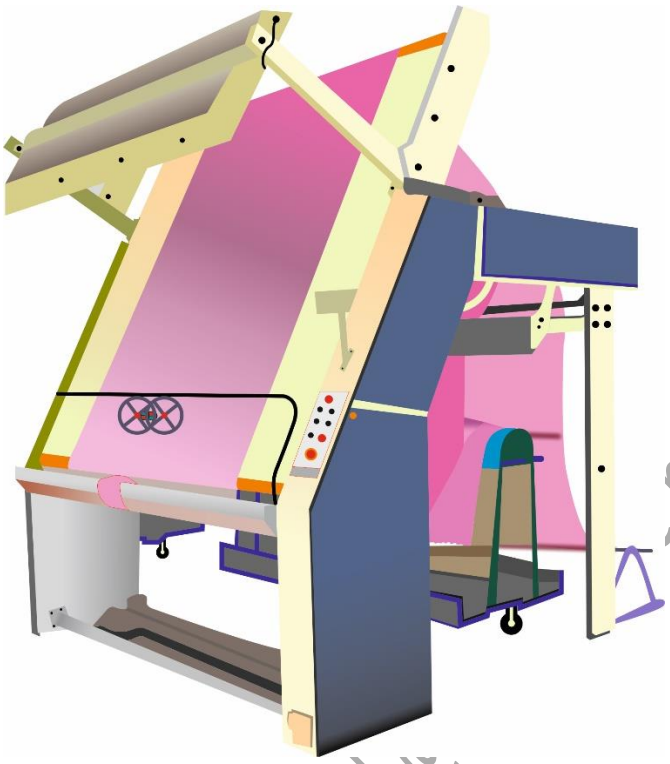
DRAFT STUDY MATERIAL



FABRIC CHECKER

(Qualification Pack: Ref. Id. AMH/Q0101)
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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20 June 2024

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Module 1	Role and Responsibilities of a Fabric Checker

Module Overview

A Fabric Checker is a pre-production job role. It is a very important role and involves careful inspection of fabrics to be used for production. A Fabric checker is mainly responsible for inspecting the fabric in order to identify fabric faults if any. This has to be done before the fabric is passed on to the cutting stage.

Raw material for garment manufacturing unit is fabric. 80% of the garment cost is the fabric cost for any garment. Hence maintaining the quality of fabric is of utmost importance.

The role of fabric checker is very crucial for both the fabric supplier and the fabric buyer, as fabric checking is done twice at both the ends i.e. when fabric has to be despatched by the mill and once again when fabric is taken by the garment manufacturer and ultimately passed on for garment cutting.

Fabric checker's journey starts from inspection of fabric received till the fabric is dispatched after fault detection and report submission.

Fabric checker does complete inspection of fabric manually or by the machine. A fabric checker should have knowledge of different tools and equipment used for fabric checking and should be able to operate fabric checking machines. Checkers should have skills to submit the inspection report in the prescribed format after inspecting the fabric.

Fabric checkers should possess skills and abilities to identify fabric faults using either machines or by hand. Thus good eyesight and vision (including near vision, distance vision, colour vision, peripheral vision, depth perception and ability to change focus) is a prerequisite for this job. They should also have basic knowledge of different types of weaves and fabrics and various types of fabric defects and its causes.

In this unit students will learn the role and responsibilities of a fabric checker. Further the students will also understand the key attributes required to be a good fabric checker.

Learning Outcomes	
After completing this module, you will be able to: • Describe role and responsibilities of fabric checker • List and describe Properties and uses of various Fibres and Yarn • List and describe various fabrics, their properties and uses	
Module Structure	
Session:1	Describe the role and responsibilities of a fabric checker
Session:2	List and describe Properties and uses of various Fibres and Yarn
Session:3	List and describe various fabrics, weaves their properties and uses

Session: 1 Describe the Role and Responsibilities of a Fabric Checker

1.1 – Introduction to fabric checking and its requirement:

In order to avoid rejections due to fabric quality and facing unexpected loss in manufacturing, fabric checking is an important aspect followed prior to construction of the garment. The aim of fabric inspection is to ensure garment quality and acceptability. Both fabric producers and clothing manufacturers conduct fabric testing. Fabric inspection is a method by which the fabric rolls are inspected to find defects in the fabric and to prepare an inspection report. Upon inspection of the fabric, grading of the fabric is performed according to the quality level of the fabric.

Fabric inspection aims to provide the garment manufacturers with quality fabrics to make quality garments. A damaged fabric produces a defective product. In case a defective fabric is used in the production of a garment, the cost of manufacturing will rise due to repair work, changes and even rejection of garments.

To avoid processing defective fabric in production, fabric rolls are inspected as a preventive action. This means fabrics that are faulty and damaged can be removed and returned to fabric manufacturers. In fabric inspection, rolls of fabric are opened and passed through a fabric inspection system with the light under the fabric and the visual inspection of the fabric is performed by the fabric inspector.

While inspecting, fabric checker marks the defects with a chalk or by placing a label on the defects. By the conclusion of the check, a fabric roll inspection report is made for that fabric rolls. These rolls are then graded and categorized by marking rolls in one of the following categories.

- Passed - These fabric rolls are ready for use.
- Failed- Not ready for use/passing to cutting stage. (May be acknowledged after corrections).
- Rejected-Not acceptable (rejected fabrics are returned to the supplier).

In case the garment unit trusts the supplier of fabrics for their quality of fabric, they can randomly test the fabrics selecting fabric rolls. Several factories inspect 10 per cent of the total rolls of cloth. They inspect all rolls of fabric in the event that factory finds a dissatisfactory result in 10 per cent fabric inspection.

Weaving defects in woven yarns, knitting defects, manufacturing defects and handling defects are among some of the faults in a fabric.

Fabric Checking is required for the following reasons-

- **Identifying fabric defects** – Fabric defects are identified and distinguished prior to the production process.

- **Marking fabric defects** - During fabric inspection, fabric checker separates defects by numbering or marking labels to identify places of damage.

- **Increasing Productivity** – As the defects are identified and marked during fabric inspection by the fabric checker, the chances of passing the damages to the production section are reduced. This leads to increased productivity.

- **Reducing Fabric Wastage** - Critical damages such as hole / ladder damage will have to be removed during the cutting process, leading to increase in fabric wastage. Thus, by identifying such defects at the pre-production stage of fabric inspection helps in reducing the wastage at later stages of production.

- It maintains the quality of the final product (Apparel, Home Furnishing Made up) – Fabric checking ensures good quality fabric rolls without any defects like holes, discoloration etc. passing to the cutting department. This helps in maintaining the consistent quality of the final product. Thus, increasing customer loyalty and reducing customer complaints.

1.2- Role, responsibilities and key attributes of a checker –

Role of a fabric checker is as follows –

- Fabric checkers should ensure that their work area is hazard free, open and there should be adequate light to check fabric.
- Collect and check the data on the job card and carry out functions.
- Raise queries to get more information on tasks to be performed in case of unclear instructions.
- Select, sort and set up the correct tools, equipments and machineries (ex: Fabric Checking Machines) according to the requirement. Also he/she must follow fabric checking system decided by management.
- Ensure that the tools like marker, measuring tape, ruler, etc. are safe and clean to use on the material and those weighing machine, tape, ruler should be calibrated.
- Fabric checkers must update and enhance their knowledge about the products.
- Fabric checkers must ensure that the work is carried out at a rate which maintains the flow and helps to meet the targets of production.
- They should ensure ways to reduce wastage and ensure disposal of waste materials safely and should return re-useable materials.
- Fabric Checkers should practice visual inspections to ensure the products are free from any handling defects and match the company's quality standards.
- They should follow company's reporting procedures related to defective tools and machines and should also report risks/ problems likely to affect the product to the authorised person quickly and accurately.
- Before leaving from work, they should ensure leaving the workplace in a clean, safe and secure condition.
- They should immediately communicate to store in charge and other concerns for fabric pass/reject status for further planning.

Responsibilities of a fabric checker are as follows –

- Fabric Checker should take up the responsibility to set up the fabric checking machine according to company's instructions and production requirements. Fabric checking machine should get calibrated every year from competent engineer.

- A fabric checker must ensure proper loading of the fabric roll on the fabric machine simultaneously taking care that the fabric is not damaged during handling.
- Fabric checker's responsibilities also include operating the fabric checking machine for inspection of fabric and mark/highlight the defects identified.
- They must maintain and fill records and submit the inspection report in the format prescribed by the company.
- Fabric checker should try and eliminate the defects on the fabrics with minimal waste.
- They should take the responsibility of basic cleanliness and maintenance of the machine and work area.
- Fabric Checkers should seek feedback from team mates on work related performance and confirm/check with them when they are not sure about the new product.
- Checker should keep pass and rejected fabric on the designated place.

Key Attributes of a fabric checker are as follows –

- A fabric checker should have good eye sight with clear vision.
- A fabric checker should follow the company's policies and procedures.
- They should be able to identify, rectify and eliminate fabric defects.
- They should have knowledge of various types of fabrics and apparels and their types and grades, various fabric defects, their grade and weightage.
- They should also have proper knowledge about types of printing and dyeing defects.
- They should be able to read, write and communicate effectively in English/Any local language as applicable.
- They should have good decision making ability and take appropriate decision for approval/ disapproval of the fabric.
- They should be well organized and planned in their approach to meet the production targets.
- Fabric checker should have a problem solving attitude and should be able to solve operational problems or in cases where problems cannot be rectified/solved they should report it to the supervisor.

Activities

ACTIVITY 1

Visit a garment industry to understand the role of fabric checker and prepare a power point presentation on the role and responsibilities of a fabric checker.

Material Required

- Register
- Pens/pencils
- Computer/Laptop

Procedure

1- Visit an apparel industry and collect information on the job role and responsibilities of a fabric checker.
2- Prepare a Power Point Presentation based on the information collected and submit the same.

Check Your Progress

A. Fill in the following blanks –

1. A Fabric checker is mainly responsible for inspecting the fabric in order to identify……if any
2. The aim of fabric inspection is to ensure garment……
3. By the conclusion of the check, the fabric rolls are graded and categorized as……,……and ……
4. Fabric checkers should ensure that their work area is……, open and there should be……to check fabric.
5. Fabric Checker should take up the responsibility to set up the……according to company's instructions and production requirements.
6. A fabric checker should have ……with clear vision.

B. Write short answer for the following-

1- Mention importance of fabric checking. (Any three)

2- What is the role of a fabric checker? Mention responsibilities of a fabric checker. (Any five)

3- Explain Key attributes of a fabric checker?

Session: 2 List and Describe Properties and Uses of Various Fibres and Yarn

2.1 Classification and types of fibres-

FIBRES – A Fibre is the smallest unit or the building block and is used for making textile yarns and fabrics. Fibres can be compared to hair strands and their diameter is very small in comparison to their length.

Textile fibre can be spun into a yarn or made into a fabric by various methods including weaving, knitting, braiding, felting, and twisting. The favourable and important properties of fibres are elasticity, fineness, lustre, durability and uniformity.

Types of fibres –

Fibres can be broadly classified into two types –

1- **Natural Fibre -** These fibres are obtained from natural sources like plants, animal or minerals. These fibres are sustainable, biodegradable and lightweight.

2- **Man Made Fibre –** 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 FIBERS ACCORDING TO THEIR ORIGIN

The common fibres that are used to make fabrics are obtained from different sources which are:

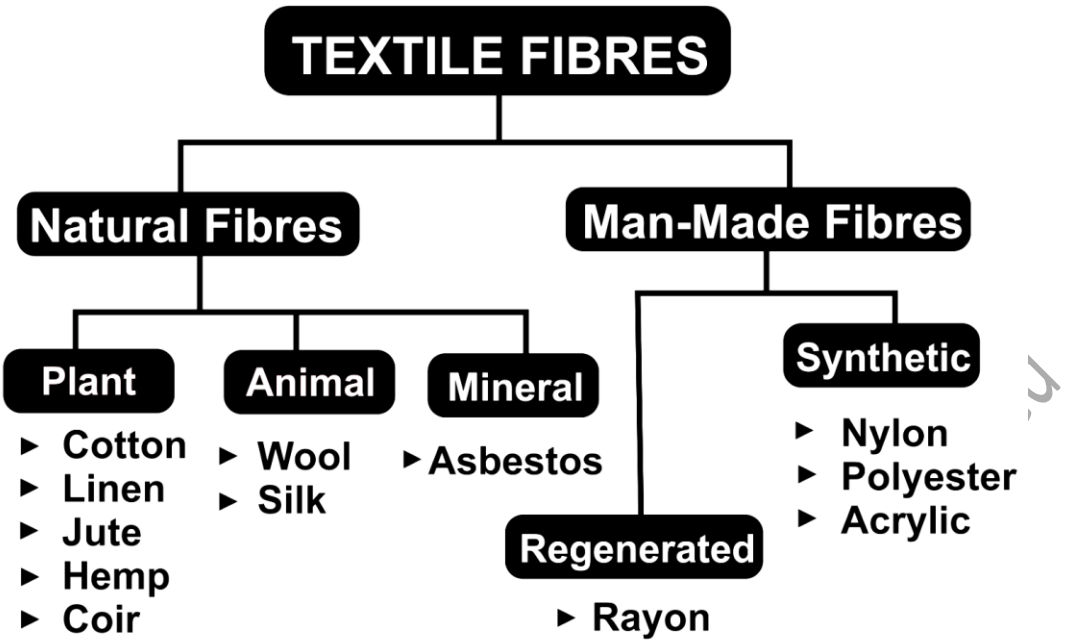


Fig 1.1: Classification of textile fibres

Natural Fibres:

Plant Fibres – These fibres are derived from plant sources. Their 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.

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.

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.

Manmade 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. The best example is rayon.

Synthetic Fibres – These fibres are 100 percent chemical based. Their source of material to process of formation is all chemical based (man-made).These fibres are very strong and durable in nature and have high resistance against wear and tear.

Other than these manmade fibers, there are some metal fibers used exclusively for decorative purposes, providing a glitter and sparkle. Metal filaments are made by beating soft metals and alloys, such as gold, silver, copper and bronze, into thin sheets, and then cutting the sheets into narrow ribbon-like filaments. The metal yarns have been known for more than 3000 years. Gold and silver were hammered into extremely thin sheets, then cut into ribbons and worked into fabrics. These were the first 'man made' fibres, which came thousands of years before nylon or rayon. The Persians made fabulous carpets with gold thread and the Indians, ornamental sarees with it.

- ❖ Fibres can be classified as Staple Fibres and Filament fibres based on their length. Length of the fibre enforces strength, durability & comfort properties to the yarn.
    - Short Fibres - Staple Fibres
    - Long Fibres - Filament Fibre

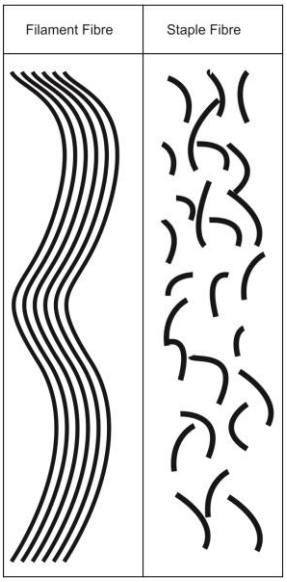


Fig.: 1.2 : Filament and staple fibres

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.

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.

Properties of Textile Fibres:

Textile fibre has some properties which make it suitable to use in Apparel and Textile industry. These properties can be divided as primary properties which are essential in any textile fibre and Secondary properties which are not essential but desirable properties in a textile fibre. Fibre properties are very important to know for different end uses.

Primary Properties:

Fig.: 1.3 : Primary Properties of textile fibres

1. High length to width ratio

Length is an important parameter which directly affects the strength of a fibre. A textile fibre should have high length to width ratio which means that the length of the fibre alone should be at least 100 times the diameter (width) of the fibre.

2. Tenacity (Strength)

It is fundamental ability of fibre to withstand or resist rupture by tension. The Strength of a fibre determines the fabric durability against wear and tear. Filament fibres have greater strength than staple fibres.

3. Flexibility

It is the ability of a fibre to bend easily & repeatedly. It governs the drape ability or fall of a fabric. Thinner fibres have better flexibility for example- Cotton has better flexibility than wool.

4. Spinnability (Cohesiveness)

Spinning quality of fibres indicates that the individual fibres must be capable of being spun into a yarn with sufficient strength. The fibre must have good cohesiveness (the ability to stay or fit together well) for a better Spinnability.

5. Uniformity

Uniformity is the evenness of individual fibres in length and diameter. It is essential that there should be limited variations in length and diameter between fibres to fibre. Or we can say that the fibre should be more uniform which will lead to uniformity in the yarn as well as in the fabric.

Secondary Properties:

1. Elasticity

Elasticity is the ability of a fibre to return to its original shape after being stretched. If a fibre returns to original length after stretching to a certain length, it will have 100% elastic recovery.

2. Resiliency

Resiliency is the ability of the fibre to return to its original position after folding, creasing, wrinkling and bending. Resilient fibers recover quickly from all these deformations. This property ranges from excellent to poor. For example: Wool has excellent resiliency whereas cotton has a poor resiliency.

3. Lustre

Lustre is the amount of light reflected from a fibre surface which determines its gloss or brightness and dullness of fibre. In natural fibre, silk has the highest lustre. The lustre can also be improved by different finishing processes. For example: by the process of mercerization, the lustre of cotton is improved.

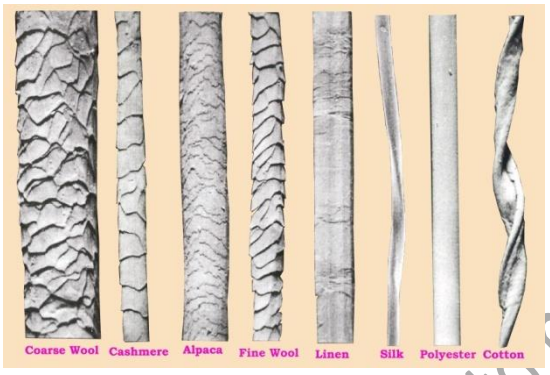
4. Absorbency and Moisture Regain

The ability of a fibre to take in moisture is called absorbency and moisture regain is the percentage of moisture a bone-dry fibre will absorb from the air under the standard temperature and moisture. Fibres that absorb water easily are known as hydrophilic (water loving) for example Cotton has very good absorbency thus it is a hydrophilic fibre. Hydrophobic fibres are those which have difficulty in absorbing water.

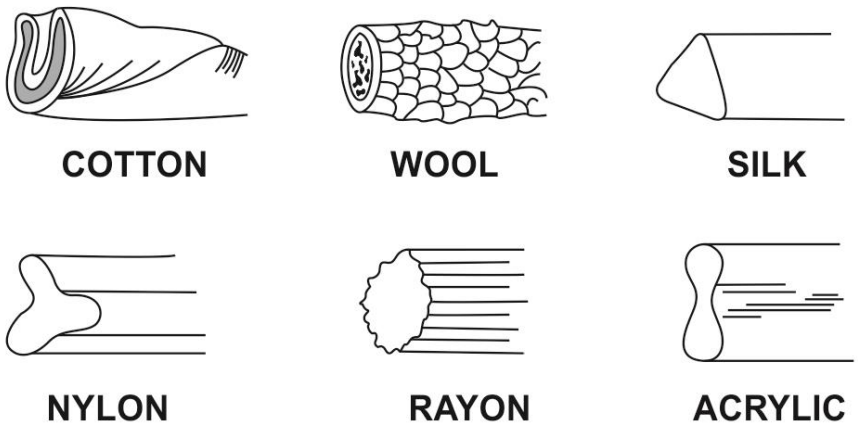
MICROSCOPIC STRUCTURE OF TEXTILE FIBRES

Each fibre has a specific longitudinal and cross-sectional structure which can be seen clearly under the microscope. Longitudinal section of a fibre pertains to a section along the long axis contrast to the other term, cross section, which is a section that is cut transversely.

Longitudinal and cross-sectional structure of some fibres are shown below-



(a)



(b)

Figure 1.4 (a & b): longitudinal & cross sectional structure of some textile fibre

2.2 Classification and types of yarn -

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

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.

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.

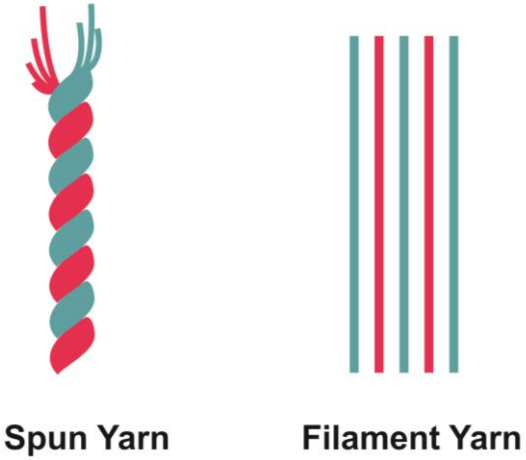


Fig 1.5 spun & filament yarn

Yarn Manufacturing Process

Spinning:

Spinning is the process of converting fibres into yarns. In spinning the fibres are drawn out and twisted into a continuous thread or yarn of sufficient strength and length. These are then woven or knitted into fabrics.

Depending upon the fibres, the preparatory methods of spinning are classified into two types:

1-Mechanical spinning – Staple/Spun Fibres

2-Chemical spinning – Filament Fibres

Mechanical Spinning (Staple/Spun Fibres)

- **Step1 – Opening and Cleaning**: Staple fibres are obtained in a compressed form known as bales. These bales are opened and cleaned. Cleaning in required as fibres have impurities like seeds, leafs and other added impurities.
- **Step 2 – Carding**: In this step, tufts are opened into individual fibres and further cleaned to remove impurities and short fibres. Fibres are parallelised and levelled into a mass of untwisted fibre. It is to form a loose tube structure called sliver.
- **Step 3 – Combing:** It is an optional step in preparation of yarn. Combing is done to remove short fibres (those fibres which contribute very less to the ultimate strength of the yarn). Thus, the resultant yarn has relatively higher luster and strength than carded yarn. Through the process of combing finer yarns can be produced. Combed yarns are costlier than the carded yarns. The slivers formed are called combed slivers.
- **Step 4 – Drawing**: In this step, the slivers are then combined, smoothened and stretched for better and uniform properties of yarn.
- **Step 5 – Speed Frame (Thinning)**: The sliver is then fed into a machine known as 'Speed Frame/Roving frame'. In this frame the sliver is elongated by series of rollers to form a thinner continuous strand of fibres. The thinner strand is given a small amount of twist and the resultant continuous strand is known as 'roving'.
- **Step 6** - **Spinning**: Spinning is done on a spinning frame where the roving bobbins are passed through a set of high speed rollers and finally the yarn of desired diameter is drawn out.

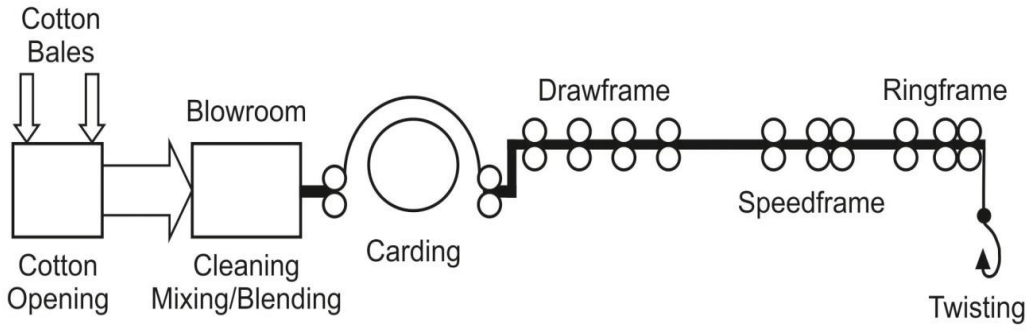


Fig 1.6 : Spinning Process of Cotton Yarn

Chemical Spinning (Filament Fibres) –

There are three types of chemical spinning-

1- Wet Spinning

2- Dry Spinning

3- Melt Spinning

Wet Spinning - Wet spinning is the first commercially successful method. A liquid solution is pumped through a small nozzle (known as 'spinneret'), into a chemical bath, that coagulates the extruded solution of endless strands. These coagulated continuous filaments are drawn out of the bath, purified by washing and drying. The number and size of the holes in the spinneret can be varied as desired. More the number of holes more will be the number of filaments. Less is the size of the hole, finer will be the filaments.

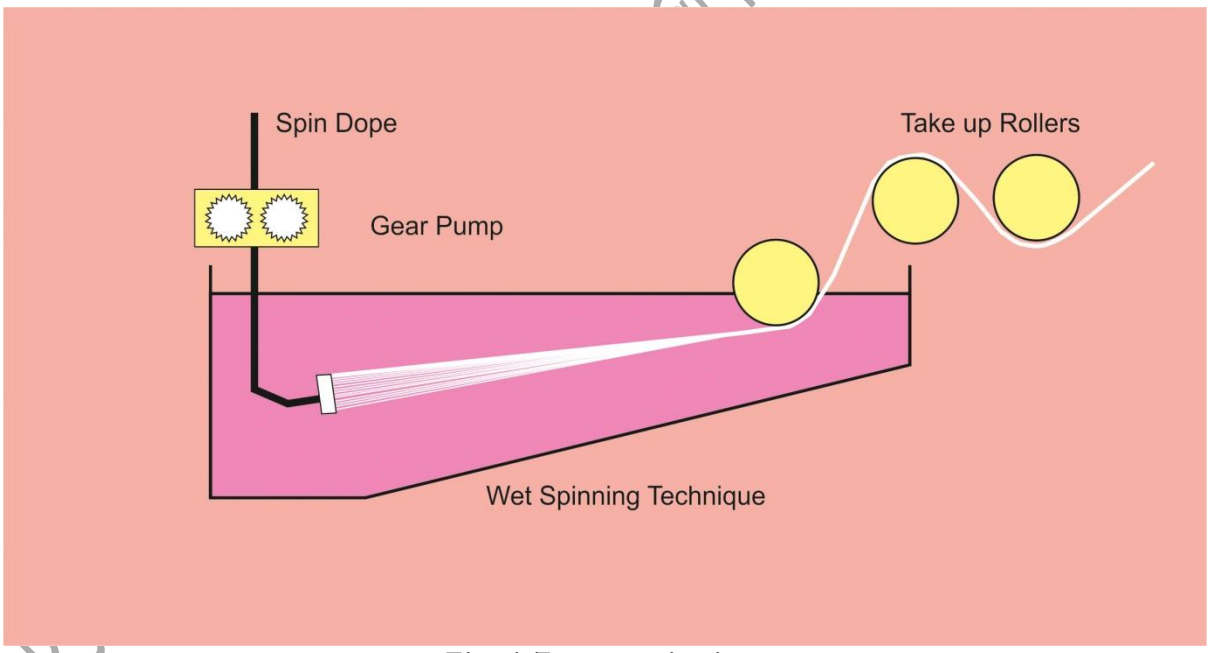


Fig. 1.7 : wet spinning

Dry Spinning – This involves pumping of an appropriate liquid solution into an air chamber through a spinneret. The air in the air chamber reacts with extruded yarns and solidifies them immediately. These coagulated continuous filaments are then drawn out of the chamber, twisted and/or processes further, and then wound onto spools. The diameter of the filament will depend upon the number and size of the spinneret holes.

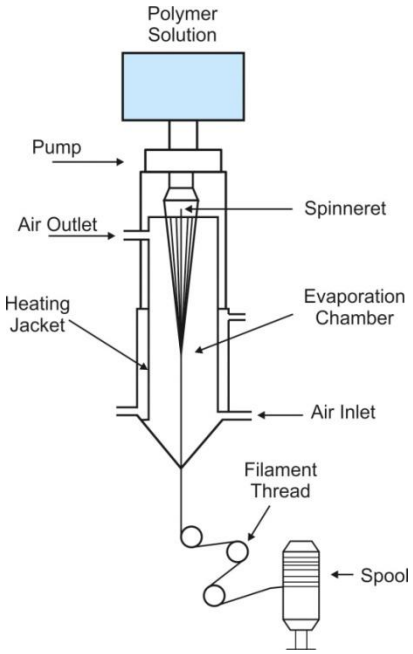


Fig.: 1.8 : Dry Spinning

Melt Spinning – In melt spinning polymer chips are used. These are obtained from various chemical combinations and are pumped through spinneret into an air chamber after melting. The extruded stream cools and solidifies into continuous filaments which are then drawn out from chamber twisted or processed or subsequently wounded onto spools.

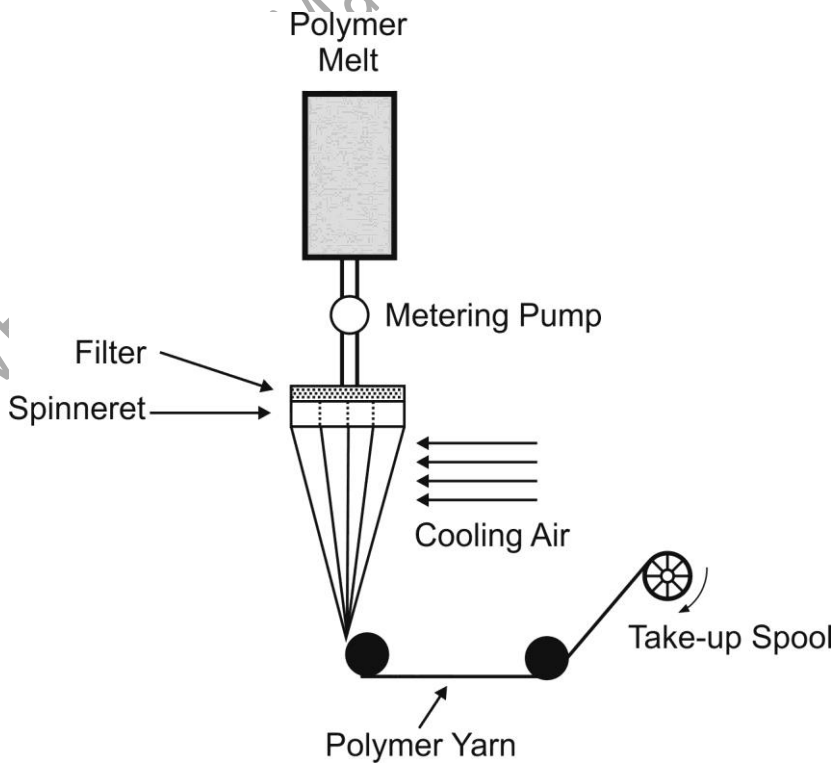


Fig.: 1.9: Melt Spinning

YARN 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
- Z twist

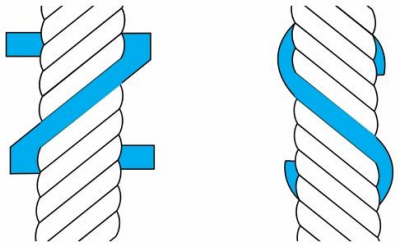


Fig.: 1.10 : S Twist & Z Twist

Single Yarn and Ply yarn

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

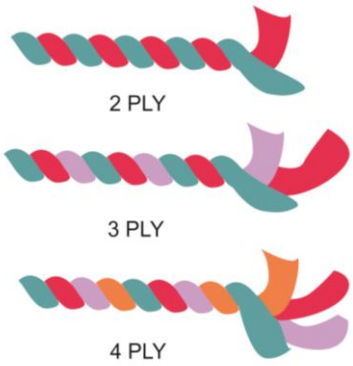


Fig.: 1.11: Single & Ply yarn

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.

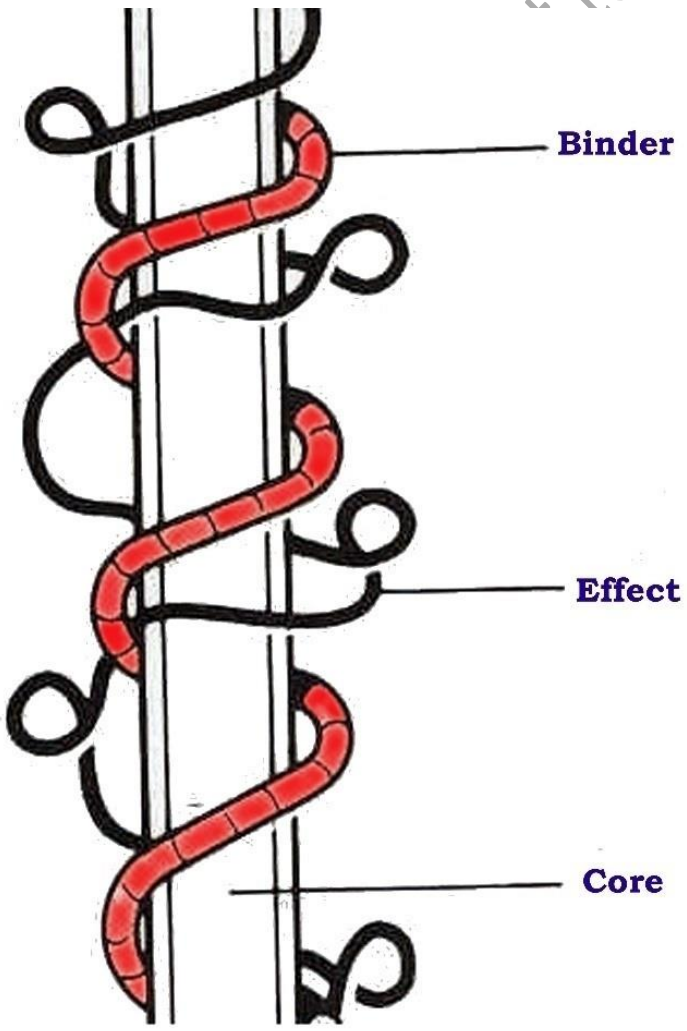


Fig.: 1.12: Novelty yarn

Activities

ACTIVITY 1

Visit any yarn spinning industry. Observe spinning technique and prepare a chart explaining 3 different techniques with pictures.

