



Participant Handbook

Sector
Apparel

Sub-Sector
Apparel, Made-Ups & Home Furnishing

Occupation
Laying

Reference ID: **AMH/Q0201**, Version **4.0**
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Layerman(Fabric)

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Shri Narendra Modi
Prime Minister of India

“

Skill development of the new generation is a national need and is the foundation of Aatmnirbhar Bharat

”



Certificate

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for

SKILLING CONTENT: PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

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The preparation of this handbook would not have been possible without the Fashion Industry’s support. Industry feedback has been extremely encouraging from inception to conclusion and it is with their input that we have tried to bridge the skill gaps existing today in the industry.

This participant handbook is dedicated to the aspiring youth who desire to achieve special skills which will be a lifelong asset for their future endeavours.

About this book

Welcome to the “Layerman(Fabric)” training programme. This PHB is designed to provide participants with comprehensive knowledge about the principles and practices of maintaining security, ensuring vigilance, and safeguarding premises. It also focuses on planning, executing, and managing routine security tasks, conducting inspections, and verifying the integrity of individuals and documents as part of field operations.

This Participant Handbook is designed based on the Qualification Pack (QP) under the National Skill Qualification framework (NSQF) and it comprises of the following National Occupational Standards (NOS)/ topics and additional topics.

1. AMH/N0201: Carry out fabric laying operation
2. AMH/N0103: Maintain health, safety and secure work place with Gender and PWD Sensitization
3. AMH/N0104: Comply with industry, regulatory, organizational requirements and Greening of Job NOS
4. AMH/N0106: Maintain work area and tools
5. DGT/VSQ/N0101:Employability Skills

Symbols Used



Key Learning
Outcomes



Unit
Objectives



Exercise



Tips



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1. Introduction

Unit 1.1 - Indian Apparel Industry and Fabric Layering



Key Learning Outcomes

By the end of this module, the participants will be able to:

1. Describe the size and scope of the apparel industry.
2. Describe various employment opportunities for a 'Layerman (Fabric)' in the apparel industry.
3. Describe the apparel production process and the role that the 'Layerman (Fabric)' plays in the process.
4. Explain roles and responsibilities of a 'Layerman (Fabric)'.

UNIT 1.1: Indian Apparel Industry and Fabric Layering

Unit Objectives

By the end of this unit, the participants will be able to:

1. Recall the key features of the apparel industry in India.
2. List the key statistics that define the size of the Indian apparel industry.
3. Explain the factors that drive the growth of the apparel industry in India.
4. Compare the various laws, schemes, and government initiatives related to the Apparel Industry in India.
5. Describe the sequence of steps involved in the apparel production process.
6. Outline the specific tasks and duties of a Layerman (fabric) in the apparel production process.
7. Identify the various employment opportunities available to a Layerman (fabric) in the apparel industry.

1.1.1 Overview of the Apparel Industry in India

Ancient skills and cultural traditions make the Indian garment sector one of the most unique in the world. Apart from their distinct cultures and languages, the various Indian states also have a range of fashions. The variety of textiles used in Indian clothing is huge, ranging from the warm Pashmina wool to the exquisite embroidery of the Chikankari in the north, to the vibrant and colourful Bandhani in the west and the majestic Chanderi in the geographical centre, to the hand-woven Sambalpuri and block-printed Kalamkari in the south.

Apparel refers to clothing and garments that people wear for functional, cultural, and aesthetic purposes. It encompasses a wide variety of products, including casual wear, formal attire, ethnic wear, sportswear, and luxury fashion. Apparel is more than just a necessity; it reflects personal style, social identity, and cultural traditions.

The apparel industry is a vast and dynamic sector that involves the design, production, distribution, and marketing of clothing. The industry involves various stakeholders, including:



Fig. 1.1.1: Stakeholders of apparel industry

This industry is influenced by changing fashion trends, consumer preferences, technological advancements, and economic factors. The apparel industry involves a series of interconnected activities, including:



Fig. 1.1.2: Interconnected activities within the apparel industry

India's apparel industry is one of the largest in the world, playing a crucial role in the country's economy by contributing significantly to employment, exports, and GDP. With a rich textile heritage, a growing middle class, and an expanding retail market, India has positioned itself as a key global player in apparel manufacturing and fashion retailing.

The Indian apparel market, valued at five trillion US dollars according to a survey by Statista Research Service, is not only the largest in the world, but it is also one of the biggest exporters of clothing. The nation's apparel industry accommodates a broad spectrum of tastes, from western clothing to ethnic clothing. One of the top producers of cotton and jute in the world is India. India is the world's second-largest producer of silk and the source of 95% of the world's hand-woven cloth. A significant portion of the vastly diverse Indian textile and clothing business is composed of traditional handloom, handicraft, wool, and silk products, as well as the organised textile industry. The primary hubs and manufacturing centres for the clothing industry are the states of Andhra Pradesh, Telangana, and Haryana. It is also the second largest employer after agriculture, providing direct employment to 45 million people and 100 million people in the allied sector according to IBEF (Indian Brand Equity Foundation). Andhra Pradesh, Telangana, Haryana, Jharkhand, and Gujarat are the top textile and clothing manufacturing states in India.

Images	Segments	Features
	Ready-to-Wear (RTW) Apparel	The RTW segment is the largest and fastest-growing segment in the Indian apparel industry. It includes clothing for men, women, and children, such as casual wear, formal wear, and sportswear.
	Ethnic Wear	Ethnic wear is a significant segment in the Indian apparel industry, driven by the country's rich cultural heritage. This segment includes traditional clothing such as sarees, salwar kameez, lehengas, and kurtas.

Images	Segments	Features
	Activewear	The activewear segment is growing rapidly in India, driven by the increasing awareness of health and fitness. This segment includes clothing for yoga, running, gym wear, and other sports activities.
 	Innerwear and Loungewear	The innerwear and loungewear segment is also growing in India, driven by the increasing demand for comfortable and stylish clothing for daily wear.
	Luxury and Premium Apparel	The luxury and premium apparel segment is a niche but growing market in India, driven by the increasing disposable income of the affluent population.
	Children's Wear	The children's wear segment is a significant market in India, driven by the large population of children in the country.

Images	Segments	Features
	Uniforms and Work-wear	The uniforms and work-wear segment is a growing market in India, driven by the increasing demand for uniforms in industries such as healthcare, hospitality, and manufacturing.
	Eco-Friendly and Sustainable Apparel	The eco-friendly and sustainable apparel segment is a growing trend in India, driven by the increasing awareness of environmental sustainability and social responsibility such as Kala cotton, banana fiber, bamboo fiber, soybean fiber.

Table 1.1.1: Key Segments of the Apparel Industry in India

Challenges in the Apparel Industry

Some of the challenges identified as major barriers to Indian apparel export growth are the below –

