly.
- Ply tension/slackness- During spreading the ply tension must be checked for uniform tension.
- Bowing- Fabric should be checked for bowing defect. If found, it must be rectified by stretching fabric.
- Splicing- The process of cutting fabric across the width and overlapping in between the lays is called splicing. The in-line checker must make sure that the splice marks are accurate and clearly marked.

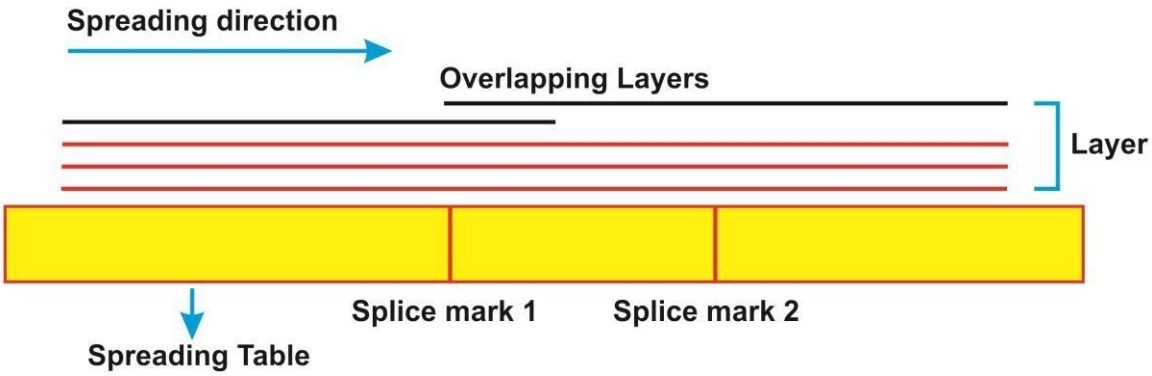


Fig 3.30 Spreading Inspection

- Grain line- In-line checker must ensure that the grain line of fabric spread conforms to the grain line marked in pattern.
- Shade variation- While spreading, shade variation must be checked for all the plies.
- Selvedge alignment- The in-line checker must ensure that the selvedge of the fabric is aligned in same manner for all the plies.
- Fabric width
- Static electricity- In-line checker must check static charge build up for the fabric plies as it created problem with flatness and accuracy of alignment.
- Direction of fabric

IV. Cutting Inspection

For inspecting proper cutting of fabric following points must be considered to conform to the specifications-

- In-line checker must ensure that there are proper notches are drill marks.
- Cutting machine and pattern precision must be checked.
- Ply to ply fusion must be ensured.
- Fuzzy, frayed, ragged or serrated edges must be taken care off.

V. Sorting/ bundling Inspection

An in-line checker must necessarily inspect numbering, sorting and bundling of cut parts and components.

VI. Sewing Inspection

An in-line checker must inspect and check machine operators work. He must analyse faults and defects encountered if any. He musk check and consider following defects-

- Sewing defects
- Seaming defects
- Assembly defects
- Pressing or finishing defects.

Identification of problems and their rectification at different stages of inline checking

I. Marker inspection

Some of the common defects are as follows -

1. Pattern Grading Defects

- **Grade not conforming to specification measurements –** This defect occurs when the final design does not conform to the specified measurements and garment parts do not match in respect to openings and seams such as collar bands, neck openings and side seams inseams, measurements of the waist, notches etc..
- **Distorted Grading –** Inaccurate patterns create twisted seams, puckering, plating and general uneconomical waste yard. This is known as distorted grading.

2. Marking Defects

Some of the common defects are as follows –

- **Shaded part -** When all the garment parts of the same section are not included in that particular section.
- **Pieces not symmetrical –** If the garment pieces are not symmetrical they will not sew properly and as a result puckering or pleating will occur.
- **Not marked by directional line –** If the patterns don't have directional line, the bias alignment of the parts of the garment will not match and cause puckering, plating, etc.
- **Skimpy marking –** Skimpy marking is caused when the marker shifts the pattern after partially marking it, in order to fit it into the space.
- **Notches and punch mark –** This defect is caused when notches or punch marks are left out or when not properly labelled.

- **Marker too wide –** When the marker is too wide the garment components will not align in the lay, hence resulting in skimpy garments.
- **Marker too narrow –** Narrow marker results in waste of material and resources.
- **Mismatched plaids –** This occurs when the marker will not block sections of the portion to fit.
- **Misdirected napping –** Misdirected napping occurs when the garment patterns are not marked in the same direction and the napped fabric.

II. Spreading Defects

Some of the common defects are as follows -

1. **Uneven spreading –** Uneven spreading can identified when the front edge of the lay is uneven, causing front and back lay not catching all ply.
2. **Narrow material –** When the rolls and bolts are too narrow to cover the width of the marker.
3. **Missed sectional breaks –** When the sectional marker is too long or too short to break.
4. **Improper tension –** When the fabric spread is either tight or loose, creating improper tension or distorting garment dimensions.
5. **Mismatching plaids –** When the material spread is either tight or loose, leading plaids line to mismatch.
6. **Misdirected napping –** The napping should be in the right direction while spreading to aid stitching of the garment.
7. **Improper matching of face of material –** When the fabrics are not laid according to the requirement, for example, face up, face down or face to face etc.

III. Cutting Defects

Some of the common defects are as follows -

1. **Marked or perforated** - The fabric must be stapled or stenciled properly to cut through the entire bundle without missing any part.
2. **Misplaced piece rate tickets or bundle members –** This defects is caused due to wrong marking or bundling sizes or land shades.
3. **Drill Marks –** When the marks of the drill are wrong, misplaced, or are not perpendicular.
4. **Opening slits –** When the cuts in the lay are at incorrect angle or not cut through the entire bundle or omitted.

5. **Improper cutting –** This defect occurs when the lines or cutting path are not followed or the knife is leaned, resulting in different sizes and distortions of clothing components.
6. **Notches –** It will create a hindrance when matching various sections of the clothing if the notches are too deep, shallow or absent.
7. **Oil spots –** This defect can occur due to improper cleaning or oiling of the equipments leaving stains on the fabric and fabric wastage.
8. **Improper knife sharpening –** If the knife edge is not sharp and smooth, it will give messy and uneven edges of the garment.
9. **Knife or scissor cut –** This defect damages the garment part by over running on the previous piece of the garments.

IV. Sorting/Bundling Defects

Some of the common defects are as follows –

1. **Not stacked in numerical order –** As the name suggest, this defect is caused by incorrect counting or stacking of the bundle.
2. **Matching Linings –** It leads to inaccurate bundling of the garment parts when incorrect material or the side is used.

V. Sewing Inspection

Some common defects are as follows –

1. **Stitching Defects**

- **Needle Damage –** Damage in the needle or needle guard leads to slow production process and fabric damage.
- **Skipped Stitch –** The irregular stitch along the seam line is known as skipped stitch and is caused due to improper handling of machine and fabric.
- **Thread break –** Thread breakage is caused due to thread tension, or thread getting stuck at thread guide.
- **Seam pucker –** Seam puckering is the gathering of fabric due to improper sewing and thread tension.
- **Wrong stitch density –** Wrong stitch density is caused due to twisting of threads or thread tension.
- **Uneven Stitch –** It is caused due to uneven sewing threads, incorrect thread path and snagging of bobbin.
- **Staggered stitch –** This is caused due to needle point and needle deflection.
- **Improper formed stitch –** It is caused due to improper threads and damaged needle.