Material Required

- Chart
- Camera to click photographs
- Pencils
- Colored pens/markers
- Eraser
- Ruler

Procedure

1. Plan a visit to any yarn spinning industry with your teacher.
2. Take permission from that industry to visit and click photos.
3. Observe the spinning techniques.
4. Prepare a chart based on your observation. Paste your clicked pictures with the explanation.

Check Your Progress

A. Fill in the following blanks –

1. Plant Fibres are derived from plant sources and their basic foundational material is……
2. Most common animal fibres are……and…….
3. The best example of regenerated fibre is……
4. Fibres can be classified as……and……based on their length.
5. ……is the only natural filament fibre.
6. ……is fundamental ability of fibre to withstand or resist rupture by tension.

7. The fibre must have good cohesiveness for a better.....

B- Write short type answers for the following –

1- Describe any five properties of a textile fibre.

2- Write the classification of yarn on the basis of the length of the fibre.

3- Write a short note on single yarn and plied yarn.

Session: 3 List and Describe Various Fabrics, Weaves their Properties and Uses

3.1- Different type of fabrics –

In this section we will try to understand the technology/methods of manufacturing of different types of fabrics. The fabrics can be made by the following ways-

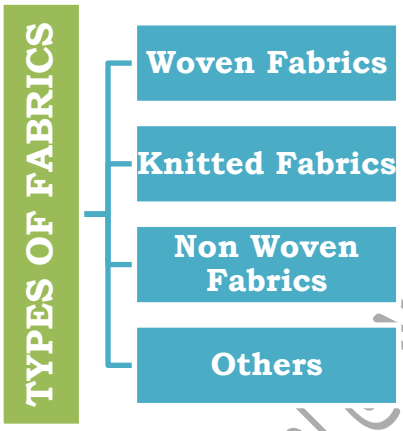


Fig.: 1.13 : Types of fabric

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.

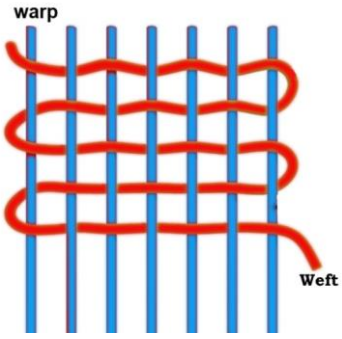


Fig.: 1.14 : Woven fabric

2- Knitted Fabrics: Knitted fabrics are constructed by interlooping 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, pique, loopknit, fleece fabric, Raschel knits, Milanese knit etc.

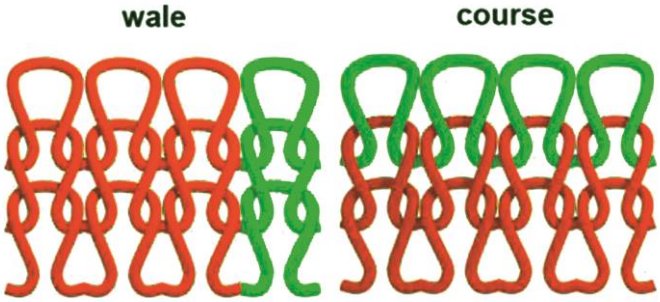


Fig.: 1.15 : Knitted fabric

3- Non Woven Fabrics – 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.

Non-woven fabrics 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.

Other techniques can be braiding 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.

Fig.: 1.16 : Non woven fabric

4- Other Fabrics – They can be 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.

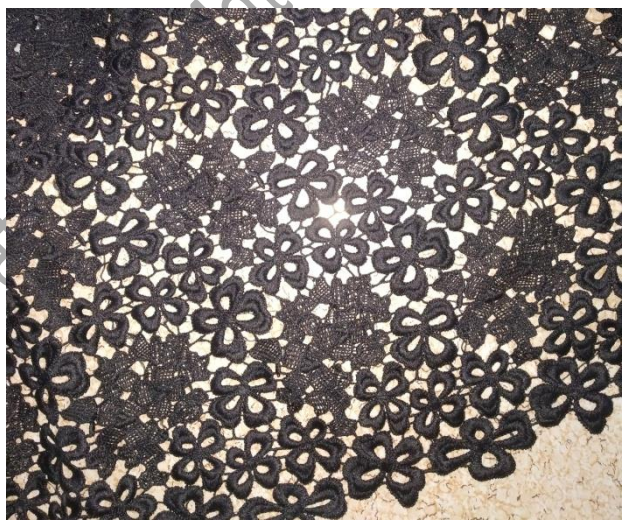


Fig.: 1.17 : Lace fabric

3.2 – Different types of weaves and their uses

Weaving is the transformation of yarn into fabric on a device called “Loom”. On a loom two sets of yarn, namely warp and weft are interlaced according to the required design. The warp yarn runs along the length of the fabric,

and the weft yarn runs in the width wise direction. The three basic weaves are –

1- Plain weave

2- Twill weave

3- Satin and Sateen weave

Plain Weave

The plain weave is the simplest of the three basic weaves. It is formed by yarn passing right angle alternately over and under each other. Here each warp yarn interlaces with each filling yarn to form the maximum number of interlacing. Therefore, the strength and the dimensional stability of the fabrics are relatively high. It requires only two harnesses loom and the least expensive weave to produce. It is also called as one up, one down weave as the first warp/end is lifted over the first weft/pick but lowered under the second. In other words, the plain weave employs the alternate method of interlacement and therefore has no face (front) and back. As the interlacement is most frequent in plain weave, it provides the highest number of intersections in a given area as compared to any other weave. This weave is used in the production of wide variety of fabrics like muslin, poplin, cambric, crepe, georgette, duck, canvas, casement etc.

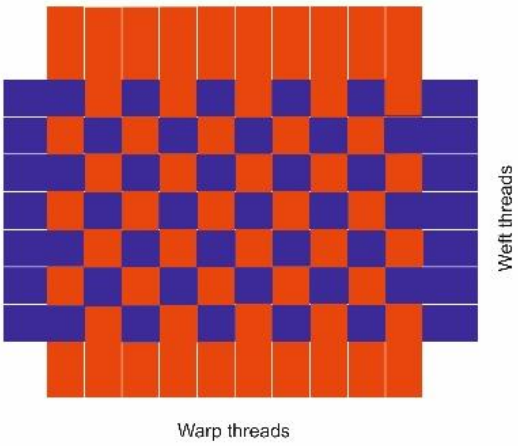


Fig.: 1.18 : Plain weave

Plain weave can be modified in various ways –

- Modified by extending warp or weft or both. The extension of the plain weave thus produces a rib effect.
- Extending warp produces warp rib.
- Extending weft produces weft rib.
- Extending both warp & weft produces matt/basket weave.

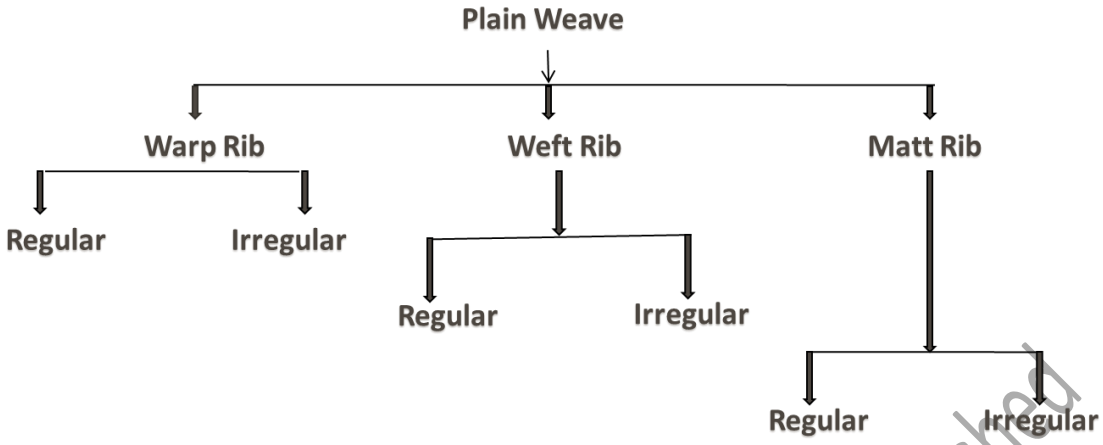


Fig.: 1.19 : Plain weave

1- Warp Rib

Warp rib is obtained by extending the plain weave in warp wise direction. These weaves are normally used to produce warp faced designs. The warp rib effect can be enhanced with a high number of ends per inch and a comparatively low number of picks per inch. The prominence of the rib can be increased by suitable use of coarse and fine yarns.

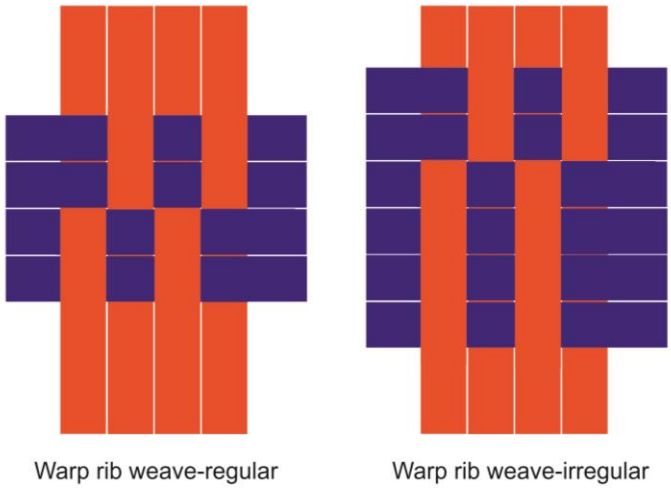


Fig.: 1.20 : Warp Rib

2- Weft Rib

When plain weave is extended in weft direction we get a weft rib. Weft rib gives a weft faced fabric which means that more of weft yarns are visible on the surface. This rib effect can be enhanced with a high number of wefts or picks per inch and a comparatively low number of ends or warps per inch. Examples of rib weave include matelassé fabric, gross grain fabric, repp cloth etc.

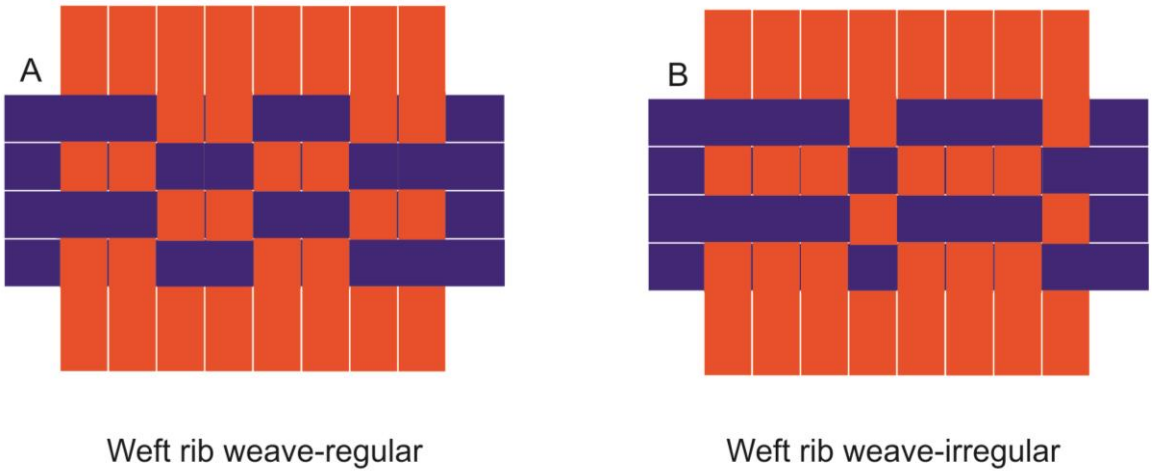


Fig.: 1.21 (a & b) : Weft Rib

3- Matt Rib Weave

These weaves are also known as hopsack or basket weaves. The matt structures are made by extending the plain weave in both warp and weft wise directions. In case of regular matt weave, the plain weaves are extended equally in the warp and weft directions, where as in case of irregular matt weaves, the plain weave is extended irregularly in the warp and weft directions. Matt weaves are mostly used for making a great variety of fabrics such as dress materials, shirting, sailcloth, duck cloth etc.

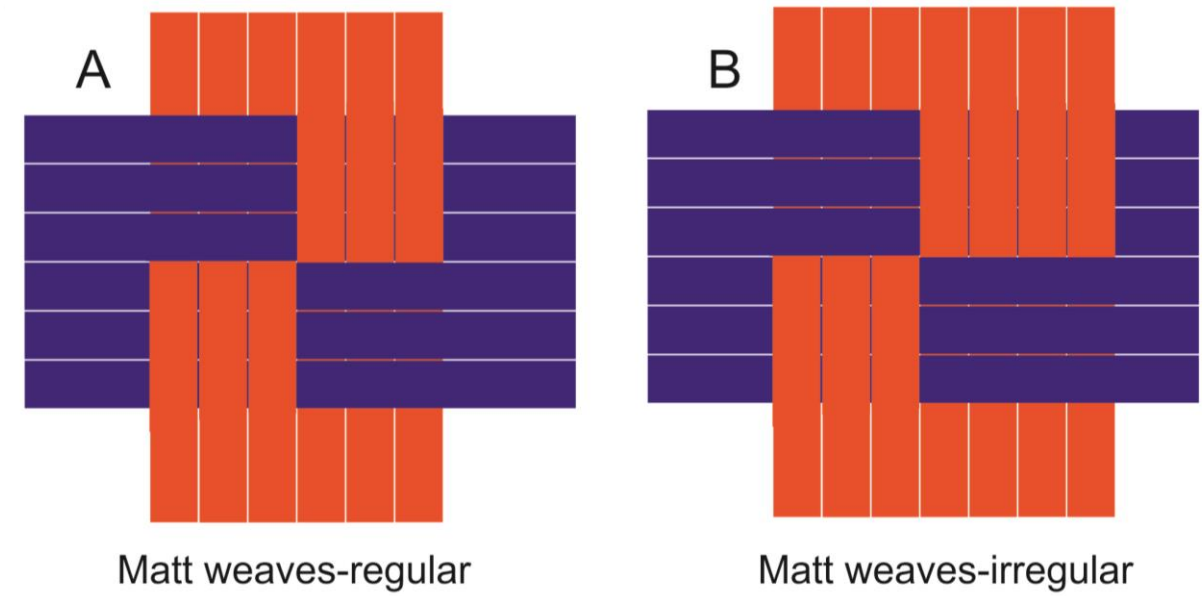


Fig.: 1.22 (a & b) : Weft Rib

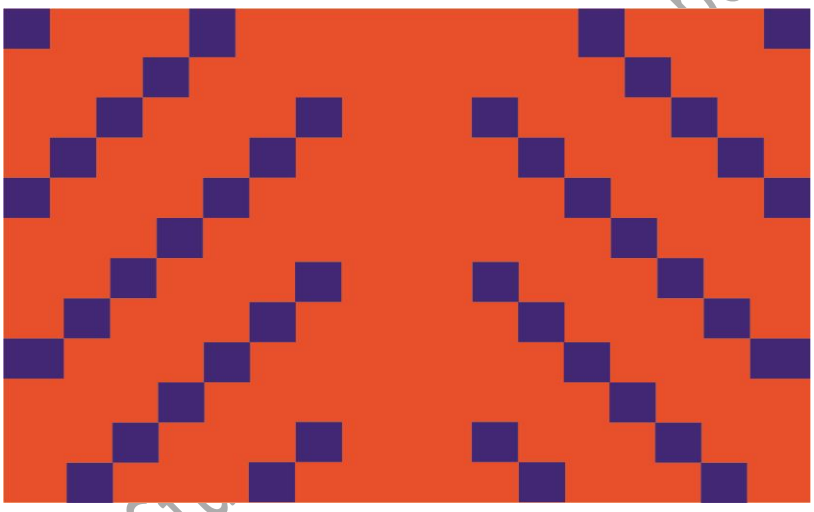
Twill Weave

Twills are characterized by diagonal lines of warp or weft float on the fabric. The interlacements are arranged in a manner that diagonal lines are produced on both face and back sides of the fabric. The minimum possible size of weave involves 3 ends and 3 picks i.e. 3 x 3. Regular twill weaves are classified on the basis of direction of the diagonal lines as –

1- Right hand twill

2- Left hand twill

Twill weaves are used in various fabrics such as drill cloth, khaki uniforms, denim cloth, blankets, shirting and soft furnishings.



RHT LHT

(RHT) – Right hand Twill

(LHT) – Left hand Twill

Fig.: 1.23 (a & b) : Twill Weave

Satin and Sateen Weave

Satin weave produces a solid face on one side of the cloth so as to give it a smooth, lustrous surface. It is a warp faced weave in which long floats of warp are structured with very few interlacements. Mostly lustrous filament yarns are used in making satin weave. It is used for making ribbons, trims, dress material, linings etc. It was originally used in all silk fabrics with a fine rich glossy surface formed by warp faced satin weave.

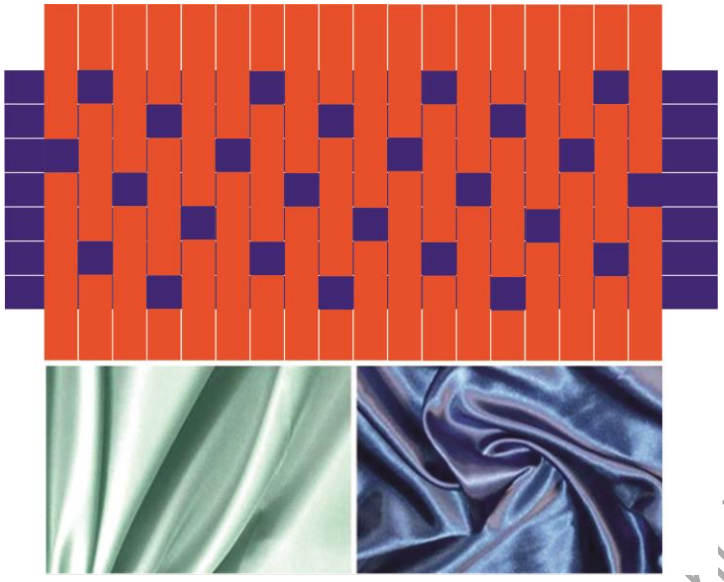


Fig.: 1.24 : Satin & Sateen Weave

(Satin Weave - Filler yarns pass over a number of warp yarns. Exposed yarns reflect light and give the weave its sheen.)

The fabric surface is very smooth and lustrous, and by using low twisted yarn and by increasing EPI, smoothness can be increased. Shorter floats in fabrics are more durable in nature than longer-floats fabric. When we require luxurious fabrics for formal wear, satin is often chosen. It is an especially used as a fabric for coat linings. Satin weave usually requires more shafts in the weaving as compared to plain or twill weaves, hence increasing the cost of production. It is also used in making dresses, skirts, jackets, sheets and other household decor items.

Sateen weave is the reverse or back side of the satin weave. Weft yarns or filling yarns show more on the front surface. The minimum/simplest satin or sateen weave requires 5 ends and 5 picks i.e. 5 x 5 repeat size.

Weave	Luster	Abrasion Resistance	Surface Effect	Tearing Strength	Wrinkle Resistance
Plain	Poor	Good	Flat, Uninteresting	Low	Poor
Twill	Fair	Good	Twill lines	Medium	Fair
Satin	Good (especially with filament yarns)	Poor if long floats	Smooth	High	Good

Fig.: 1.25 Comparison Chart of Weaves

3.3 Various fabrics, their properties and end uses –

1- COTTON AND ITS BLENDS

Cotton clothing allows skin to breathe and heat to escape naturally. Unlike synthetic fibres, cotton fibres absorb sweat which then evaporates into the air – making cotton an ideal choice for wearing in summers and also for working, cooking and outdoor activities. Cotton fabric is easy to wash and maintain. It is highly durable in nature and is even 30% stronger when wet. Cotton fabrics are finest fabrics around the world, giving comfort, wear ability, and versatility. Here are some examples of cotton fabrics along with their properties and uses.

Muslin

Muslin is a cotton fabric woven in plain weave and ranges from heavy weight fabrics to sheer delicate varieties. It is often sheer, delicate and un-dyed. Pure and natural product, inexpensive, often used to strain liquids.

Denim

Denim is a sturdy and durable fabric. It's made in twill weave and usually has a coloured warp and white weft. This hardwearing fabric is usually dyed indigo blue and used to make jeans. Used earlier for making work trousers, it has now become an essential fashion item.

Cotton Chambray

Chambray's characteristic is its colored yarn in the warp and a white in the weft. Two tone durability used in jackets and shirts.

Flannel

This cotton fabric has a very light texture sometimes on one side, sometimes on both sides, giving it a soft washed feel. It is mostly used for nightwear and sheets in the winter months.

Cotton Chenille

Cotton Chenille fabric has a pile weave which gives this cotton yarn a fuzzy feel. Widely used as a table covering in Victorian times. Today mostly used in dressing gowns, bedspreads and upholstery.

Egyptian cotton

Egyptian cotton is the most supreme quality cotton fabric. Egyptian cotton provides the best quality bed linen, T-shirts, shirts etc.

Terrycloth

Terry cloth has a moisture-absorbing ability to absorb more than most types of cotton. It is soft and absorbent therefore is perfect for towels and cloth nappies.

Gingham Cotton

This balanced plain-woven fabric is usually recognizable by its distinctive checked pattern. Popular for summer school uniforms, it is lightweight and cool.

Broadcloth

It is a lustrous cotton cloth woven tightly with fine rib effect. It is mostly used for shirts, dresses and sleepwear. Broadcloth is known for its hard-wearing nature.

Canvas

Canvas cloth is heavy and strong in nature. It is a plain-weave cotton fabric. It has high durability, and therefore, is often used for bags and shoes.

Chino

It's a durable cotton twill weave fabric that is woven in several weights. Used mainly for trousers as it's a durable and comfortable fabric.

Poplin

Poplin is a strong plain weave fabric. It is characterized by fine ribs in the direction of weft. It can be made with wool, silk or cotton and is used for making shirts, dresses and even sportswear.

Voile

Voile is a sheer, lightweight cotton fabric with slightly crisp feel. Its light, natural and semi-sheer feel and properties makes this cotton fabric best for summer dresses, scarves, blouses and home furnishings.

Cotton blends –

A blend is made by mixing two or more fibres and then spinning them together. The individual yarn thus contains two or more different types of fibres.

The blending of cellulosic fibres with man-made fibres is done to produce fabrics with improved characteristics. Blending of fibres is done in order to produce fabrics with better qualities. By blending we can improve the characteristics that are poor in one fibre, by blending it with another type of fibre that excel in those characteristics. Cotton tends to wrinkle easily but is very absorbent whereas polyester doesn't wrinkle easily, however it has poor absorbency. Thus by blending Polyester with cotton, we can get a fabric which has moderate absorbency as compared to very low absorbency in 100 percent polyester fabric and more wrinkle resistance as compared to cotton fabric. The cotton can be blended with the following-

Cotton/Poly Fabric-

A cotton poly fabric is made up of cotton and polyester fibres. The ratio varies, with 65% cotton and 35% polyester being the most common. 50/50 blends are also common. The blend is designed to get the advantages of both the cotton and polyester fibres into one fabric. A fabric made from a poly cotton blend combines the strengths of the two fibres. These fabrics are generally resistant to shrinkage, wrinkling, pilling and have more durable properties. Poly cotton blends costs less than garments made of 100% cotton.

Cotton/Wool Fabric-

Wool is known for its moisture wicking properties. Wool acts as a natural insulator for both cool and warm environments. Cotton has a softer feel with high breathability but is more likely to have shrinkage and wrinkles. A Wool/Cotton blended fabric helps in improving the ability of the garment to retain its shape resulting in better appearance. Wool improves wrinkle resistance, while cotton softens the fabric making it more comfortable to wear. It's a common blend used in making hats, socks, jackets and vests.

Cotton/Linen Fabric –

Blending of linen with cotton increases the strength of the fabric while also reducing the cost of an expensive pure linen fabric. As a 100% linen fabric is difficult to maintain and expensive. Cotton linen is a fabric blend mostly used in making shirts, jackets and blouses.

Cotton/Silk –

Silk fibre is known for its strength, fineness, luster and elasticity whereas cotton is known for its comfort. . Hence, blending of silk with cotton and manufacturing of blended yarns and fabrics provides with both aesthetic value as well as comfort characteristics. The demand for cotton/silk blended fabrics has increased due to expensive prices of raw silk.

Cotton/Rayon –

Rayon is a synthetic fibre that drapes well. It has a beautiful luster and silky feel on the other hand cotton has a dull look with natural properties. Cotton rayon blend makes a combination of fabric which fulfills both the requirements.

2- SYNTHETIC FABRICS

Synthetic fabrics are made from fibres that are not obtained by natural sources. These fabrics have high resistance against wear and tear and are also crease-resistant but, as they have low absorbency, they can be little

uncomfortable to carry specially during summer season. Some examples of synthetic fabrics are as follows-

- **NYLON**

Nylon was the first synthetic fibre manufactured. It is used across all sectors i.e. apparel, industrial, home furnishing etc. Nylon fabric is preferred for its qualities like strength, abrasion resistance, flexibility, quick drying and water resistance. Nylon resembles the look and feel of silk. It is used in hosiery products, sails, parachutes, blouses, gowns, swimsuits, lingerie, and even car tires. Nylon has also replaced wool as the fibre most used in making of carpets.

- **POLYESTER**

Polyester fabric is one of the world's most popular fabrics, and is used in many different consumer and industrial applications. The durability and strength of polyester fabric along with its cost effectiveness and easy maintenance makes it the widely chosen fabric for apparel brands. Polyester may be the only fibre constituent of apparel products, but it's more common for polyester to be blended with cotton or any other natural fibre to increase its comfort level. Polyester fabric is used in making of suits, jackets, socks, blankets, rugs, upholstery, curtains etc.

- **ACRYLIC**

Acrylic is a synthetic substitute of Wool. Since acrylic fabric is designed to be similar to wool, it is used in many of the same applications as this highly popular and reasonably expensive natural fibre "wool". Therefore, apparel manufacturers use acrylic to manufacture sweaters, mittens, gloves, pants, hoodies, and a variety of other types of winter clothing. Additionally, acrylic is also used in the making of carpets, upholstery, rugs, and other traditionally wool-made home furnishing product range.

- **SPANDEX**

Spandex is a synthetic fabric that is famous for its elasticity. Spandex fabric can stretch up to 5-8 times its original size and regain its shape back as the tension is released. This fabric is highly popular in sportswear category as in most types of sports activities, wearing clothes that fit close to the body and have good stretch ability is required. To fit these requirements, spandex fabric is used in swimwear, bicycling apparel, athletic wear and other types of clothing that are used in sports category. Other advantages are that it has a smooth hand; it is durable in nature with good tensile strength, is mostly lightweight, wrinkle resistant, wicks moisture and very easy to maintain. It is also commonly known as Elastane or Lycra.

3- SILK FABRIC

Silk is the strongest and longest natural fibre obtained by the process of sericulture. Despite its high tensile strength, silk fabric is mostly valued for other reasons like softness, high luster, excellent drape-ability, flexibility, smooth texture and a luxurious feel and appearance. The most common consumer application of silk is apparel production. Examples of consumer apparel products made from silk are scarves, shirts, blouses, and eveningwear. In the home furnishing sector, silk is mostly used to make decorative pillows, curtains, or wall hangings. Silk from silkworms can be broadly classified into various types -

Mulberry silk

Mulberry silk is made from domesticated silkworm species known as Bombyx mori fed exclusively on Mulberry leaves. Mulberry silk is a most general and widely available category of silk and this category dominates the world silk production by about 80%.

Tussar Silk

This variety of silk is obtained from silkworms found in the wild. These feed on oak leaves instead of mulberry leaves. This variety of silk is coarser in nature and texture.

Eri Silk

This is the silk produced from silkworm species which feeds on castor oil plant leaves. The silk derived is white or brick-red in colors.

Muga Silk

This variety of silk is natural golden yellow in color and is produced by strong silk fibres made from the silk worms found in the state of Assam in India. This variety has a shimmery and glossy texture along with high durability.

Fabrics made from silk are as follows –

Silk Charmeuse (Silk Satin)

Silk Charmeuse is a soft medium weight silk fabric with a satin weave, lustrous face and a dull back (called crepe backed satin). It is mostly used in producing apparels due to its good drapability. Mostly used in making lingerie, gowns, loose blouses, scarves etc.

Chiffon Silk (Crepe chiffon)

Chiffon silk is a light to medium weight sheer fabric with a slight rough feels (matt, crepe like feel) because of the use of twisted yarns. This fabric comes in various colours and prints. It is suitable for making loose flowy clothes.

Dupion Silk

Dupion silk is a medium weighted, reversible, crisp silk fabric having a nubby texture weaved in a plain weave. It does wrinkle quickly and has high strength. This fabric is made by weaving two types of yarns (said to be from two cocoons nested together). The lustrous vivid colours of the dupion silk and its shimmery look makes for a very attractive fabric.

Silk Gauze

Silk gauze is a sheer, thin lightweight open weave silk fabric with a soft feel and floaty drapability. It is lighter than chiffon and organza. This is most often used for sewing as facings, interfacing or lining.

Silk Organza

It is a sheer crisp fabric having lightweight. It is a durable silk fabric with a loose weave and smooth texture. It looks like silk gauze but silk organza is heavier and stiffer. The fine yarns that make this fabric make it see through. This fabric creases easily.

Silk Brocade

These are silk fabrics blended with jacquard patterns woven on a heavyweight twill/satin weave base. This fabric is mostly used in home furnishings, for making wedding dresses and costumes.

Silk Gabardine

This fabric has a smooth surface with twill weave with distinct diagonal lines on the fabric. This fabric is less lustrous with a good drape. The fabric resists wrinkles. Durable and crisp, it is mostly used for making skirts, slacks and suits.

Silk Georgette

This fabric has a sheer and grainy texture with a dull creped surface and has good strength. It has less luster and is heavier than chiffon and is mostly used for dressmaking.

Some common Indian varieties are as follows –

- Cashmere Silk - Twill weave silk fabric.
- Jamawar - Pashmina silk with a blend of cotton and wool.
- Matka Silk -A rough handloom silk fabric made from the waste Mulberry Silk.
- Banarasi Silk – A fine silk evolving with gold and silver brocade and zari work
- Bangalore Silk

- Pochampalli Silk
- Mysore Silk
- Kosa Silk- This is a type of Tussah silk fabric with a soft texture and dull-brownish look
- Kanchipuram Silk
- Bhagalpuri Silk
- Uppada Silk
- Khadi Silk – This is silk fabric made from handspun silk yarns. Khadi silk is usually 50% cotton and 50% silk. It has a very crisp and neat look and a soft lightweight feel.

4- WOOL FABRIC

Wool fiber is the natural animal fibre obtained from hair of the sheep and is composed of a protein substance called keratin. Other than sheep there are some specialty hair fibre obtained from certain animals of the goat and camel families. Specialty hair fibres obtained from the goat family include mohair, Angora goat, and cashmere (referred to as cashmere wool). Fibres obtained from the camel family include camel hair mainly from the Bactrian camel, and guanaco, llama, alpaca, and vicuna fibres.

To produce the wool fabric, producers harvest the hair of animals and spin them into yarn. These yarns are then weaved into fabrics and then into garments or other forms of textiles. Wool is famous for its durable and thermal insulating properties. Depending on the type of hair that producers use to make wool, the fabric benefits from the natural insulation property that helps to keep warm during winters.