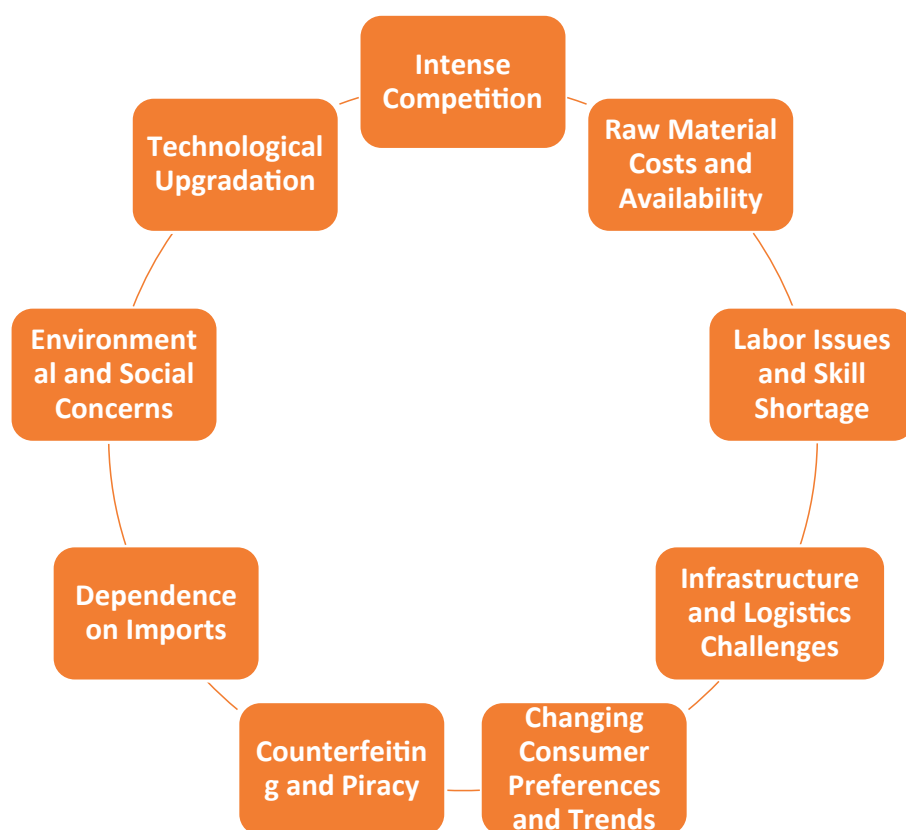


Fig. 1.1.3: Challenges in the apparel industry

- **Infrastructure and Supply Chain Bottlenecks:** India's apparel industry relies on a fragmented supply chain, with textile production, dyeing, stitching, and finishing often scattered across multiple states. This lack of streamlined logistics leads to inefficiencies, delays, and higher costs. The transportation of raw materials from cotton-producing states like Gujarat to textile hubs such as Tiruppur and Ludhiana often faces logistical delays due to poor road networks and regulatory checkpoints.
- **Intense Global Competition:** The Indian apparel industry competes with countries like China, Bangladesh, and Vietnam, which offer lower production costs and faster turnaround times due to advanced manufacturing techniques and government incentives. Bangladesh's low-cost garment manufacturing and preferential trade agreements with Western countries have made it a major exporter, often undercutting India's pricing in the global market.
- **Rising Production Costs and Labour Issues:** Labour-intensive apparel manufacturing is becoming expensive due to increasing wages, labour shortages, and compliance with stricter worker protection laws. Additionally, unorganised labour and a lack of formal training impact efficiency. Many garment factories in India have faced criticism for poor working conditions, low wages, and long working hours. This has led to labour unrest, strikes, and negative publicity, impacting the industry's reputation and competitiveness.
- **Limited Adoption of Advanced Technology:** While leading brands and manufacturers have embraced automation, a significant portion of India's apparel sector, especially small and medium enterprises (SMEs), still relies on traditional methods. High capital investment requirements deter widespread adoption of AI, robotics, and blockchain technology. While large firms like Arvind Limited use automated fabric cutting and digital printing, many local textile mills still rely on manual looms and conventional dyeing processes, reducing efficiency.
- **Environmental Concerns and Sustainability Issues:** Textile production is one of the most water- and energy-intensive industries. Pollution from dyeing units and excessive water usage for cotton farming pose severe environmental challenges, forcing brands to rethink sustainability strategies. The Noyyal River in Tamil Nadu, polluted by textile dyeing units in Tiruppur, has led to government crackdowns, forcing industries to adopt wastewater treatment plants, adding to operational costs.
- **Changing Consumer Preferences and Fast Fashion Impact:** With the rise of fast fashion, Indian consumers are demanding trendy, affordable apparel at a rapid pace. This puts pressure on local brands to keep up while maintaining quality and ethical production. International brands like H&M and Zara have captured a significant market share in India by offering trendy collections every few weeks, challenging homegrown brands like FabIndia and Manyavar.
- **Counterfeit Products and Brand Imitation:** The Indian market faces challenges with counterfeit goods and unauthorised replicas of branded apparel, affecting both high-end and budget segments. This reduces consumer trust and revenue for legitimate brands. Markets like Delhi's Palika Bazaar and Mumbai's Linking Road are flooded with fake versions of top brands like Nike, Adidas, and Levi's, harming both brand reputation and legal market sales.

1.1.2 Size of the Indian Apparel Industry

The Indian apparel industry has emerged as a significant sector in the country's economy, driven by a large and growing domestic market, as well as a substantial export potential. With a rich textile heritage and a strong manufacturing base, India has become a major player in the global apparel market. The industry has witnessed rapid growth over the past few years, driven by increasing demand from domestic and international markets, favourable government policies, and investments in technology and infrastructure.

According to a report made by Statista, as of the financial year 2023, the market size was estimated at ₹7.6 trillion. Projections indicate that by 2027, this figure could surpass ₹10 trillion, underscoring the sector's robust expansion.

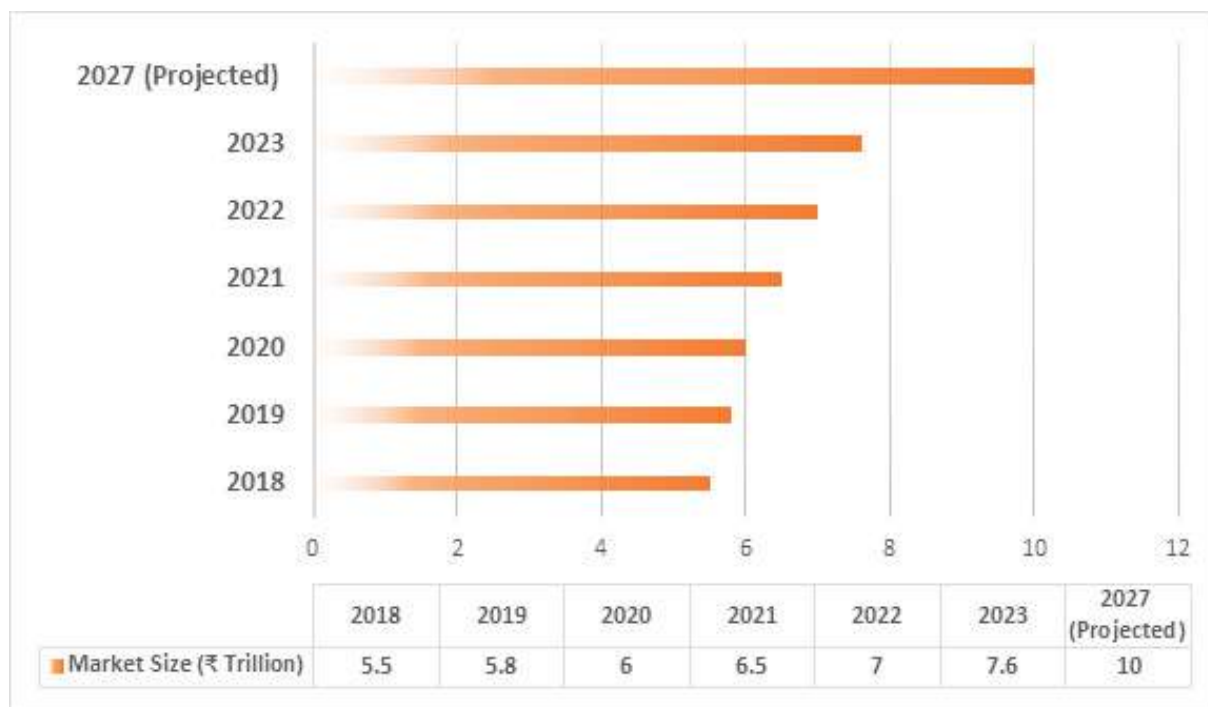


Table 1.1.4: Market size of the Indian apparel industry (₹ Trillion)

Top Export Destinations

India exports textile and clothing items, including handlooms and handicrafts, to over 100 nations worldwide. The United States, Bangladesh, the United Kingdom, the United Arab Emirates, Germany, and other nations are among India's top export markets for textiles and clothing items. Approximately one-fourth of India's total exports are imported by the USA, making it the biggest importer of all, according to the Ministry of Commerce and Industry.

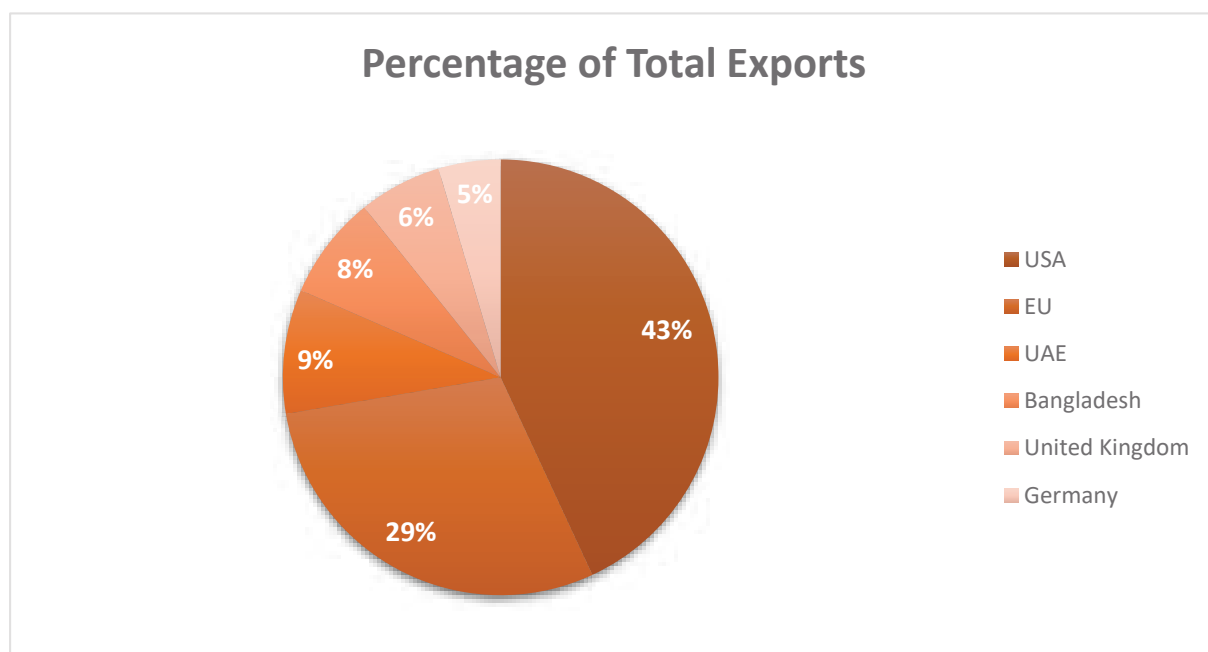


Fig. 1.1.5: Country-wise export share (2023-2024)

The Indian apparel market is diverse, catering to various demographics and preferences. Key segments include:

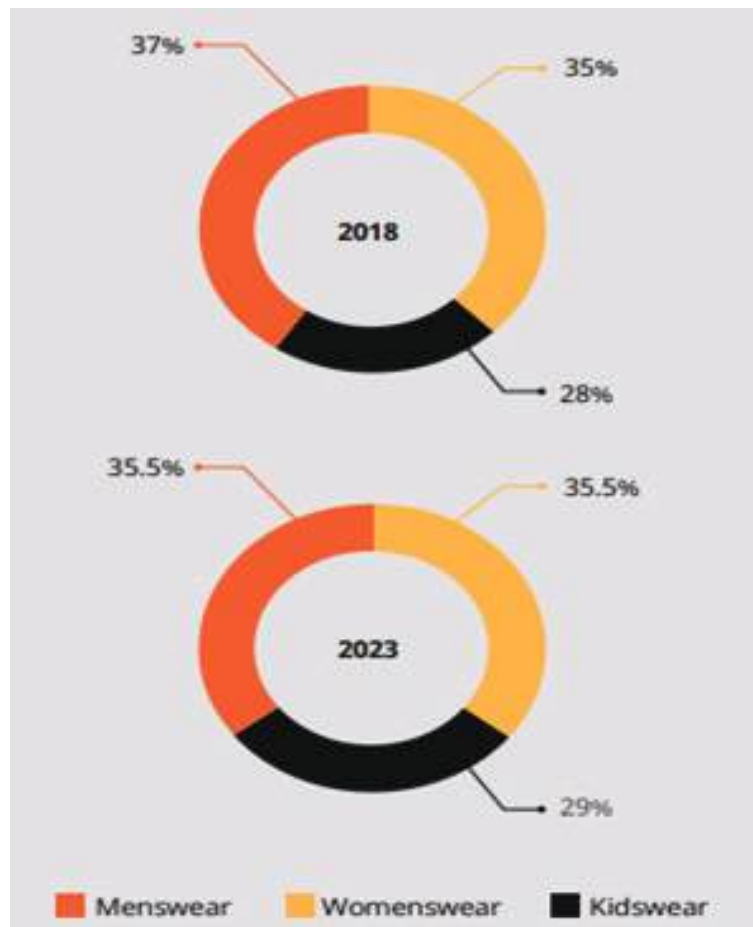
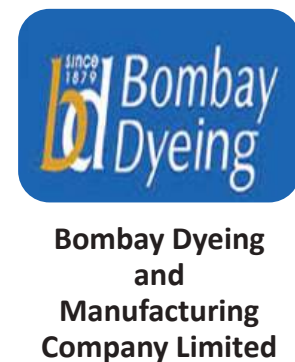


Fig. 1.1.6: Indian apparel market share by segment

Top 10 apparel exporters in India

Here is the list of the top 10 garment export companies in India:





Loyal Group



Sutlej Textiles



Shahi Exports



Page Industries



KPR Mills



Welspun India

Fig. 1.1.7: Top 10 apparel export companies in India

1.1.3 Scope and Growth Drivers of the Apparel Industry in India

The apparel industry in India is a cornerstone of the country's economy, contributing significantly to GDP, employment, and exports. With rapid industrialisation, an expanding middle class, and evolving consumer preferences, the sector is poised for exponential growth. Below are the key growth drivers shaping the future of India's apparel industry:

- 1. Rising Disposable Income and Changing Consumer Behaviour:** India's economic trajectory has been marked by steady GDP growth, leading to increased disposable incomes across urban and semi-urban areas. As per economic reports, per capita income in India has been rising, empowering consumers with greater purchasing power.



Fig. 1.1.8: Rising disposable income and changing consumer behaviour

- 2. Urbanisation and Changing Lifestyles:** India is undergoing rapid urbanisation, with millions migrating to cities for better employment and lifestyle opportunities. As urban centres grow, the demand for formal, semi-formal, and occasion wear increases significantly.

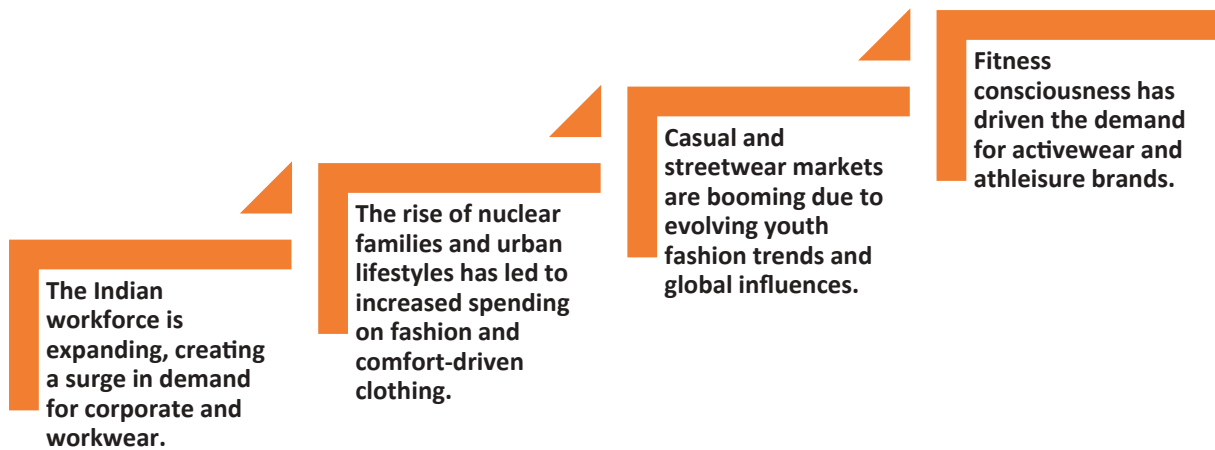


Fig. 1.1.9: Urbanisation and changing lifestyles in India

- 3. E-Commerce and Digital Transformation:** India's e-commerce boom is one of the most significant drivers of the apparel industry's growth. With the proliferation of smartphones and affordable internet access, online shopping has become mainstream, even in smaller towns and rural areas.

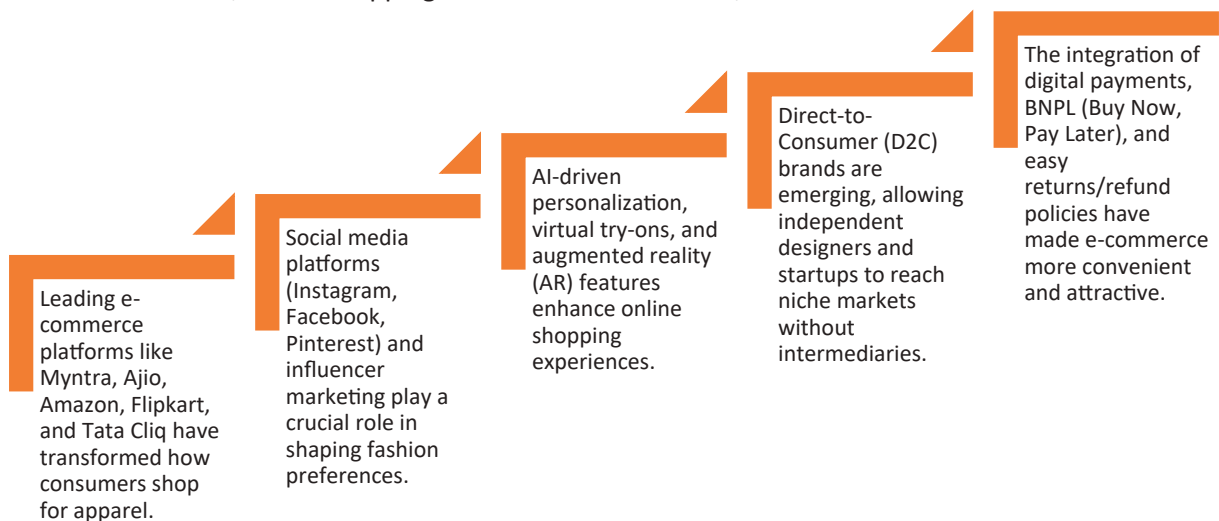


Fig. 1.1.10: E-Commerce and digital transformation

- 4. Foreign Direct Investment (FDI) and Policy Support:** The Indian government has liberalised policies to attract Foreign Direct Investment (FDI) in the apparel sector, further boosting the industry's growth.

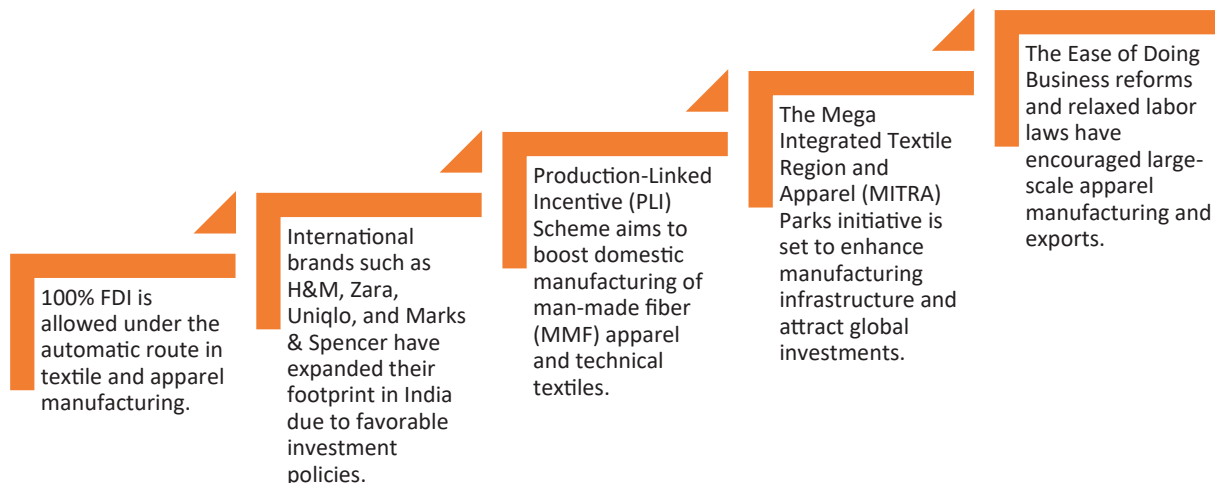


Fig. 1.1.11: Foreign Direct Investment (FDI) in the apparel sector

5. Sustainability and Growing Conscious Fashion Trends: Sustainability is no longer just an industry trend but a necessity, and Indian consumers are becoming more eco-conscious.