2. **Seaming Defects –**
   - **Uneven width** - The stitch width should be equal through-out the garment.
   - **Fault stitch line –** This occurs when the stitch line is ruptured/distorted or is misaligned.
   - **Back stitch –** Back stitch must be done equally and at equal distance.
   - **Twisting –** This occurs when the seam twists around to the front and gives a distorted appearance.
   - **Check or stripe matching –** The back and front part of the garment with stripe or check pattern should match.
   - **Wrong stitch face side or back side –** This occurs when stitch does not match the pre-mark stitch line.
   - **Threads colour shade variation –** Thread colour should always match with the colour of the fabric.

3. **Assembly Defects –**
   - The size of the finished component is not of correct size.
   - Garments not accurate in size.
   - If any design skips to match while joining garment components.
   - Garment components do not join at right place.
   - Lining is tight or loose according to the garment size.
   - Direction of parts while assembly is not uniform or inaccurate.

4. **Pressing or finishing defects –**
   - Fabric burn or burn spot gets attached with the garment while finishing.
   - The fabric of the garment has marks of water spot or colour smudge due to steam press.
   - Shading of colour of fabric due to very hot ironing.
   - Buttons, fasteners, zippers, hooks etc. are insecure or broken.
   - Garment appearance is not smooth.

5. **Folding Defects –**
   - Garments are not folded according to the specifications.
   - Garment not folded with proper material like cardboard, tissues or other material.
   - Incorrect placement of pins or folds.

- Garment not buttoned or fastened.
- Label not showing from the outside after folding.

6. **Packaging Defects-**
   - Packing not made as per specification.
   - Incorrect placement of labels and tags.
   - Label not showing from the outside after packing.

Activities

ACTIVITY 1

Visit an apparel industry and observe various production stages at which inline inspection takes place. Make a chart on in-line inspection at different stages of production.

Materials Required:

1. Pen
2. A4 size sheets
3. Coloured pens/ pencil
4. Eraser and sharpener

Procedure:

1. Visit an apparel industry.
2. Observe in-line inspection in different departments for different production stages.
3. Collect pictures of inspection.
4. With the help of the pictures explain in-line inspection at different production stages on a chart.
5. Place the chart in your classroom.

Check Your Progress

A. Match the following with appropriate words-

i.	AQL		a) Marking defect
ii.	Post Production		b) Fabric Inspection
iii.	4 point system		c) Final Inspection
iv.	Marker too narrow		d) Acceptable quality limit

B. Briefly answer the following questions-

1. What is inspection? Enlist stages of production where inspection takes place.
2. What is marker inspection? Explain marking defects.
3. Briefly explain 4-point inspection system.

Module 4 Maintaining a Clean and Hazard Free Working Area

Module Overview

All industries have different type of tools, equipments 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. In-line checkers should also understand the importance of maintaining a clean and hygienic work environment. Healthy working conditions can result in increased rate of production and better operating efficiency.

In an apparel industry, an efficient process of manufacturing, distribution and transportation will lead to enhanced customer service, reduced inventory cost and further reduce/shorten the delivery time.

While we design a material handling system for an industry, it is important to understand and refer to best industrial practices to ensure that all the equipments 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 and list different cleaning substances and equipment
- Use of different cleaning substances
- 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: Handling Tools and Material Safely and Correctly

By reducing, combining, or eliminating unnecessary movement, material handling processes can be simplified. For example, use of gravity to help in movement of material with minimum manual force. 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.
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, equipments 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 i.e. from receiving, inspection, storage, production, assembly, packaging, unitizing and order selection, to shipping, transportation and the handling of returns.
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.
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.

   Tools that are mostly used for the purpose of In-line checking are as follows –

1. Hand Scissor/Thread trimmer:

Hand scissor or thread trimmer should be used safely while cutting of extra threads while in-line checking.

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 thread removing equipment:

In knitted fabrics, loose threads are removed manually by using gum tapes.

4. Garment checking work station:

At the initial stage all garments 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 garment pieces. By using a spotting gun, the solvent is sprayed 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. 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 in-line checking operations. Calculators are used for measuring any deviation from the required width or length of the fabric or garment.

8. Body Forms:

To check the drapability of garment, in line checkers might use body forms at initial stages of product development. In-line checker drapes the garment on the form to check if the garment fits the body measurements as per the specifications approved by the buyer. This helps to find out fitting defects at very initial stages of garment production which results in efficient manufacturing.

One 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.
- One 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.

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.

High levels of dust interfere with efficient production and require cleaning and maintenance operations that may otherwise spoil materials and finished products. Proper cleaning procedure and maintenance protocol is an immediate, low-cost measure to enhance overall cleanliness, consistency 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, fibres, 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 are as follows -

- Avoid placing in-line checking 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 stitching line free of any unwanted material like extra set of cartons, bins etc.
- The floor around the inspection table 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 in line checking 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's used for in line checking 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's used for in line checking and its cleaning and maintenance methods.
3. Prepare a report and submit the same.

Check Your Progress

A. Fill in the blanks with appropriate words–

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 machinery, 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 and correctly. One must also ensure safe disposal or recycle of the used chemicals.
- Regular checks must be conducted for ensuring that the environment is safe with hygienic work areas and sufficient ventilation to remove dust and fumes, and has also has noise-level control systems.
- 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 in-line checking 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 like emergency exit and evacuation areas.
- The floor surfaces of the chemical storage areas should be made of a material which is impervious to the types of chemicals being stored therein.
- Mostly there is a requirement of 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 at the event/time of a chemical leak or a spill.

- All chemical storage areas should be secured (i.e. locked) when the factory is not in operation.
- 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 meters between such chemicals if a separate storage is not possible.
- One 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. One may use sand for this purpose, although commercial adsorbent products are preferable.
- One should also ensure availability of equipments such as shovels, a container and suitable protective gloves, eyewear, etc.

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..

One can minimize waste generation in an apparel industry by following below measures-

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 materials 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 Store Properly

All the locations of inventory, tools, supplies, and assets necessary to manufacturing processes must be clearly marked throughout the store. 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.

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.

DISPOSAL OF WASTE AT DESIGNATED LOCATIONS

The requirement for an efficient and effective waste management is motivated by the increasing cost and decreasing availability of natural resources. It helps in reducing input and waste disposal costs. 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.

One 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.
- While sorting waste one must make sure that the recyclable items are put to correct use and not go in waste. The responsibility of keeping a track of the bins and finding a feasible solution for elimination, reduction or reuse of the waste generated should be carefully assigned to selected employees and workers and there should also be clear cut policy for this.
- Hazardous and non-hazardous 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 and sewing 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. One must 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, an_____ to 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 garments such as kurta, tops, trousers, shirts, skirts etc. Apparel manufacturing companies thus have different departments such as cutting department, sewing department, store department, fabric checking 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, polythenes and labels, papers etc.