When wool is woven into fabrics, it has a natural waviness called “crimp.” This crimp enhances wool’s insulation properties, which exists as the bulkiness of wool traps air naturally. Some types of wool have more crimp than others, and more the crimp, the more superior quality of wool fabric is produced. Wool fabric is commonly used to make sweaters, hats, gloves, and other types of winter accessories.

Some variety of wool fabrics are as follows-

1. Merino Wool

Merino wool is a natural animal fibre grown all year-round by Merino sheep on farms across Australia. Merino wool is one of the finest qualities of wool in existence. Merino wool is most-suited for luxury clothing, high-performance sportswear and next-to-skin apparel.

2. Cashmere Wool

Cashmere is a soft wool fabric woven from the hair of the Cashmere, or Kashmir goat. Cashmere fibres are extremely soft and silky to touch and weigh very less. Mostly cashmere fabric is used to make sweaters, cardigans, shawls, dresses, and also can be sewn into outerwear coats and jackets.

3. Mohair Wool

Mohair wool is obtained from the hair of the Angora goat. The diameter of the fibre increases with the age of the goat, the thinner fibres from young goats are used more for clothing, like sweaters, while the thicker, coarser fibres are used for producing carpets, upholstery and outerwear.

4- Alpaca Wool

Alpaca wool is derived from Alpaca goats which are bred in South America. The wool is very soft in its feel and makes much warmer fabrics compared to merino sheep's wool. It is easily dye able to get interesting color combinations to make unique alpaca fabrics. It is naturally waterproof and free of oil, it also hypoallergenic and is a good choice for those with sensitive skin. These fabrics are used both for outerwear, like coats and jackets, and lighter apparel like pullovers, dresses and cardigans.

5- Camel Wool

Camel wool fabric is derived from the coats of camel hair. The camel hair derived usually consists of two separate parts: The guard hair and the undercoat. The guard hair is hard and coarse in texture and it doesn't make very good fabric unless it is mixed with another material like sheep wool. The undercoat hair is quite soft and is most commonly used to make apparel. Camel wool is usually used in making of Coats, sweaters, suits, tents and carpets.

6- Angora Wool

Angora wool comes from the hair/fur of Angora rabbits. This wool is incredibly fine and soft in texture. Angora wool is used in knitwear category, as it adds its luxurious effect, or fluffy layer, to the garment or accessory. Angora is also used for home décor products, like throw pillows and blankets. The fibre is normally incorporated with other fibres, as it is very expensive.

7- Vicuna Wool

Vicuña is the finest of wools, coming from a delicate little animal living in the Andes. The vicuña animal is known as the "bearer of the golden fleece," and it is a small member of the camel family.

3.4 –Fabric flow chart of various processes in apparel production -

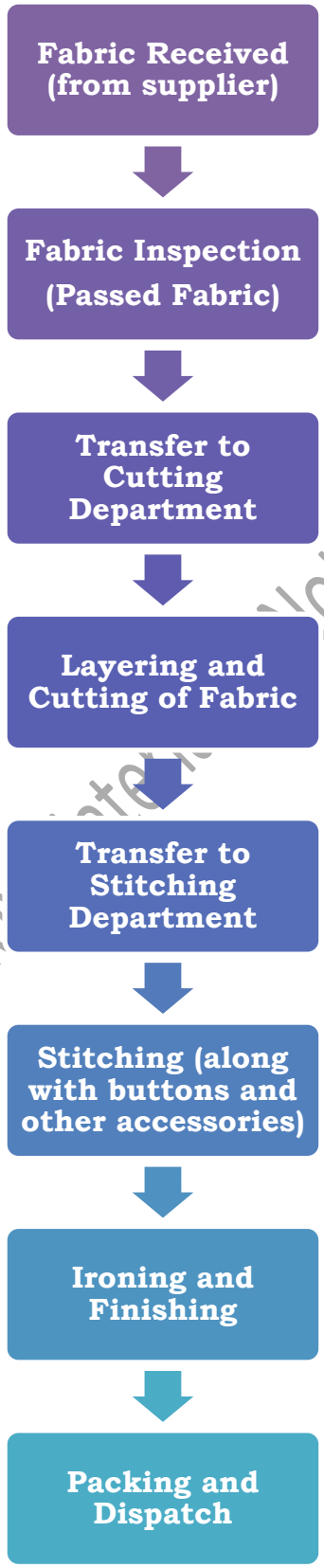


Fig.: 1.26 Various processes in apparel production

Activities

ACTIVITY 1

Prepare a sample file of different type of fabrics with their properties and a fabric swatch. (Any 15)

Material Required

- File/Register
- Sample of different types of fabrics
- Pencils
- Colored pens/markers
- Eraser
- Ruler

Procedure

1. Collect sample of different types of fabrics.
2. Place the samples in a file/register.
3. Label the samples collected and write about their properties and end uses.
4. Submit the sample file.

Check Your Progress

A. Fill in the following blanks –

1. ……are made by interlacing two sets of yarn.
2. The length wise yarn is known as……., and the width wise yarns are known as weft or picks.
3. ……fabrics are constructed by interloping the yarns.
4. In……., each warp yarn interlaces with each filling yarn to form the maximum number of interlacing.
5. Twills are characterized by ……of warp or weft float on the fabric.
6. ……is the most supreme quality cotton fabric.

B. Write short answers for the following -

1. Describe different types of fabrics i.e. woven, knitted and non-woven.
2. Write short notes on each of the following -
   - Plain weave
   - Twill weave
   - Cotton Fabric
   - Wool Fabric

Module 2	Identify and Describe Fabric Defects

Module Overview

The manufacturing process of textile i.e. Fiber to Garment is inclusive of physical & chemical technology. In any process even if it is well standardized, variation is bound to occur. The contributing factors for variation from predefined quality parameters are manual, mechanical or chemicals. Some variation is accepted but damage or excess deviation is rejected. The fabric manufacturing process is a long system where inputs & output changes forms continuously. The process flow chart starts from fiber onwards through steps like spinning of yarn, weaving or knitting, processing and in last garmenting. At every stage some damages are observed which ultimately are noted down at fabric stage. These faults needs to be removed, rectified to avoid rejection of garments.

Learning Outcomes
After completing this module, you will be able to: • Identify and describe different types of fabric Defects • Classify dyeing and printing methods and list associated defects • Define and describe Inspection systems and criteria
Module Structure
Session: 1 Classification of fabric defects
Session: 2 Classification of dyeing and printing methods and listing of associated defects:
Session: 3 Define and describe Inspection systems and criteria

Session:1 Classification of Fabric Defects

Fabric defects

A fabric defect corresponds to a flaw on the manufactured fabric surface. There are numerous fabric defects, and most of them are caused by machine or process malfunctions. Apart from this, defects are caused by faulty yarns

or machine spoils. Each factor has different effects and greatly reduces the sale and serviceability of the textile material.

Classification of defects -

Defects are broadly classified as minor, major, and critical defects. Minor defects include small faults which have no influence on the purchase of the product. Major defects are those which when exposed, are likely to affect the purchase of the product and are hence are categorized as seconds. Critical defects would cause an entire roll to be rated as a seconds or will subsequently lead to rejections.

The defects on the fabric can be categorized as –

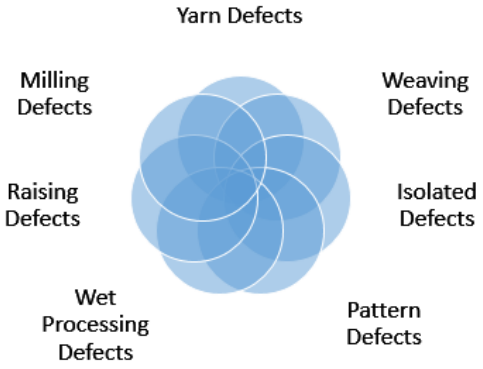


Fig.: 2.1 Categories of yarn defects

YARN DEFECTS –

Defects in fabrics due to faulty yarns are called yarn defects.

i. Barre - These are horizontal stripes or streaks of uniform or uneven width caused mainly due to high yarn tension.

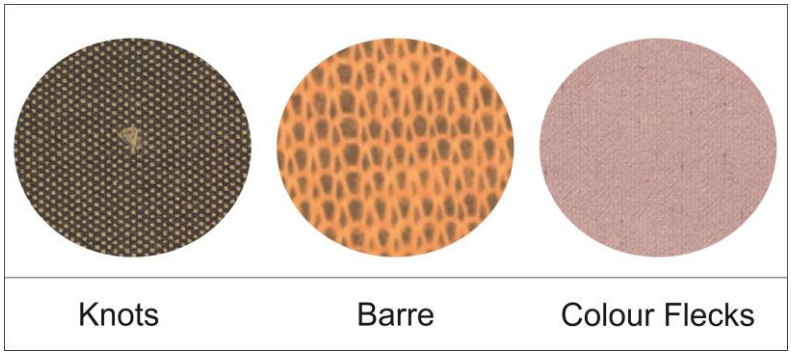


Fig.: 2.2 : Yarn Defect

iii. Colored Flecks – The presence of any foreign material in the yarn gives rise to defects called as colored flecks.

iv. Knots - This results when broken threads are pieced together by improper knotting.

v. Slub - A slub is a bunch of fibers having less twist or no twist and has a wider diameter compared to normal spun yarn.

vi. Spirality - It is the twisting of yarn due to residual torque in it.

WEAVING DEFECTS

These defects are those which occur due to the process of weaving. The different weaving defects are as follows:

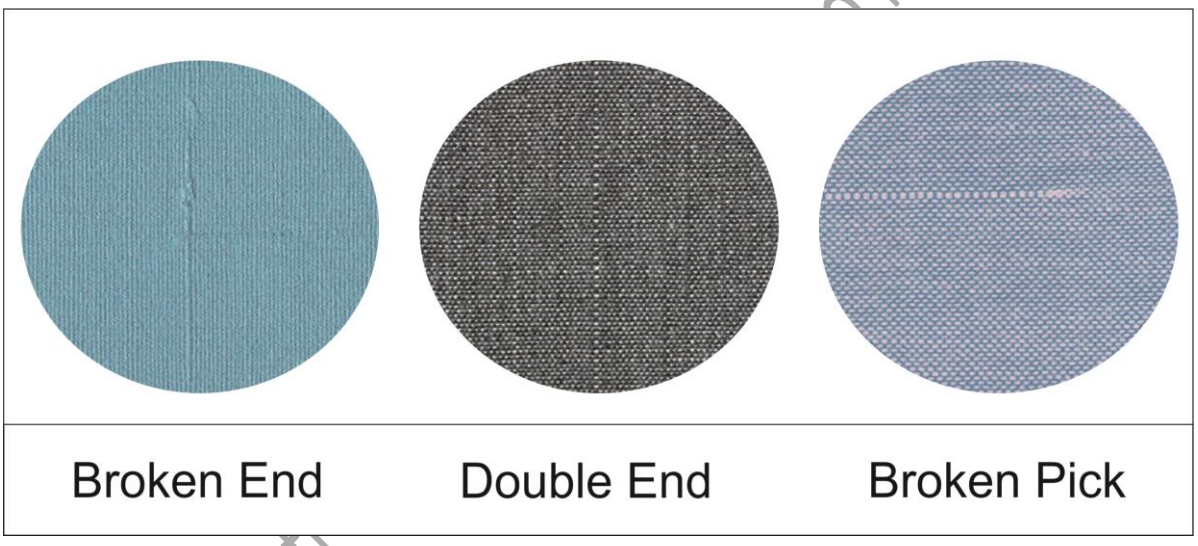


Fig.: 2.3 : Weaving Defect

Broken Ends - This defect occurs due to breakage of warp yarns during weaving.

Broken Picks - This defect occur due to breakage of filling/weft yarns during weaving.

Double End - When two or more ends by fault get woven as one generating a thick bar running parallel to the warp.

Double Pick - Instead of single, double weft yarns are woven in the fabric

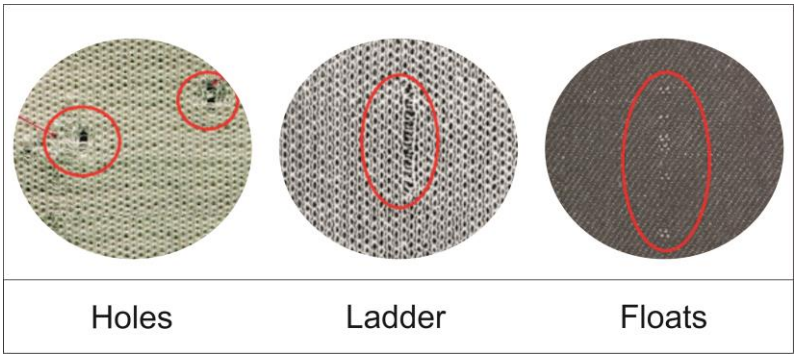


Fig.: 2.4 : Weaving Defect

Float - Float is an improper interlacement of warp and weft yarns in the fabric over a certain area.

Gout - It occurs due to an accumulation of short fibres in the yarn and gives a lumpy appearance on the fabric.

Holes, Cut or Tear - These defects may be generated due to various reasons like mishandling of the fabric, or an accidental cut.

Ladder - This defect is found in knitted fabrics. It indicates a row of dropped stitches in the wale direction.

Lashing in - This defect occurs when an extra piece of yarn is woven in the fabric near the selvedge.

Local Distortion - Displacement of warp and/or weft yarns from their normal position.

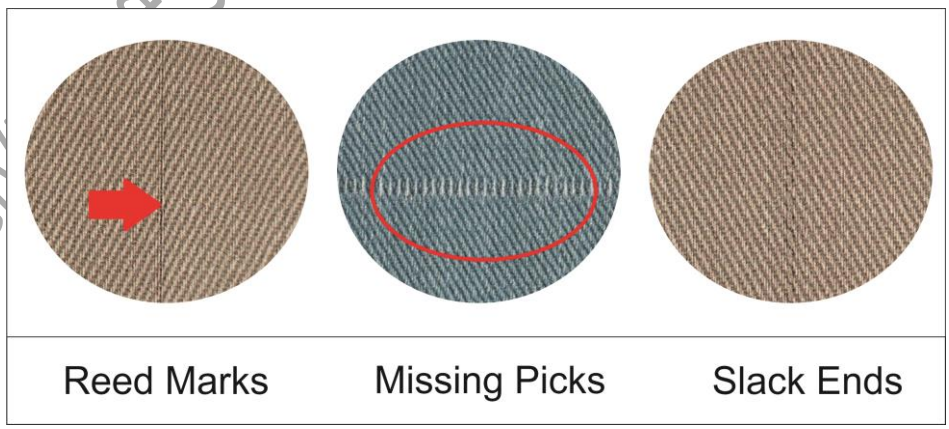


Fig.: 2.5 : Weaving Defect

Missing Ends - Omission of an entire end along the length of the cloth
Missing Pick - Omission of an entire pick across the width of the cloth

Reed marks - These appear as a pronounced warp way crack and are caused by a damaged or defective reed.

Slack End - Slack ends are due to the broken ends that are being woven without tension. The yarn puckers as it is woven.

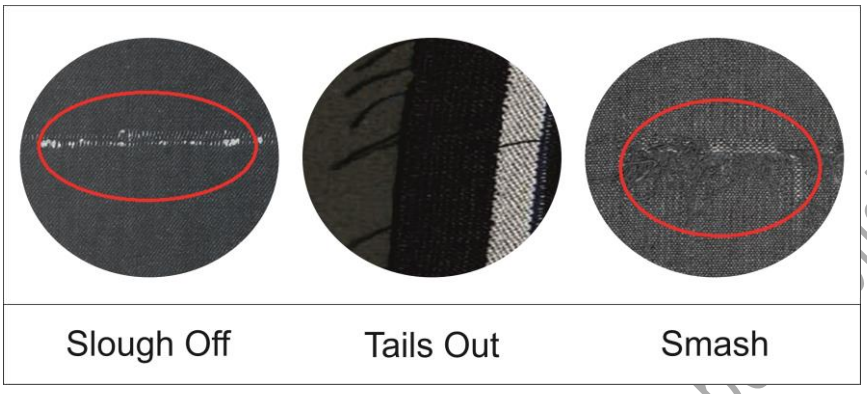


Fig.: 2.6 : Weaving Defect

Slough Off or Snarling - Bunch of weft yarns is woven into the fabric together due to yarn slippage.

Smash - It refers to the ruptured cloth structure created as a result of many broken warp ends and floating picks.
Tails Out - These are untrimmed loose threads on the selvedge of the fabric due to improper cutting.

Thick and Thin Place - Bunching up of yarns in the fabric causes thick and thin places in the fabric.

Tight Ends - This defect in the fabric is due to warp yarns which are under much higher tension than the normal amount.

ISOLATED DEFECTS

Colour Fly - Fibres or yarn pieces of varying colours stuck on yarn or woven in the fabric.

Fuzz Balls - Fuzz balls are created when the fibres are broken loose and pushed back on the yarn.

Neppy Surface – Sometimes excessive amount of small tangles and/or knots of fibres (neps) appear on the fabric surface. This type of defect is refered to as neppy surface.

Oil Stains – The machine oil can come up on the fabric causing it to get stained and dirty.

Unevenness – Irregularities in yarns and certain defects in weaving may cause an uneven fabric. Thereby making the fabric defective.

PATTERN DEFECTS

Broken Colour Pattern - When a coloured yarn is out of place, this defect is created.

Cover - Considering twill fabrics, this defect occurs when a coloured yarn is out of place in the creel. If settings are proper, warp yarn will dominate and form a smooth surface of accentuated twill lines.

Miss-selection of pattern- Due to the random drop of stitches the pattern design is altered in this defect.

Skip Stitch- A float is created on the face of the fabric when a stitch is skipped in knitted fabric and next yarn is picked up.

WET PROCESSING DEFECT

It is caused by desizing, scouring, bleaching, dyeing, and finishing processes in the cloth.

Some of the flaws are known as -

i. Colour Bleeding and Staining – Sometimes if the colour is not fast enough then it may bleed during subsequent finishing and washing. This may result in staining of other fabrics that come in contact of the bleeding fabric.

ii. Crease Marks - Crease marks are produced due to fabrics passing through squeeze rolls during the colouring or finishing process.

iii. Dye Marks – These are dye spots or blotches on the fabric and result from improper mixing of dye solution or residual dye spots or dye deposits left on the machine during some previous dyeing operations.

iv. Fabric Width Variation- Fabric shrinks width-wise due to wet processing.

v. Misprinting or Colour Out - Misprint occurs when the print is not according to the design. The incorrect placement of print sections due to the non-synchronization of printing rolls is off printing or out of register. The amount of color running short in the reservoir is known as colouring out.

vi. Pin marks- These are pin holes created when a cloth is placed over a pin and the holes are created, distorting or tearing the fabric.

vii. Scrimp – Sometimes the fabric may enter the printing machine in a creased state. As a result the printing of creased area in the fabric is not achieved properly. Scrimp refers to this pattern break in the fabric.

viii. Selvedge defects - The defects become visible on the selvedge are torn, waved, turndown selvedge. A broken selvedge is caused when it is passed through the frame, leading to the breakup of the fabric under extreme stress. Wavy selvedge is the outcome of the fabric's edge being longer than its centre. Selvedge turndown is the selvedge mark created on the fabric when the selvedge is folded and it moves through squeeze rollers.

ix. Shade Variation – At times the shade within a fabric roll or in two rolls of the same fabric is not uniform. There is a variation in the shade and its undesirable. This defect is known as shade variation.

x. Skewing - When one end of weft yarns at one selvedge slowly run with the warp yarns of the fabric at the other selvedge at a lower or higher angle than 90 degree.

x. Irregular or patchy dyeing- Uneven or patchy dyeing is primarily caused by improper dyeing conditions or defective pre-treatment.

RAISING DEFECT

These defects are found in piles fabrics caused by their method of manufacture.

Broken Pattern- Refers to the discontinuity found in the pile fabric design or pattern. An example will be in stack-cut fabrics where the pattern is broken due to an inappropriate distance between the shearing machine blade and the material.

ii. Missing Pile Thread – This defect is found in pile fabrics. If a thread is missed then pile is not created in that area and a gap is created in the fabric. This gap is visible in the form of a line and is called as a missing pile thread.

iii. Uneven Piles – In certain pile fabrics the piles are not raised uniformly all over the fabric causing uneven patch in the fabric. This is called as uneven pile.

MILLING DEFECTS

These defects are observed in woollen fabrics due to the process of milling.

i. Chaffing and Tearing - Damage may be caused to the cloth during milling.

ii. Fibre migration - This defect is particularly common in the milling of double cloths, where in the fibres migrate from the face of the cloth to the back.

iii. Mill Rigging - This is because the cotton is milled in the same place for too long, which creates crease marks in the woollen fabric.

The gradation of defects is according to testing methods and their extent of contribution in lowering the quality of finished fabric & garments.

1.2 Significance of identifying, rectifying and eliminating fabric errors

General Inspection Procedures for checking of fabrics are as follows -

- The place where Fabric inspection is being carried out should be well lit and has adequate ventilation.
- For lighting white fluorescent bulbs must be used above the area of fabric inspection and if needed backlight can also be used for better viewing of the fabric. The fabric being passed through the frame should be placed at an angle of 45-60 degree with respect to the fabric checker.
- One must ensure that the speed of fabric on the inspection machine must not be more than 15 yards per minute.
- The process of fabric inspection must be initiated after receiving at least 80% of the entire fabric or lot.
- For the assessment of color, hand, weight, construction, finish and visual appearance availability of approved standard of bulk dye lot must be ensured.
- The fabric rolls should also be checked for shade continuity within the roll. For this the fabric roll must be checked at centre and selvage. The beginning, middle and end of each roll must also be evaluated and documented.
- Weight evaluation of fabrics like knits must be conducted against standard approved weight.
- Fabric width must be checked from selvage to selvage against the standard.
- All defects must be clearly marked during fabric checking or inspection. Flagging of defects should be done.
- The length of each fabric roll must be inspected and it should match the length mentioned on the supplier ticketed tag. Even slight

deviation must be noted and reported. This is essential to avoid a shortage of fabric during production process.

- If yard dyed or printed fabrics are being inspected the repeat measurement must be done from the beginning, middle and end of selected rolls.

Fabric checking is an important step due to the following reasons –

- Fabric Inspection is an important aspect followed prior to garment manufacturing to avoid rejects due to fabric quality and to reduce the risk faced with an unexpected loss in manufacturing.
- Fabric inspection is done for fault/defect rate, fabric construction, fabric weight, shrinkage, end to end or edge to edge shading, color, hand feel, length/width, print defect and appearance.
- Fabric inspection ensures to minimize the rejection of cut panels or rejected garments due to fabric faults. Inspected and approved fabric ensures not only finished garments quality but also reduce rate of rejections, improves efficiency and ensures timely deliveries.

Activities

Activity 1

Prepare a power-point presentation on various types of fabric defects.

Material Required

- Pens/pencils
- Computer/Laptop
-

Procedure

1- Collect information about various types of fabric defects with pictures or you can click real time pictures of a fabric defect.

2- Prepare a Power Point Presentation based on the information collected and submit the same.

Check Your Progress

A. Fill in the blanks.

1. .....would cause an entire roll to be rated as a seconds or will subsequently lead to rejections.
2. .....is when two or more ends by fault get woven as one generating a thick bar running parallel to the warp.
3. .....are horizontal stripes or streaks of uniform or uneven width caused mainly due to high yarn tension.
4. .....occurs due to an accumulation of short fibres in the yarn and gives a lumpy appearance on the fabric.

B. Write short type answers for the following -

1- Explain any five types of weaving defects observed in a fabric.

2- Write a short note on importance of fabric checking.

Session: 2 Classification of Dyeing and Printing Methods and Listing of Associated Defects

Dyeing is an application of color to the textile material. It can be done in fiber, yarn or fabric stage. The textile material is completely immersed in the dyeing solution for its application and complete penetration of the color.

Printing is the process of applying colour to fabric surface in predefined definite patterns or designs.

The common difference between dyeing and printing are as follows-

S.NO.	DYEING	PRINTING
1	Uniform application on both sides of the fabric surface with single color only.	Single or multicolour application on one side of the fabric at selected portions only.
2	Dyes are applied in dilute form.	Dyes are applied in paste form.
3	In fabric preparation, half bleaching is enough.	Full bleaching with optical whitener is necessary.
4	Color penetrates through the fabric.	Color is applied only on the surface.
5	More time is required in batch application.	Not applied in batch process. Applied only by continuous process alone. Therefore requires less time.
6	Fabric need not be in dry condition.	Fabric should be in dry state.
7	Requires single machine and the process is simple.	Requires complex machinery and the process is also complex.
8	Dyeing consumes more water.	Printing consumes less water.

2.1 Classification and application of different dyes

Dyes are colouring agents and are aromatic organic compounds. These have an affinity towards the substrate (a substrate is material to be dyed) to which it is applied. Most dyes are soluble in water and are applied from solutions.

A mordant may also be used to treat the fabric before actual dyeing. Mordants are compounds that fix the dye to the fabric. They are also known as dye fixatives. Alum is a natural occurring mordant.

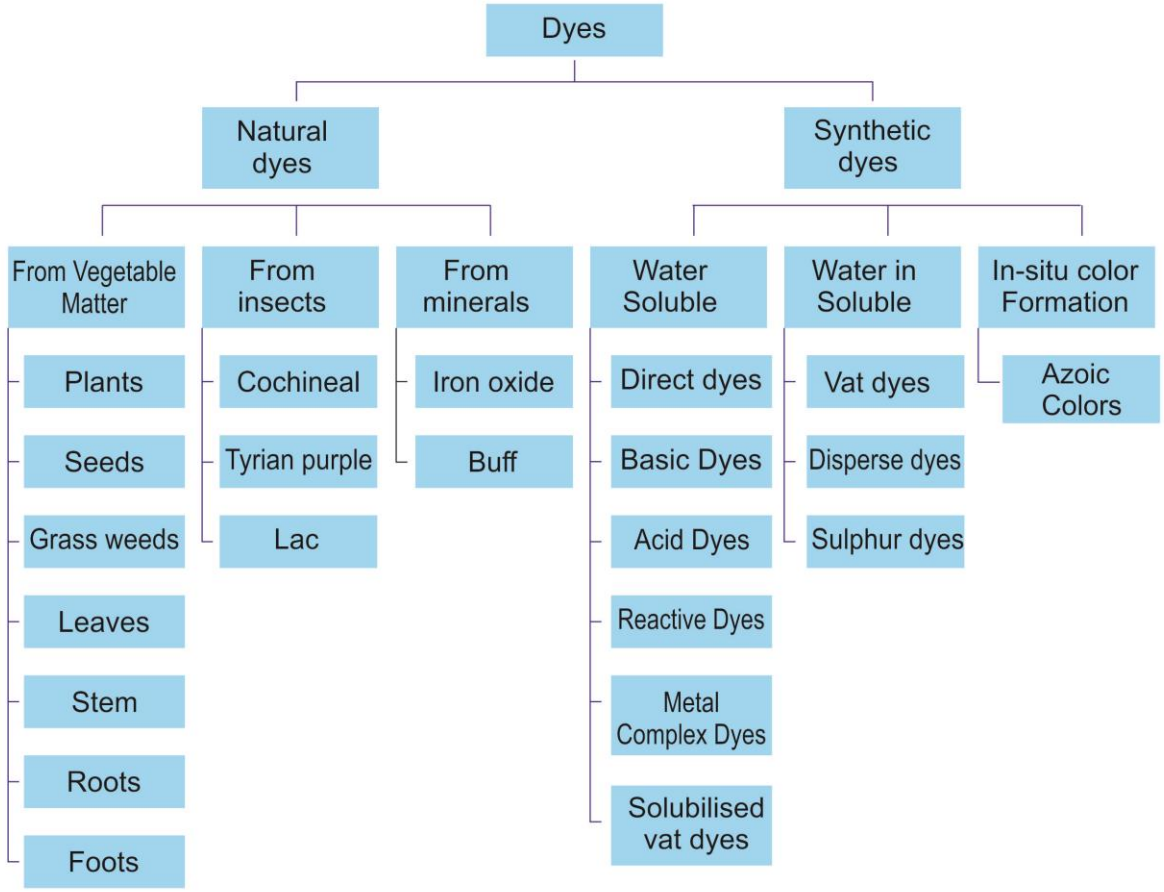


Fig.: 2.7: Application of different dyes

Dyes can be classified as follows –

Natural Dyes - Natural dyes are derived from natural sources such as plants, animals, fruits, insects, minerals etc. Ex. Tea, coffee, turmeric, indigo etc are all natural dyes. Since natural dyes are obtained from natural sources they are environment friendly and safe.

Natural dyes are scarce and required in huge quantities. That is why they are expensive also. However natural dyes are not very fast and fade with washing, exposure to light, dry heat, perspiration etc.

Synthetic Dyes - Synthetic dyes are so called because they are not obtained from nature and are manufactured in the laboratories with the help of chemicals. The first synthetic dye was discovered accidentally in 1857 by W.H. Perkin. These dyes soon became popular because of excellent fastness and permanency of colour, ease of application and availability in a variety of hues/colours. They are cheaper as compared to natural dyes and

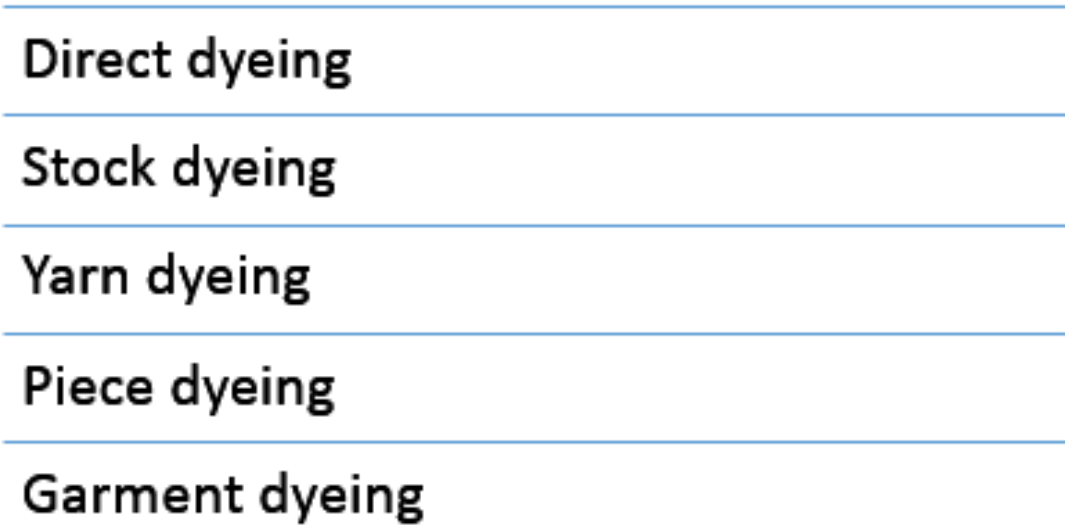
convenient to use. However, synthetic dyes have harmful effects on the environment and human beings.

Synthetic dyes are made up of chemical compounds and thus are harmful for the environment and consumers as well as for those who work in dyeing and printing with synthetic dyes. Mercury, lead, chromium, copper, sodium chloride, toluene, and benzene are some of the chemicals found in synthetic dyes and are known for toxic effects on human health as well as environment. Exposure to large doses of these substances can be toxic and can have severe effects in the human body.

Water pollution can also result from manufacturing synthetic dyes when untreated dye effluent is dumped directly on bodies of water.

2.2 Different methods of dyeing and its defects.

Colour is applied through the process of dyeing on the textile material at different stages like fiber, yarn or fabric. There are various methods of dyeing, these methods include:



1. Direct Dyeing

When a dye is added to the fabric directly without the help of an affixing agent, it is called direct dyeing. The direct colors, are mostly used for colouring cotton, are water-soluble and can be applied directly to the fibre from an aqueous solution. Most other classes of synthetic dyes, are also applied in this way.

2. Stock Dyeing

Stock dyeing refers to fiber dyeing, before being spun in to yarn. This is achieved by placing loose, unspun fibers in large vats containing the dye bath, which is then heated to the temperature required for the dyeing.

3. Yarn Dyeing

Yarn dyeing is the dyeing of the yarns before they are woven or knitted into cloth. In the weaving process, yarn dyeing is used to create interesting checks, stripes and plaids with different yarns of colour. Dyestuff in yarn dyes penetrates the fibers at the root of yarn.

4. Piece Dyeing

The dyeing of cloth after it is being woven or knitted is known as piece dyeing. It is the most common method of dyeing used. The various methods used for this type of dyeing include jet dyeing. Jig dyeing, pad dyeing and beam dyeing.

5. Garment Dyeing

Garment dyeing are the dyeing of the finished garments. The styles of clothing that can be dyed are mainly non-tailored and simpler kinds, such as sweaters, sweatshirts, T-shirts, pantyhose, and hosiery. It is essential to note the impact on the size, fabric, zippers, trims and snaps. Tailor-made pieces, such as suits or dresses, cannot be dyed as clothing, because the variation in shrinkage of the different components and linings deform shape of the article.