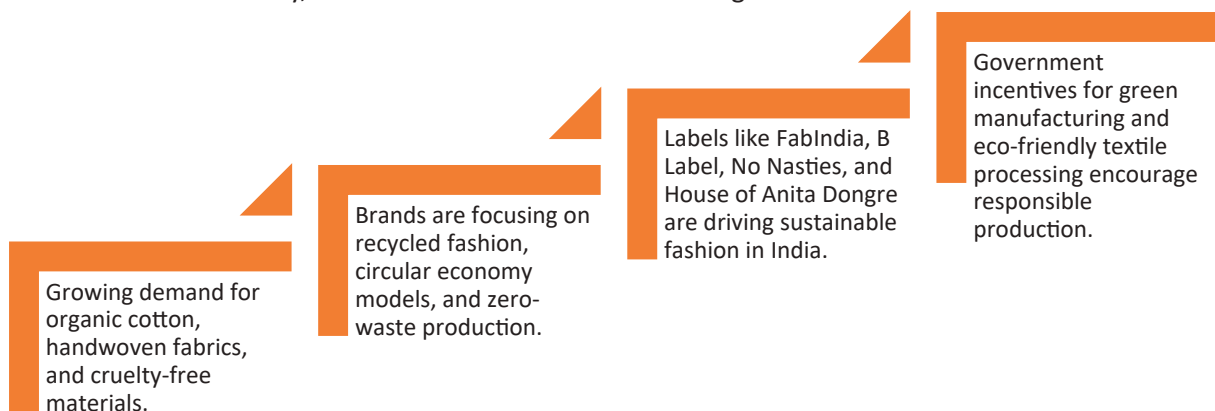


Fig. 1.1.12: Sustainability and growing conscious fashion trends

6. Expansion of Organised Retail and Brand Penetration: The shift from unorganised to organised retail is reshaping the apparel landscape:

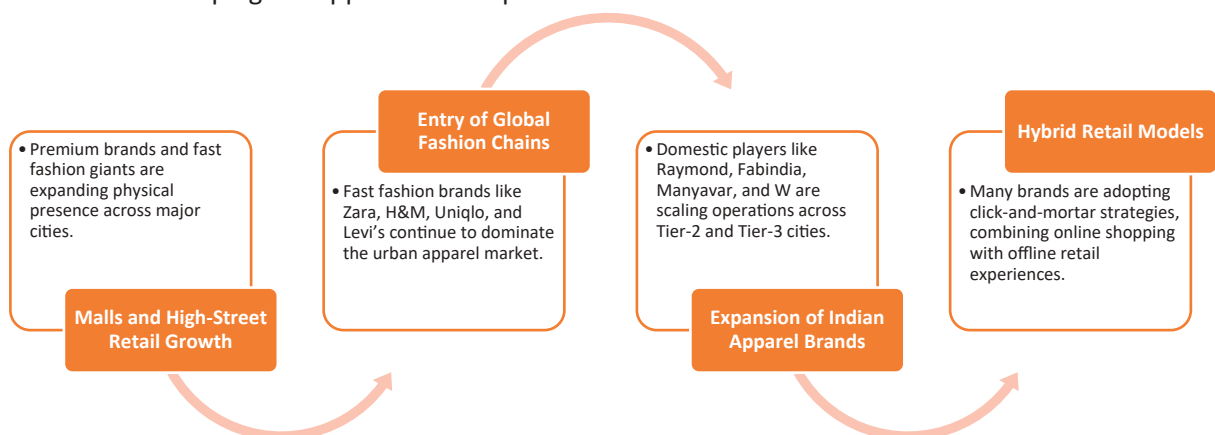


Fig. 1.1.13: Expansion of organised retail and brand penetration

- 7. Global Recognition and Export Potential:** India has emerged as one of the world's leading exporters of textiles and apparel. The country's reputation for high-quality craftsmanship, traditional weaving techniques, and affordable manufacturing costs makes it a preferred destination for global sourcing.



Fig. 1.1.14: Export potential of India

1.1.4 Laws, Schemes, and Government Initiatives Related to the Apparel Industry

The Indian government has introduced several laws, schemes, and initiatives to support the apparel and textile industry. These initiatives aim to promote growth, enhance competitiveness, boost exports, and ensure sustainability. The table below provides a detailed overview:

Category	Law / Scheme / Initiative	Features
Labour & Employment Laws	Factories Act, 1948	Regulates working conditions, safety, and welfare of workers in textile and apparel factories.
	Minimum Wages Act, 1948	Ensures fair wages for workers, including those in garment factories.
	The Employees' Provident Fund (EPF) Act, 1952	Provides retirement benefits to workers in the textile industry.
	The Payment of Wages Act, 1936	Ensures timely payment of wages in the garment sector.
Export Promotion & Financial Support	Production Linked Incentive (PLI) Scheme for Textiles (2021)	Offers incentives of ₹10,683 crore to boost the production of Man-Made Fibre (MMF) apparel, MMF fabrics, and technical textiles.
	Rebate of State and Central Taxes and Levies (RoSCTL) Scheme	Supports exporters by reimbursing taxes and levies on exported apparel.
	Integrated Processing Development Scheme (IPDS)	Supports the modernisation of textile processing units and promotes eco-friendly manufacturing.

Category	Law / Scheme / Initiative	Features
Infrastructure & Technology Upgradation	Scheme for Integrated Textile Parks (SITP)	Facilitates the development of world-class infrastructure for textile clusters with financial assistance from the government.
	Technology Upgradation Fund Scheme (TUFS)	Provides financial support for modernisation and upgradation of textile and apparel manufacturing units.
	SAMARTH (Scheme for Capacity Building in Textile Sector)	Aims to train youth in the textile industry to enhance skill development and employment opportunities.
Sustainability & Environment Protection	Zero Liquid Discharge (ZLD) Norms	Mandates textile processing units to implement wastewater treatment and reuse systems to reduce pollution.
	Green Textile Initiatives	Encourages the use of sustainable fabrics, organic cotton, and eco-friendly production techniques.
Small & Medium Enterprise (SME) Support	Mudra Loan Scheme	Provides credit support to small textile and garment businesses to expand operations.
	Credit Linked Capital Subsidy Scheme (CLCSS)	Offers subsidies to small and medium textile enterprises for technological upgradation.
Foreign Trade & Investment	Foreign Direct Investment (FDI) Policy	Allows 100% FDI in the textile and apparel sector under the automatic route to attract global investment.
	Mega Investment Textile Parks (MITRA) Scheme	Plans to establish seven mega textile parks with modern infrastructure to promote large-scale manufacturing.
Quality Standards & Certification	BIS Certification for Textiles	Ensures quality standards for textiles and apparel to enhance competitiveness in domestic and international markets.
	Geographical Indications (GI) for Traditional Textiles	Protects the unique identity of region-specific textiles like Banarasi Silk, Pashmina Wool, and Kanjeevaram Sarees.

Table 1.1.2: Laws, schemes, and government initiatives related to the apparel industry

1.1.5 Apparel Production Process

The apparel industry is one of the most dynamic and labour-intensive sectors, where precision and efficiency play a crucial role in ensuring quality output. From design conceptualisation to final stitching, multiple processes contribute to the seamless production of garments. India's apparel production sector is diverse, ranging from handloom and cottage industries to large-scale, automated garment factories. States like Tamil Nadu, Maharashtra, Gujarat, West Bengal, and Punjab are key manufacturing hubs, with cities such as Tiruppur, Ludhiana, Surat, and Bengaluru serving as major apparel centres.

What is the Apparel Production Process?

The apparel production process is a structured workflow that transforms fabric into finished garments through a series of well-defined stages. The process follows strict quality control measures, ensuring that garments meet aesthetic and functional standards.

The apparel production process in India follows eight major stages, from design conceptualisation to final packaging. This intricate process requires skilled professionals at each level to ensure that garments meet quality, sustainability, and international compliance standards. Among these, fabric laying is a critical step that determines the accuracy of pattern cutting and ultimately influences the final garment quality. This role is played by a layerman (fabric)—a professional responsible for accurately laying fabric before cutting, ensuring minimal wastage, and maintaining fabric quality. Despite being a behind-the-scenes role, the layerman's expertise significantly impacts efficiency and cost-effectiveness in apparel production.

According to a study published in the *Tanzanian Journal of Science*, the success of apparel production relies on precision at every stage, particularly in fabric laying and cutting, where material optimisation can reduce costs by 10-15%. This highlights the significance of layermen, whose expertise in fabric handling directly impacts the final garment's quality, durability, and design accuracy.