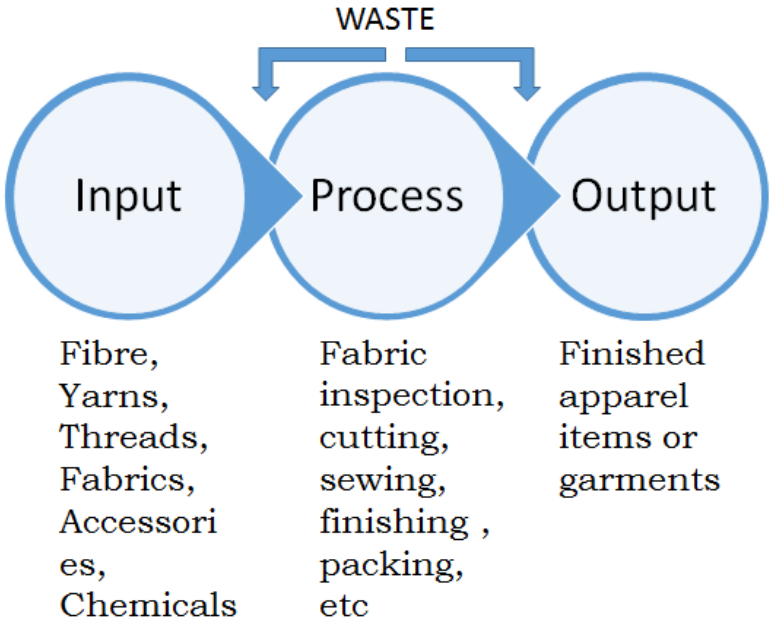


Fig 4.1 Production Process

Fig 3.x 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 present in building materials, such as asbestos and polychlorinated biphenyls (PCBs)
- 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.

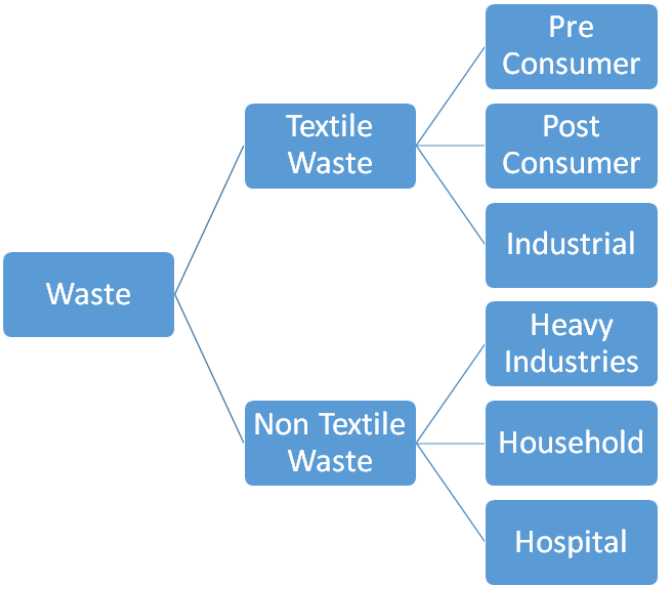


Fig. 4.2 : Waste & its Type

WHAT IS TEXTILE WASTE?

Waste generated by textile and apparel companies is called textile waste. It can be fibers, yarns, or fabrics. Fabric scrap, threads, 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 by Fabric Checking Department.

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 of.

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?

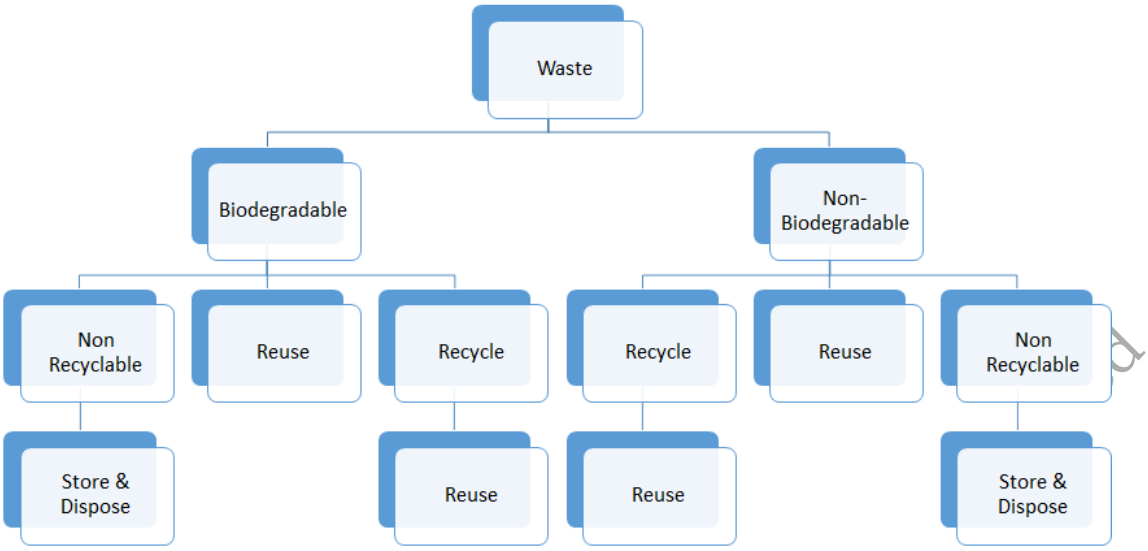


Fig. 4.3: Classification of the Waste on the basis of Recyclability

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.

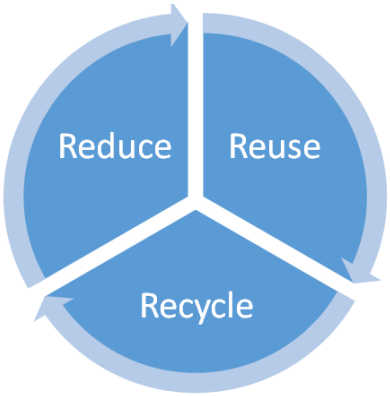


Fig. 4.4 : 3R's of Waste Management

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 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 supervison 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 primaryrole 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:

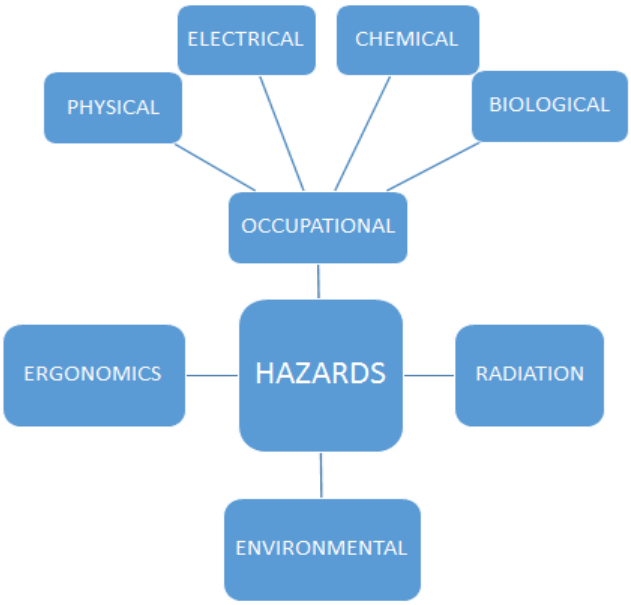


Fig. 4.5 : Types of Occupational Hazards

The above mentioned flowchart briefly summarize 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, and broken body parts among others.
    - Electrical hazards: These basically include electrocution arising out of various factors including negligence.
    - 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, 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, 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
- 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.