Garment dyeing is achieved by putting a suitable number of garments in a wide nylon net bag. The garments are loosely bound. The bags are placed in large tubes that contain the 10-50 dye baths and are kept agitated by a motor – operated paddle in the dye tub.

Dyeing defects and Remedies

Dyeing is a method of colouring fiber, yarn and fabric either with natural or synthetic dyes. There are several known-unknown faults during dyeing process.

Major faults in dyeing which occur during the period are listed below:

Sr.	DYEING FAULTS	CAUSES	REMEDY
1	**Uneven Dyeing**	Irregular pre-treatment (uneven scouring & bleaching). Incorrect quantity of color Using dyes of high fixation property. Uneven heat-setting in case of synthetic fibers. Lack of control on dyeing	By making sure even pre-treatment. By making certain even heat-setting in case of synthetic fibers. Correct quantity of dyes and chemicals. Right controlling of dyeing
2	**Batch to Batch Shade Variation:**	Uneven pre-treatment (uneven scouring & bleaching). Improper color dosing. Using dyes of high fixation property. Uneven heat-setting in case of synthetic fibers. Lack of control on dyeing machines.	Use standard pre-treatment, dyes and chemical. Keep the same liquor ratio & dyeing cycle. Pursue the standard pre-treatment procedure. Identical dyeing procedure for the identical depth of the hue. Around the same time add the correct bulk chemicals and plant temperature.
3	**Patchy Dyeing Effect:**	Entanglement of fabric. Faulty addition of alkali. Incorrect addition of color. Due to hardness of water, salt addition. Dye migration during Dye shift during intermediate dyeing. Uneven heat in the machine.	Proper pre-treatment. Adequate dosage of dyes and chemicals. All over the dye liquor heat will be the same. Proper application of salt
4	**Roll to Roll or Meter to Meter Variation:**	Poor movement property of dyes. Incorrect dyes solubility. Hardness of water.	Use appropriate dyes and chemicals. Use of soft water Proper machine speed

		Faulty machine speed.	
5	**Crease Mark:**	Less opening of the fabric rope. Shock cooling of synthetic material. If pump pressure & reel speed is not identical. Due to high running Speed of machine.	Retaining correct reel speed & pump speed. Proper control of rising and cooling temperature Reducing the machine load. Higher liquor ratio.
6	**Dye Spot:**	Incorrect dissolving of dye particle in bath. Incorrect Dissolving of caustic soda particle in bath.	By accurate dissolving of dyes & chemicals By removing the large un-dissolved particles by passing the dissolved dyestuff through a fine stainless steel mesh strainer.
7	**Wrinkle Mark:**	Improper opening of the fabric rope. Blow cooling of synthetic material. High temperature. Entanglement of the fabric.	Maintaining correct reel speed & pump speed. Reducing rate of rising and cooling the temperature. Higher liquor ratio.
8	**Softener Mark:**	Incorrect mixing of the Softener. Incorrect running time of the fabric during use of softener. Entanglement of the fabric during use of softener.	Correct mixing of the softener before addition. Maintaining appropriate reel & pump speed. Check the entanglement of the fabric during use of softener

2.3 Different styles of printing and its defects

Introduction to Printing

Printing is localized application of dye or pigment in a thickened form to a substance or textile surface, to generate a desired pattern or design. The printing paste which is applied to textile material consists of dye, water, thickener and hydrocarbon solvent or oil. It is different from dyeing in the sense that in dyeing the fabric is immersed completely in the dye solution whereas in printing the complete fabric is not immersed. The printing paste is only applied to pre decided or selective areas.

After printing paste is applied, the textile material is usually steamed to enable the dye molecule to migrate from the surface of the fibre to enter the fibre polymer system. Steaming swells the fibre and enhances penetration of the dye. The basic process of printing is as follows -

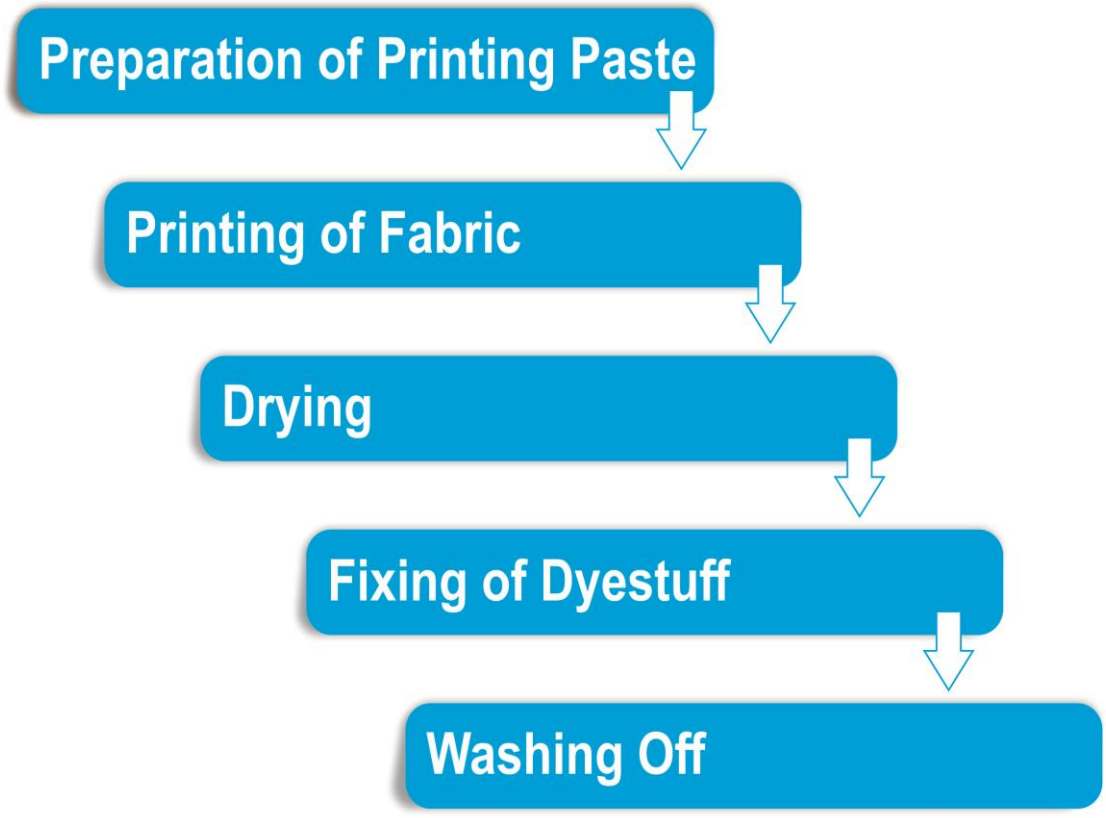


Fig.: 2.8: Printing Process

Different styles of printing are as follows -

1. Direct Printing

In direct printing style the print paste is applied directly on the fabric followed by steaming/curing and washing off. It is the most common approach for applying colour on fabric. The dyes are usually dissolved in a limited amount of water to which the thickening agent has been added to give the necessary viscosity to the material.

In this type of printing dye is applied onto the fabric by carved block, stencil, screen, engraved roller etc. The dye is imprinted on the fabric in paste form and any desired pattern may be produced.

Example of direct printing includes Block printing, Roller Printing, Screen printing etc.

i) Block Printing

Block printing is a slow and laborious manual printing process and is not ideal for commercial use in large quantities. The blocks are usually made of wood and the pattern is hand-designed, so that it stands out in relief against the background surface. The print paste is applied to the design surface of the block, and pressed against the fabric. The cycle is repeated with different designs and colors before completion of the pattern.

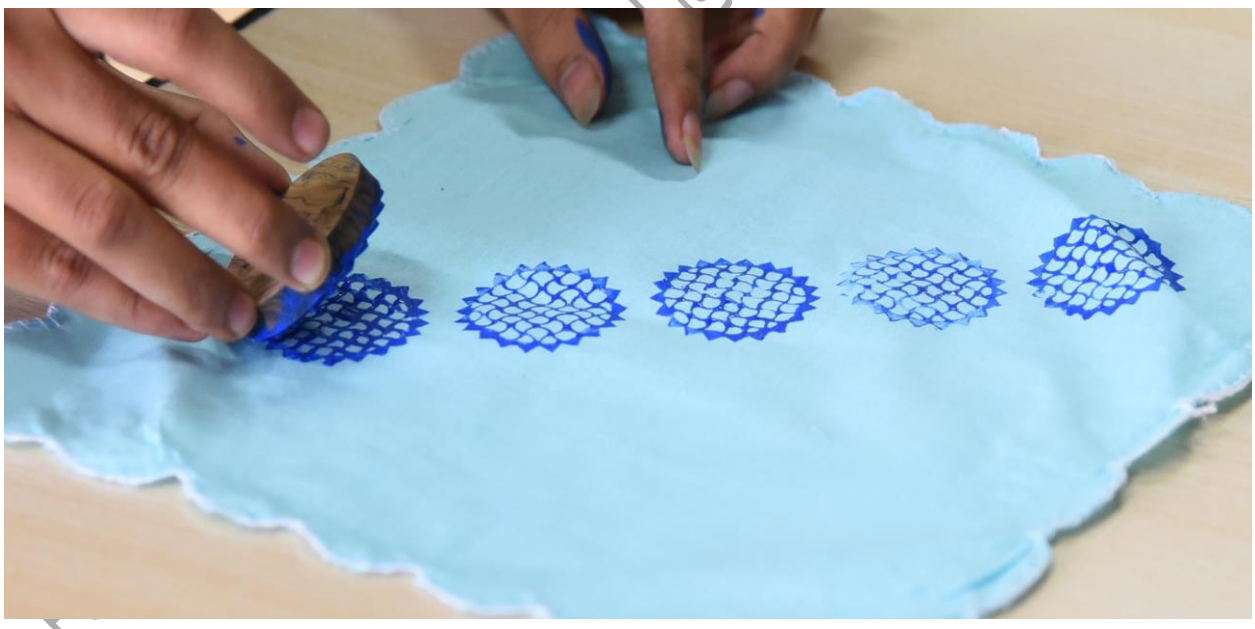


Fig.: 2.9 : Block print

ii) Roller printing

This technique is used if fabrics with the same pattern are to be printed on long runs. The basic roller printing equipment consists of a number of copper-faced rollers that prints the pattern on the fabric surface. Each color has a separate print roller for being printed.

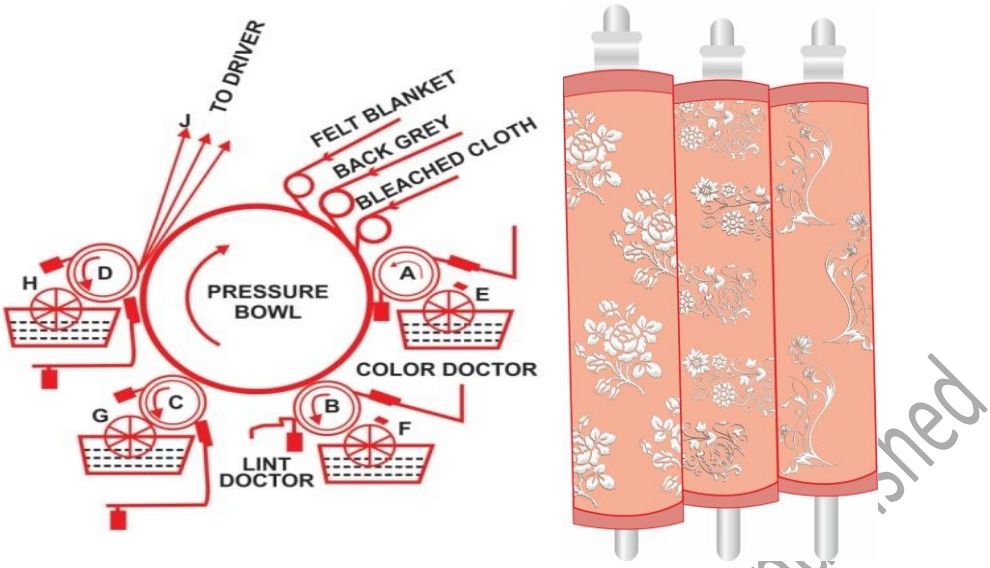


Fig.: 2.10 : Roller printing

iii) Screen Printing

It involves the application of the printing paste through a fine screen placed in contact with the fabric to be printed. The screen is placed over the fabric and the printing paste is forced through the open areas of the screen using a flexible synthetic rubber or a steel blade. There are two major types of processes of screen printing, flat screen printing, and rotary screen printing. Screen printing can be a hand or automatic machine process. Due to its versatility and the development of rotary screen printing machines which are capable of very high production rates, this type of printing has increased enormously in use in recent years.

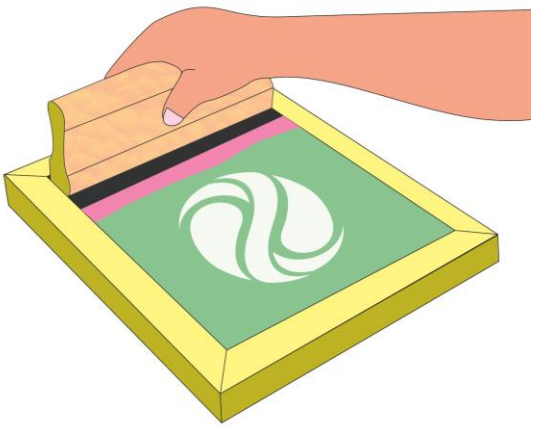


Fig.: 2.11 : Screen printing

2. Discharge Printing

In this method the fabric is dyed and then printed with a chemical that will destroy the color in designed areas. Sometimes the base color is removed and another color printed in its place.

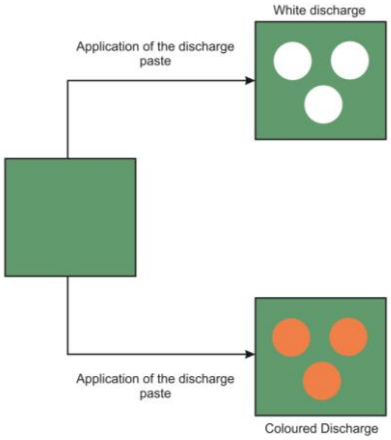


Fig.: 2.12: Discharge printing

3. Resist Printing:

In this method bleached fabric are printed with a resist paste (a resinous substance that cannot be penetrated when the fabric is immersed in a dye solution). The dye will only affect only the parts that are not covered by the resist paste. After the fabric has passed through a subsequent dyeing process the resist paste is removed, leaving a pattern on a dark background.

The chemicals used for discharge or resist the ground colour could be a reducing agent or even an alkali, depending upon the dye being used. It should be noted that destruction of dye does not takes place during printing, but during the subsequent steam fixation process. Batik and tie-dye are examples of resist printing technique.

The resisting agents may either be mechanical or chemical or both. In the tie dye or Bandhani process, a portion of cloth is tied by rubber bands or cotton thread before dyeing it to resist the bound portions, which act as a mechanical resist. Whereas in Batik printing, portions of the cloth which are required to remain undyed are treated with wax and the whole cloth is then dyed with a dyestuff, which can be dyed at a temperature below the melting point of wax.

a. Tie and Dye or Bandhani b. Batik

Fig.: 2.13 (a & b) : Ressist printing

Some other types of printing:

Heat Transfer Printing:

The popularity of polyester fabrics led to the invention of a whole new printing method: heat transfer printing, which prints the pattern on paper with carefully selected colours. The paper is then transferred to the cloth via a type of hot calendar, bringing the two together, and the pattern is moved from one to the other. The transfer techniques of printing include the transfer of a design from one medium to another. Heat transfer printing is the most common form used, where the template is initially printed onto a special paper using traditional printing machines. The paper is then heated and put in close contact with the fabric, when the colouring is sublime and transferred via the process of vapour to the fabric.

Fig.: 2.14: Heat transfer method

Stencil printing

Stencils can be made by cutting out intricate design areas from any pliable material that does not allow dyes to seep through. The colour is applied through these cut outs to get the design printed on the fabric, which is placed underneath the stencil.

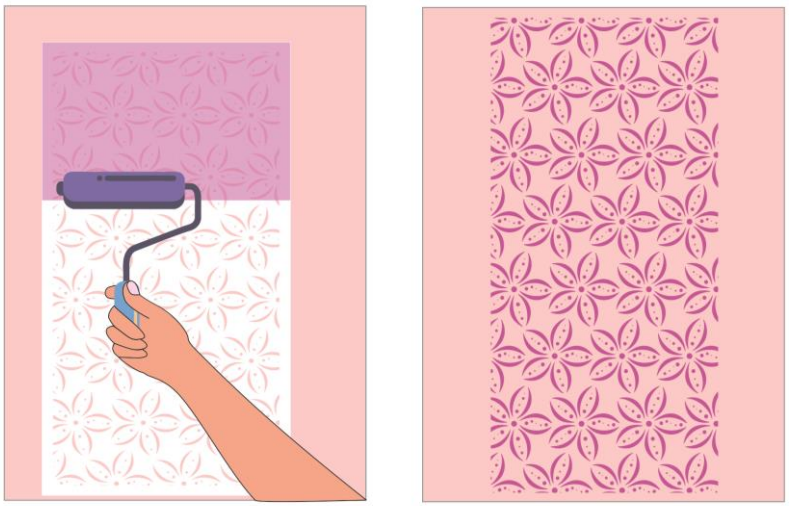


Fig.: 2.15: Stencil printing

Printing Defects:

Default or improper printing procedures, faulty or improper fabric preparation before printing or imperfections in the material used can result in printing defects. Here are some of the major faults to be identified in textile printing.

The defects which take place in printing process are given below:

1. Flushing/Wicking
2. Bleeding
3. Misfits
4. Stick-ins
5. Scrimps
6. Banding
7. Unnecessary pigment marking on Fabric
8. Mottled
9. Miss Alignment in Transfer Printed Fabric
10. Printing Machine Stop
11. Color out

The reasons of these defects are enlisted below:

1. **Flushing/Wicking:** Caused due to Low viscosity of print paste. It occurs when the printed area bleeds out into the unprinted area. The result is a haloing or shadowing effect around the outline of the pattern design.
2. **Bleeding:** Caused due to Low viscosity of print paste. It is a major defect as it happens throughout the fabric unless the viscosity is corrected.
3. **Misfits:** A misfit is a print defect caused by improper alignment of the screens. It is also known as out of registration, misfits leave unprinted areas in the design. For example, a green leaf may overlap its black outline or print over another color.
4. **Stick-ins:** A stick-in occurs when a small fiber or piece of lint gets stuck in the screen opening. The result is a small unprinted circle in the design. A stick-in is very difficult to see and often goes unnoticed during a long run.
5. **Scrimps:** A scrimp defect occurs when the fabric creases underneath one of the screens during the printing process. The pattern is then printed on top of the crease, leaving a large unprinted area when the fabric returns to its relaxed state.
6. **Banding:** Defect created by the print head's movement over the substrate. Use of scanning print head or a print head that moves back and forth across the substrate in straight line placing drops of ink at precise locations along the line. If the head is not properly aligned, or if the substrate advances unevenly, the result is a slight horizontal band or line of unprinted area.
7. **Unnecessary pigment marking on Fabric:** Unnecessary pigment marking on fabric is caused due to screen having holes, which should have been covered. This could be because of ageing of the screen and eventual damage or just improper exposure to light.
8. **Mottled:** Non uniform/uneven application of color results in such defects.
9. **Miss Alignment in Transfer Printed Fabric:** Incomplete transfer of design from paper to fabric on transfer printing due to removal of transfer of paper while the fabric was still hot.
10. **Printing Machine Stop:** As a result of printing machine stopping the dye sometimes is smudged along the width of the fabric.
11. **Color out:** The effect of color on printing machine running low in reservoir results in such defect.

Activities

Activity 1

Prepare a sample file of different type of printing technique mentioned in the above session and attach one fabric swatch related to that printing.

Material Required

- File/Register
- Sample of different types of prints.
- Pencils
- Colored pens/markers
- Eraser
- Ruler

Procedure

1. Collect sample of different types of printing technique like a fabric swatch of block printing, one of stencil printing etc.
2. Place the samples in a file/register.
3. Label the type of print and explain it
4. Submit the sample file.

Check Your Progress

A. Fill in the following blanks –

1. ……are compounds that fix the dye to the fabric.
2. The first synthetic dye was discovered accidentally in 1857 by……
3. The dyeing of cloth after it is being woven or knitted is known as……
4. The two major types of screen printing are……and……

5. ..... are examples of resist printing technique.

B. Write short type answers for the following-

1- Write any four differences between dyeing and printing?

2- Explain any four types of dyeing and printing defects?

3- Briefly explain about block and resist printing?

4- What is the difference between stencil and screen printing?

5- Differentiate between natural and synthetic dyes?

Session: 3 Define and Describe Inspection Systems and Criteria

Inspection and Quality control in Production Management

Inspection is an important instrument for achieving the principle of quality. Producers must be full of trust and strives for customer service. Inspection is an essential tool for modern fabrication processes. It helps with quality control, lowers manufacturing costs, Prevents loss of scrap and assignable causes of work defects. It is the responsibility of the inspection and testing unit to determine the quality of incoming raw materials and components as well as the quality of the manufactured product or service. It checks the components at various stages with reference to certain predetermined factors and detects of the defective or faulty items and sorts them out. It also specified the type of inspection apparatus to be used and the procedure to pursue to determine the quality features.
In the case of variables, the test only tests the degree of adherence to a norm. Inspection in the case of characteristics merely separates the non-conformant from the conforming. Inspection does not show why the units that don't conform are being made. Inspection is the most universal method of achieving standardization, uniformity, and manufacturing efficiency. After comparison with existing standards and specifications it is the cost art of regulating the quality of the production. It is quality control feature. If the said item is not within the acceptability region, it will be rejected and corrective action will be taken to ensure that the products will comply with the specified requirements in the future.

Purpose of Inspection

1) To differentiate good batch from bad batch.
2) To differentiate good quality pieces from bad quality pieces.
3) To decide if the procedure is changing.
4) To determine if the method is come close to the requirement limits.
5) To rate quality of manufactured goods
6) To rate accurateness of inspectors.
7) To measure the precision of the measuring instrument.
8) To secure products-design information.
9) To determine process capability.

3.1 Metric system for yarn calculations of various inspection systems

What is yarn count?

Count is a numerical term, which express the coarseness or fineness i.e. diameter of the yarn and also specify the relationship between length and weight (the mass per unit length or the length per unit mass) of that yarn.

What is yarn numbering?

Yarn numbers are measurements of a yarn's coarseness or fineness which Indicates the length per unit mass or mass per unit length, and the procedure for measuring count numbers is called as yarn numbering system.

Types of yarn numbering system

1. Indirect yarn numbering system
2. Direct yarn numbering system

INDIRECT YARN NUMBERING SYSTEM [LENGTH/UNIT MASS]:

Indirect yarn numbering method also known as length per unit yarn mass, thus the higher number or number of yarns in this equation indicates the finer or lighter yarn size and the lower number or number of yarns indicates the thicker or coarser yarn size. This method is commonly used for counting English cotton, woollen count, worsted count, Linen count and French cotton count.

Numbering system	Units of length(l)	Units of weight(W)
English cotton count (Ne)	840 yards	1 pound (lb.)
Metric count (Nm)	1000 meters / 1km	1 kg
Woolen count (YSM)	256 yards	1 pound (lb.)
Worsted count (Nek)	560 yards	1 pound (lb.)
Linen count (NeL)	300 yards	1 pound (lb.)
French cotton count	1000 meters	500 grams

Table 2.1 : The following formula is used to calculate the indirect yarn count:

$$N = (L \times w) / W \times l$$

Where,

N = Yarn count or number system
W = Weight of the sample

L = Length of the sample
l = Units of length of sample
w = Units of weight of sample

DIRECT YARN NUMBERING SYSTEM [MASS/UNIT LENGTH]:

Direct yarn numbering system which is also known as mass per unit length of yarn, hence in this system higher the yarn number or count indicates the coarser or thicker the yarn size and smaller the yarn number or count indicates the finer or lighter the yarn size.

NUMBERING SYSTEM	UNITS OF LENGTH (L)	UNITS OF WEIGHT (W)
Tex system (Tex)	1000 meters	No. of grams
Denier (D)	9000 meters	No. of grams
Decitex (dtex)	10,000 meters	No. of grams
Militext (mtex)	1000 meters	No. of milligrams
Kilotext (ktex)	1000 meters	No. of kilograms
Jute count	14,400 yards	No. of pounds
Grex count	10,000 meters	No. of grams
Linen count	14,400 yards	No. of pounds

Table no. 2.2 Different yarn number system

The following formula is used to calculate the direct yarn count:

$$N = \frac{W \times l}{L}$$

Where,

N = Yarn count or number system
W = Weight of the sample at the official regain in the units of the system
L = Length of the sample
l = Units of length of sample

This system is generally used for Tex and Denier:

1. Tex count system (gK)

The Tex count of the yarn is the no. of gms. in 1000 mts.

It is a Direct System of Yarn numbering.

$$\textbf{Tex count system (gK)} = \frac{\text{Weight of yarn in gms.}}{\text{Length of yarn in 1000 mts}}$$

2. Denier count system (Td)

The denier count is weight in gms of 9000 mts of yarn.

$$\textbf{Denier count (Td)} = \frac{\text{Weight of yarn in gms.}}{\text{Length of yarn in 9000 mts}}$$

3.2 Importance of grain line & selvedge

Grain and its importance in clothing construction

Fabric grain means the direction of the warp and weft threads used in weaving the fabric.

Lengthwise grain is in the direction of the warp threads, which runs parallel to the selvage, and crosswise grain runs in the direction of the weft threads and perpendicular to the selvage edge.

Bias grain is at a 45 degree angle from the Lengthwise grain. Bias cut apparels have better stretch and have an elegant drape.

On-grain: When a fabric is "on-grain," the lengthwise and crosswise threads are at an exact right angle to each other.

Off-grain: When a fabric is off-grain, the crosswise yarns do not run exactly at right angles to lengthwise yarns. Garment pieces cut off-grain do not fit correctly and hang poorly when worn.

Selvage- The **selvage** is the firmly woven rough and thick edge runs each side of the fabric along the length of a fabric which prevents it from unravelling and fraying.

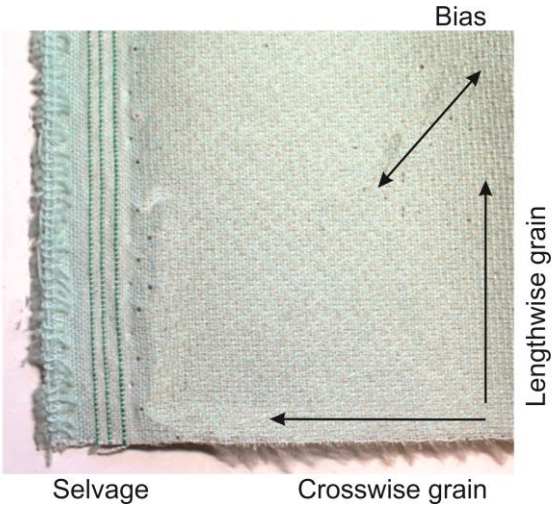


Fig.: 2.16 : Selvage

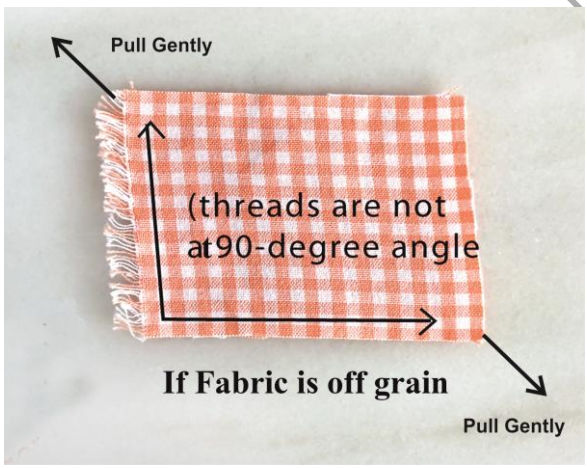


Fig.: 2.17 : Selvage

Importance of selvage of Fabric

In basic terms, selvage is the tightly woven edge that runs down either side of the cloth along the length of the cloth, also called the warp. The selvage of a fabric is considered a part of the anatomy of a woven fabric, commonly found on both edges of the fabric. This is more durable than the rest of the fabric because it is tightly woven, so it can be a little more difficult to sew through. The main purpose of selvage is to avoid unravelling or fraying which makes a fabric stable and safe. For decorative reasons some fabrics come with frayed edges.

Selvage comes in a variety of widths, depending on what it is made of and what type of fabric it is. Selvedge of fabric has a number of uses. They differ in width, style, and design and they are more closely connected than the

rest of the fabric. This consistency avoids fraying and allows a longer longevity of the fabric.

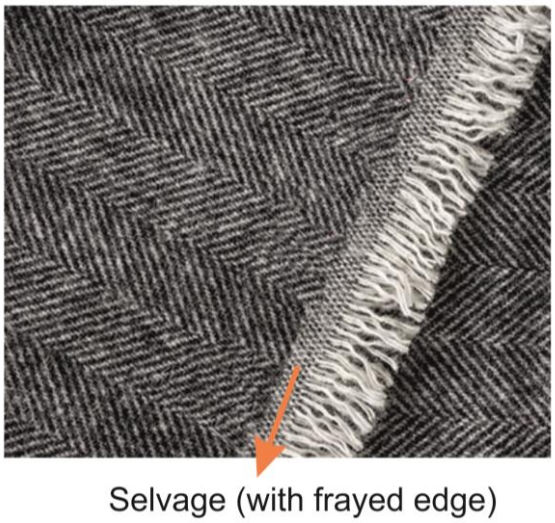


Fig.: 2.18 : Selvage

3.3 Fabric nap and identification of nap

Nap is the term employed to describe a fabric's textured surface. It is most evident in velvets, corduroys and fleece fabrics, but is also visible in smooth fabrics like silks and satins.

The surface is not completely smooth when fabric is woven; process fibers protrude through the spinning and weaving process. The fabric should be "sheared" and singed for removal of nap to create a smooth surface.

The loops are often kept as loops as they are in terry towels otherwise cut to produce a velour or velvet finish. Carding or combing the fabric's surface also constitutes a nap.

When laying out your pattern pieces, the nap of a fabric needs to be taken into account, as it usually lies in one direction. To see if the selected fabric has a distinctive nap, brush the palm of hand down the length of fabric, try now to move your hand back in the opposite direction – one way would be smooth and the other would "fight" against you.

Alternatively put one end of your fabric at 180 degrees to the other end to see if the depth of color shifts. In any case, when you have a nap, you can usually lay your fabric flat in a single layer and place your sewing pattern pieces with the nap lying down, so when you put your dress on it, it is easy to smooth it down.

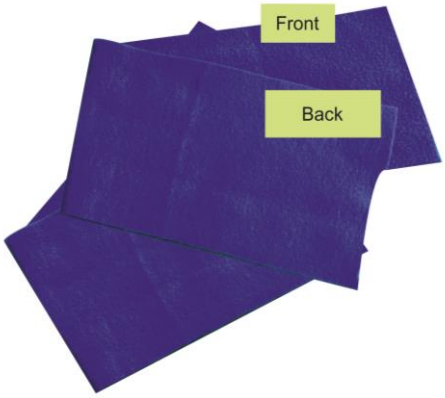


Fig.: 2.19 : Fabric identification

The photo above shows a Fleece cloth on two sides: front and back. A clear nap at the front, smooth at the back. The front is darker than the back and, if you combine them, gives you the ability to work with different hues.

3.4. Significance of lots in the fabric

Definition: The lot size refers to the quantity of an item ordered to be delivered on a specific date for the processing of a particular shade or print, so planned in a single production run. In other words, lot size essentially refers to the total quantity ordered for manufacturing of a product. The complete lot will consist of fixed meters for colouring in a specific color range or combination of colours in printed design.

If no lot size is specified, consistency, packaging quantity, price and trading value will not be standardized. An important part of many lean manufacturing strategies is a smaller batch of production. Inventory and development have a direct bearing on the lot size. Certain variables, too, are less apparent but equally important.

A small lot size results in reduced device variability and ensures smooth manufacture. This increases efficiency, simplifies scheduling, reduces inventories and facilitates continuous improvement. While this raises the cost of small lot size production, due to the competitive market, it is need of the time.

3.5. Filling inspection records

Inspection:

Fabric Inspection is one of the important procedures of apparel production. It refers to visual examination and checking of raw materials such as fabrics

and trims partially finished components of the garments like buttons, zippers, trims etc. Examination of completely finished garments is also done in inspection procedures by measuring the garments against specified or given measurements to check if they meet the required measurements, in relation to buyer's requirements, standards or specifications.