Who is a Layerman (Fabric)?

A Layerman (Fabric) is a skilled worker in the textile and apparel industry responsible for spreading and arranging fabric layers systematically before the cutting process. This role requires precision, as improper fabric laying can lead to distortions, fabric wastage, and defects in the final garments.

Layermen are typically employed in garment manufacturing units, textile mills, and export houses where large-scale apparel production takes place. They work closely with pattern cutters, quality controllers, and production supervisors to ensure that the fabric is laid according to specifications.

They typically work as a team, with each person involved in performing various roles in the process. One may be involved in layering and holding the fabric; another may perform the crucial task of cutting the fabric; another perhaps in running the machine, which is used to help cut the fabric according to the desired pattern, etc.

Step-by-Step Process of Apparel Production

Stage	Description	Role of Layerman in Production
Design & Development	Fashion designers and manufacturers create garment designs based on trends, seasons, and buyer requirements.	Ensures fabric meets industry standards.

Stage	Description	Role of Layerman in Production
Sourcing of Fabric & Materials	Fabrics, trims, buttons, zippers, and accessories are sourced from mills or suppliers.	Prepares fabric for cutting and minimises waste.
Fabric Inspection & Testing	Fabrics undergo quality checks for defects, shrinkage, colourfastness, and GSM (gram per square meter).	Ensures fabric is used economically.
Fabric Spreading & Lay Planning	The Layerman (Fabric) spreads the fabric in layers to prepare for cutting, following the marker layout.	Converts fabric into garment pieces.
Cutting	Using manual cutting, laser, or automated cutting machines, fabric is cut into garment components based on pattern layouts.	Assembles different garment components.
Stitching / Sewing	Garment pieces are stitched together using industrial sewing machines.	Ensures garments meet quality standards.
Finishing & Quality Inspection	Garments are ironed, checked for defects, and trimmed for excess threads.	Ready for retail or export.
Packaging & Dispatch	Final garments are packed, labelled, and shipped to stores or buyers.	Ensures fabric meets industry standards.

Table. 1.1.3: Step-by-step process of apparel production

1.1.6 Roles and Responsibilities of a Layerman (Fabric)

India's apparel industry is one of the largest in the world, contributing significantly to employment and economic growth. With its deep-rooted textile heritage and a rapidly modernising production landscape, the sector caters to both domestic demand and international exports. From the bustling garment hubs of Tiruppur, Ludhiana, Surat, and Bengaluru to large-scale factories supplying global brands, India's apparel industry is a dynamic blend of traditional craftsmanship and modern automation.

Behind every finished garment lies a meticulous production process involving multiple skilled professionals. Among them, the Layerman (Fabric) plays a crucial role in ensuring fabric is precisely prepared for cutting, a step that directly impacts garment quality and material utilisation.

The key responsibilities of a Layerman (Fabric) differ from company to company, but, in a gist, they include the following steps:

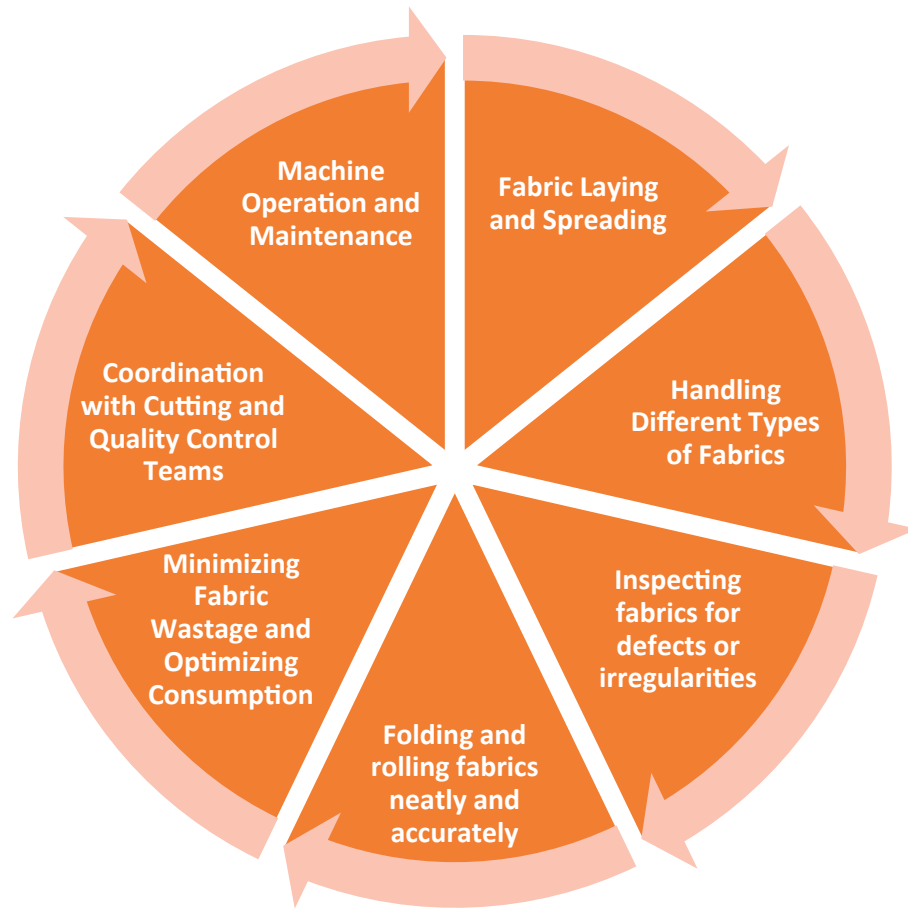


Fig. 1.1.5: Responsibilities of a Layerman (Fabric)

1. **Production Planning:** The first step involves the layerman collecting the fabric and examining what fabric has been given before laying it on the cutting table and then deciding on the cost involved in the process.



Fig. 1.1.16: Fabric being laid on the cutting table

2. **Fabric Laying and Spreading:** Fabric laying is the most critical function performed by a layerman. The accuracy of the garment production process starts here, and any mistake in fabric spreading can lead to misalignment, fabric wastage, and faulty cutting, resulting in defects in the final product.

Steps a layerman follows when laying the fabric:



Fig. 1.1.17: Steps when laying the fabric

Steps to follow when laying the fabric in various situations:

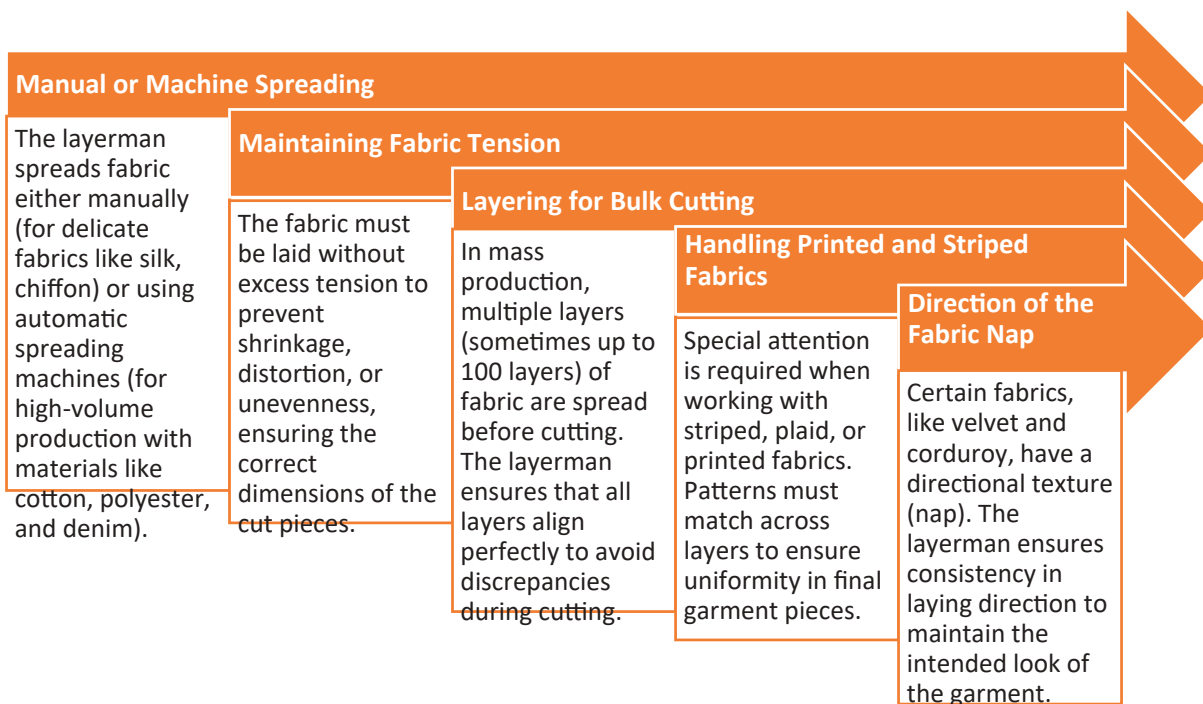


Fig. 1.1.18: Steps to follow when laying the fabric in various situations



Fig. 1.1.19: Fabric laying and spreading on an automatic machine

The layerman proceeds with the laying of the fabric only once the design, cost and quality of the fabric has been determined. All of this is decided by the client or work order given to the layerman and his/her team.

- 3. Handling Different Types of Fabrics:** Every fabric type has unique characteristics that influence how it should be laid before cutting. The layerman must have in-depth knowledge of fabric behaviour to prevent issues during the manufacturing process.