Materials required

Pens/Pencils

Register/file

Eraser/sharpener

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

1. Explain the term hazard in the context of occupation. Also state and define the types of potential hazards
2. Why is environmental, health and safety legislation required in an organization? Substantiate with a real life example.
3. What is waste. How is Textile waste different from Non-textile waste and what do they include?
4. List the various types of wastes generated in a fabric checking department of a company.

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 equipments

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. In line checking operation does not involve any cleaning agent as such. However the work area needs to kept clean, hygienic and disinfected at all times so that no damage is caused.

CLEANING AGENTS FOR GENERAL HOUSEKEEPING

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..

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 production of apparels, 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 labelled and only authorized 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

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 classified based on usage as follows:

- Cleaning agents for regular cleaning
- Cleaning agents for hard surface care formulations Cleaning agents for maintenance of machinery and space

1. Cleaning agents for regular cleaning:

These are primarily used to ensure upkeep, shine and functionality of the fabric. They include antifoams, surfactants, chelants, solvents, dispersants and polymers which ensure high performance fabric care.

2. 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 (viscosity modifier) that clean more efficiently and improve fabric performance.

3. Cleaning agents for maintenance of machinery and space:

The substances that are used to ensure the upkeep of the machinery and to keep the space neat and tidy are referred to as cleaning agents. These include disinfectants, floor cleaners, etc..

The job of the cleaning agents cannot be completed without the application of cleaning equipment. Hence, cleaning equipment plays an important role.

CLEANING EQUIPMENTS

The tools that are put to use to apply cleaning agents for the purpose of stain removal both for the purpose of housekeeping and in line checking are referred to as cleaning equipments.

The different types of cleaning equipments are as follows:

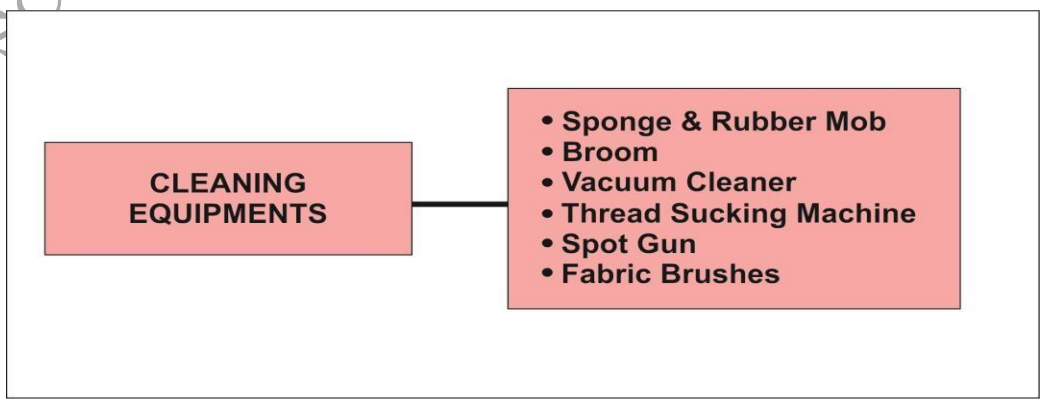


Fig 4.1 Cleaning equipments

1. Cleaning equipments for housekeeping

i. **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. ii. **Broom –** Their use is to sweep the working areas.

iii. **Dustbin –**This is used to store all accumulated unused cloth waste rags, trash and dust of the working area prior to cleaning. iv. **Vacuum cleaner** - It is used to remove the dust and powder in floors, the exterior surface of the machine walls, ceilings and ventilators.

2. Cleaning equipments for in-line checking:

i. **Thread sucking machine** -This machine has a crucial role as it primarily used to remove the loose threads.

ii. **Spot Gun** - It is used to remove the stains observed during the process of in line checking.

iii. **Brushes –** These are used to brush off the loose dust.

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:

Write the steps you followed for the cleaning of the laboratory. List all the cleaning agents and equipment used in the process.

1. Prepare the chart.
2. Decorate it.

3. 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
4. Attach the chart on the drawing board of the classroom.

Check Your Progress

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.
2. _____ is primarily used to remove the loose threads.
3. _____ should be made use of while handling cleaning agents as it might lead to breathing issues and damage of lungs.

B. Answer the following 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 equipments used for the same.
3. Briefly describe

Session 5: Personal Hygiene and Health

Introduction to 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 leads to better health and reduced illnesses. Poor personal hygiene can lead to some minor side effects, like body odour, bad breath and greasy skin. However, it can also result in more serious health 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 one 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 neat 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**

  While wearing gloves in a clean room is standard practice, those who wear gloves are less likely to wash or clean their hands prior to donning gloves. Poor hand hygiene increase the vulnerability of store department to bacteria and potential transfer or introduction of microbes such as viruses and fungus.

  - Hand Wash :Hands should be washed thoroughly with effective soaps.
  - 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 hair.

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.

Following points must be considered to ensure safety:

- 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 vapours from heat sealers.
- Safety guards and protective clothing, gloves and footwear should be worn.
- Displaying educational posters is a powerful way to educate workers. These are very effective because they deliver a consistent message, and use pictures which are a strong form of communication targeting specific behaviour. 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 and organizational requirements.
- Waste material should be handled carefully and safely.
- Seek clarifications, from supervisors or other authorized personnel in case of perceived risks.
- Keep checking the workplace and work processes at regular intervals for potential risks and threats.
- Workers must report risk of potential threats, accidents to supervisors or any other authorized personnel.
- Workers should undertake all training and drills related to first aid, firefighting 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 control:

a) Sharp Objects –In-line checker should not handle broken sharp objects or broken glass by hand. Use tongs, forceps, tweezers, magnets or other devices to pick up and discard the broken object.

b) While disinfecting contaminated areas or equipment, in-line checker 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.

d) Use only lint free sterile sponges and mops for cleaning and disinfection in the sterile area. Wipe the entire sterile area using sponges and mops wet with the required concentration of the sterile disinfectant solution, the areas include walls, floors and doors.

e) 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 is 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 organisation.

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
- Unclean light fittings, windows and skylights
- Accumulated piles of paper and other packing materials 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, wellmaintained 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. Improper lighting arrangements at the workstation can lead to eye strain and accidents because of low visibility. Efficient housekeeping ensures that windows are not blocked by stacked materials, 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 operational areas need regular cleaning and disinfection, in order to remove spillage powders, dust and dirt. Cleaning

ensures avoidance of cross contamination and to maintain working environment tidy and safe. 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.

Materials 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.

Material Required:

1. A4 size Sheet
2. Colourful Pens & pencils
3. Pencil
4. Eraser
5. Ruler

Procedure:

1. Plan your skit on any situation related to hazards of poor house keeping 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. Answer the following questions:

1. What do you mean by good housekeeping practices? Mention any 3 good housekeeping practices.
2. Describe a few benefits of good housekeeping practices.
3. What is meant by poor housekeeping practices? Explain briefly.
4. Mention a few hazards of poor housekeeping practices.

Module 5	Health and Safety Related Practices Applicable at the 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 organisation 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/Equipments.
- Keep repetitive/continuous motions to a minimum level.
- Avoid unbalanced postures.
- Safe weight lifting procedures.
- Appropriate resting time.
- Other aspects to monitor which can have potential risk factors.