Objectives:

The main objectives of inspection are -

1. Detection of Defects.
2. Correcting of defect or defective garments as early as possible in the manufacturing process so that time and money are not wasted later.

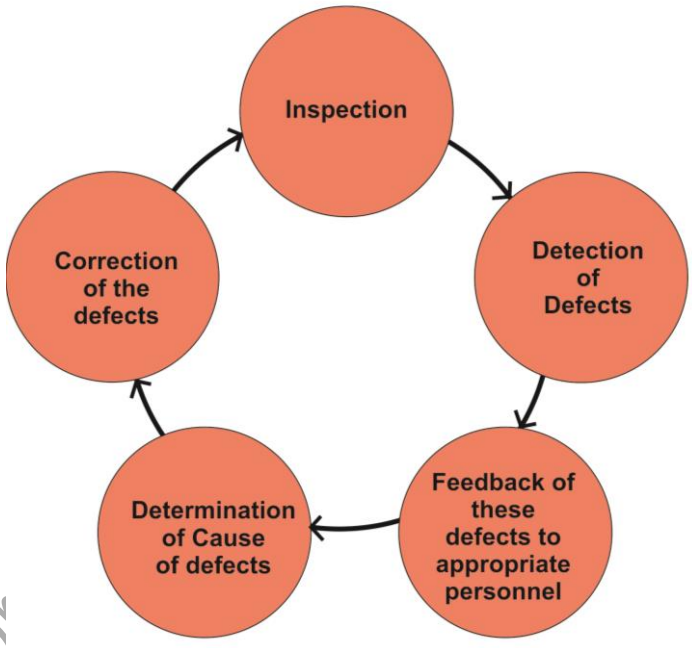


Fig.: 2.20 : Inspection loop

Fabric Inspection Method:

Fabric is inspected to determine its acceptability from a view of quality. There are various fabric inspection systems. Some commonly used Inspection systems are -

- 4- Point system.
- 10-Point System.

4-POINT SYSTEM:

- The 4-Point System, is a point-grading system used for determining fabric quality, it is widely used by producers of apparel fabrics. The other name for this system is the American Apparel Manufacturers Association (AAMA).
- The 4-Point System works by assigning 1, 2, 3 and 4 penalty points to the defect, according to its size and significance. We cannot assign more than 4 penalty points for a single defect.
- Defects can be in either length wise or width wise in direction, the system remains same for both types. Under this system we consider only major defects. No penalty points are assigned to minor defects.
- Under this system, at least 10 percent of the total rolls are inspected from the entire shipment lot and must ensure to check at least one roll of each color way.
- Fabric defects are assigned points based on the following:

LENGTH OF DEFECT	PENALTY POINTS
Up to 3 inches	1 point
3-6 inches	2 points
6-9 inches	3 points
Over 9 inches	4 points
Holes and openings (1 inch and less)	2 points
Holes and openings (over 1 inches	4 points

Table 2.3

10 POINT SYSTEM:

- In this system, a piece is graded as "first" if the total penalty points do not exceed the total yardage of the piece. A piece is graded as "second" if the total penalty points exceed the total yardage of the piece.
- Penalty points are assigned as per the following:

WARP DEFECTS	PENALTY POINTS
10-36 inches	10 points
5-10 inches	5 points
1-5 inches	3 points
Up to 1 inch	1 points

WEFT DEFECTS	PENALTY POINTS
Full width	10 points
5 inches to half the width of fabric	5 points

1-5 inches	3 points
Up to 1 inch	1 points

Table 2.4

Apparel or home furnishing or upholstery whatever may be the final merchandise the quality of final product depends on the quality of the fabric that goes into its making. So to avoid all the Non- conformance at the end product, it is important to do Fabric inspection at the initial stage.

Activities

ACTIVITY 1

Collect any 5 fabric swatches and mark the grain line, bias and selvedge on them.

Material Required

- Fabric Swatches
- Markers/Colored Pens
- Pencils
- File/Register
- Ruler
- Eraser

Procedure

1- Collect any five fabric swatches.
2- Mark the grain lines, bias and selvedge on the swatches collected.
3- Paste the marked fabric swatches in a sample file/register.
4- Submit the sample file.

Check Your Progress

A. Fill in the blanks –

1. .....is a numerical term, which express the coarseness or fineness i.e. diameter of the yarn.

2. .....is commonly used for counting English cotton, woollen count, worsted count, Linen count and French cotton count.

3. .....is at a 45 degree angle from the Lengthwise grain.
4. The ..... is the firmly woven rough and thick edge runs each side of the fabric along the length of a fabric which prevents it from unravelling and fraying.
5. Commonly used fabric inspection systems are ..... and .....

B. Write short answers for the following –

1- Write any five purposes/objectives of inspection.

2- Describe the indirect and direct yarn numbering system.

Module 3	Fabric Checking Methods and Techniques

Module Overview

Fabric constitutes more than 3/4th of the cost of any garment, home furnishing item etc. It also affects the appearance and quality of the final garment, home accessory or linens. Hence it's very important to check the fabric thoroughly and completely before the production stage. In readymade garment manufacturing companies, export houses, apparel and home furnishing factories fabric is being checked before issuing it to cutting department. Fabric checking is a pre-production process and involves visual examination and review of fabric rolls to check if they meet the required standards. The fabric manufacturers also check it before supplying it to apparel and home furnishing manufacturers. Fabric checking or inspection is carried out in a suitable and safe environment with proper ventilation and adequate lighting. It can be done manually or on machines. Usually big companies and organizations have proper fabric checking machines and follow fabric inspection systems and procedures. Smaller companies or micro enterprises carry out manual fabric checking. Retail customers also perform amateur fabric checking while buying fabrics for them. Various tools, equipment and machines are used for checking fabrics and identification of defects if any. Then the fabric is graded for quality as per the number of defects. For ex. first grade fabric, second grade fabric and so on. Sometimes the complete fabric lot or batch may be rejected if there are too many defects. Usually there are no or minimum defects in fabrics that are procured from reputed companies.

Learning Outcomes

After completing this module, you will be able to:

- Identify, explain and setup various tools and equipment for fabric checking
- List and explain operations of a fabric checking machines
- Demonstrate the ability to check fabric samples as per specifications
- Ensure safety and maintenance of fabric checking machines and work area

Module Structure

Session: 1 Tools, equipment and machinery for fabric checking

Session: 2	Fabric inspection machine
Session: 3	Checking fabric samples as per specifications
Session: 4	Ensuring safety and maintenance of fabric checking machines and work area:

Session 1: Tools, Equipment and Machinery for Fabric Checking

Fabrics should posses certain desirable characteristics such as uniform color and texture, uniform width, smooth handle, straight weaving, knitting, smooth hand feel and print (Like checks, lining etc.) etc. depending on end-use. These defects leads to adverse effects on appearance as well as some desired characteristics of the fabric. Thus, the fabric produced should be checked prior of its dispatch so that proper and approved quality goods reach the customers.

Fabric is the most important raw material of any garment. Its contribution to the cost of garment is maximum. So it is important that it must be checked properly to avoid rejections and cost addition due to faults in the fabric.

The main objectives of fabric inspection are as follows:-

1. Detection of defects as early as possible
2. Providing solutions for eliminating defect or defective garments at the initial stage in the manufacturing process. It will help save time and money by reducing waste.
3. Fabric Inspection is an important aspect followed prior to garment manufacturing to avoid rejects due to fabric quality
4. For ensuring a high quality product

Tools and Equipment Used in Fabric Checking:

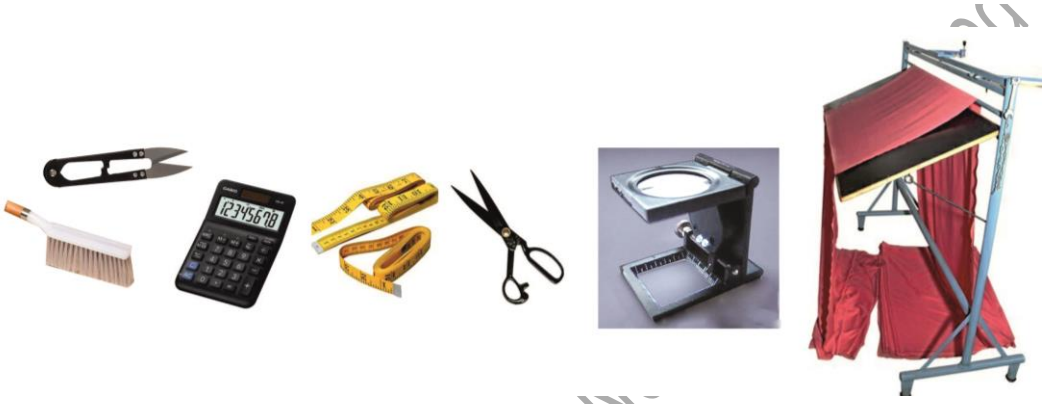
1. Markers

These are used for marking and writing on the packages and bundles. Chalks, pens and permanent markers are used for marking up the bundles.

2. Measuring Tape

The width of the fabric is checked at 3 to 4 places to ensure uniform width of the fabric roll throughout. This is done with the help of a measuring tape. In new age machines width is measured automatically on the machine itself. All the measuring tape/machine/ruler should be calibrated every year.

3. **Ruler:**
   It's used for removing creases and folds while checking or inspecting the fabrics.



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3.1: Tools and Equipment Used in Fabric Checking

4. **Pick Glass:**
   Pick glass or lens is used for counting picks per inch and ends per inch.

5. **Scissors and thread cutters:**
   These are used for cutting and unpacking the fabric rolls. Thread cutters are used for cutting loose, left over threads on the fabric surface.

6. **Inspection Table:**
   In small or medium size firms where there is no inspection machine, tables are used to carry out the task of fabric checking manually. Usually there is an overhead light or the table itself is lighted from below for better and close inspection of the fabric.

7. **Calculator , Pen**
   Fabric checkers are required to fill an inspection form after after the fabric checking is complete. Calculators, pens and markers are used for filling up the inspection form or inspection report.

8. **Tape and stickers :**
   Fabric checkers are supposed to flag or mark the defects, if any, on the fabric surface while inspecting it. Tapes, stickers and flags are used for marking the defects and OK report.

9. **Brushes:**
   These are used for brushing off the loose fibres and threads from the fabric to overrule presence of some other colour fibre in the fabric.

10. **Tweezer**
    Sometimes the fabric may have a single warp or weft of entirely different colour or may have uneven slubs. These are pulled out with the help of a tweezer or a plucker.

11. **Thread cutter:**
    These are used for cutting extra threads or fibres hanging loosely from the fabric.

Selecting, sorting and Using Correct Tools and Material:

It's very important to select and use correct tools as it directly affects the quality of work. Also it's very important for a tool to be properly maintained and cared for so that it is safe and available to use when needed to complete a task. Sorting of tools and keeping them in designated spaces such as shelves, racks or drawers is necessary, to keep them in good shape and working condition.
Fabric checking is mainly done on fabric checking machines however it also uses tools such as scissors, measure tape, thread cutter, calculator etc.

Safety and Cleanliness of Tools:

Safety and cleanliness of tools has a direct effect on production and output. Therefore it is very important**.** All tools must be cleaned and checked for defects before and after use. Sharp tools such as scissors and thread cutters should not have loose screws to avoid falling off of sharp blades on checkers while working. Measure tape should not be broken or damaged; the numbers should not be missing or unclear, as it may result in faulty measurement. Pens should not leak or should not have broken tips. Calculator buttons should have clear symbols and battery should be checked from time to time. To keep the tools safe and clean inspect them from time to time, clean them before and after use and shouldn't be left in open, undesignated spaces.

Ensuring safety and cleanliness of tools (e.g. Marker, measuring tape, ruler, etc.)

There are different types of machinery that an operator uses in the garment industry. Thus, it is very important to understand about the safety and health measures while operating them. The Machine Operator has to be safe and healthy & be aware of the various occupational hazards associated with operation, and work related illnesses and injuries. Many of the injuries are caused mainly by the Operator's error, carelessness and inattentiveness. The Operators must be properly guided for the use of all the tools and equipment, machines, their safety measures, and precautions to be taken at the time of working. It should be compulsory for the Operator to follow the basic instruction to use machines, tools and equipment.

All tools &equipment must be properly maintained so that the efficiency of workforce is not reduced and also their life not endangered. One should follow preventive maintenance for taking required care and protection of tools, equipment & machines in order to keep them in a good usable condition; it further helps in reducing downtime and extends productivity. The successful maintenance program has following factors

1) well organized and scheduled

2)controls hazards

3)defines operational procedures

4) trains key personnel.

The details to be incorporated in the company's policies and programs regarding tools and equipment maintenance will depend on the type of tools/equipment used. Power tools should be maintained in good working order. Damaged or defective equipment/tools should be tagged and removed from service.

Most machine, tools manufacturers provides maintenance schedules for their equipment.

- **Ensuring safety and cleanliness of tools:**

Inspecting, cleaning, maintaining, and storing the tools properly is not very time consuming, in fact it will save time. It will be very hard if half the tools

are either broken or in such poor condition that it will take time to repair it or clean it prior to use. Even with proper maintenance, at some point, tools just need to be replaced.

- Tools should be placed at designated locations to protect them from any damages. If it has any cover, it should be wrapped or cover properly. Tools like scissor, cutter should keep or designated place after use to avoid accidents and to maintain their sharpness.
- In case of any oil, grease, chemical spill on the tool, ensure that it is wiped off and cleaned properly prior to its storing back.
- This will also prevent other tools from getting dirty/damaged/coated with unwanted substances.
- Ensure proper maintenance of tools as some tools may require additional caretaking like sharpening or dressing for its safe usage.
- Check properly and regularly for any tool handles for defects such as burrs, splinters, missing/loose grips to prevent any injury.
- Inspecting the tools on a regular basis will help reduce the chance of someone using an unsafe tool and cause a potential injury.
- All the employees and workers must be aware of potential hazards associated with different tools. They must also have the knowledge and suitable training about safety precautions necessary to prevent those hazards.
- Workers must have adequate training for operating various tools and equipment so that there are no accidents and injuries due to misuse and improper maintenance.

Activities

Activity 1:

List out various tools used in fabric checking or inspection on a chart paper and prepare your own kit of tools.

Material Required:

1. Chart Paper
2. Kit or pouch
3. Colour pen and pencils
4. Scale, sharpener and eraser etc.
5. Scissors

Procedure

1. Plan the layout on a chart
2. Divide the chart into two parts
3. Draw tools and equipments on one side and write their function on the other.
4. Collect all the fabric checking tools and keep them in your kit.
5. Submit the same to your teacher.

Check Your Progress

A. Fill in the Blanks:

1. _____and _____ of tools has a direct effect on production and output.

2. _____is the most important raw material of any garment.

3. .....or lens is used for counting picks per inch and ends per inch.

4. Sometimes the fabric may have a single warp or weft of entirely different colour or may have uneven slubs. These are pulled out with the help of a.....

B. Question and Answers:

1. List various tools used in fabric inspection?.

2. How will you ensure safety and cleanliness of tools?

3. Why is safety and cleanliness of tools important?

Session 2: Fabric Inspection Machine

INSPECTION

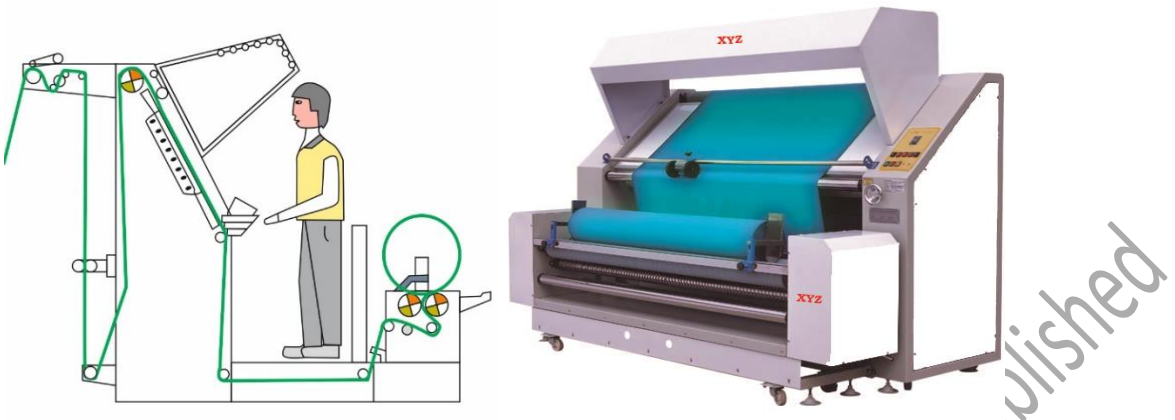
Inspection simply means visual examination or review of any material or product. In apparel and textile industry routine inspection is carried out for raw materials (like fabric, sewing threads, buttons, trims, etc), partially finished components of the garments and completely finished garments as against predefined or required standards. It is mainly carried out for early detection of defects in the manufacturing process. Thus it saves wastage of time and money later on during production stage in either correcting the defect or writing off defective garments.

Fabric Inspection is necessary for quality of final product i.e. garment. It is defined as the physical testing/ examination of raw materials such as fabric and accessories which are used in manufacturing process. It also includes partially finished and completely finished garments with respect to some standards, specifications or requirement as per requirement
Defects can be easily spotted on the Fabric Inspection machines as it provides a very good view of the fabric. These machines use modern technology and help in inspecting the fabric much faster than the fabric inspected on a conventional inspection table. The defects are observed, marked and recorded on a quality inspection form. Fabrics can be checked in flat table, flat table with light box or on fabric checking machine.

FABRIC CHECKING MACHINE

Fabric assessment is usually done on fabric checking machine. Ten percent of the total fabric lot is randomly selected for fabric inspection. These machines are designed on the basis of checking operations so that fabric rolls can be mounted behind the inclined inspection table under adequate light and rerolled as they leave the table. The table is designed in such a way that the fabric defects are clearly visible to the fabric checker. The fabric from the roll unwinds on the part of machine where an opaque glass is fitted with number of lights beneath it. These lights illuminate any irregularities seen in the fabric. The fabric checker does not require reversing the fabric to see it from both ways; the illuminated surface of the machine helps in visual appearance of the fabric both ways easily. The fabric checker is provided with marking which most of the times are red arrow head stickers that he/she has to stick pointing towards the defect. These marking are bold

enough to be visible easily while a person is working with fabric thee can be avoided.



(a) (b)

Fig.: 3.2 (a & b) : Fabric Checking Machine

These machines are driven on electricity and the defects are visually located, marked and recorded on an inspection form. These machines are also equipped to precisely measure the length of each roll of fabric as well as monitor the width of the fabric. The difference in width of fabric can result in a higher cost of manufacturing for basic garments since profit margin for these garment producers is usually lower than that for fashion garment producers and therefore, maximum fabric consumption is vital.

Recent developments in fabric checking machines have made it convenient for fabric manufacturers to maintain the quality of their product in consistent manner. These machines have more improved performance and advanced technology. The machines have a system which is set to deliver accurate results each time it's used for the ease of the worker. The accurate length measurements, it also perfects the width of the fabric, it maintains the tension of the fabric throughout inspection for the ease of the checker, it

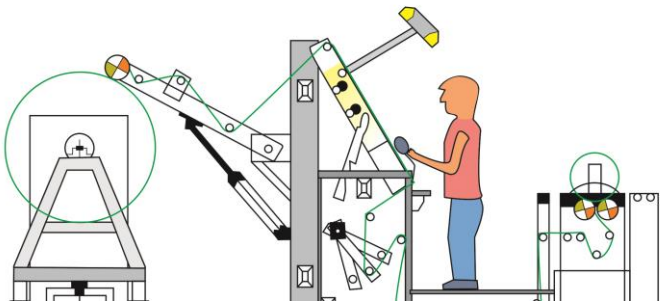


Fig.: 3.3 : Fabric Checking

Also ensures a neat and compact winding of the assessed fabric on the take-up roller. The machine has wide space between two rollers of the fabric that is ergonomically designed for the checker to comfortably stand and assess the fabric without any disturbances. The machines are also set with sensors where if at any dangerous parts that may hinder the performance of the machine it will stop at its point and will start blinking. The fabric checker must know the details of the machine and its operations to have to work on a fully functioning fabric checking machine.

The inspection system gives following advantages:

It provides Complete Control over our Most Valuable Resource fabric which constitutes more than 70% of the cost of the Garment. For this, a Fabric Inspection of machine is a must. The need and advantages of fabric inspection are as follows:

1. Inspection (100%) of Most Valuable Resource: In order to avoid finding faults later, mostly 100% inspection is done.
2. Saving LOT of Time: As Fabric Inspection Machine is capable of conducting Inspection very fast, resulting in saving lot of time. And time is the most valuable and critical resource of a Garment Exporter.
3. To Reduce undue dependence on Manual Labour : With a Fabric inspection machine only 1-2 people are required to do inspection of the fabric
4. To check all Weaving Defects ,Printing and processing defects in the fabric with ease
5. To reduce Fatigue of the Operator in a significant way: As the operator has to only focus on checking the fabric and all the other job is performed by the machine.
6. To add to our Profits : With a good Fabric Inspection machine 100% of the Fabric inspection is possible for all type of Weaving, printing and dyeing defects in a much shorter time thus resulting in enhancing our profits in a considerable way.

Setup equipment and machinery (Fabric Checking Machine) for Fabric Checking as per the job requirement

What is Fabric checking?

When we put on clothing, we want it to feel good against our skin. Textile companies and consumer agencies conduct many kinds of analysis to make

sure our clothes and the fabrics we use in our homes won't harm us, will be comfortable and will stay colorful for a long time. These processes are called textile testing.

Textile testing is the term for a whole series of tests that examine the physical, mechanical and chemical properties of textiles. These tests are sometimes done before a textile goes into widespread use

The testing machines need to have SOP (Standard operating procedure). The settings of technical parameters for operating machines are provided by machinery manufacturers but the skilled operator or training of operator is the responsibility of Production department.

Machine Operator responsibilities and duties are as follows:

The responsibilities and duties are the most important parts of the job description. The functions will be performed on a regular basis, as how the job functions & the job reports are important part of it.

Machine Operator responsibilities are as follows:

- Carry out fabric inspection and machine operation duties.
- Follow rules/methods set by organisation for fabric checking.
- Set up machinery and ensure all materials are readily available.
- Follow daily production plan accordingly he/she has to check fabric.
- Effectively monitor production equipment.
- Coordinate the shop floor technicians and materials clerk as and when necessary.
- Submit reports on time.
- Perform appropriate duties as assigned by management.
- Maintain a safe and clean work space by following established safety rules and regulations.

Operations of Fabric inspection machine

- Fabric is the main and biggest raw material of garment thus it is necessary that fabric should be fresh without any defect. Fabric inspection is carried out by both fabric manufacturers and garment manufacturers. Fabric checking or inspection involves checking the fabric sheet for detecting faults. All these defects are recorded in an inspection form and an inspection report is prepared for the same. After the fabric inspection, grading of the fabric is done according to the fabric quality level.

- During fabric inspection, fabric rolls are opened and passed through a fabric checking machine. These machines have light under the fabric so that the checker is able to locate the defect easily and no defect is left in the process. While checking the defects are marked with a chalk or with a sticker.

  At the end of the checking, a fabric roll inspection report is made for that fabric roll. In fabric inspection, fabric rolls are graded and segregated by marking rolls either one of the following categories (in a garment manufacturing unit)

  Passed - these fabric rolls are ready for use

- Failed - Not ready for use in the cutting. Although such fabrics can be used after correction.
- Rejected – A fabric which has been rejected is not acceptable. These are sent back to the supplier.
- Decision pending – These include the fabric rolls which are awaiting for approval from the authorized person. The supervisor or the authorized person needs to give the decision whether to pass or fail or reject the fabric.
- The fabric faults include weaving defects, knitting defects, processing defects and defects due to improper handling of fabrics.
- The shade of the fabric should match with the approved shade of fabric. There should not be shade variation from selvedge to selvedge, centre to selvedge, start and end, roll to roll.

FABRIC DEFECTS:

1) Abrasion Mark: Abrasion marks are caused on the fabric surface due to friction or weakening of the fabric by any operation through which it has been passed.
2) Misprint: Sometimes the printing is faulty in printed fabrics. The prints are either missed or partially missed. They may be incorrectly positioned or skewed.
3) Double Pick: Two yarns running simultaneously, mostly in the weft yarn.
4) Oil Stain: The fabric may get oil stains from machines or accidental spillage or improper handling.
5) Hole: A breakage of yarns in the fabric involving more than two yarns.
6) Bow: When the weft/filling yarns lie in an arc across the width of the fabric.

7) Skew: Distortion in the construction of the fabric i.e. in the yarn that constitute the fabric.
8) Crease: A fabric defect across the fabric width usually caused by a sharp fold.
9) Dye Stain: An area of discoloration due to uneven absorption of colorant.
10) Miss-pick: A pick/weft yarn not properly interlaced. Slubs: An abruptly thickened place in a yarn.
11) Colored fibers with the warp or weft fibers.

Activities

Activity 1:

Visit any fabric inspection department in a garment industry and ask them to show the complete fabric inspection process on a machine or watch the fabric inspection video online. Click pictures and prepare a report on the procedure in your own words.

Material Required:

1. A4 size papers
2. Pens, coloured pencils, markers
3. Camera or phone
4. Eraser
5. Ruler

Procedure:

1. Talk to the people involved in the fabric inspection.
2. Observe their working, talk to concerned people and prepare a report
3. Write this in your file.
4. Paste relevant pictures.

Check Your Progress

A. Fill in the Blanks:

1. The fabric checker is provided with marking which most of the times are .....that he/she has to stick pointing towards the defect.
2. Recent developments in.....have made it convenient for fabric manufacturers to maintain the quality of their product in consistent manner.
3. Textile testing is the term for a whole series of tests that examine the .....,.....and.....of textiles.
4. After the fabric inspection,.....of the fabric is done according to the fabric quality level.
5. .....are caused on the fabric surface due to friction or weakening of the fabric by any operation through which it has been passed.
6. ..... is necessary for quality of final product i.e. garment.
7. In fabric inspection,.....are opened and passed through a fabric checking machine.

B. Question and Answer:

1. Explain the process of fabric Inspection and why is it necessary?
2. What are the various defects that can be found in a fabric while fabric checking?
3. What are the advantages of an inspection system?

Session 3: Checking Fabric Samples as per Specifications

Fabric checking involves inspecting or checking fabrics for defects. It also involves grading the fabrics as per quality and number of defects. It is carried out by fabric manufacturer as well as apparel manufacturers. So a fabric checker must not only be aware about various defects but he/she must also be able to check the given fabric or sample as per the specification/company standards and select the best quality fabric. If the sample doesn't match the specifications then it should be discarded or replaced as products made with damaged or poor quality fabrics will have no demand. If specifications do not match with bulk fabric but overall quality is ok, in that case checker can recommend and ask for approval.

General Inspection Procedures

1. Fabric inspection should be carried out in a safe and hazard free environment with adequate lighting and ventilation.
2. The fabrics should be passed by moving the rolls between 45-60 degree angles in relation to the fabric checker. Lighting specifications should be followed and backlight should also be used to ensure proper grading of the fabric rolls.
3. Fabric speed on inspection machine must not be more than 15 yards per minute.
4. It is advisable to carry out fabric inspection only when 80% of good or lot is received.
5. Standard approved bulk dye lot standards for all approved lots must be available prior to inspection.
6. The approved standard of bulk dye lot must be available before starting inspection for assessing color, hand, weight, construction, finish and visual appearance.
7. Shade continuity within a roll must be ensured by checking shade variation between center and selvage. Also the beginning, middle and end of each roll must be evaluated and documented.
8. Textiles like knits must be evaluated for weight against standard approved weight. +/- 5% variation is acceptable.

9. Fabric width must be checked from selvage to selvage against the standard. It should be done at least at three different places in the entire roll.

10. All defects must be marked or flagged clearly during inspection.

11. The length of each roll inspected must be compared to length as mentioned on supplier ticketed tag and any deviation must be documented and reported to mill for an additional replacement to avoid a shortage.

12. If yard dyed or printed fabrics are being inspected the repeat measurement must be done from the beginning, middle and end of selected rolls.

Fabric Specifications:

Fabric quality affects the appearance, comfort and quality of the final product which is an apparel item, home furnishing item or any fashion accessory. The quality of fabric is affected by following factors:

- Its weave or construction
- Number of warps(ends) and wefts(wefts) per inch of fabric
- Faults with respect to warp and weft
- GSM of fabric
- Composition of fabric
- Width of the fabric

Fabric Width

Fabric width is the distance from one selvedge to the other, measured perpendicular to the length of the fabric.

Collection of samples from fabrics:

Samples should be collected from at least three places from fabric e.g.

a) Two samples from the two sides and

b) One from the middle.

Measurement of fabric width

- In the standard method, (B.S. Hand book) it is recommended that the fabric should be exposed to a standard atmosphere for at least 24 hours before final width measurements are taken. Few fabrics have elastic

tendency like viscose, lycra etc, so these fabrics are relaxed for 24 hours before cutting.

- Measurements should be taken before and after conditioning. Then it should be watched that if there is any change in width. If there is any surface ornamentation like printing and embroidery, width shrinkage has to be checked specially in knits, cotton and linens.
- On a piece of cloth, 10 width measurements should be made at points distributed at roughly equal distances throughout the full length of the fabric piece.
- If full length is not used, a sample length not less than 1 yard should be used and width measurement should be taken at least 3 places. Then, in both cases, mean width should be calculated.

Major Defects Found in Woven Fabrics:

Various types of faults found in woven fabrics has mentioned in the below:

- Bad selvedge
- Broken ends or warp
- Broken picks or weft
- Loose warp
- Loose weft or snarl
- Double end
- Tight end
- Float of warp
- Wrong end color
- Miss pick
- Double pick
- Weft bar
- Ball
- Hole
- Oil spot/Marks
- Tails out
- Temple mark
- Reed mark
- Slub
- Thick and thin place
- Color variation

Faults with respect to warp and weft

In textile industry, woven fabric is produced by interlacing warp and weft yarn. Faulty woven fabrics hamper the total quality of woven fabric garments. Fabric checker should know about the major woven fabric faults

which produced during woven fabric manufacturing. The quality of fabric usually depends on warp & weft count and the density of warp and weft per inch. The EPI (ends per inch) & PPI (picks per inch) can be measured for assessing the quality. Usually PICK Glass is used for measuring EPI & PPI.

Ends per inch:

The number of ends per inch should be uniform. The thickness of all the ends or warps should also be uniform. Any deviation or difference will cause a poor appearance of the fabric.

Picks per inch:

The picks or wefts per inch is the measure of number of wefts in one inch of the fabric and affects its strength, appearance and cover. The number of weft should also be uniform throughout the width and length of the fabric**.**

How to Use Pick Glass: Pick Glass is used to determine the reed and pick in woven fabric. Reed is actually number of ends or number of warp threads per inch and by picks we mean the number of picks or number of weft threads per inch. The following procedure is based on IS 1963: 1981 method:

Sampling

1. Avoid sampling within 50 mm from the selvedge.

2. Within two metres from either end of a piece or roll.

3. While sampling from design fabrics it is convenient to:

a) Determine the number of units in a weave repeat from a point paper diagram.

b) Count

i) The number of whole repeats

ii) The remaining units, in the distance across which the threads are to be counted.

iii) From the above data so obtained, the number of threads per centimetre or inch both in warp way or weft way as required can be calculated.

Cloth Width :

The standard widths for fabric bolts include 36, 38, 42, 44/45, 48, 54, 58, 59, 60, 72 and 108 inches, out of which 45, 54 and 60 inches being the

most common in use . The width is often listed on a label at the end of a flat fabric bolt. The amount of fabric needed for a project often depends upon the width of the material, which is often specified in commercial patterns. In general, the wider the fabric is, the less of it that is needed. Be certain of the amount of fabric required before it is cut by a store clerk, because some patterns require one long piece rather than multiple shorter pieces.

Procedure for Checking the Fabric as per Specifications:

1) Keep the test sample on a flat table and smoothen it out.

2) Set the pointer of the counting glass at zero.

3) Place the counting glass on the fabrics in a direction parallel to warp if weft density is to be determined and parallel to weft if warp density is to be determined.

4) Find the number of warp or weft threads in a specified length as required.

5) Following the procedure prescribed in steps 1 to 4, determine the number of warp and weft threads per centimetre or inch in at least four more places.

6) Calculate the number of warp or weft threads per centimetre or inch by the following formula: $n = N \div L$

   Where

   n = number of warp or weft threads per centimetre (or inch),

   N = observed number of threads in the distance L, and

   L = distance in centimetre (or inch) across which the threads are counted.