Steps a layerman follows when handling different types of fabrics:



Fig. 1.1.20: Steps when handling different types of fabrics

Steps to follow when handling different types of fabrics in various situations:

Rigid Fabrics (e.g., denim, canvas, twill)	Require strong handling and precise alignment, as these fabrics do not stretch easily.
Stretch Fabrics (e.g., lycra, jersey, spandex)	Must be handled carefully to avoid overstretching, which can lead to size distortions when cut. The layerman must use relaxation techniques before spreading stretchable fabrics.
Sheer & Delicate Fabrics (e.g., silk, organza, chiffon)	Need special techniques such as using paper layers between fabric to prevent slippage.
Fabrics with Special Coatings (e.g., waterproof, fire-retardant fabrics)	Require extra caution in handling to maintain the coating integrity.

Fig. 1.1.21: Steps to follow when handling different types of fabrics in various situations

- 4. Minimising Fabric Wastage and Optimising Consumption:** One of the key responsibilities of a layerman is to ensure minimum fabric wastage while laying out fabric for cutting. Optimising fabric usage can save substantial costs in large-scale garment production.

Steps a layerman follows to minimising fabric wastage:



Fig. 1.1.22: Steps a layerman follows to minimising fabric wastage

Steps to follow when minimising fabric wastage in various situations:

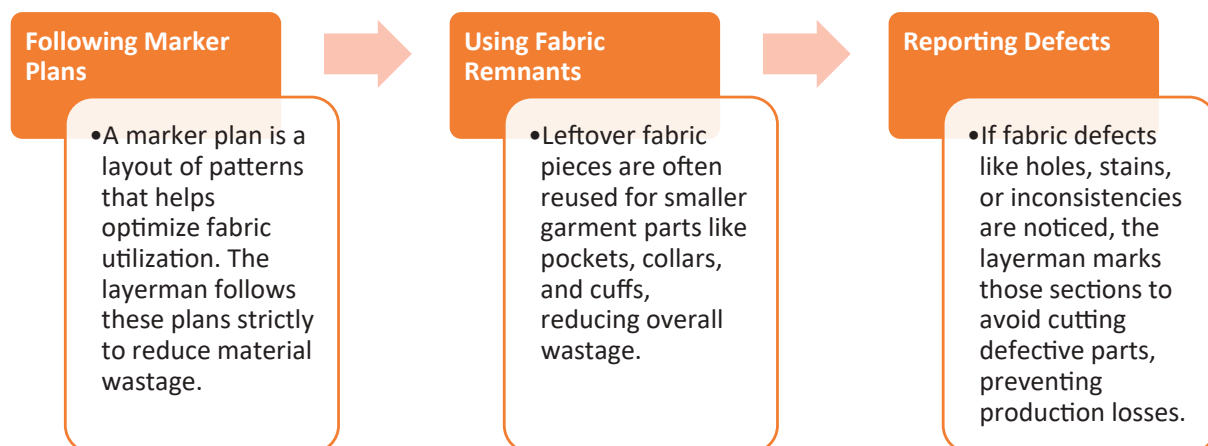


Fig. 1.1.23: Steps to follow when minimising fabric wastage in various situations

- 5. Marker Layout:** One of the most important steps in achieving fabric utilisation and cutting efficiency is marker layout, a strategic arrangement of pattern pieces on the fabric to maximise fabric usage and minimise material wastage. A marker layout is a planned arrangement of pattern pieces on fabric that determines how the fabric will be cut to produce apparel in the most economical and efficient manner. The marker layout is printed on paper or digitally projected onto fabric and serves as a guide for cutting operators in apparel manufacturing. It is designed to ensure:

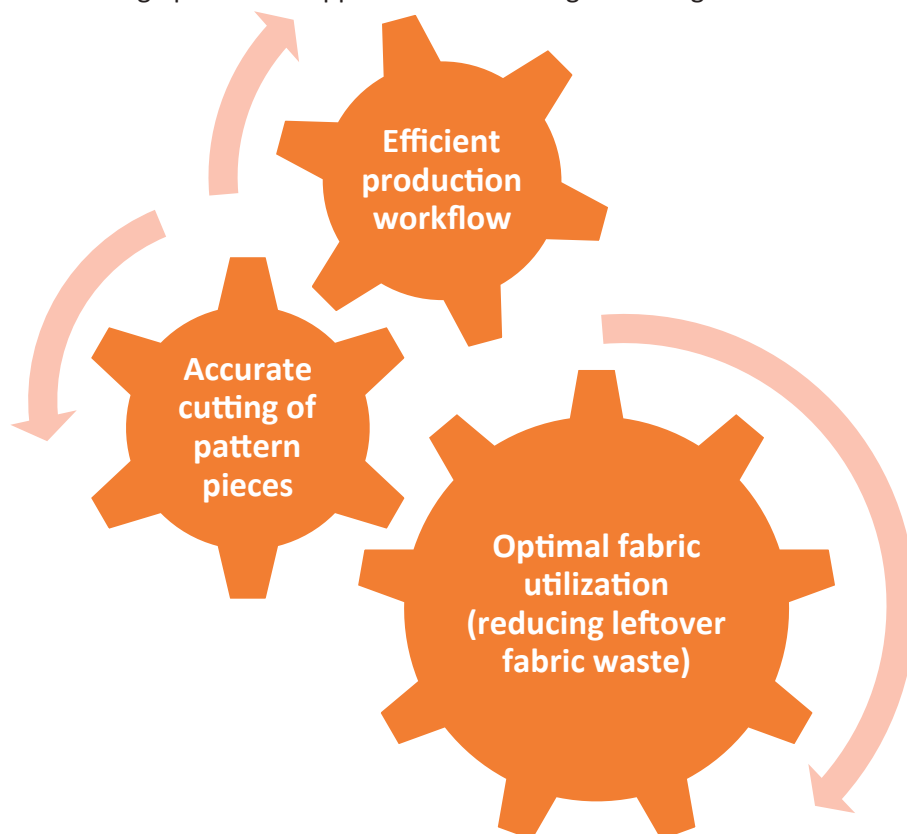


Fig. 1.1.24: Importance of marker layout



Fig. 1.1.25: Marker for fabric

Types of Marker Layouts

Type	Description	Best For
Open Marker	Pattern pieces are arranged without doubling the fabric, laid out as a single layer	One-way prints, fabrics with nap or direction (e.g., velvet, corduroy)
Closed Marker	Fabric is folded, and pattern pieces are placed on the double layer	Symmetric designs, bulk production (e.g., T-shirts, uniform production)
Mixed Marker	Combines both single-layer and double-layer placements	Complex garments with both symmetric and directional patterns
Computerised Marker	Automated software arranges pattern pieces to maximise efficiency	Large-scale production, minimising waste with AI-based precision

Table 1.1.4: Types of Marker Layouts

- 6. Coordination with Cutting and Quality Control Teams:** The layerman at this step sees to it that the quality of the fabric is good enough to go ahead as this step decides on the quality of layering which will be done. The quality must be satisfactory so that the layerman can start cutting the fabric. Cutting the fabric depends on this crucial step.

Steps a layerman follows to ensure coordination with other key departments and quality:

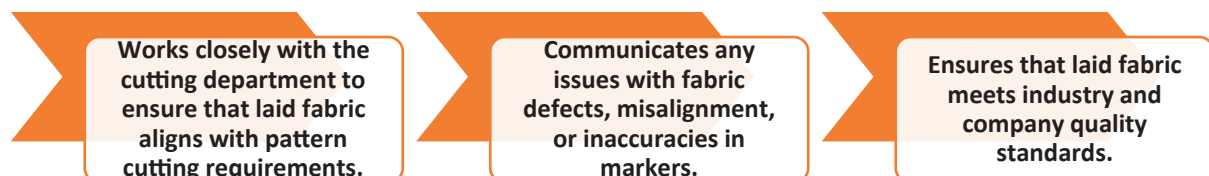


Fig. 1.1.26: Steps a layerman follows to ensure coordination with other key departments and quality

Steps to follow when ensuring coordination with other key departments and quality in various situations:

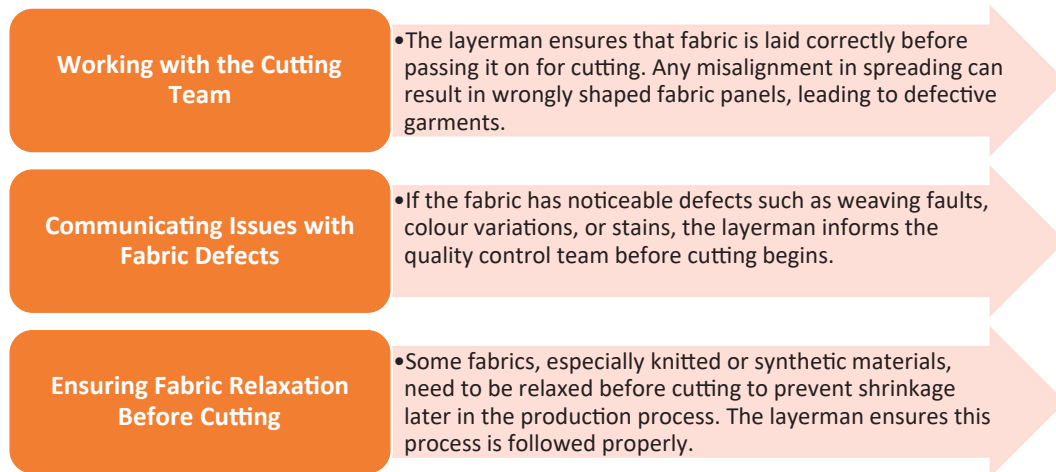


Fig. 1.1.27: Steps to follow when ensuring coordination with other key departments and quality in various situations

7. Cutting and Machine Operation and Maintenance: Finally, at this step, the layerman cuts the fabric. This can be done manually, wherein two helpers hold the fabric and the layerman cuts through it based on what design has been given to him/her.