Learning Outcomes
After completing this module, you will be able to: • 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
Session-5	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 assessment is to identify the potential risks/hazards at the workplace. To overcome these hazards 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 minimise 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 in line checking area free from any 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/virus attack on the fabric rolls, cut pieces of garments or any stitched garment can have a negative impact on the condition of the checking area.
- **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 the in-line checking area can be damaging to the employees as well as the material.
- **Physical**- Physical hazards are one of the most common types of hazard occurring at the workplace and often cause physical injuries to workers. These include any such factor or condition which can cause harm to an employee without essentially touching them, including heights, 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 hazards create unsafe working conditions. For example: exposed or open electric wires or blind corner can be injurious. These are mostly included in 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 height of the stitching machine is not designed according to the height of the workers it may lead to body aches, stiffening and will eventually lead to reduce productivity rates.
- **Psycho-social**-Psycho-social hazards adversely affect an employee's mental health or wellbeing. 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 example: In-line checking requires very efficient lighting to detect fabric or garment 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/ in line sewing area would look illuminated.

Activities

Activity 1

Collect the data and make a report on risk and hazards of industry.

Materials 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 adversely affect an employee's_____.
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 in line checking area free from any 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. 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 Vapor 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 and ETP (Effluent Treatment Plant) operators).

- **Ear Muff**

  Purpose: - For protection of ears while working in high noise areas

- **Ear Plug**

  Purpose: - For protection of ears while working in high noise areas.

- **Leather Apron**

  Purpose: - For protection of body while working at heat. (For Boiler Operator)

- **Safety Helmet**

  Purpose: - For protection of head against falling objects.

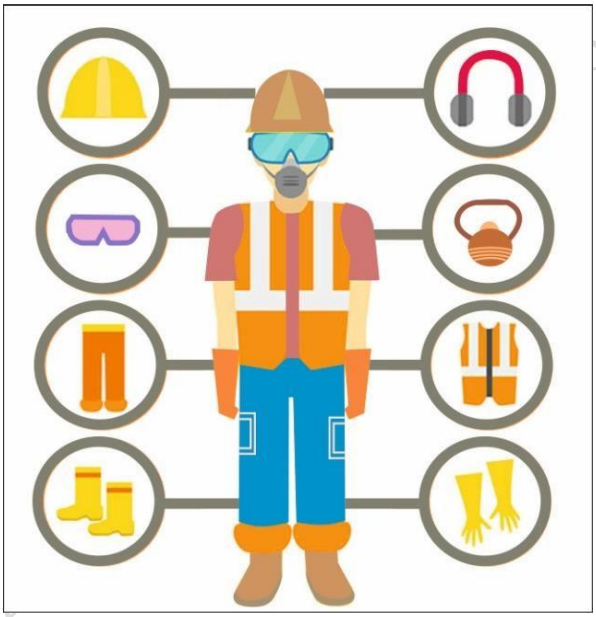


Figure 5.1: Protective Equipments

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. Operation of machinery
3. Presence of water on the floor
4. Loud noise areas
5. High voltage current
6. Release of poisonous fumes

3- Compliance towards – Noise Protection, Cleanliness and maintenance

i. 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.

ii. 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.

iii. Ladder should be secured and kept in a proper tilting position to avoid slipping. Do not use damaged ladders. iv. When transporting hot water in a bucket, use apron and boots and do not fill bucket to its full capacity.

v. 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, for example: 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 24hours 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-thejob 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 contact details of ambulance/doctor/nurse and 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 equipments 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. Identification of each of these hazards is necessary. For example: a workplace may have moving parts, noise, hazards associated with manual tasks and psychological hazards at the workplace. Some of them can be explained as follows-

Hazard /Risk	Potential Harm/Loss
Manual Task	Overexertion or repetitive movement can cause muscular strain.
Electricity	Exposure to live electrical wires can cause shock, burns or death from electrocution.
Machinery and Equipments	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, falls, slips and trips of people can cause fractures, bruises, lacerations, dislocations, concussion, 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.

Activities

ACTIVITY 1

Visit an industry and check the requirement of equipments for ensuring no faults/defects and efficient working.

Materials Required:

1. Practical File
2. Coloured pens and pencils
3. Ruler

4. Eraser
5. Report of daily checks and condition of equipments.
6.

Procedure:

1. Search and collect the data and pictures of checklist of equipments.
2. Place the pictures in the practical file and label the same.
3. Write the description of checklist of equipments 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 equipments.
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 the hazard has been identified at the workplace, appropriate steps for reduction of risk and work related injuries must be taken.
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 equipments -** Use ergonomically designed furniture, tools and equipments, and arrange work area in a manner that everything you need is well within reach.
4. **Wear suitable protective equipments –** Correctly worn equipments 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 organizational 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 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

It is observed that people who smoke regularly have a higher risk of developing type 2 diabetes than to those who don't smoke. The condition of people who suffer from diabetes gets more adverse due to smoking.

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 breadth, discoloration 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 from a higher

risk of developing skin cancer. Smoking can also cause loss of hair and can eventually lead to baldness

8. Risk of other cancers

Smoking cigarettes can also contribute to other forms of cancer like pancreatic cancer, lung cancer 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 cold, flu, etc. by sharing pipes and bongs.

- **Legal Consequences**

Drug and alcohol abuse has negative effects on the health and can also lead to legal consequences/actions that have to be dealt for the rest of the life. Many employers suggest taking a drug test before offering a job to an employee. Refusing to give up drugs could lead to loss of jobs for the employees.

Driving under the influence of drugs or alcohol can lead to a suspension of one's driving license, usually for a period of 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 a quality life especially when the consumption is more and constant. Substance abuse also impacts the productivity and success at work and in school. The time spent searching for, using and recuperating from drugs can be better spent in learning new skills to advance the career.

The legal issues tied to drug use will increase the bills as well. Health insurance rates may increase and one has to find a way to pay for arrest warrants, DUIs (Driving Under Influence), and legal counsel.

- **Injuries and Death**

  Use of drugs and alcohol, lead to physical injury or be involved in car accidents. Even worse, is an increased risk of death through both suicide and homicides.

These drug-related deaths are on the rise, doubling since the early 1980s. Alcohol consumption leads to 5.2 million accidental injuries and 1.8 million deaths each year. It's 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

Historically it has been believed that consuming on average more than two standard drinks a day may cause many long-term health problems and other harms, though current research states that no level of alcohol consumption poses reduced risks of chronic disease development.

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).

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 store 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. Inhaling _____ exposes 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:

1. Write about the benefits of personal hygiene.
2. 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 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.
- Analysing its environmental impacts and legal requirements.
- Setting targets for reduction of harmful impacts on environment and comply with legal requirements.
- Introducing and implementing 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 necessary improvements.

Potential Benefits of implementing EMS are as follows:

- 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 equipments and assembly points

Plant layout is the most effective physical arrangements of machines, processing equipments 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 equipments 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:

- Firefighting 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.

Figure 5.2 Fire Extinguishers symbol and equipment

Potential accidents and emergencies and response to these scenarios

Nobody wishes to have an emergency or disaster at work place, especially one that affects them, their employees, and their business premises. Yet the simple truth is that emergencies and disasters can strike anyone, anytime, and anywhere. At time of emergencies, employees could be forced to evacuate company when they least expect it. 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 one selvesis 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 one have time to prevent any crisis as rightly said “prevention is better than cure”.

EMERGENCY RESPONSE PLAN

The actions taken in the initial minutes of an emergency are critical. A prompt warning to employees to evacuate, shelter or lockdown can save lives. A call for help to public emergency services that provides full and accurate information will help right responses with right equipment. An employee trained to administer first aid or perform CPR can be lifesaving. Action by employees with knowledge of building and process systems can help control a leak and minimize damage to the facility and the environment.