7) Calculate the mean of all the values and report it as the number of warp or weft threads per centimetre or inch of the fabric.

Colour, weave and design:

The colour and print of the fabric should be uniform throughout the entire fabric roll. It should not happen that somewhere the colour is light and somewhere it is darker or the print is clearer in some parts and is blur or misprinted in other parts. Its weave should also be uniform with no visible

weaving defects. If uniformity of colour, print or design is absent then the appearance of the fabric will not be good. Thus if we make a product out of such a fabric, its demand and hence price will be less.

Weaving – This is a process in which warp yarn (threads that is lying along the length of the fabric) and weft yarn (threads that are lying along the width of the fabric) are interlaced to form the fabric. The weaving process is a technology where warp yarns are separated by and the weft is inserted for interlacement for creating dimensionally stable structure.

Basic Weaving Operation

Whether the fabric is prepared on handloom or power loom, involves the three primary motions. Primary motion is the main motion of a weaving loom. It is impossible to produce a woven fabric in any loom without using these motions. That is why, it is known as primary motions. These are:

1. Shedding
2. Picking
3. Beating

In addition to these, some secondary weaving motions required to make the weaving process continuous. These motions include warp let-off motion and cloth take-up motions. These are:

1. Let-off Motion
2. Take-up Motion

Shedding:

The shedding separates the warp yarns into two layers or divisions to form a tunnel known as 'shed'. The shed provides room for passage of the shuttle.

Picking

In picking the weft yarn passes from one selvedge of the fabric to the other through the shed by means of a shuttle. The inserted weft thread is known as "pick".

Beating

The beating mechanism beats or pushes the newly inserted weft thread (pick) into the already woven fabric at a point known as "fell of the cloth". These three operations namely shedding, picking and then beat-up are done in sequence.

Let-off Motion

As the fabric is formed, it is essential to let off the warp yarn for continuous weaving. The delivery of warp yarn at required speed is called warp let-off motion.

Take-up Motion

The woven cloth needs to be wound around a specific package after it has been beaten up. The winding of woven cloth is called take-up motion.

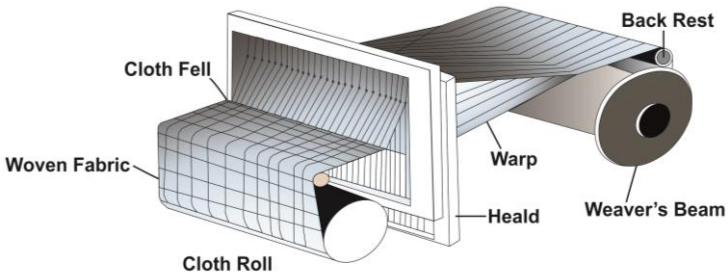


Fig.: 3.4 : Basic Weaving Operation

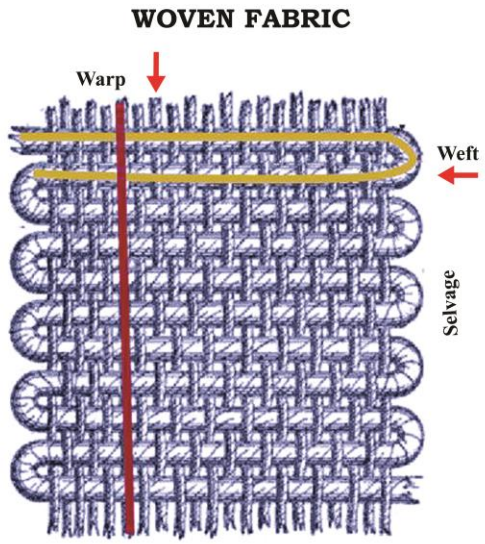


Fig.: 3.5 : Warp Weft & Selvage of Woven Fabric

Classification of Woven Fabrics:

The weaves are classified in to:

a) Basic/Simple Weaves

b) Compound/Complex/Novelty Weaves

Basic/Simple Weaves: 3 basic weaves

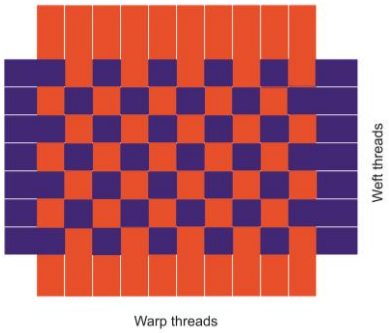


Fig.: 3.6 : Basic/Simple weave

Plain Weave

A basic weave, which is a simple alternate interlacing of warp and filling yarns. Any type of yarn made from any type of fiber can be manufactured into a plain weave fabric.

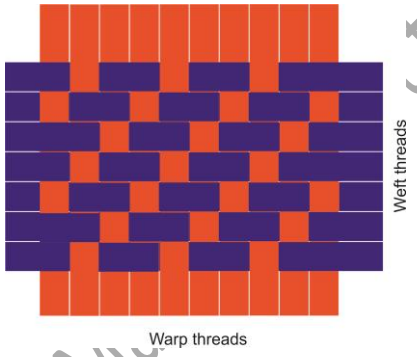


Fig.: 3.7 : Plain weave

Twill Weave

A basic weave that has a diagonal effect on the face, or right side, of the fabric. In some twill weave fabrics, the diagonal effect may also be seen clearly on the back side of the fabric.

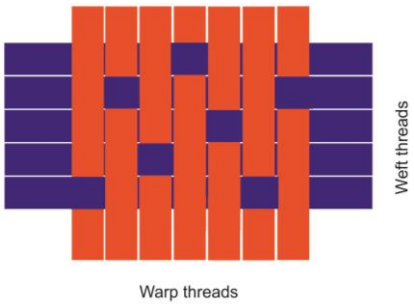


Fig.: 3.8 : Plain weave

Satin Weave

A basic weave, characterized by long floats of yarn on the face of the fabric. Satin weave fabric always has the warp yarns floating over filling yarns.

Compound/Complex/Novelty Weaves :

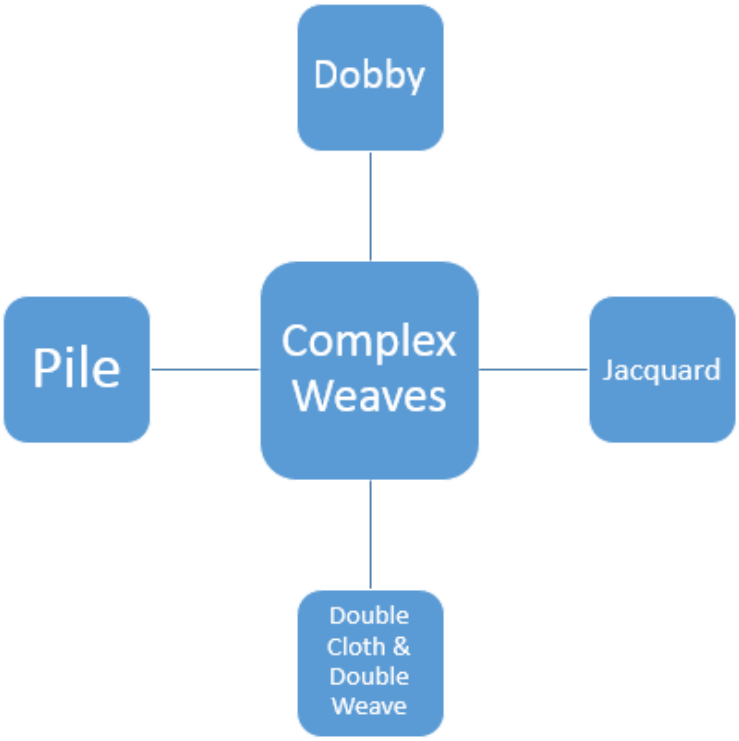


Fig.: 3.9 : Types of Complex Weave

a) Dobby Weave

Dobby weave is produced by the dobby loom, characterised by small geometric patterns and an special texture in the cloth.

Fig.: 3.10 : Dobby weave

b) Jacquard Weave

Jacquard weave is a figure weaving. It can be used to create intricate designs and detailed images of motifs such as flowers and birds. This is done on a Jacquard loom.

Fig.: 3.11 : Jacquard Weave

c) Double Cloth & Double Weave

Double cloth or double weave is a type of woven textile in which two or more sets of warps and one or more sets of weft or filling yarns are interconnected to form a two-layered cloth.

Fig.: 3.12 : Double Cloth & Double Weave

d) Pile Fabrics

Pile fabrics are characterised by the tufts or loops of fibres or yarns that stand up from the base fabric. Pile fabrics exist in many forms such as velvet, terry towel etc.

Fig.: 3.13 : Pile Fabrics

Even a minor defect while weaving will look magnified if it comes in a dress say on the yoke or in pocket. Thus weave should be uniform throughout the fabric in terms of tautness, pattern, colour etc.

Activities

Activity 1:

Check the given fabric swatches / samples for faults and write the name of the fault, if any.

Material Required:

1. Fabric Swatches
2. Magnifying glass,
3. A4 size papers
4. Pens, coloured pencils, markers etc.
5. Ruler
6. Eraser

Procedure:

1. Teacher should collect at least 5 samples of defected fabric and give it to students to check the given samples carefully.
2. Students must note down the type of defect and its details.
3. Teacher will give 2 points for each correct identification and minus 1 for incorrect one.

Check Your Progress

A. Fill in the Blanks:

1. .....is characterised by small geometric patterns and an special texture in the cloth. (Dobby weave)

2. All.....must be flagged during inspection. (Defects)

3. .....is a type of woven textile in which two or more sets of warps and one or more sets of weft or filling yarns are interconnected to form a two-layered cloth. (Double cloth or double weave)

4. The fabric faults are identified, labelled and recorded in a.....(fabric inspection form)

5. .....are characterised by the tufts or loops of fibres or yarns that stand up from the base fabric. (Pile fabrics)

6. The _____ was introduced in the 1970s and it was developed particularly for knitted fabrics. (Dallas system)

B. Answer the given questions:

1. What is a fabric inspection form? Where is it used?
2. Explain the factors that affect fabric quality.
3. Why is it necessary that the fabric matches the company standards/specifications
4. What do you mean by uniform weaving and why is it necessary?
5. Explain dobby, jacquard, pile and double weave?

Session 4: Ensuring Safety and Maintenance of Fabric Checking Machines and Work Area

Fabric Checker's role involves checking up the fabric rolls as well as sorting and bundling the rolls/lots. This (Fabric checking or inspection) is done on Fabric Inspection machines and also involves other tools such as calculator, measure tape, ruler, brushes, tweezers, rulers etc. It is very important to keep all the tools, machines and equipment operational as well as fit and safe for use. Regular maintenance of machines goes a long way in ensuring safety of machines as well as operator's safety. It also helps in preventing and minimizing accident and injuries, machine breakage and faults, machine downtime and helps in increasing machine output. Regular safety and maintenance also helps in maintaining the workflow and thus helps in achieving the target work.

Safety Education and Training:

Safety of employees as well as machines and the premises or workspace is of utmost importance for any company or organization. Employees should be given safety education and training to make them safety conscious. It can be done through posters, bulletins, slogans, films, signs and supplemented by holding seminars, safety weeks, safety contests and SOPs made by safety officers of organisation.

Safety drills and practice should also be carried out from time to time to keep employees aware of potential hazards and risks and how to be safe during emergencies. Provisions should be made for disciplinary actions/punishments for breach of safety regulations. Strict vigilance should be kept in plant and machinery to ensure safety in the factory. Machines, equipment's and electric cables should be inspected on regular basis to prevent untoward incidence in factory premises. Regular maintenance goes a long way in ensuring safety.

MAINTENANCE OF FABRIC CHECKING MACHINES AND WORKAREA:

Regular maintenance of equipment is an important and necessary activity. The term 'maintenance' covers many activities, including

- Inspection
- Testing

- Replacement
- Adjustment

It is carried out in all sectors and organisations. It has a vital role to play in reducing the risk associated with some workplace hazards and providing safer and healthier working conditions. Insufficient/inadequate maintenance can cause serious (and potentially deadly) accidents or health problems. Machinery that has a maintenance log needs to be kept up to date and maintenance operations need to be carried out safely.

TYPES OF MAINTENANCE:

There are two types of maintenance:

- Routine maintenance- It is planned and focuses on preventing future problems
- Corrective maintenance- It is reactive and happens when equipment goes wrong and needs to be fixed.

One measure to prevent accidents may be maintaining a check on unsafe work conditions. These may include keeping the floors clean, maintaining adequate light and ventilation, proper maintenance of machines, equipment's, and tools and sufficient space for workers for their movement without obstructions.

4.1 CHECKING EQUIPMENT SAFETY SET UP AND READINESS FOR USE:

For fabric checking, various machines and tools are used. Thus, it is very important to have an understanding about the safety and health measures while operating them. The Machine

Operator has to be safe and healthy & be aware of the various occupational hazards associated with operation, and work related illnesses and injuries. Many of the injuries are caused mainly by the Operator's error, carelessness and inattentiveness. The Operators must be properly guided for the use of all the tools and equipment, machines, their safety measures, and precautions to be taken at the time of working. It should be compulsory for the Operator to follow the basic instruction to use machines, tools and equipment.

Checking equipment safety, set up and its readiness is important to:

- Prevent injuries and threat to workers

- Ensure uninterrupted production
- Avoid machine breakage and downtime

Every time a new machine is setup or every time before using equipment it needs to be checked, its test run done and its safety being ensured. If the safety of tools, machines and equipments is not ensured, it can result in worker getting fatally injured, delayed work and loss of time, material and life. Every time a worker finishes work or starts work they first need to check up and test run the equipment. Equipment readiness or preparedness is also tested before and after the shift to ensure nonstop working without faults and accidents.

Make sure the machine is:

- Safe for any work that has to be done when setting up, during normal use, when clearing blockages, when carrying out repairs for breakdowns, and during planned maintenance.
- Properly switched off, isolated or locked-off before taking any action to remove blockages, clean or adjust the machine.
- Manuals should be read thoroughly and should be available readily to fabric checkers.
- Standard Operating Procedure should be written and kept at a point easily visible.
- Work area and machine area should be marked with yellow tapes.

Also, make sure to identify and deal with the risks from:

- Electrical, hydraulic or pneumatic power supplies.

- Badly designed safeguards. These may be inconvenient to use or easily overridden, which could encourage the workers to risk injury and break the law.

Checking equipment readiness for use-

Readiness means: State of preparedness of persons, systems, or organizations to meet a situation and carry out a planned sequence of actions. Readiness is based on thoroughness of the planning, adequacy and training of the personnel, and supply and reserve of support services or systems.

Equipment readiness means readiness of the equipment for performing the intended task. Equipment readiness is very important for uninterrupted inspection cycle. **Let's understand the various do's and don'ts.**

Do's

• Clean and check the machine and then only handover your shift or duty.

• Check the machine is well maintained and fit to be used, ie appropriate for the job and working properly and that all the safety measures are in place – guards, isolators, locking mechanisms, emergency off switches etc

• Use the machine properly and in accordance with the manufacturer's instructions

• Make sure you are wearing the appropriate protective clothing and equipment required for that machine, such as safety glasses, hearing protection and safety shoes

Don't...

• Use a machine or appliance that has a danger sign or tag attached to it. Danger signs should only be removed by an authorised person who is satisfied that the machine or process is now safe.

• Wear dangling chains, loose clothing, rings or have loose, long hair that could get caught up in moving parts.

• Distract people who are using machines.

• Remove any safeguards, even if their presence seems to make the job more difficult.

Before using any machine, think about what risks may occur and how these can be managed. One should therefore do the following:

• Check that the machine is complete, with all safeguards fitted, and free from defects. The term 'safeguarding' includes guards, interlocks, two-hand controls, light guards, pressure-sensitive mats etc. By law, the supplier must provide the right safeguards and inform buyers of any risks ('residual risks') that users need to be aware of.

• Produce a safe system of work for using and maintaining the machine. Maintenance may require the inspection of critical features where deterioration would cause a risk. Also look at the residual risks identified by the manufacturer in the information/ instructions provided with the machine and make sure they are included in the safe system of work.

- Ensure every static machine has been installed properly and is stable (usually fixed down)

- Choose the right machine for the job and do not put machines where customers or visitors may be exposed to risk.

- Note that new machines should be supplied with a Declaration of Conformity and instructions.

The machines in department are used continuously for production and over a period of time wear & tear is obvious. Every day while using the machine it is necessary for certain steps has to be followed by operator and his assistance The physical checking of mechanical moving parts , their alignment , settings for smooth function is necessary. It is the duty of operator along with his assistance to perform routine check .It is necessary for faultless production; safety of worker and desired productivity. The operators are to be trained before employing them as machine operator.

Following are some guidelines which should be followed:

1) Keep hands away from shafts and rollers at all time.

2) The machine only to be operated by authorized and trained personal.

3) Never operate the machine with any guards removed.

4) Maintenance/service should be performed only by authorized personal and before performing, disconnect the machine from the mains.

4.2 Setting up of the Equipment and Machinery for Fabric checking as per the Job Requirement

Any machine needs to be set up as per the requirement of the job, plant layout and other company specifications. Fabric checking machine also need to be set up properly before they can be used. The area where the machines are kept should be clean, well lit and well ventilated.

- The machines should be set up according to manufacturers' instructions and production requirements.
- All the manuals should be read carefully and the working should be understood clearly before starting to work on the machine.
- Safety requires that floors be kept as clean and dry as possible to prevent accidental slips with or around dangerous hand tools.

- Operate fabric checking machines safely and in accordance with guidelines.
- Clean the machines and make them safe after use.
- Carry out basic maintenance of the machines.
- Handle materials, machinery, equipment and tools safely and correctly.

Job requirements of a fabric checker:

- Taking charge of shift and Handing over shift
- Organising and controlling the manufacturing process
- Clean the machine and department before handing over the shift
- Hand over the necessary operational tools if any.
- Note the fabric checking details properly and carefully
- Ensure proper functioning of the machine and problems if any, should be reported to the supervisor and maintenance incharge.
- Safe working practices to be adopted
- Keep work area clean and safe and free from waste and obstructions during operations
- Check that materials, machinery and equipment meet specifications
- Prepare records/reports and documentation and handover to immediate supervisor.
- Knowledge about machine settings and operation
- Reset machines for restart after fault correction, style changes, and pattern changes
- Ensure that machine is always working properly, if any deviations inform superiors immediately
- Inform the supervisor and maintenance incharge in case of a jam
- Inform superiors immediately, if any break down or fault in the machine is noticed
- Identify materials, machinery or equipment that fail to match specification
- Carry out daily maintenance in accordance with specified procedures
- Follow guidelines for carrying out maintenance activities
- The working environment should be kept clean and free of contamination
- Ensure the machines are lubricated as directed in the machine manual
- Ensure the machines are monitored for continuous functioning of all systems, and variations notified in accordance with workplace procedures
- Leave work area safe and secure when work is complete

- Ensure the Fabric Roll is loaded on the fabric machine appropriately
- Ensure the fabric is not damaged during movement and handling
- Set the parameters of the fabric checking machine
- Operate the fabric checking machine to inspect the fabric for defects
- Mark or sticker the defects identified on the fabric
- Fill and maintain the records
- Produce fabric report
- Eliminate the defects on the fabric with minimal wastage of the material
- Report defective machines, tools and/or equipment to the responsible person

4.3 Keeping the work area free from hazards:

Work areas need to be safe for every employee and for any other person on site. Irrespective of the nature of the job it is important to reduce the risks of injury and illness at work. The work area or the area where the fabric checking inspection is being carried out must also be safe and free from all hazards. It is necessary and important to stay healthy and safe at work as it affects the productivity and in turn company's output and growth. Negligence can result in accidents, injuries and damages to men, machines and material. Messy and untidy work area can also result in damages and accidents. Thus it is duty of the operator and other workers working on shop floor to maintain the work area neat & clean and free from all possible hazards. The usual reasons for accidents are due to mechanical or electrical parts of machines.

Machine & Equipment Hazards

Electrical Hazards – equipment that uses electricity as a power source is a potential electrocution hazard. Check power cords, switches and connections for exposed wires or broken parts.

Amputation & Caught-in Hazards – machine guards on equipment are installed to protect the employees from moving parts. Of course if they have been removed during maintenance or adjustment they will no longer provide protection. Check equipment every day to ensure that all guards are in place.

Chemical Hazards – processing equipment that uses chemicals can be sources of numerous hazards. Leaks can cause slip hazards as well as possible exposure to harmful chemicals. Hoses that leak could create a respiratory problem from vapours.

Sharp Edges – simply walking past machinery may be hazardous if sharp edges are not guarded - check equipment mounting brackets, sign edges and control boxes to see if sharp edges are present.

Eye Hazards – tools and equipment that create chips, sparks or dust are potential eye hazards. These types of eye hazards are generally controlled by safety glasses, goggles and face shields. One should check eye protection the workers use to make sure they are not broken, scratched and are the correct type for the hazard. As a minimum, anyone who uses hand or power tools should wear safety glasses.

Some other injuries that can be caused by machinery:

- People can be struck and injured by moving parts of machinery or ejected material. Parts of the body can also be drawn in or trapped between rollers, belts and pulley drives.
- Sharp edges can cause cuts and severing injuries, sharp-pointed parts can cause stabbing or puncture the skin, and rough surface parts can cause friction or abrasion.
- People can be crushed; both between parts moving together or towards a fixed part of the machine, wall or other object, and two parts moving past one another can cause shearing.
- Parts of the machine, materials and emissions (such as steam or water) can be hot or cold enough to cause burns or scalds and electricity can cause electrical shock and burns.
- Injuries can also occur due to machinery becoming unreliable and developing faults or when machines are used improperly through inexperience or lack of training.

10 quick and easy tips to prevent different hazards associated with the work area, machinery and different tools:

1. **INSPECT THE TOOLS -** Never issue or use a damaged or defective hand or power tool. Always make sure they are in good working order before and after each use.

2. **PICK THE RIGHT TOOL -** Make sure to use the correct tool for the task at hand. This also means using the right sized bits, blades and accessories on the power tools.

3. **WEAR PPE -** Issue personal protective equipment to the employees and make sure they wear them properly. This comprises of items like safety goggles, hard hats, etc. Personal protective equipment should be considered a secondary line of defence against equipment hazards.

Employees need to know how to properly select, use and clean any PPE they use. PPE does wear out and has limitation on the level of protection against hazards – the workers should know these limitations.

4. **DON'T ALTER THE TOOLS -** Never remove guards or disable safety devices on power tools. Don't paint or cover up your tools as this could prevent you from noticing chips or cracks.
5. **HANDLE WITH CARE -** Tools are not toys. Never throw or toss a tool in the direction of or directly to a co-worker. Never use electrical cords to lower or lift a tool to get it to a workspace.

6. **KEEP THE DISTANCE -** When working with hand and power tools, be sure you have enough room to safely operate without coming into contact with other objects or co-workers.

7. **KEEP TOOLS IN PLACE -** Don't leave idle hand tools lying around the job site. They can lead to tripping or be accidentally knocking on someone's head.

8. **UNPLUG AND DISCONNECT -** Don't leave electric power tools plugged in when not in use, when making adjustments such as replacing blades and bits, or loading fasteners.

9. **KEEP THE WORKSPACE CLEAN -** A cluttered floor can lead to accidental trips or falls which can be extremely dangerous when working with hand and power tools.

10. **Training** – The employees should be thoroughly trained on the proper use of hand and power tools required for the task at hand. A worker who knows how to recognize hazards can then use his or her training to control the situation and avoid exposure to unsafe conditions. If you expect your people to safely operate equipment, they must first be trained to understand the operating principles, equipment controls and possible hazards to themselves and others.

Some other points to keep in mind to make a safe workplace:

- **Understand the risks.** By knowing the particular hazards of the job or workplace, one can take steps to reduce the risk of work-related injury or illness.

- **Reduce workplace stress.** Common causes include long hours, heavy workload, job insecurity and conflicts with co-workers or bosses. Stress can lead to depression, sleeping difficulties and problems with concentration.

- **Take regular breaks.** Staying fresh and alert will help avoid injury or burnout.
- **Avoid stooping or twisting.** Use ergonomically designed furniture and equipment, and rearrange the work area so that everything needed is within easy reach.

- **Use mechanical aids whenever possible.** Instead of trying to lift or carry a heavy object, use a wheelbarrow, conveyor belt, crane or forklift.

- **Protect the back.** If any worker needs to pick up and carry heavy loads, keep the load close to the body and lift with the thigh muscles.

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

- Machines should be fitted with automatic adjustable guards to fully cover the exposed part of the cutting blade.

- Regularly check the condition of the light, guard and table fittings.

- Put an effective cleaning system in operation that prevents build up of fluff, fly and off cuts.

- Document a safe system of work for changing and disposing of cutter blades.

- The seats of the workers and the tables should be well aligned in height so that there is no musculoskeletal strain.

- There should be proper lighting at the place of work so that eye strain can be avoided.

- Machinery should be well maintained in order to reduce the level of noise. If necessary, certain parts of machines can be replaced.

- In case the noise level cannot be controlled, workers should be provided with earplugs so that exposure to noise can be reduced.

- There should be proper ventilation at the place of work.

- In order to reduce the exposure to dust, workers should be provided with masks.
- Trained medical personnel and first aid facilities as well as safety equipments such as fire extinguishers and fire alarms should be available at the place of work.

- In units where there is heavy exposure to dangerous chemicals, workers should be provided with safety gloves.

- Medical examinations should be conducted by the employers for the workers from time to time. If significant occupational health problems are observed, appropriate measures should be taken by the management.

Activities

Activity 1:

Visit an apparel production unit and observe carefully the safety signs and symbols displayed in fabric inspection department. With the help of observation make any 5 safety signboards on a chart.

Material Required:

1. Chart paper
2. Pens, markers etc.
3. Ruler
4. Eraser
5. Colours

Procedure

1. Plan to visit an apparel production unit.
2. Observe all the safety signs displayed in different departments.
3. Gather information about the displayed signs.
4. Prepare a chart based on observation and information.

Check Your Progress

A. Fill in the Blanks:

1. Maintenance of machine covers many activities, including..... (Inspection, Testing, Replacement and Adjustment)

2. .....are the two types of maintenance. (Routine and Corrective)
3. Equipment.....is very important for uninterrupted inspection cycle. (Readiness)

B. Answer the given questions:

1. What do you mean by maintenance of fabric checking machines and what are the types of maintenance?
2. Explain types of hazards associated with the work area?
3. Explain how to prevent different hazards associated with the work area, machinery, tools and equipments?

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. Fabric 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 Proper Storage and Disposal of Waste Material • Identify and list different cleaning substances and equipment • Personal hygiene and health
Module Structure
Session:1 Material handling, cleaning and maintenance of tools
Session:2 Safe and correct storage of material

Session:3	Guidelines for proper storage and disposal of waste material
Session:4	Use of different cleaning substances
Session:5	Personal hygiene and health

Session: 1 Learn to Handle 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. More over the work area should have plenty of space for the task to be accomplished, and 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 fabric checking are as follows -

1. Hand Scissor/Thread trimmer:

Hand scissor or thread trimmer should be used safely while cutting of extra threads while fabric 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 threads removing equipment:

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

4. Garment checking work station:

At the initial stage all fabrics are thoroughly checked. For this quality checking workstation is required with adequate light, display board, highlighters for defects etc. Ensure placing lighting fixtures in a way that light should fall on the working area properly.

5. Spotting gun:

Spotting gun is used to remove stains from the fabric. By using a spotting gun, we spray the solvent at a high speed to the stained area. The solvent then dissolves the stains found on the fabric. Sometimes we also use liquid soaps, solvent, and toothbrush for cleaning of stains.

6. Measuring tapes:

Measuring tapes are used to measure garments. 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 fabric checking operations. Calculators are used for measuring any deviation from the required width or length of the fabric.

We should take care of the following points for proper handling of material and tools -

- Fewer and more efficient lifting operations. Don't lift loads higher than necessary. Use correct lifting and handling procedures. Make lifting more efficient and safer.
- We should move materials and perform tasks at safe, comfortable and working heights.
- Make transport and handling operations fewer, shorter and more efficient.
- All the passageways should be clean and clearly marked.
- Ensure that the correct machine guards are in place for safety of workers.
- All materials and tool should be handled safely and correctly as per the standard operating procedures.
- Use jigs and other mechanical devices to save time and effort.

1.2. 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, fibers, and more.

Improved conditions usually mean increased output, higher productivity and quality. There are simple and inexpensive ways to control most of the environmental problems. Maintenance of tools often result in cost savings, productivity benefits and increased safety of workers.

Points to be considered to clean and maintain the tools are as follows -

- Avoid placing the fabric 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 fabric checking machine free of any unwanted material like extra set of cartons, bins etc.
- The floor around the fabric inspection machine should be made anti slippage with the help of anti-skid mats or tiles.
- Ensure regular cleaning all the tools after every use.
- Keep all the tools and material back into their covers after use. This will not only prevent them from dust but will also prevent any accidents or injuries.
- Allocate proper space for fabric 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 equipments used for fabric 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 equipments used for fabric checking and its cleaning and maintenance methods.

3- Prepare a report and submit the same.

Check Your Progress

A. Fill in the blanks –

1- ..... processes should be simplified by reducing, combining, shortening or eliminating unnecessary movement that will impede productivity.

2- Work area should have plenty of space for the task to be accomplished and should be ..... and .....

3- We should move materials and perform tasks at ....., ... and working heights.

4-We shouldkeep 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 Demonstrate 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 ensuring the practice of adherence to 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.

2.1 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.
- 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 fabric 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.

- Away from emergency exit and evacuation areas.
- The storage area where chemicals are kept should be designed with floors which are not affected by chemicals or do not absorb the chemicals.
- Mostly we require some kind of ventilation facility like a mechanical exhaust fan for providing adequate ventilation and avoid collection of highly flammable or toxic fumes in the work area in the event/time of a chemical leak or a spill.
- All chemical storage areas should be secured /locked when the factory is not in operation and only authorized personnel should be allowed to handle the chemicals.
- Operations involving smoke and heat should not be performed near the chemical storage.
- Electrical supply, switches, wiring etc. should preferably be outside the chemical storage areas.
- Equipment such as generators, boilers, etc. should not share the same space as chemical storage
- Provision of fire extinguisher should be there but these should also be kept outside the storage room and not inside.
- While storing chemicals their nature and compatibility issues should be kept in mind. For example chemicals which are corrosive or oxidizing in nature should not be stored with flammable material. There should be a distance of at least 5 metres between such chemicals if a separate storage is not possible.
- We must ensure availability of any absorbent material near the storage area to remove/absorb any liquid chemical from the floor or other surfaces after a chemical spill or leak. We may use sand for this purpose, although commercial adsorbent products are preferable.

In addition to this, we should also ensure availability of equipments such as shovels, a container and suitable PPE protective gloves, eyewear, etc. depending upon the extent of the spill and the hazards of the particular chemical.

2.2 Proper usage of materials to minimize waste

Some amount of manufacturing waste is always generated in almost every factory or manufacturing unit. Thus it becomes mandatory to establish and implement practices for minimizing waste generation. Different production processes in apparel and textile units such as washing/drying, warp preparation, weaving, dyeing, printing, finishing, quality control, and warehousing etc. result in waste-generation. Some types of commonly observed wastes in textile and apparel industries include fabric scraps, chemicals, untreated dye solutions, finishing agents, cutting and stitching waste etc. Wet finishing processes use up to 200 litres of water per kilogram of fibre. Thus the largest chunk of waste in this sector is water (as per volume)

1. Efficient Inventory Management

One can reduce manufacturing waste, by controlling the excess/not required materials being used in the manufacturing process. Inventory should be managed efficiently and only required quantity of raw material should be procured to minimize wastage.

2. Reduce Packaging Materials

Product packaging may be redesigned to ensure that minimum amount of 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 Warehouse Properly

All the locations of inventory, tools, supplies, and assets necessary to manufacturing processes must be clearly marked throughout the warehouse. This may result in decreased time being spent on searching for the right tool needed for an urgent repair. One should always replace the faded tags and repaint the floor lines regularly.

7. Minimize Water Usage

Industrial sludge and wastewater make up a significant portion of manufacturing waste streams. One can reduce these elements by minimizing water usage in the operations like dyeing and finishing processes. Install a treatment system to recycle waste water. We should also encourage employees to cut down on drinking water from plastic water bottles as they add up to major portion of plastic waste generated. Switch to drinking water in glasses or promote the use of reusable bottles in the workplace.

8. Volume Reduction

Volume reduction refers to the segregation techniques that remove the hazardous portion of waste from the non-hazardous portion. As a result of using volume reduction technique, there is a considerable reduction in the volume and the cost of waste disposal.

They can be broadly divided into two categories — waste concentration and source segregation. The former may increase the likelihood of the material being reused or recycled and the latter consists of different types of materials within the waste being treated separately so that the cloth value in the bulk can be recovered.