Another way is through a fabric cutting or spreading machine in which the fabric is just placed in the machine, and the machine cuts it accordingly.



Fig. 1.1.28: Automatic fabric spreading machine

Steps a layerman must follow when using machines to cut fabric:



Fig. 1.1.29: Steps a layerman must follow when using machines to cut fabric

Modern garment factories use advanced spreading and laying machines to improve efficiency. A layerman is responsible for operating and maintaining these machines.

Steps a layerman must follow when operating and maintaining these machines:

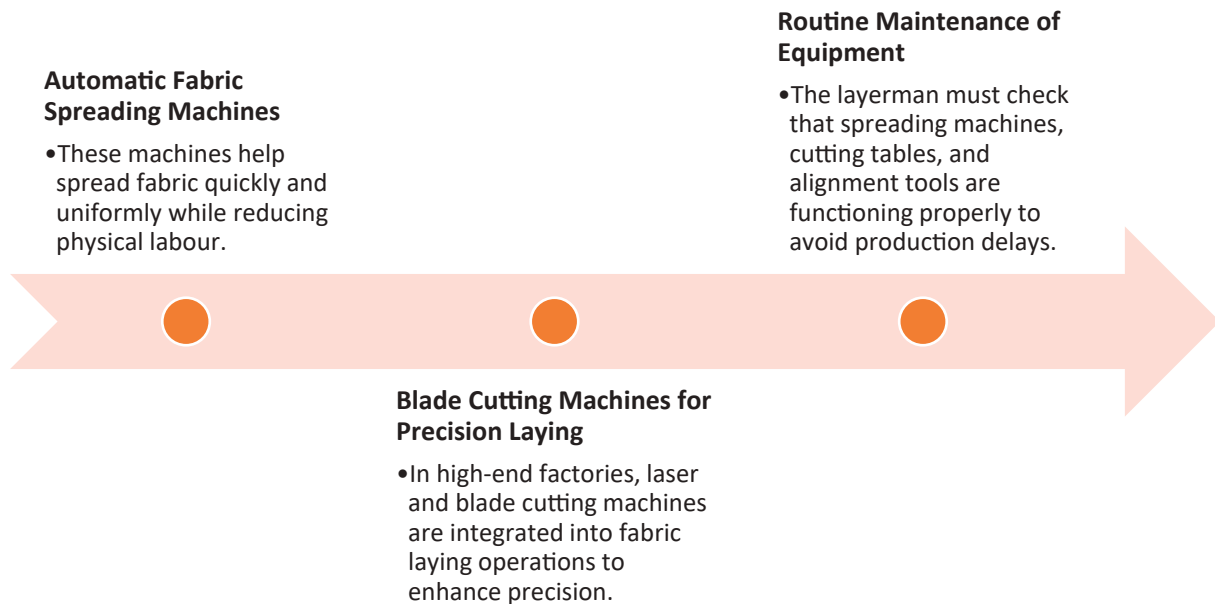


Fig. 1.1.30: Steps a layerman must follow when operating and maintaining these machines

- 8. Placing Numbering Stickers:** After the whole laying and cutting process, numbering stickers are used to ensure correct fabric alignment, prevent mismatches, and streamline the stitching process. This is particularly important in mass-production units where hundreds of fabric pieces are cut simultaneously and need to be sewn in the correct order.

In India, garment factories use manual and automated techniques for placing numbering stickers on the backside of fabric. The process ensures that all fabric layers remain properly sequenced before proceeding to the stitching and assembly phase.

Step-by-Step Process of Placing Numbering Stickers on Fabric

- **Preparing the Fabric Pieces for Numbering:** Before applying stickers, the fabric pieces are cut using a pre-determined marker layout to ensure maximum efficiency and minimum wastage. Once the fabric layers are spread and cut, the cut pieces are stacked together in the same sequence as they were in the fabric lay. The pieces are then separated according to garment sections, such as front panels, back panels, sleeves, collars, and cuffs.
- **Selecting the Correct Sticker Type:** Factories in India use different types of numbering stickers, depending on the fabric type and production scale.
- **Manual or Automated Sticker Application:** Depending on the production scale, factories in India use either manual or automated methods to apply numbering stickers to fabric.

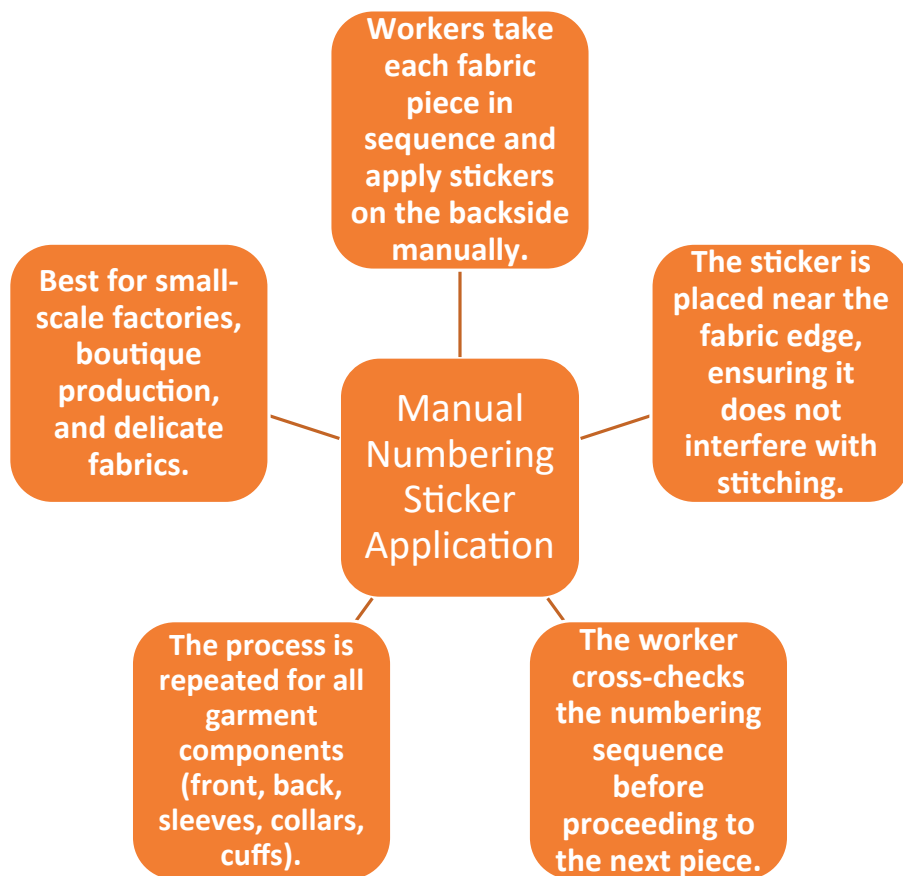


Fig. 1.1.31: Manual numbering sticker application

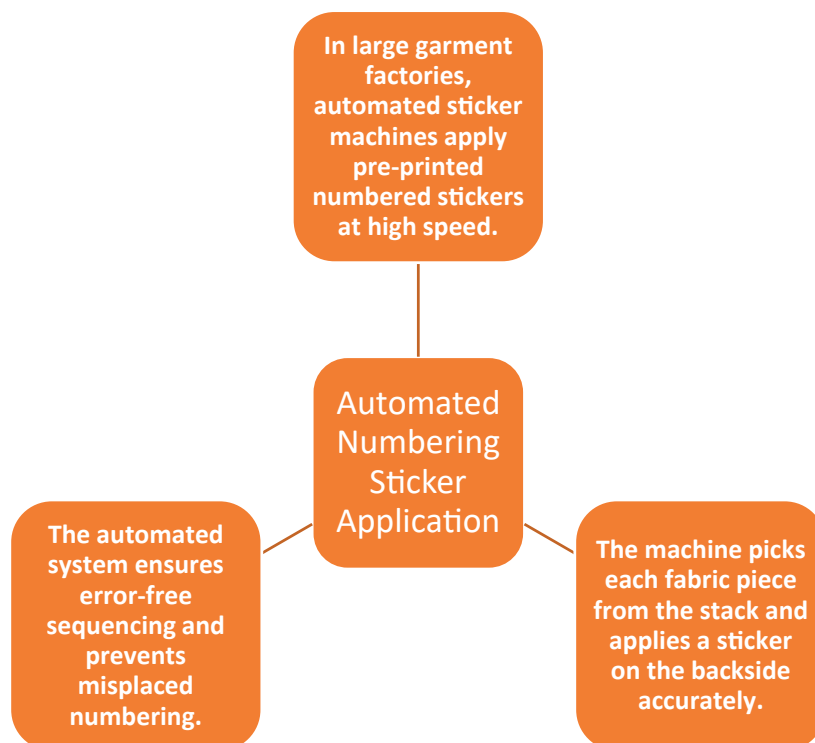


Fig. 1.1.32: Automated numbering sticker application

9. **Bundling:** Lastly, the layerman simply bundles up the fabric, which is then sent to the stitching department. The fabric is rolled in a paper tube roll as paper weighs less. It is then stored in a rack or a warehouse.