The first step when developing an emergency response plan is to conduct a risk assessment to identify potential emergency scenarios. An understanding of what can happen will enable us to determine resource requirements and to develop plans and procedures to prevent them. The emergency plan should be consistent with our performance objectives.

It is vital for every industry to develop and implement an emergency plan for protecting employees, visitors, contractors and anyone else in the facility. This part of the emergency plan is called “protective actions for life safety” and includes building evacuation (“fire drills”), sheltering from severe weather such as tornadoes, “shelter-in-place” from an exterior airborne hazard such as a chemical release.

When an emergency occurs, the first priority is always safety of life. The second priority is the stabilization of the incident. There are many actions that can be taken to stabilize an incident and minimize potential damage. Use of fire extinguishers by trained employees can extinguish a small fire. 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 apparel 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. An _____is a framework that helps an organization in achieving its environmental goals through consistent reviewing, evaluation, and improvement of its environmental performance.
2. 2._____is the most effective physical arrangements of machines, processing equipments 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**: Sign providing information or instruction about safety or health at work by means of a signboard, a colour, an illuminated sign or acoustic signal, a verbal communication or hand signal.
- **Signboard:** A sign which provides information or instructions by a combination of shape, colour and a symbol or pictogram which is rendered visible by lighting of sufficient intensity.

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').

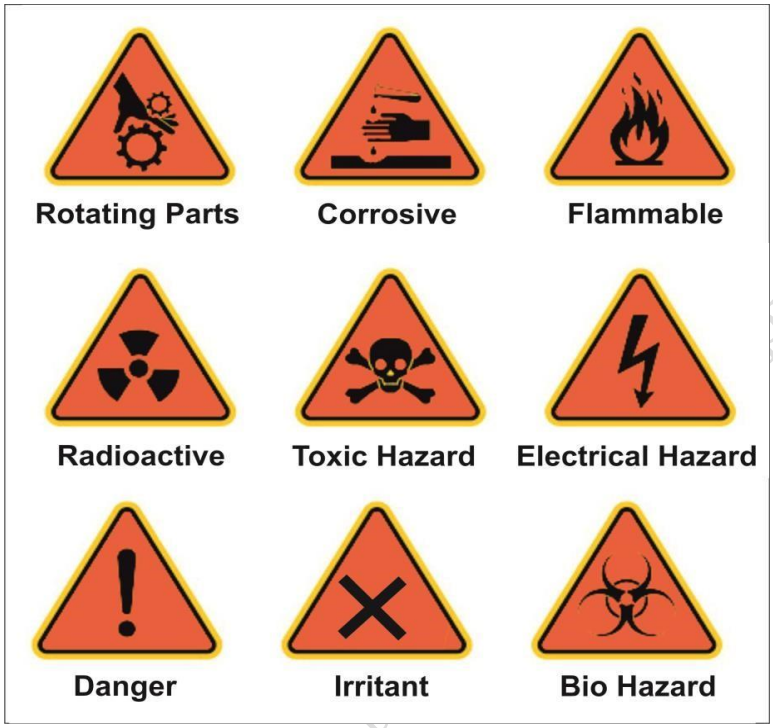


Figure 5.4 Warning Signs

Orientation to 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 accountabilities 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.

Firefighting 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

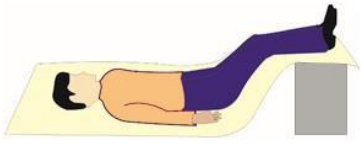
Postures	Evacuation from surface area
	Casualty is too heavy to be lifted
	An upright position will reduce intracranial pressure, essential for head injuries, and assist breathing.
	In case of injury on the back, make sure the injured area is covered and taken care of.
	In case of burns keep the head low and make sure the injured area is completely covered.

Figure 5.5 Emergency situations (First Aid)

A typical basic First- Aid kit may include the following items in a dustproof and waterproof box:

- Sufficient quantities of the different sizes of bandages and gauge should be available at all times to treat small cuts and burns
- Sterile cotton gauge for cleaning wounds
- Scissors, tweezers (for splinters) and safety pins
- An eye bath and eye wash bottle
- Sterile eye dressings
- Crepe roll bandages
- Disposable sterile gloves
- Medical tapes
- Thermometer
- Ready-to-use antiseptic solution and cream
- Simple over-the-counter medicines such as aspirin, painkiller 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 summarize 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 organization.

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 while performing the corrective 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 a machine operator or a worker goes beyond the working area.
 **Figure 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. Vapours should be exhausted safely
 **Figure 5.7 Sewing**	

Finger and hand injury during cleaning and repair work	The machine must be switched off, with plug removed and must be 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.

Figure 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 it is required
Finger and hand injury from the press	A machine which requires two hands to operate ,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 fit which stops and raises the head when it is touched

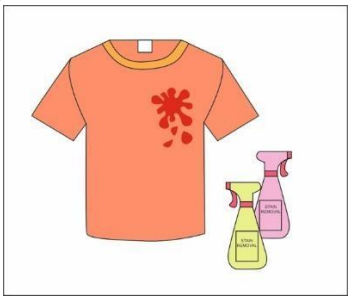


Figure 5.9 Cleaning, Stain Removal

Inhalation of solvent vapours, 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

Figure 5.10 Material Handling

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 manoeuvring careers over points	Safety guards should be installed 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 of goods.
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

Figure 5.11 Packaging Machinery

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, servicingor clearing of faults, only the engine control should be used.

Activities

Activity 1:

Prepare a detailed report on personnel trained in first aid, firefighting 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. Answer the following 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: • 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 • Plan and manage work routines
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-4 Planning and managing work routines

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. For ex. it is not ethical on the part of an in-line checker to show that the garment is defective when it is not and sell it secretly in the market to earn some extra money. 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 is 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. 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 form 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 respectcompany 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 organization / industry.

Materials Required:

1. A4 papers or file
2. Coloured pen, pencils, permanent marker etc.
3. Scale
4. Eraser and sharpener

Procedure:

1. Visit any industry, organization 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. Write short answers for the questions that follow:

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 & 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. For 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.

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

Businesses should be committed to minimizing their impact on the environment, from simple recycling process to sophisticated water and waste management techniques. 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. Theses 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 behaviour 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 for welfare of 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

Businesses must value their suppliers, treat them fairly, honestly, offer fair tenders, offer reasonable terms of payment and pay them in good time. 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 made aware that any internet use at work is not private. 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). 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 have to use company property in order to do their jobs. Depending on your industry, this could include electronics, medical equipment, vehicles, tools and uniforms. Include guidelines on how to care for company property, as well as how much (if any) and what types of personal use are permitted using company property.

12. Policies and Procedures for Harassment and Discrimination

Harassment and discrimination affect workplace culture. Employees should be kept safe and treated fairly by developing policies and procedures that prohibit behaviours such as:

- sexual harassment
- bullying
- verbal and physical harassment
- stalking
- hiring discrimination
- workplace discrimination

Employees should be informed on how to report harassment and discrimination at workplace and explain that the company will not retaliate for reporting.

13. Policies and Procedures for Expenses

When employees travel or purchase things for work, having an expense reimbursement policy in place is essential. Employees should be informed what types of expenses are acceptable for reimbursement (airfare class, transportation, meals, etc.). Procedures on how to submit a reimbursement claim, should be explained to employees.