2.3 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, improve your environmental performance and be more competitive. Disposal of waste at designated location is of utmost importance as if the waste is not packaged and transported safely, hazardous materials may leak or spill and cause harm to factories, industry workers, transportation workers, communities involved in these work and the environment.

We should follow the following ways of waste disposal –

- The types and amounts of hazardous wastes generated should be identified and segregated and the waste disposal method for each category of waste should be determined.
- Sorting of waste 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 nonhazardous wastes should not be mixed. Disposal of hazardous waste that cannot be treated or recycled should be done at a secure, permitted and designated place which has no access to the general public or any unauthorized personnel.
- Industrial shredders can be used to reduce waste by condensing cloth material, wood, rubber, and plastics to a fraction of their original size.
- Bins/Containers containing hazardous waste should always be kept covered only except when workers are transferring hazardous waste into them.
- Fabric waste from checking, cutting 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- We have to ensure that machinery, equipment, tools and materials are stored safely, have....., are safe to use and are regularly tested for their safety standards.

2-Savings in ..... results in easy accessibility to work items and tools, and improved inventory control.

3- ..... at designated location is of utmost importance as if the waste is not packaged and transported safely, hazardous materials may leak or spill and cause harm to the environment.

4- The types and amounts of hazardous wastes generated should be ..... and ..... and the waste disposal method for each category of waste should be determined.

5- The benefits of reducing the volume of solid waste generated at a factory include a positive effect on the environment, 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.

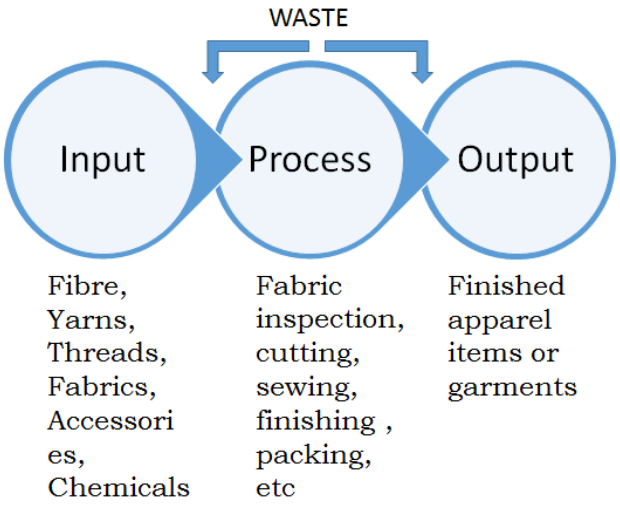


Fig 4.1 Production Process

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.

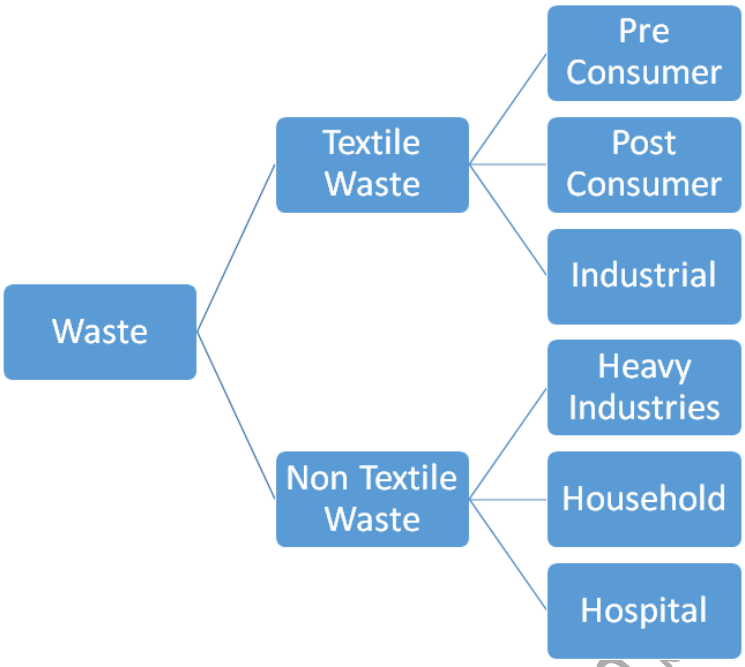


Fig.: 4.2 : Waste & its Type

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?

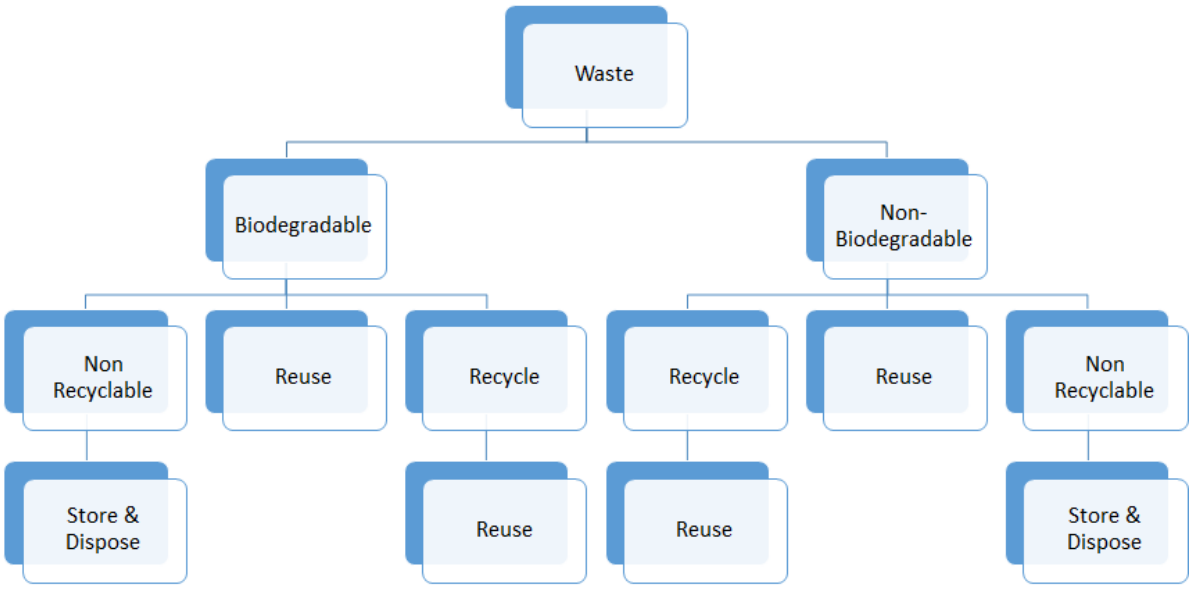


Fig.: 4.3 : Classification of the Waste on the basis of Recyclability

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.

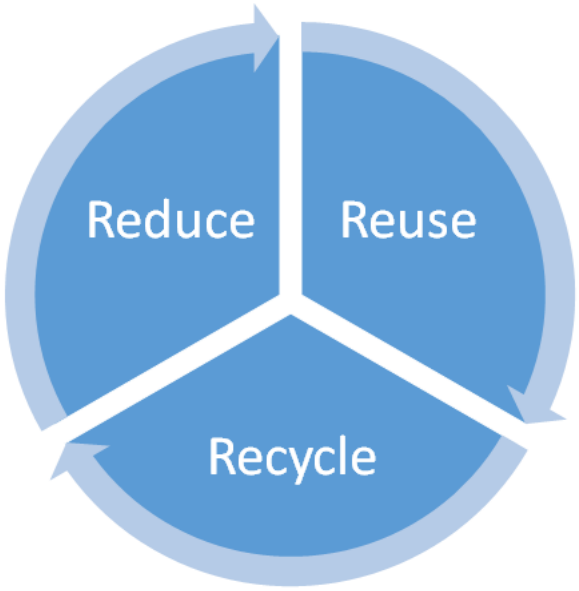


Fig.: 4.4 : 3R's of Waste Management

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 primary role of the Environmental, Health and Safety legislation is to prevent hazards that affect not only health of the workers but also the environment, hence it is necessary to understand the types and nature of hazards. The various hazards are as follows:

Fig.: 4.5 : Types of Occupational Hazards

The above mentioned flowchart briefly 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 install 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

1. Pens/Pencils
2. Register/file
3. 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: List and Describe the 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. Fabric 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 to fabrics to be inspected. Mostly cleaning agents required in housekeeping need to be stored here apart from other chemicals such as dyes, pigments etc.

Cleaning agents for general housekeeping of the work area

General housekeeping involves regular operations of cleaning and maintenance, thereby making the role of cleaning agents a primal one. The most common cleaning agents used include floor cleaners, disinfectants etc.

Cleaning agents for fabrics and accessories in the work area:

Sometimes the stored fabrics and accessories may get spoiled due to unforeseen reasons such as spillage, seepage etc. Thus cleaning agents may be required to ensure freshness and spotless fabrics prior to production. The primary purpose of the cleaning agents is spot removal but can also involve dyeing and washing if required. Apart from this cleaning agents are also used for keeping the premises of fabric inspection clean and tidy.

Though cleaning agents play an important role in various processes involved in the business and are widely used, still they must be handled with care and precautions.

The points to be kept in mind while using the cleaning agents are as follows:

- They should not be touched directly as it might lead to skin irritation.
- They should be stored in a separate, designated area as coming in contact with them would lead to fatigue, headache and dizziness.

- All the containers with cleaning agents should be well labeled and only authorized or limited personnel should be allowed to handle them.
- Protective gear such as apron, skullcaps and gloves,etc should be made use of while handling cleaning agents as it might lead to breathing issues and damage of lungs

Many of these problems can be prevented and solved at little or no cost. If you use organic solvents, keep them properly stored and labeled. They should be very carefully handled and used sparingly.

These points must be kept in mind as if they are ignored, they would lead to reduction of productivity and product quality, increased absenteeism and turnover of staff.
Some of cleaning agents which are widely used could be classified based on usage as follows:

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

Cleaning agents for regular cleaning:
These are primarily used to ensure upkeep, shine and functionality of the fabric. They include Antifoams, surfactants, chelants, solvents, dispersants and polymers which ensure high performance fabric care.

Cleaning agents for hard surface care formulations
When the stains on the fabric are not easily removable by application of above mentioned cleaning agents, they are required to be treated with hard surface care substances. These include Surfactants, dispersants, chelants, solvents and rheology modifiers that clean more efficiently and improve fabric performance.

Repellants
The substances that are used to provide the fabric with the qualities of water-proofing or make it anti flammable, are referred to as repellants. They are generally used to improve the functionality of the fabrics.

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

The job of the cleaning agents can not be possible 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 fabric checking are referred to as Cleaning Equipments.
The different types of Cleaning Equipments are as follows:

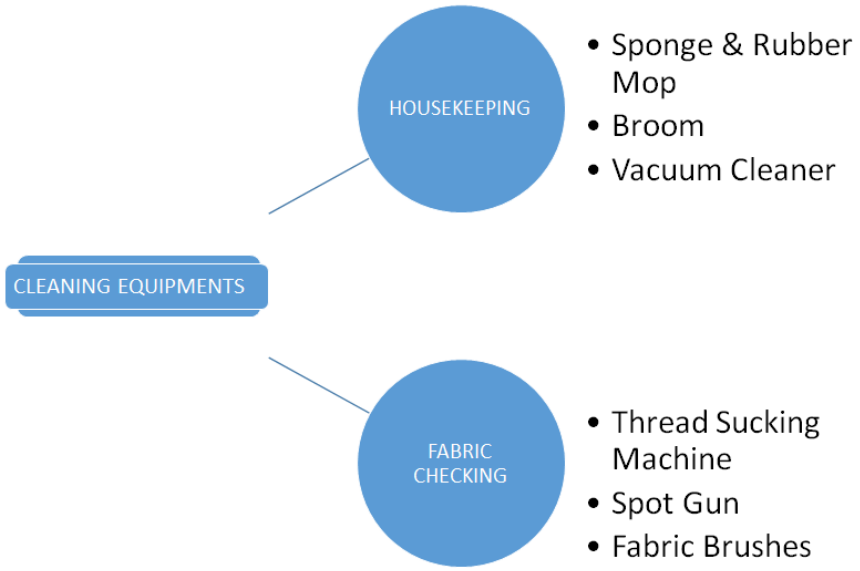


Fig.: 4.5 : Cleaning equipment

Cleaning Equipments for Housekeeping

1) Sponge and Rubber mop -They are used to clean all the plastic pallets as well as the floor with the help of a wet mop
2) Broom – Their use is to sweep the working areas
3) Dustbin –This is used to store all accumulated unused cloth waste rags, trash and dust of the working area prior to cleaning
4) Vacuum cleaner - It is used to remove the dust and powder in floors, the exterior surface of the machine walls, ceilings and ventilators.

Cleaning Equipments for Fabric checking:

1. Thread sucking machine -This machine has a crucial role as it primarily used to remove the loose threads on the top of the fabric
2. Spot Gun - It is used to remove the stains if they are detected prior to issuing of the fabric.
3. Brushes—To brush off the loose dust.

Activities

Activity 1

Imagine that the apparel and textile laboratory in your school had to be closed for a long duration say, 5 months. Clean the laboratory with the help from other students and support staff and make it fully functional again. Write the procedure followed in a chart.

Material Required:

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

Procedure:

1. Write the steps you followed for the cleaning of the laboratory. List all the cleaning agents and equipment used in the process.
2. Prepare the chart.
3. Decorate it.
4. Now, present a comparison of the pre and post scenario of the laboratory by pasting adequate number of photos of various stages in the cleaning process
5. Attach the chart on the drawing board of the classroom.

Activity 2

Prepare a chart on various storage equipment (any 10) used in the fabric checking department of an apparel company.

Procedure:

1. Collect the information on storage equipment from various sources.
2. Write it in your chart along with relevant pictures.
3. Decorate your chart.
4. Display in the class and also hold a group discussion on the same.

Check Your Progress

A. Fill in the blanks with the most appropriate word :

1. Sometimes the stored fabrics and accessories may get spoiled due to unforeseen reasons such as _____ , _____ etc. (spillage, seepage)
2. _____ is primarily used to remove the loose threads on the top of the fabric.
3. _____ should be made use of while handling cleaning agents as it might lead to breathing issues and damage of lungs.

B. Questions

1. Describe the precautionary measures used while handling cleaning agents.

2. Explain the various problems associated with the cleaning of the machinery, space and fabrics and the various cleaning agents and equipments used for the same.

Session 5: Explain 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 us from illnesses and ensures good health. It also has many other benefits. These include:

- Neat and Tidy appearance
- Improved stamina and efficiency
- Boosts self confidence
- Acceptance and
- Lesser leaves and absenteeism

PERSONAL HYGIENE, TAKING CARE OF BODY, FOOD HABITS:

Unsatisfactory quality and quantity of drinking water, lack of sanitation and hygiene can cause a number of illnesses. These factors can affect individually or in combination also. The diseases caused by poor sanitation and hygiene mostly affect individual employees and are not communicable. Thus they can be controlled but there are situation where lack of hygiene and sanitation may simultaneously affect many employees or group of employees. Such a situation is difficult to control and may result in huge loss of work. The latter is often indicative of poor working conditions in the factory.

The prevention of diseases related to water, sanitation and hygiene is possible with the institution of simple control measures at the factory level. Workers must be regularly trained in hygiene and sanitation practices to avoid loss.

The following mentioned are few tips on dealing issues regarding good personal hygiene at work and also some workplace health and safety tips:

ENSURING PERSONAL HYGIENE AND CARE OF BODY:

Poor hand hygiene increase the vulnerability to bacteria and potential transfer or introduction of microbes such as viruses and fungus. Hence washing hands frequently, wearing gloves etc. should be strictly followed

- Hand Wash: Hands must be washed on regular intervals with an effective hand disinfectant liquid/solution.
- Wear clean uniforms/ Protective clothes during working in the area along with cap, eye glass, face mask and footwear that adequately covers their feet to protect products from human particles such as skin flakes or hairs.

SAFE WORKING PRACTICES AND ORGANIZATIONAL PROCEDURES:

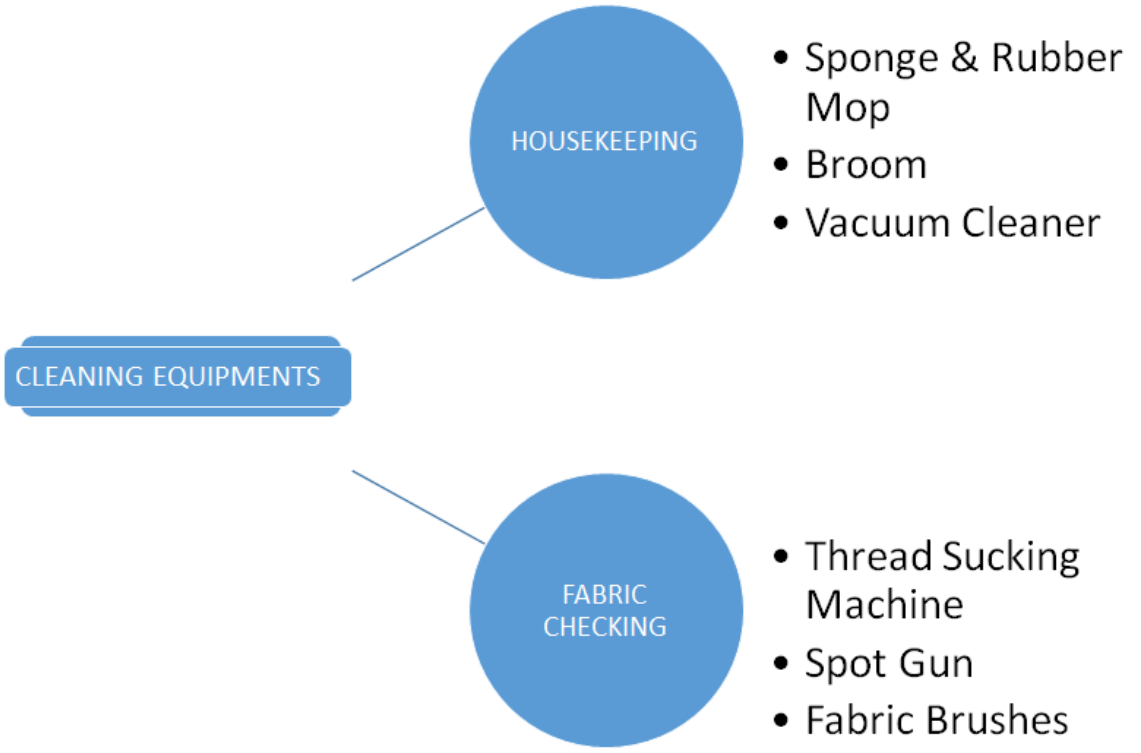


Fig.: 4.6 : Cleaning equipment

Every organization's safety measures include proper training of machine operators, which is essential throughout the production line and across the workplace. Safety can be greatly enhanced by introducing automation in machinery and processes for materials handling, particularly for heavy loads or wherever fast-running machinery is used or where heat or sharp blades or needles are involved. Safety devices are used to check that machine setting is correct and to stop machinery in an emergency.

- All Organizational policies and procedures should be followed for issues related to security, material handling, potential hazards etc.
- All compliances should be strictly followed. Special care and attention should be paid to health and safety regulations and procedures in case of fire, chemical hazards, bio-hazards, etc.
- Maintain distance between moving machinery and stay within designated areas.
- Maintain a clean, neat and orderly working area
- Safety measures: Ventilation to remove vapors from heat sealers.
- Safety guards and protective clothing, gloves and footwear worn.

- Displaying educational posters is a powerful way to educate workers. It is very effective because deliver a consistent message, and use pictures which are a strong form of communication targeting specific behavior. Examples which have been used in other garment factories include posters on lifting postures, proper mask wearing, and reproductive health.

3.4.2.1 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 organisational 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, fire-fighting and emergency response very sincerely and should not do it just for the sake of formality
- Take action, based on instructions in the event of fire, emergencies or accidents
- In situations where shutdown and evacuation is mandatory or compulsory, workers should follow standard organizational procedures

- Environmental hygiene should not be neglected – regular checks of waste disposal, drainage, sewage and effluent treatment systems should be instituted.

Hazard Controls –

- Sharp Objects – Packer 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.
- While disinfecting contaminated areas or equipment workers should wear protective gloves such as latex or other watertight gloves, safety glasses or goggles and cleansing wipes.

- If work surfaces or equipment have come in contact with blood or other body fluids for example, a worker's finger has been cut and has bled onto the equipment surface, these surfaces should be cleaned and disinfected immediately.

- All the earmarked areas such as walls, floors and doors of the work areas should be wiped with clean and sterile sponges and mops. Care should be taken to wet the sponges and mops with sterile disinfectant solution in proper concentration

- All exposed surfaces of equipment and glass panels should be sprayed and wiped with sterile solutions. Spillage or leaks if any should be cleaned and mopped immediately using sponge and sterile disinfectant solution.

GOOD HOUSEKEEPING PRACTICES AND ORGANIZATIONAL PROCEDURES:

INTRODUCTION TO HOUSEKEEPING:

Efficient production and good working environment are complimentary and go hand in hand for achieving organizational goals. A clean, orderly and attractive environment encourages tidy work habits in employees and also boosts their efficiency. Good housekeeping is more than just the cleanliness. It also involves minimizing risks due to accidents and hazards. Good housekeeping is mandatory in every phase of industrial operation. Entire premises that 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
- Open electric wires or air lines across aisles.
- Uncleaned 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:

   Houseleeping should not be restricted to only few ocassions such as inspections and audits, meetings etc. Infact the entire premises should be cleaned and maintained regularly and frequently.

2. REPAIR AND CHECK OF ALL ELECTRICAL SWITCHES, WIRING AND SUPPLY

3. All power supplies and electrical wiring and switches also fall under housekeeping and should be checcked and maintained regularly with utmost sincerity.

4. 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.

5. 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.

6. WELL-MAINTAINED AMENITIES:

Facilities or amenities such as washrooms and lockers for clothing should be clean and up to date. Lunchroom should be clean, well-maintained and inviting.

7. 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.

8. 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.

9. 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.

10. VENTILATION:

There should be adequate ventilation in the premises. The ventilators and exhaust fans should be clean and free from dust, cobwebs, grease etc.

11. 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.

12. 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. Loss of productivity and morale

Activities

Activity 1:

Prepare a chart on importance of personal hygiene.

Material Required:

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

Procedure:

1. Collect all the required information.
2. Prepare your chart and get it verified by your teacher.
3. Decorate it.
4. Attach the chart on the drawing board of the classroom.

Activity 2

Prepare a skit on various hazards of poor housekeeping practices and enact it in your class. Also conduct a discussion on the same.

Material Required:

Pencil/Pen

1. Eraser
2. Chart paper

Procedure:

1. Plan your skit on any situation related to hazards of poor housekeeping practices.
2. Distribute dialogue and roles among all the participants.
3. Enact the skit in your class.

Check Your Progress

A. Fill in the blanks with the most appropriate word:

Regular and timely ---------- has many benefits.

1. Regular _____ of all fire-fighting equipment such as _____ and fire hoses is vital for keeping them in good working condition.
2. Good housekeeping practices help in keeping the premises _____, _____ and _____.
3. Good housekeeping is an important factor of _____ _____.

B. 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 in a nominated person is appointed for conducting formal risk assessments; however, it is everyone's responsibility to be careful and mindful of hazards at the workplace and 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 work area free from potential hazards.

1.1 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

work area and also lead to negative health impacts. For example, any fungi attack on the fabric rolls can deteriorate the condition of the fabric lying in the work 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 work area can lead to damage in the raw materials/products stored. Its fumes may cause irritation of eyes or skin.

- **Physical**. Physical hazards are one of the most common 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 in the work area. 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 heights of the racks are not designed according to the height of the workers it may lead will result in body aches, stiffening and thus will lead to reduce productivity.

- **Psychosocial.** Psychosocial hazards adversely affect an employee's mental health or wellbeing. For example, sexual harassment, victimisation, stress and workplace violence.

1.2 Keeping work area free from potential hazards-

Workstations have to be kept free from any potential hazard to ensure the safety of workers and the work place. Therefore, following measures can be followed to maintain the safety and security –

1. **Environmental Control Measures**

Hazardous substances in one form or another can be found in almost all small and medium-sized enterprises. The garment industry generates a lot of dust from fabrics being cut and sewn, heat and noise from machinery. There are simple and inexpensive ways to control most of the environmental problems. Improvements often result in cost savings, higher productivity and increased safety of workers.

2. Regular and Proper Cleaning

Dust originates from fabrics and threads, from cutting and sewing to packing operations. It is very common to see small clothing enterprises with ceilings and walls full of dusty cobwebs.

One low-cost cleaning method is sweeping the floor carefully with an appropriate broom and accompanying dust pan to prevent dust from spreading. Spraying water on the floor before sweeping will avoid dust remaining airborne.

3. Cost-effective Local Ventilation

Local ventilation should only be considered as a means of reducing chemical hazards when other means have failed.
There are cost-effective ways of improving ventilation:

- **Use proper fans**

  Apart from those used for ventilating workstations, fans may be utilized to remove dangerous substances from the workplace.
  Contaminated air can be pushed or blown outside by having more open windows.

- **Good Lighting for Quality Products**

  Good lighting does not necessarily mean more light bulbs and more use of electricity. Natural lighting is usually a better option than the bulbs. But if there is a difficulty in arranging for a natural lighting through windows and ventilators, it's important that the bulbs and other elements of artificial lights should be well-maintained. A good lighting arrangement is directly proportionate to an efficient workforce.

  Lighting requirements are mainly affected by following factors:

  - The type of operation or task to be done for ex. Fabric checking requires very efficient lighting to detect fabric defects if any

- The eyesight of the worker , if any worker has very good eyesight then they can work efficiently in dim light too but workers with poor eyesight require optimum and efficient lighting system
- Area where the work is being done. If the work area has ample day light and clear, open windows then requirement of light is not that important. But during night shifts and in closed areas without adequate windows efficient lighting system is must

- **Full use of Daylight**

  If there are too many machineries omitting heat, it isn't a great idea to allow the natural heat to come in and add up to the temperature. The higher the window, the more light is in.

  It is important to paint the walls in lighter shades which not just give a sense of space to a room, but the workstation would look illuminated. In a store we should have be very careful with the light as long time exposure to light can cause degradation of fabric colour/shade.

Activities

Activity 1

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

Material Required-

1- Practical File
2- Coloured pens and pencils
3-Ruler
4-Eraser
5- Pictures of different hazards in an industry

Procedure –

1- Search and collect the data and pictures of different types of hazards of an industry.
2- Place the pictures in the practical file and label the same.
3- Write the description and make a report.

Check Your Progress

A. Fill in the blanks –

1. ..... is a potential source of harm that can cause temporary and permanent damage or even death in severe case.

2. ..... hazards create unsafe working conditions.

3. Psychosocial hazards adversely effect on 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 work area free from potential hazards.

Session 2 - Safe Handling of Equipment

2.1 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.
  User Department: - Chemical Store, Washing, ETP, STP

- **Acid-Alkali Hand Gloves**
  Purpose: - Used for handling Acid/Alkali

- **Chemical Splash Safety Goggle / Mechanical Safety Goggle**
  Purpose: -For protection of eyes against chemicals.

- **Different types of Masks:**
  - **Organic Vapour Mask**
    Purpose: - For protection against Organic Chemical vapours.
  - **Particulate Respirator**
    Purpose: - For protection against chemical Dust.
  - **Chemical Mask**

Purpose: -Used for protection against high concentration of organic vapours.

- **Dust Mask**

  Purpose: - For protection against normal repairable Dust.

- **Gum Boot**

Purpose: -For protection of foot while working in wet process. (For Washing & ETP operators)

- **Ear Muff**

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

- **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.

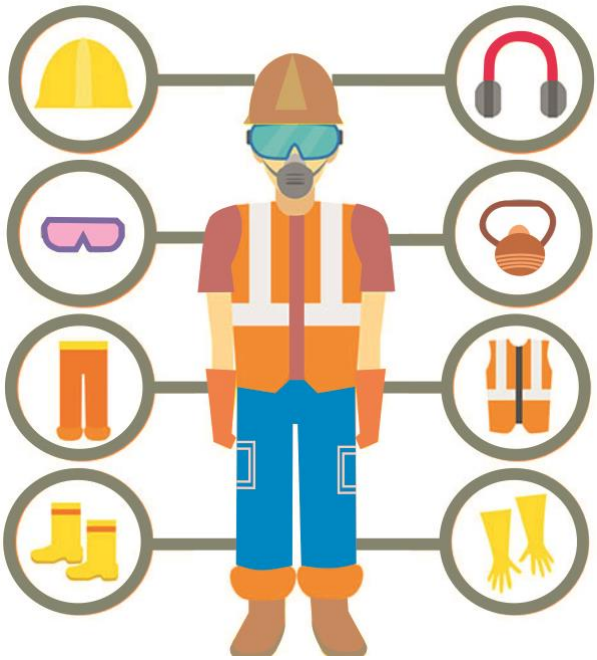


Figure 5.1 Protective Equipments

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

There are threats based on the nature of the operations and workers have to be trained to understand these hazards and take proper precautions.

Exercise 1: Visit a factory and make a list of sign boards seen on the production floor.

3- Compliance towards – Noise Protection, Cleanliness and maintenance

a- Technical measures should be taken to reduce noise generation. In case noise level cannot be reduced then wearing of ear protectors should be a must.

b- For maintaining cleanliness waste should be placed in the bins provided. Traffic lanes, fire appliances and emergency exits should not be obstructed and kept free.

c- Ladder should be secured and kept in a proper tilting position to avoid slipping. Do not use damaged ladders.

d- When transporting hot water in a bucket, use apron and boots and do not fill bucket to its full capacity.

e- Maintenance of the equipment should be regularly done to avoid hazards.

4- Reporting an Accident

All the employees should be aware of potential hazards and correct reporting processes. If a potentially hazardous situation is noticed, e.g.: a client expressing violent behaviour, it is important to report it immediately to the management and fill out the appropriate forms as legally required by you.

If injured at work, one must:

Report the injury to the management as soon as possible, maximum within 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-the-job training about the first aid facilities and services available at the workplace, including:

- Location of first aid rooms and first aid kits.
- Complete, up-to-date contact details of trained first aid officers in the workplace procedures for critical accidents – such as who should be responsible for calling.
- The ambulance/doctor/nurse and what is the best method of contact, measures for evacuation of the injured person/s.

4- 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.

5- 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.

2.2 – 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 are they 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.

Material Required –

1- Practical File
2- Coloured pens and pencils
3- Ruler
4- Eraser
5- Report of daily checks and condition of equipments.

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 –

Q1-Describe about any five types of protective equipments.

Q2 -Describe any five potential hazards, risks based on nature of operations.

Session: 3 Describe the 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.

3.1 – 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 your work area in a manner that everything you need is well within your 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.

3.2- 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 dustfree by wiping them regularly.
- Tea and food should always be consumed in designated spaces and all the utensils and crockery should be cleaned immediately and regularly.
- Workers should be trained in proper hygiene and practices and should follow it too sincerely.
- All the workers and employees should adhere to organisational hygiene policy
- Unhygienic practices like sneezing and coughing in open should be avoided.
- Washrooms must be kept clean and workers must wash their hands thoroughly after using wash rooms.

3.3 – Ill effects of tobacco

Consumption of tobacco in any form is injurious to health. Inhaling tobacco smoke can cause a person exposure to about 7000 toxicants and at least 70 carcinogens. All these can damage the body and result in critical illnesses like cancer, respiratory disorders etc. Both smokers as well as passive smokers are at equal risk. Passive smokers are people who don't smoke but are present near the people who smoke and thus get affected by the smoke.

Tobacco use is one of the most important preventable causes of premature death in the world. Limiting use of tobacco can save a lot of lives and improve well being of the workers as well as their families.

Effect of smoking on the body

Smoking cigarettes and *beedis* is very common among workers. It not only costs money for buying cigarettes but can result in many adverse effects on the body. Smoking can also lead to life-threatening complications such as:

1. Lung damage
   Smoking is linked to chronic bronchitis and can also trigger or exacerbate an asthma attack besides lung cancer.

2. Heart disease
   Vital body parts such as the heart, blood vessels, and blood cells are damaged by smoking and this may also result in heart diseases .Smoking can also increase the risk of peripheral artery disease (PAD) that is narrowing the arteries of the arms and legs. This may result in restriction of blood flow and can also cause blood clots. Some of the diseases related to smoking are angina or chest pain, stroke, heart attack.

4. 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.

5. 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.

6. 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

7. 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 diseases. Smoking can cause swollen and tender gums, foul breadth, discolouration of teeth and rashes in the oral cavity. It can also make the teeth sensitive.
Smoking tobacco can limit a person's ability to taste and smell things properly.