14. Drug and alcohol policy:

Generally, the use of drug and alcohol is prohibited in the organization's premises considering the ill effects of its consumption. Human resource department is responsible for implementation and administration of such policies. They also conduct various seminars and training programs to educate the workers about the ill effects of consumption of drugs and alcohol.

15. Policies and Procedures for Health and Safety

Protecting employee's safety and well-being should be every organization's top priority. While drafting health and safety policies, employees should include information about how to deal with illness or injury at work, equipment safety guidelines and how to report a health or safety concern. Also include 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 the company from potential legal action.After investing time and resources creating these policies, employer should make sure that employees read, understand and apply them to their daily job responsibilities.

Policies and procedures play a very important role by defining an organization's guiding principles, providing detailed task instructions and forming the basic structure of business operations. As part of risk management, it's important to have clear policies, procedures and processes.

Business processes, procedures and standards are vital for training staff and induction programs, as well as formal processes like staff performance reviews.

Having formalized procedures for the business can save the time and money by increasing efficiency. Staff can get more done in less time by following set processes and procedures, and you can spend less time overseeing the dayto-day running of the business.

Procedures can also improve the consistency of product and service delivery by the staff. It helps in achieving optimum staff performance. These create standards and help everyone to know how to operate. For example: If a factory catches fire then what procedure would be followed for evacuation and safety or what procedure would be followed for reporting critical defects if any found during inspection. Developing formal policies and procedures can make it run much more smoothly and efficiently. They communicate the values and vision of the organization, ensuring employees understand exactly what is expected of them in certain situations.

Since both individual and team responsibilities are clearly documented, there is no need for trial-and-error or micromanaging. Upon reading the workplace policies and procedures, employees should clearly understand how to approach their jobs.

Formal policies and procedures save time and stress when handling HR issues. The absence 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 and procedures controlling the way in which businesses operate. Implementing these documents also improves the way an organization looks from the outside. Formal policies and procedures help to ensure that company complies with relevant regulations. They also demonstrate 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 worker's 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

Now that we have a better understanding of policies and procedures, let's take a look at the major benefits they provide.

- 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.
- They send a "We Care!" message. 'The company wants us to be successful at our jobs.'
- 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.

Materials Required:

1. A4 size papers, chart papers and file covers
2. Coloured pen and pencils, permanent markers
3. Eraser and sharpener
4. 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:

1. Visit any organization or company and enquire about the Procedure for applying for a house loan by an employee.

Materials Required:

1. A4 size papers, chart papers and file covers
2. Coloured pen and pencils, permanent markers

3. Eraser and sharpener
4. 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

Check Your Progress

A. Fill in the blanks:

1. _____ are rules and guidelines formulated by a company or any organization.
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. Write short answers for the following questions:

1. Name and briefly explain any two company policies.
2. What do you mean by Procedures?

C. Write long answers for the questions that follow:

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. For example: 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 important to perform well as individuals but also as a member of a team. To do well in a team requires patience, tolerance, and good social skills. Team efforts are linked with many advantages such as, the work gets completed quickly and the speed is more likely to increase with more people involved, better relations among employees and members of the team learn from each other's 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 / organization. Apparel production companies have different departments such as store department, cutting department, stitching department, finishing and quality department 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.

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. For example: an inline checker should be able to clearly understand the procedure of checking a garment while stitching and how to report in case of any defect found. This will result in achieving the business targets and management of work routine.

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 authorized 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 embrace change and are able to quickly adapt are seen as more valuable than those who cling to outdated principles and concepts that are past their expiry date. Don't 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 member's 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 example: 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 realize that the problem is not at work but back at home or vice versa. One must clearly identify the reason behind their anxiety and spot the real problem.

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. Prioritize and organise:

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 prioritize 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:

Imagine you are an in-line checker in ABC apparel production company. While working you notice some illegal or banned work practices. Present a skit in your class on how will you support your supervisor in controlling the situation.

Materials 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 production line.
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. Write short answers to the questions that follow:

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.

Session 4: Planning and Managing Work Routines

Routines help to stay focused on the things that are most important. They bring discipline and give a smooth flow to various tasks. Having a proper work routine is known to boost the productivity and efficiency of workers and employees. Work routines help in achieving the assigned goals and daily targets in an efficient and organized manner.

Benefits of Proper Planning of Work Routines

- It gives a direction and purpose to the employees and they are able to give quality output.
- It helps supervisors in management of time and task allocation.
- It also helps the management in performance evaluation.
- It helps in proper resource allocation for the tasks.
- Work routines prevent employees from distraction and stay focussed on assigned tasks.
- It helps in prioritising tasks and achieving the target.
- Thus work routines help in accomplishment of assigned tasks and boost efficiency and productivity of the staff.

Planning work routines as per company procedures and requirements

Every organization or company has specific procedures. Each company or organization has different goals and requirements. For example: the requirements and procedures of a packaging company will be entirely different from that of a food and beverage company.

The work routines also differ from organization to organization. Thus it's very important to keep in mind your organizations policies, procedures and specific requirements while planning as well as managing work routines of your employees.

- Understand the goals and targets of the company, the resources available for achieving these goals and then plan the work routine.
- The strengths and skills of each employee should be kept in mind while planning work routines and tasks should be assigned as per the capability and efficiency of the employees.
- Due consideration should be given to recreation, entertainment and lunch breaks to keep the monotony away from work routines.

- There should be provision for time to time checking of work routines and managing last minute changes in schedule due to unforeseen causes such as sick leaves by employee, machine breakage etc..
- It should be possible to make quick adjustments in the work routines of the employees due to unforeseen circumstances and communicate it too with workers.

Importance and benefits of punctuality and attendance

Punctuality and regular attendance are vital attributes for all employees. Employees should attend work regularly and arrive at work on time, because it affects work routine and productivity. When employees are absent or late, work and service are interrupted and an additional burden is placed on coworkers and colleagues. Unauthorized absenteeism and late arrival is liable for disciplinary action and may result in termination of employment also. Employees should inform their supervisor or concerned authority if they expect or anticipate being late for work due to some unavoidable reason. If an employee fails to notify his/her absence for a long period it can be considered as job abandonment and may result in termination of employment. Good attendance and punctuality helps in creating a professional image helps in securing a better position or role in the company

Attendance of workers and employees affects the people with whom they work. If you're present for work, completing your tasks enables others to fulfil their tasks and responsibilities. For example, if you're an in-line checker charged with checking stitching of garments, the results of your work could determine whether the products can be dispatched timely or not. If you're consistently absent, checking of goods and transportation and supply of goods will be affected and delayed. This in turn can result in loss to the company.

Figure 6.3: Punctuality

Punctuality means the habit of being on time. It also means showing consistency and regularity in behaviour. Punctuality helps us to appreciate time and use it effectively. It is a virtue that is widely appreciated. Punctuality helps in developing a habit of regularity in behaviour and helps prevent procrastination. It enables us to be organised and on time so that we prevent stressful situations.

We can't be punctual unless we plan and organize our tasks smoothly. Thus we can say that punctuality makes us more organized and helps us in managing situations in better ways. It contributes to being more productive in everyday life.

It is an important characteristic of successful people. Valuing and making productive use of time eventually leads to success. Punctuality comes with effective time management of time and completion of tasks.