8. 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.
9. 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 colds, the flu, and mono from 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 the quality life especially when the consumption is more and constantly. Substance abuse also impacts your productivity and success at work. The time spent searching for and using drugs can be better spent on learning of new skills to advance one's career options.

Injuries and Death

Use of drugs and alcohol, can lead to physical injuries or car accidents. It also increases the death rate due to committing suicides or 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 is estimated that 1 out of every 4 deaths is caused by drugs and alcohol, according to the World Health Organization.

The short-term effects of drinking alcohol usually includes -

- Loss of intellectual stability
- Conflicts within groups.
- Injuries and Accidents
- Unethical or violent behaviour
- Hangover
- Alcohol poisoning

The long-term effects of alcohol

It is observed that consuming on average more than two standard drinks a day may result in a number of long-term health problems.

It is stated by World Health Organization (WHO) that consumption of alcohol contributes to more than 200 different types of disease.

Some of the common harms related to alcohol consumption are as follows:

- road and other accidents
- domestic and public violence
- crime
- family breakdown
- social dysfunction
- cardiovascular disease
- different types of cancers
- diabetes

- malnutrition and other nutrient deficiencies
- overweight and obesity
- risks to pregnant females
- liver diseases
- anxiety , depression and other mental health conditions
- alcohol tolerance and addiction
- long-term cognitive impairment
- suicidal thoughts

In the long term, alcohol consumption can affect physical, mental ,work, and social aspects of one's life.

Activities

Activity 1

Prepare a report after interviewing the fabric checkers 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-

Q1- Write about the benefits of personal hygiene.

Q2- Write in detail about the ill effects of alcohol consumption.

Session: 4 Explain Environmental Management Procedures, Security Details, Potential Accidents and Emergencies

4.1 – Environmental management system related procedures at the workplace

Every organization has an Environmental Management System (EMS) that helps it in achieving its environmental goals. This is done through consistent reviewing, evaluation, and improvement of its environmental performance. This approach reduces the risk of non-compliance and improves health and safety practices of the workers. Basic procedures followed under EMS are as follows –

- Review of the environmental goals of the organization.
- 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 -

- 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.

4.2 - 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

4.3 POTENTIAL ACCIDENTS AND EMERGENCIES AND RESPONSE TO THESE SCENARIOS

Emergencies or disasters are not at all welcome in any organization as they effect the health and life of employees and in turn also effect the business. However, the truth is that despite all the precautions and safety measures, emergencies and disaster can occur any time and anywhere. Sometimes these emergencies and disaster occur at a time when they are least expected.

At such difficult times the corrective measures are necessary to overcome such situations.

An incident/potential accident that can occur during the process of production or services if left unintended can lead to injuries, complication leading to disability, death, or prolonged hospital stay for a worker.
Awareness of high potential incidents at other workplaces is a key factor in preventing them at yours. Following are some of the most common causes of accidents at the workplace:

1) Heavy Lifting

2) Fatigue

3) Dehydration

4) Poor Lighting

5) Hazardous Materials

6) Fire Accidents

7) Acts of Workplace Violence

8) Trips and fall

9) Stress

10) Explosions

11) Chemical spills

12) Heat Waves

The best way is to prepare ourselves to respond to an emergency before it happens. Few people can think clearly and logically in a crisis, so it is important to do so in advance, when we have time to prevent any crisis as rightly said “prevention is better than cure”.

Emergency Response Plan

The initial minutes of an emergency are very critical and require immediate action. Promptness in announcing warnings and instructions to employees for evacuation, shelter or lockdown can save their lives. Public emergency services such as police, fire department, hospitals should also be called for immediate action. All employees must be trained in first aid, emergency evacuation, fire drills etc.

Proper risk assessment should be done for developing an emergency response plan for this all potential emergency scenarios should be clearly identified. An understanding of potential emergency scenarios can also help us to plan an arrange all resources and procedures required to prevent them in the first place. The emergency plan should be consistent with our performance objectives.

Development and implementation of an emergency plan is vital for every industry. This is specially required for protection of all the employees, visitors, contractors and anyone else visiting and working in the organization. This emergency pan also includes building evacuation through fire drills, sheltering practice from severe weather such as lighting, floods etc. There should also be a provision for shelter - in - place from air borne hazards such as a chemical release. Safety of life should always be the first priority is case of emergencies. Stabilization of the incident and normalization of the situation should be the second priority. Employees should be aware of the action that should be taken to stabilize unprecedented incident.

For example - Employees should be trained to use the fire extinguisher efficiently for controlling small fire accidents. Containment of a small

chemical spill and supervision of building utilities and systems can minimize damage to a building and can help prevent any environmental damage. A plan should be well established and resources should be on hand, or quickly available as response to any potential accident or emergency.

Activities

Activity 1

Study and make a layout of the factory by visiting an industry.

Materials Required –

1- Practical File

2- Coloured pens and pencils

3- Ruler

4- Eraser

Procedure –

1- Visit an industry.

2- Study the layout of a factory.

3- Make the layout in a practical file and label the details.

Check Your Progress

A- Fill in the following blanks –

1- An .....is a framework that helps an organization in achieving its environmental goals through consistent reviewing, evaluation, and improvement of its environmental performance.

2 ..... is the most effective physical arrangements of machines, processing equipments and service departments.

3- A good plant layout helps in achieving proper coordination of ....., ... and .....

B- Write short answers for the following questions-

Q1- State some potential benefits of implementing EMS.

Q2- State measures of safety at the workplace ensured by a plant layout.

Session: 5 Identify and Implement Safety Measures at Workplace

5.1 Different type of safety measures at workplace and their application -

At any workplace, there are certain rules and regulations which haveto be followed –Rules regarding organizational hierarchy, process flow chart, safety SOP's.

These signs include:

Figure 5.3 Safety Signs

Safety Signs: Theses are the signs or simple visuals which provide information or instruction about safety and health at workplace. All safety signs have a fixed sign board, a fixed color and an illuminated sign. They can also have an acoustic signal, a verbal communication or a hand signal.

Signboard: A typical signboard a combination of a shape, color and a symbol or pictogram. A sign board is always accompanied with lighting of sufficient intensity to make it clearly visible.

Signboards can be of the following four types:

Prohibition sign:
This sign is generally meant for warning against dangerous situations or for safeguarding privacy.

Warning sign:
A sign giving warning of a hazard or danger (example - 'danger: electricity').

Mandatory sign:
A sign prescribing specific behaviour for example "Staying away from hazardous chemicals stored in the work 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

5.2 Orientation to training on safety measures at workplace/ Action to be taken –

Mock Drills/ Evacuations –

Incase 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

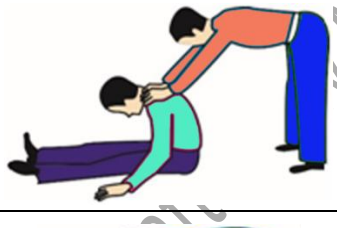
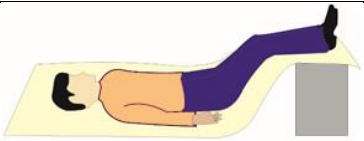
Postures	Evacuation from surface area
	Casualty is too heavy to be lifted
	An upright position will reduce intracranial pressure, essential for head injuries, and assist breathing.
	In case of injury on the back, make sure the injured area is covered and taken care of.
	In case of burns keep the head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

Figure 5.5 General recovery Position

Emergency situations (First Aid)

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

- Bandages and medicinal gauges of various sizes in sufficient quantities of the different sizes should be made available at all times to treat small cuts and burns.
- Scissors, tweezers (for splinters) and safety pins
- Eye bath and eye wash bottle
- Antiseptic solution and creams.
- Simple over-the-counter medicines such as aspirin and antacid.
- A booklet or leaflet giving advice on first-aid treatment.

Health and Safety measures at workplace and their application –

Health and safety play a vital role in the garment industry. To summarise the whole chapter, these are the some of the important areas where safety measures are of utmost priority to safeguard from hazards in the day-to-day practices in an organisation.

Here are some of the examples of these conditions:

Hazards	Safety Measures
Spreading and Cutting	
Finger and hand injuries from spreading machines	Disengage the spreader carriage when doing correcting work on the lay
Finger and hand injury from moving or idle cutting devices	Ensure that the finger guard is adjusted to the correct height of the fabric layers before starting to cut. Learn and use the correct handling techniques for the tool.
Finger and handing injury at swinging arm or flat punch machines	Ensure that the two handed control system is functioning properly. A light sensor should stop the machines when the working area is transgressed

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. Vapors 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 after the place is closed

Finger and hand injury from the press	A machine which requires two hands to operate it must never be operated by two people never attempt to adjust the position of parts after the closing process has started a safety bar must be fitted which stops and raises the head when it is touched
 **Figure 5.9 Cleaning, Stain Removal**	
Inhalation of solvent vapors, skin damage or reaction to contact with solvents	Ensure adequate ventilation only the equipment in materials actually required for a given working shift should be present
Fire hazard	An adequate distance must be maintained at least 5 meters from any potential ignition source
Hazardous chemicals	Safety warning instructions on the container should be observed and appropriate working method adopted

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 maneuvering careers over points	Safety guards should be fitted and proper training in handling method should be given
Falling from raised service platform and access points	Safety guards have to be in place. Specialized equipment should be used for servicing trolleys and proper handling procedures observed
Hand and finger injury from conveyors	Equipment must be guarded, and the safety guards must never be removed
Accidental injuries from tripping over the feet of movable hanger stands	Movable hanger stand should be found only in designated areas. They should not encroach on to marked walkways

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

Activities

Activity 1

Prepare a detailed report on personnel trained in first aid, 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. 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 a fabric checker to show that fabric inspected is passed 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.

Its not easy to explain what values are though most people would claim to have values. Their 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.

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 respect company property and don't indulge in unions, strike etc. Workers who follow ethical and value based approach are self motivated and hence perform better.

An ethical and value based approach also results in effective organizational control and hence better productivity and efficiency of employees. Companies that follow an ethical and "values-based" approach to ethics may have an advantage in the marketplace. They enjoy healthy returns through employee and customer loyalty as well as public respect for their brand. This in turn will help in smoothly achieving business goals. It also helps in avoiding breaking of regulations and associated punishments. It helps in achieving customers' and employees' trust and loyalty. It creates an environment of respect and faith.

Activities

Activity 1

Visit any industry or company. Talk to its employees and observe the working and employees. Prepare a report on the ethics and values being followed in that organisation / industry.

Material Required:

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

Procedure:

1. Visit any industry, organisation or head office in your vicinity.
2. Observe the sign boards, working of the employees and also talk to the employees to find out the working environment, various ethics and regulations followed there.
3. Prepare a report and write in your file.

Check Your Progress

A. Fill in the Blanks:

1. _____ simply means what is right or wrong.

2. Together _____ and _____ form the foundation of trust.

3. _____ and _____ are examples of ethics.

4. _____ are closely related to ethics.

5. Ethics and values help businesses and organizations in achieving their _____, without compromising on _____, _____and well being of the society and people at large.

B. Short Question Answers:

1. What do you mean by ethics? Give one example also.

2. What are the benefits of following an ethical and value based approach to management?

3. What are values? Give one example?

4. What are the benefits of following an ethical and value based approach to workers?

Session 2: Company Policies, Procedures and Its Benefits

Figure 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. Example - Every company has policy for substance abuse because constant substance abuse in employees if not tackled can lead to scuffles,daily fights and reduce work efficiency.

A company policy helps achieve employee wellness, fair treatment and also ensures that a company is following laws and regulations. Procedure is a fixed manner or way in which something is done. Procedures are the specific methods which inform employees as to how the daily duties should be performed. Every department in a company or an organisation has an SOP or standard Operating Procedure. This can be in the form of a manual, file or a booklet and is followed by all the staff member including senior management, middle management and all the other workers. Most of the company decisions and working is governed by the standard operating

procedure. Any deviation in SOP has to be informed and is scrutinised carefully.

Together, policies and procedures ensure that the company /or the organisation is able to achieve its goals and mission in the most efficient and smooth way.

Policies and procedures are different from each other. We can understand the difference between the two by following points:

Policies	Procedures
Policies are the guiding principles.	Procedures means how a particular task will be done, what steps to follow while doing a task.
It is general in nature and relates to overall activities in the company.	It is very specific and related to particular tasks.
It is formulated by top management in the company	It is formulated by middle and lower management in the company
Policies tell us why a thing needs to be done	Procedures tell us how a thing needs to be done

Every company has different policies and procedures which govern their daily business operations. Company policies and procedures also protect their business interests and employees. Procedures for each business can differ depending on the products and/or services provided. Organizations need policies and procedures for a wide range of HR topics.

Thus, policies set aside the desired results and procedures are required in place to ensure its achievement.

Some policies which are critical for businesses and are mostly followed by almost all the organizations are as follows:

1. Quality Assurance Policy:

Businesses should strive to offer quality goods and services to the clients. Products offered should meet the customers' expectations and even surpass their expectations. Quality services and products establish a good reputation and will build a successful business.

2. Environment Policy

All business organization should have commitment towards preservation of environment and should have practices to minimize their organization ill impacts on the environment. These practices include simple recycling

process as well sophisticated practices such as water treatment, waste management techniques etc. Some of the 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.

4. Corporate social responsibility

This is a strategic decision where businesses undertake an obligation to the society. For instance, a business may offer sponsorship to the community, take care of the environment. This is not necessary for profit maximisation, but to better the welfare of the public.

5. Employment

Managing your employees and ensuring they understand the position within the business is of critical importance. Employees need to understand how Performance Reviews are conducted, the process for rehabilitation, safe working conditions, compensation to workers injured at work, non-discrimination at workplaces, and termination conditions.

6. Purchasing Policy

All Businesses organizations depend on suppliers and vendors for their raw materials and supplies. Therefore, they must value their suppliers and treat them fairly. They must also offer fair and honest tenders to their suppliers as well as offer reasonable terms of payment. Purchasing policy helps in formalizing all these details. Employees also need to understand what are considered work expenses, how goods for the business are purchased and what is the purchasing process?

7. Use of Internet and E-mail Policy

Internet and email is a necessary part of our daily business. Having internet and email policies and procedures provide employees with guidance on what is expected behaviour and acceptable use. Business should also consider having guidelines on Social Media usage within the business. Employees

should be advised against use of internet at workplace as it affects the work output.

They should be urged to reduce time spent on personal use of internet. It is the duty of the organizations to add guidelines about what should and what should not be posted on social media regarding the organization in particular and events in general.

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

For a business to be successful, it is important to maintain high quality customer service. Good customer service is the key to build and maintain loyal customers.

11. Policies and Procedures for Use of Company Property

Employees are required to use company property like electronics, medical equipment, vehicles, tools and uniforms in order to perform their duties. To avoid loss and damage to company property due to misuse and mishandling by the staff many companies include guidelines on how to care for company property. These policies also include how much (if any) and what types of personal use are permitted while using company property.

12. Policies and Procedures for Harassment and Discrimination

Harassment at workplace includes bullying, stalking, verbal and physical harassment, sexual harassment and workplace discrimination. All this can negatively affect the motivation and efficiency of employees. Thus, most of the companies nowadays have policies on harassment and discrimination. These help in keeping employees safe and guarantee fair treatment by developing policies and procedures that prohibit behaviors such as:

- sexual harassment
- bullying
- verbal and physical harassment

- stalking
- hiring discrimination
- workplace discrimination

Include information on how to report harassment and discrimination and explain that the company will not retaliate for reporting.

13. Policies and Procedures for Expenses

Employees need to tour and travel for company assignments. They also need to purchase things for work. Thus, having an expense reimbursement policy is very crucial for all the organizations. This type of policy has details such as acceptable expenses, reimbursement of transportation and meals, medical reimbursements etc. This type of policies also have procedures to submit reimbursement claims, time limit for submitting reimbursements.

or purchase things for work, having an expense reimbursement policy in place is essential. Explain what types of expenses are acceptable for reimbursement (airfare class, transportation, meals, etc.). Include procedures on how to submit a reimbursement claim.

14. Drug and alcohol policy:

Workload, family tensions, anxieties can lead employees to indulge in drug and alcohol consumption. If it becomes a regular affair then employee gets habituated and his/her work efficiency is greatly reduces and may negatively affect the output and culture of the organization. Thus, most of the company nowadays have policies against such practices.

15. Policies and Procedures for Health and Safety

Health and safety of employees is crucial for every organization. Policies related to health and safety of employees includes information to deal with illness or injury at workplace, equipment safety guidelines and procedures to report an injury or accident. It also includes procedures to follow in the event of a fire or natural disaster.

Policies help in developing a good working operational model and this in turn motivates employees to perform and develop company standards. Employees refer to company policies for guidance on their roles, responsibilities, business principles, ethics and beliefs — for compliance reasons and to ensure a healthy company culture.

Written policies and procedures also help protect your company from potential legal action. After investing time and resources creating these policies, make sure employees read, understand and apply them to their daily job responsibilities.

Policies and procedures play a very important role. They define an organization's guiding principles and providing detailed task instructions. Policies and procedures form the basic structure of business operations. It's important to have clear policies, procedures and processes.

Business processes, procedures and standards are vital for training staff. Having formalised procedures for your business can save you time and money by increasing efficiency of the employees. Processes and procedures guide and help employees in giving more output in lesser time. Thus less time is required by management for overseeing the day-to-day running of the business.

Procedures can also improve the consistency of product and service delivery by your staff. It helps in achieving optimum staff performance. These create standards and help everyone to know how to operate. For ex. If a work area catches fire then what procedure would be followed for evacuation and safety or what procedure would be followed for registering vendor complaints. Formulating and implementing formal policies and procedures can result in smooth and efficient flow of work. They communicate the values and vision of the organization, ensuring employees understand exactly what is expected of them in certain situations.

Because both individual and team responsibilities are clearly documented, there is no need for trial-and-error or micromanaging. The policies and procedures must be written in a manner that the employees are able to understand them easily.

Formal policies and procedures act as guides while handling HR issues. The unavailability of written policies causes waste of time and effort to agree on course of action. With strict guidelines issued it is easy to follow the procedures and enforcing policies becomes easier. 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 your 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
- Helps in identification company rules
- Gives explanation of their existence
- Tells application of rules
- Describe concerned workers/ departments
- Explains enforcement of rules
- Prelists the consequences
- Are written in simple sentences and paragraph

Procedures

- Helps in identification of specific actions
- Describes situation when actions are needed
- Suggests alternatives
- Enlists emergency procedures
- Explains warning and cautions
- Provides examples and explanations
- Enlists steps to complete forms
- Are normally written using an outline format

Policies and procedures are required for maintaining consistency in the day-to-day operational activities. Policies and procedures helps in giving clarity and also state clear accountability of the person responsible for critically important activities of the company, such as, health and safety, legal liabilities, regulatory requirements or issues that have serious consequences.

Benefits of Following Company Policies and Procedures:

Policies and procedures protect business interests of the company on one hand and they also protect workers' rights on the other hand. They also provide a vision and mission to the company and thus in turn help in achieving standards of customer service**.** Together the two make sure that the company achieves the desired outcome in the most efficient way.

Benefits of Policies and Procedures

- Policies and procedures help the employees to understand their job constraints better, as all the key points are stated with clarity.
- It helps in saving time and resources by enabling the workforce by clear understanding of their responsibilities and keeping all of them on the same page.
- It also helps managers to exercise control by exception rather than 'micro-manage' their staff.
- Clearly written policies and procedures provide legal protection to the company.

Activities

Activity 1:

Visit any industry and enquire and study about its policies. Prepare a detailed report of the policies followed by them.

Material Required:

1. A4 size papers, chart papers and file covers
2. Colured pen and pencils, permanent markers
3. Eraser and sharpner
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

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

Material Required:

1. A4 size papers, chart papers and file covers
2. Colured pen and pencils, permanent markers
3. Eraser and sharpner
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.
   Paste related photos and pictures

Check Your Progress

A. FILL IN THE BLANKS:

1. _____ are rules and guidelines formulated by a company or any organisation.
2. Policies tell us _____ something needs tobe done.
3. _____ tell us how something needs to be done.
4. Policies and procedures enable the workforce to clearly understand _____ and _____ responsibilities.

B. SHORT QUESTION ANSWER:

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

C. LONG QUESTION ANSWERS:

1. Write any 3 differences between policies and procedures.
2. Why it is important to have company policies and procedures?

Session: 3 Teamwork and Support to Supervisor

Teamwork: Introduction and Importance

A team is a group of individuals working together to achieve a common goal. We can find teams in sports, business, offices, schools and so on. Ex. A cricket team, forensic team, quality assurance team. Members of a team collaborate and cooperate with each other for a common cause.

Figure 6.2 Teamwork & support

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.

Providing Support to Supervisor and Team Members for enforcement of Company Policies and Procedures

A collaborative and supportive work environment is crucial for a successful organization. Implementation of policies and procedures cannot be done without the support of employees. Every employee in turn must provide support and cooperation to the supervisor as well as other team members for effective implementation of company policies and procedures. This will go a long way in achieving the targets and goals set by the company / organisation. Apparel production companies have different departments such as store department, cutting department, stitching department, finishing and quality department, 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. For ex. in a fabric checking department, the senior inspector is responsible for guiding and training the support staff about how to inspect a fabric safely and correctly.

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 can not 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 type 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 ex in a quality control department the support staff should be able to clearly understand the procedure for handling and operating fabric checking machine properly. This will help in smooth operations without any chaos, confusion or loss in the stock. This will result in achieving the business targets and management of work routine. This in turn will be a big.

4. Be Responsible

If you notice that there is a task that needs to be done and the staff is less or not adequate and you have the skills to accomplish it then offer to do the task and complete it.

5. Be dependable –

Do your duties and assigned tasks seriously, efficiently and well within the time limit. This is one way of showing support to your supervisor and being a valuable employee too.Dependable employees respect deadlines, and make every effort to meet them. For this work hours should be used effectively and time should not be wasted in gossiping or taking longer than authorised lunch breaks. Help your supervisor by doing your share of the work and try to complete assignments in a timely fashion.

6. Prior sanction of leave/late arrival

Always inform your supervisor before taking leaves. Even if some last minute emergency comes up and you need to report late for the duty, do inform your supervisor. One must always inform supervisor about leaving early or late arrival. Keep him/her informed about your leave plan. This will help in assigning your duties or work to someone else. This is essential for meeting deadlines and maintaining the workflow and production cycle.

7. Be Punctual:

Always arrive and leave on scheduled time. Try to arrive and settle a little early then your shift timings as this will help in utilizing the shift

time effectively. Do not over extend tea or lunch breaks. Punctualty 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 adapt to changes quickly are more beneficial than those who cling to outdated practices and concepts. One should always be open to experiment and explore new ideas which can improve productivity and performance.

10. Make your supervisor and team members' work easier:

Be ready to offer help and to do extra duties in case of emergencies and deadlines. Try to help not only your supervisor but also your team members if there is more work or if there is some situation which requires to put in extra effort. For ex. If a consignment has to be shipped by a certain date and your shift is over, you can voluntarily offer to stay longer and help so that shipping can be done on the date given.

This requires a pro-active approach, especially because this work is not part of your assigned duties.

11. Take charge and volunteer:

Many a times your supervisor and/or any of the team members may not be able to perform their duties due to factors such as unforeseen illness, stress, constant juggle between home and work, financial pressure or other factors such as marital discord. This may hamper their productivity and output on certain days. All this can lead to unmet work targets resulting in high anxiety levels, thus pulling down productivity at work. Such times require you to show your support and solidarity by taking charge of the situation and volunteering to do more than your share of duties.

12. Spot real problem

There are times that your anxiety over something at home gets spilled over at work place. You may never realise that the problem is not at work but back at home or vice versa. 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. Prioritise 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 priortise 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 the assistant to the fabric checking supervisor in ABC apparel Production Company. A big supply of fabrics is being unloaded in the work area. Suddenly there is a fire outbreak how will you support your supervisor in controlling the situation. Present a skit in your class on this situation.

Material Required:

1. Placards
2. Furniture
3. Costumes
4. Bags and boxes

Procedure:

1. Plan the script and dialogues.
2. Arrange for the setting of the work area.
3. Enact the skit.

Check Your Progress

A. FILL IN THE BLANKS:

1. A _____ is a group of individuals working together to achieve a common goal.
2. _____ is very crucial for success of any business task or operation.
3. There are many _____and _____ ways of showing support to your supervisor.
4. A collaborative and supportive work environment is crucial for a organization.

B. SHORT QUESTION ANSWERS:

1. What do you mean by teamwork?
2. What are the benefits of teamwork?
3. Briefly write some of the duties of a supervisor.
4. How can workers in any organisation provide support to their supervisor? Write any 3 ways.

Session: 4 Planning and Managing Work Routines

Routines help you 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 ex. 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 co-workers 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 tobe 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 fulfill their tasks and responsibilities. For example, if you're a packer charged with checking and packing items, the results of your work could determine whether the products can be dispatched timely or not. If you're consistently absent, packing and hence transportation and supply of goods will be affected and delayed. This in turn can result in loss to the company

Figure 6.3 : Punctuality and Attendance

- Punctuality means the habit of being on time. It also means showing consistency and regularity in behavior. 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 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 ex. if we talk about the job of a 'fabric checker'. A 'fabric checker' who is punctual will arrive atleast 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 inspect the fabric 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.

A person who is punctual will not extend meal or tea time, will not indulge in workplace gossip and hence will be able to perform better and do quality work.

Benefits of Punctuality

Punctuality helps the individuals to be more productive and successful in their approach towards life. The various benefits are as follows:

- It is strongly linked with success and achievement. It is associated with happiness in every spheres of life. Inculcating punctuality in our lives helps us in crossing various hurdles and challenges.

- Punctuality demonstrates your respect for co-workers and clients and enhances 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.

Material 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.

Material 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. SHORT QUESTION 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: ROLE AND RESPONSIBILITIES OF A FABRIC CHECKER

SESSION 1: DESCRIBE THE ROLE AND RESPONSIBILITIES OF A FABRIC CHECKER

1. Fabric faults
2. Quality and acceptability
3. Passed, Failed and rejected
4. Hazard free, adequate light
5. Fabric checking machine
6. Good eye sight

SESSION 2 – LIST AND DESCRIBE PROPERTIES AND USES OF VARIOUS FIBRES AND YARN.

1. Cellulose
2. Wool and silk
3. Rayon
4. Staple Fibres and Filament fibres
5. Silk
6. Tenacity
7. Spinnability

SESSION 3 – LIST AND DESCRIBE VARIOUS FABRICS, WEAVES THEIR PROPERTIES AND USES.

1. Woven fabrics
2. Warp or ends
3. Knitted
4. Plain weave
5. Diagonal lines
6. Egyptian cotton

MODULE 2: IDENTIFY AND DESCRIBE FABRIC DEFECTS

SESSION 1: CLASSIFICATION OF FABRIC DEFECTS

1. Critical defects
2. Double End
3. Barre
4. Gout

SESSION 2: CLASSIFICATION OF DYEING AND PRINTING METHODS AND LISTING OF ASSOCIATED DEFECTS

1. Mordants
2. W.H. Perkin
3. Piece dyeing
4. Flat screen printing, and rotary screen printing
5. Batik and tie-dye

SESSION 3: DEFINE AND DESCRIBE INSPECTION SYSTEMS AND CRITERIA

1. Count
2. Indirect yarn numbering method
3. Bias grain
4. Selvage
5. 4- Point system and 10-Point System

MODULE 3: FABRIC CHECKING METHODS AND TECHNIQUES

SESSION 1: TOOLS, EQUIPMENT AND MACHINERY FOR FABRIC CHECKING

1. Safety, cleanliness
2. fabric
3. Pick glass
4. Tweezer

SESSION 2: FABRIC INSPECTION MACHINE

1. Red arrow head stickers
2. Fabric checking machines
3. Physical, mechanical and chemical properties
4. Grading
5. Abrasion marks
6. Fabric Inspection
7. Fabric rolls

SESSION 3: CHECKING FABRIC SAMPLES AS PER SPECIFICATIONS

1. Dobby weave
2. Defects
3. Double cloth or double weave
4. Fabric inspection form
5. Pile fabrics

6. Dallas system

SESSION 4: ENSURING SAFETY AND MAINTENANCE OF FABRIC CHECKING MACHINES AND WORK AREA:

1. Inspection, Testing, Replacement and Adjustment
2. Routine and Corrective
3. Readiness

MODULE 4: MAINTAINING A CLEAN AND HAZARD FREE WORKING AREA

SESSION 1: LEARN TO HANDLE TOOLS AND MATERIAL SAFELY AND CORRECTLY

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: DEMONSTRATE SAFE AND CORRECT STORAGE OF MATERIALS

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: GUIDELINES FOR PROPER STORAGE AND DISPOSAL OF WASTE MATERIAL

Fill in the blanks-

1. Environment health and safety
2. Radiation Hazard

SESSION 4: LIST AND DESRIBE THE USE OF DIFFERENT CLEANING SUBSTANCES

Fill in the blanks-

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

SESSION 5: EXPLAIN PERSONAL HYGIENE AND HEALTH

Fill in the blanks-

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

MODULE 5: HEALTH AND SAFETY RELATED PRACTICES APPLICABLE AT THE WORKPLACE

SESSION 1: POTENTIAL HAZARDS AT WORK PLACE

Fill in the blanks-

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

SESSION 2: SAFE HANDLING OF EQUIPMENT

Fill in the blanks-

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

SESSION 3: DESCRIBE THE BENEFITS OF A HEALTHY LIFESTYLE

Fill in the blanks-

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

SESSION 4: EXPLAIN ENVIRONMENTAL MANAGEMENT PROCEDURES, SECURITY DETAILS, POTENTIAL ACCIDENTS AND EMERGENCIES

Fill in the blanks-

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

MODULE 6: COMPLIANCE TO LEGAL, REGULATORY AND ETHICAL REQUIREMENTS

SESSION 1: IMPORTANCE OF ETHICS AND VALUES

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: COMPANY POLICIES, PROCEDURES AND ITS BENEFITS

Fill in the blanks-

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

SESSION 3 TEAMWORK AND SUPPORT TO SUPERVISOR

Fill in the blanks-

1. Team
2. Teamwork
3. Direct, Indirect

SESSION 4: PLANNING AND MANAGING WORK ROUTINES

Fill in the blanks-

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

GLOSSARY

Apparel: "Apparel" means clothing in general. Specifically "Apparel" is a generic description that covers menswear, womenswear, childrens wear and sportswear.

Biodegradable: Breakdown of an organic matter thus avoiding pollution.

Block: Wooden blocks with the design carved on it used in textile printing.

Braiding: Braiding is a method of interlacing three or more yarns or bias-cut cloth strips in such a way that they cross one another and are laid together in diagonal formation, forming a narrow strip of flat or tubular fabric.

Burrs: A burr is a raised edge or small piece of material that remains attached to a fabric piece after a modification process.

Calibrated: It is to adjust or mark (something, such as a measuring device) so that it can be used in an accurate and exact way.

Color fast ness: Resistance to fading, i.e. the ability of a dye to retain its color when the dyed or printed textile material is exposed to conditions or agents such as light, perspiration, atmospheric gases, or washing that can remove color.

Dimensional stability: The dimensional stability of a fabric is the ability to retain its original dimensions while being used for its required purposes.

Dobby: A mechanical attachment on a loom that controls the harness to permit the weaving of geometric figures.

Drape: A term to describe the way a fabric falls while it hangs; the suppleness and ability of a fabric to form graceful configurations.

Fabric: Textile fabric is defined as two dimensional structure made of textile yarn and fibre through weaving knitting or felting.

Fabrication: The selection of fabrics for the style or line of garments.

Felting: Felt is a dense, non-woven fabric and without any warp or weft. Instead, felted fabric is made from matted and compressed fibers with the help of heat, moisture and pressure.

Fibre: Textile fibre is the basic unit of any textile material. It can be made from natural or manmade sources.

Grading: The act of classifying something by quality, rank, size, or progression. Fibre grading is done depending on their physical characteristics such as length, strength, fineness, maturity, trash content etc.

Interlacing: It is used in weaving process by two sets of yarn where one set of yarn goes up and down to the other set of yarn forming a two-dimensional fabric structure.

Interlooping: When loop of one thread passes through the loop of another thread is called interlooping.

Standard operating procedure: A standard operating procedure (SOP) is a set of step-by-step instructions compiled by an organization to help workers carry out routine operations.

Stencil: a sheet of card, plastic, or metal with a design pattern cut out of it, used to produce the cut design on the fabric surface below by the application of color paste through the holes.

Sustainable: The ability to sustain or to be maintained constantly.

Unraveling: Untangle twisted, knitted, or woven threads.

Upholstery: Upholstery fabric is fabric or textiles used for furniture.

Yarn: Yarn is a long continuous length of interlocked fibres, suitable for use in the production of textiles, sewing, crocheting, knitting, weaving and embroidery.

List of Credits

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