It is also a mark of discipline. It is a virtue that reflects regularity and organised work ethics. These are virtues that come along with punctuality and are important elements for success. For example: if we talk about the job of an 'In-line Checker'. An in-line checker who is punctual will arrive at least 15-20 minutes prior to the start of shift, will not waste time in talking or whiling away and will use time judiciously and meticulously to start checking systematically in given time. Also, a punctual person will not leave work prior to the end of assigned/scheduled work time and without prior approval of in charge or supervisor.

Benefits of Punctuality

It helps the individuals to be more productive and successful in their general daily lives as well as professional lives. Punctuality is strongly associated with success and achievement in the undertake endeavours. It is associated with general happiness in everyday life as well as successful achievement in various spheres of life. Inculcating punctuality in our lives go a long way in helping us across various hurdles and challenges.

Punctuality demonstrates your respect for co-workers and clients and reinforces your time-management skills. It is a sign of professionalism and helps one to stand out as a reliable, dependable and trustworthy employee / worker. Punctuality is often the key to completing projects and assignments quickly and effectively.

Activities

ACTIVITY 1

Visit any factory or company. Talk to their manager and find out the ways in which they manage and check the attendance and punctuality of their staff. Also research online for the latest ways of checking the attendance. Make a PowerPoint presentation using pictures as well as text.

Materials Required:

1. Notebook
2. Pen
3. Pencil
4. Eraser
5. Computer

Procedure:

1. Visit the company or browse online.
2. Write down the necessary points as directed in the question.
3. Make a power point presentation.
4. Present in the class and discuss about the same.

Activity 2:

Prepare a chart on the importance of punctuality.

Materials Required:

1. Chart paper
2. Pictures
3. Pen, pencils, markers
4. Eraser
5. Ruler

Procedure:

1. Read and collect material on punctuality
2. Collect pictures.

3. Write about punctuality in the chart
4. Paste related picture

Check Your Progress

A. Fill In The Blanks

1. _____ help you stay focused on the things that are most important.
2. Punctuality is a sign of _____.
3. Punctuality and regular _____are vital attributes for all employees.
4. Work routines help in achieving the _____and daily targets in an efficient and organized manner.
5. _____ is often the key to completing projects and assignments quickly and effectively.

B. WRITE SHORT ANSWERS:

1. What is meant by routine? Why it is important to have routines?
2. What are work routines and how do they affect production cycle?
3. What do you mean by punctuality? Why is it important?
4. Why is attendance necessary in companies?

ANSWER KEY

MODULE 1

SESSION-1: FILL IN THE BLANKS

1. Outer
2. Marketing
3. Merchandising
4. Sampling

SESSION-2: FILL IN THE BLANKS

1. Ruler
2. Gauge
3. Shears
4. Pinking
5. Trimming, Clipping
6. Rounded
7. Thicker, Coarser
8. Loop Turner

SESSION-3: FILL IN THE BLANKS

1. Straight Knife
2. Small
3. Post
4. Single, Two

MODULE 2

SESSION-1: TRUE AND FALSE

1. False
2. True
3. True

4. False

SESSION-2: TRUE AND FALSE

1. False
2. False
3. True
4. False
5. True

MODULE 3

SESSION-1: FILL IN THE BLANKS

1. Garment specification
2. Spec sheet
3. Thread count
4. Specifications

SESSION-2: FILL IN THE BLANKS

1. Upper Garments
2. Fullness
3. Sleeve
4. Set-in
5. 2

SESSION-3: MATCH THE FOLLOWING

i. **d)** Acceptable quality limit
ii. **c)** Final Inspection
iii. **b)** Fabric Inspection
iv. **a)** Marking defect

MODULE 4

SESSION-1: FILL IN THE BLANKS

1. Material handling process

2. Clean and ventilated
3. Safe, comfortable
4. Tools and Material
5. Cleaning and maintenance

SESSION-2: FILL IN THE BLANKS

1. Safety Guards
2. Floor Space
3. Disposal of waste
4. Identified and segregated
5. Economic advantage, Community relation

SESSION-3: FILL IN THE BLANKS

1. Environment health and safety
2. Radiation Hazard

SESSION-4: FILL IN THE BLANKS

1. Spillage, Seepage
2. Thread sucking machine
3. Protective gears

SESSION-5: FILL IN THE BLANKS

1. Housekeeping
2. Inspection, Extinguishers
3. Clean, Systematic and Hazard free
4. Quality Assurance

MODULE 5

SESSION-1: FILL IN THE BLANKS

1. Hazard
2. Safety
3. Mental health and Well being
4. Local ventilation

SESSION-2: FILL IN THE BLANKS

1. Close fitting
2. Ear muff
3. Management
4. Psychological hazards

SESSION-3: FILL IN THE BLANKS-

1. Performance
2. Personal hygiene
3. Fit and healthy
4. Tobacco smoke
5. Alcohol

SESSION-4: FILL IN THE BLANKS

1. EMS
2. Plant layout
3. Men, Materials and Machine

MODULE 6

SESSION-1: FILL IN THE BLANKS

1. Ethics
2. Ethics and Values
3. Honesty, Integrity, Loyalty, Keeping Promises
4. Values
5. Goals
6. Security, Peace

SESSION-2: FILL IN THE BLANKS

1. Policies
2. Procedures
3. Policies
4. Individual, Team responsibilities

SESSION-2: **FILL IN THE BLANKS**

1. Team
2. Teamwork
3. Direct, Indirect

SESSION-3: FILL IN THE BLANKS

1. Routines
2. Professionalism
3. Attendance
4. Assigned goals
5. Punctuality

GLOSSARY

Grading – Potentially increasing or decreasing size of a garment to fit different body sizes according to the size range intended for production.

Marker- A full scale diagram used for cutting parts and components of garment. It indicates the most fabric conscience arrangement of all the components of garment.

Pattern- A pattern is a guide which is used to cut parts and components of a garment from fabric for sewing operations.

Spinneret- It is a metal nozzle with multiple fine holes. A spinneret is used in spinning of mam-made fibbers. The spinning solution is passed through the spinneret with force to form a filament.

Polymer- A polymer is a substance that comprises of large molecules. These molecules are made of several repeating sub units called monomers.

Monomer- Monomers are smallest repeating units that form polymers.

Fabric ply- For cutting, fabric is spread in multiple layers. These layers of fabric are called fabric plies.

Bowing- It is a woven fabric defect in which the weft or filling yarn is displaced and it does not lie perpendicular to the selvedge. The yarn lies in wave or arc across the width of the fabric.

Grain line- It refers to the direction of yarns in fabric. A straight grain refers to the direction of warp yarns in fabric whereas a cross grain is refers to the direction of weft yarns in fabric.

Selvedge- the edge of fabric that runs parallel to the warp yarns is called selvedge. It protects the fabric from unraveling and fraying by providing a finished edge.

Sludge- It refers to semi solid waste that is generated from a range of manufacturing processes, water treatment etc..

Surfactants- These are chemicals that lower the surface tension between two mediums.

Chelants- These are chemicals that bind to positively charged metal ions such as magnesium and calcium. They are used in cleaning process while using hard water.

Dispersants- These are chemicals that break oil in small particles which can be removed easily.

SOP- Standard Operating Procedures refer to a step by step instruction set by an organization for a particular work.

List of Credits

Graphics

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