Fig. 1.1.33: Bundling of fabric in a paper tube roll



Fig. 1.1.34: Paper tube roll

1.1.7 Employment Opportunities for a Layerman (Fabric)

The apparel industry is a vast and dynamic sector that offers numerous employment opportunities for skilled professionals at various stages of garment production. Among these roles, a layerman (fabric) plays a critical part in ensuring efficiency and accuracy in fabric preparation before cutting and stitching. With the increasing demand for high-quality garments, both in domestic and international markets, the need for experienced layermen has grown significantly. Their expertise in handling fabrics, operating laying machines, and following precision-driven techniques makes them valuable assets in the apparel production process. Additionally, with advancements in automation and sustainable fabric handling, new opportunities are emerging in eco-friendly and high-tech apparel manufacturing.

Various employment opportunities available to layermen (fabric) are as follows:

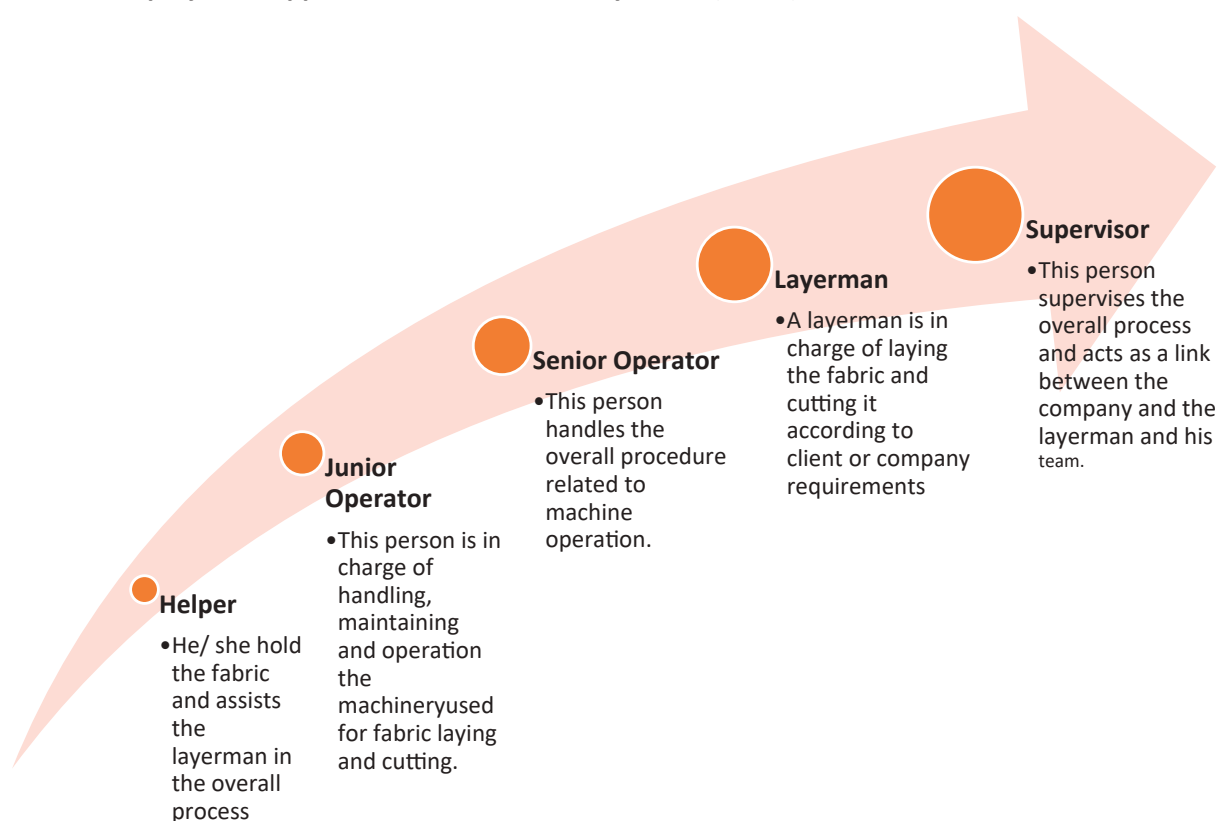


Fig. 1.1.35: Employment opportunities available to layermen (fabric)

Summary

- The apparel industry is a major sector that includes designing, manufacturing, and retailing clothing.
- India has a large apparel industry that contributes significantly to the economy.
- Various factors like fashion trends, technology, and exports drive the growth of the apparel industry.
- Government laws, schemes, and initiatives support the growth of the apparel industry.
- The apparel production process involves designing, fabric laying, cutting, stitching, and finishing.
- A layerman (fabric) is responsible for spreading and aligning fabric layers for cutting.
- A layerman (fabric) must ensure fabric is free from defects and laid properly.
- Accuracy in fabric laying prevents wastage and maintains quality in apparel production.
- A layerman (fabric) works in garment factories, textile mills, and export houses.
- Employment opportunities for a layerman (fabric) exist in large-scale and small-scale apparel units.
- Proper training and experience improve job prospects in the apparel industry.
- The efficiency of a layerman (fabric) affects the speed and quality of garment production.

Exercise

Multiple-choice Question:

1. What is the role of the apparel industry?
 - a. Manufacturing electronics
 - b. Designing, producing, and selling clothing
 - c. Constructing buildings
 - d. Providing financial services
2. What is a key responsibility of a layerman (fabric)?
 - a. Operating sewing machines
 - b. Laying and aligning fabric layers for cutting
 - c. Packing finished garments
 - d. Marketing apparel brands
3. Which factor contributes to the growth of the Indian apparel industry?
 - a. Increase in garment exports
 - b. Decrease in textile production
 - c. Reduction in labour availability
 - d. Less demand for fashion items
4. Where can a layerman (fabric) find job opportunities?
 - a. IT companies
 - b. Hospitals
 - c. Textile mills and garment factories
 - d. Banks
5. Why is accurate fabric laying important?
 - a. It helps in reducing fabric wastage
 - b. It increases production costs
 - c. It delays the cutting process
 - d. It reduces fabric quality

Descriptive Questions:

1. What are the main features of the apparel industry in India?
2. What are the key steps involved in the apparel production process?
3. What are the main responsibilities of a layerman (fabric)?
4. How does government support help in the growth of the apparel industry?
5. What job opportunities are available for a layerman (fabric) in the apparel sector?

Notes

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Scan the QR codes or click on the link to watch the related videos



<https://youtu.be/5dLX8mRAE88>

Apparel Industry in India





2. Carry Out Fabric Laying Operation

Unit 2.1 - Fabric Handling and Inspection

Unit 2.2 - Work Planning and Waste Management

Unit 2.3 - Equipment Handling and Maintenance

Unit 2.4 - Workplace Safety and Organisation



Key Learning Outcomes

By the end of this module, the participants will be able to:

1. Explain the organisation's policies, procedures, and standards for maintaining a clean and hazard-free work area.
2. Interpret the manufacturer's guidelines for setting up, operating, and maintaining equipment safely and efficiently.
3. Analyse various types of fabrics, their laying procedures, and the significance of fabric laying in the production process.
4. Illustrate the procedures for fabric issuance, return, grouping, and storage while ensuring minimal waste.
5. Identify basic fabric faults (e.g., holes, slubs, knots) and apply quality inspection procedures to maintain product standards.
6. Examine the process of marker placement, splicing, end bits, off-cuts, and fabric folding to ensure accuracy in production.
7. Demonstrate the correct setup and operation of a fabric laying-up machine, ensuring proper levelling and handling to prevent damage.
8. Apply work instructions to select, sort, and maintain tools and equipment, ensuring operational efficiency and cleanliness.
9. Evaluate agreed-upon work targets, workflow management, and adherence to production timelines while maintaining quality standards.
10. Assess reporting protocols for work-related risks, defective tools, and procedural queries while ensuring compliance with company policies.

UNIT 2.1: Fabric Handling and Inspection

Unit Objectives

By the end of this unit, the participants will be able to:

1. Describe the types of fabric laying.
2. Discuss various types of fabrics and their respective laying procedures.
3. Illustrate the procedures for issuing and returning fabric to the store.
4. Explain the significance of the fabric laying process.
5. Analyse the procedure for fabric laying and its impact on quality.
6. Identify basic fabric faults such as holes, slubs, and knots.
7. Follow quality procedures to identify basic fabric faults.
8. Examine different types of markers and their uses.
9. Illustrate various fabric grouping procedures.
10. Explain the process of filling in a lay sheet.
11. Discuss the process of splicing, handling end bits, off-cuts, and bowing.
12. Examine fabric folding procedures and their significance.
13. Illustrate basic visual inspection procedures for identifying defects.
14. Explain the concept of laying up allowance and its significance.

2.1.1 Types of Fabric Laying

What is Fabric Layering?

The technique of unwinding big rolls of fabric into long, wide tables so that each piece of clothing may be cut is known as layering. The thickness of the fabric and the intended number of attire determine how many layers there should be. Fabric layering is the process of laying fabric in stacks according to their width and marker length. You can layer by hand or by machine. It is possible to cut up to 200 layers of fabric at once, depending on the fabric and cutting technology. Typically, thinner stacks are used to cut fabrics that are more challenging to handle.



Fig. 2.1.1: Fabric layering in the apparel industry

Types of Lay Plan

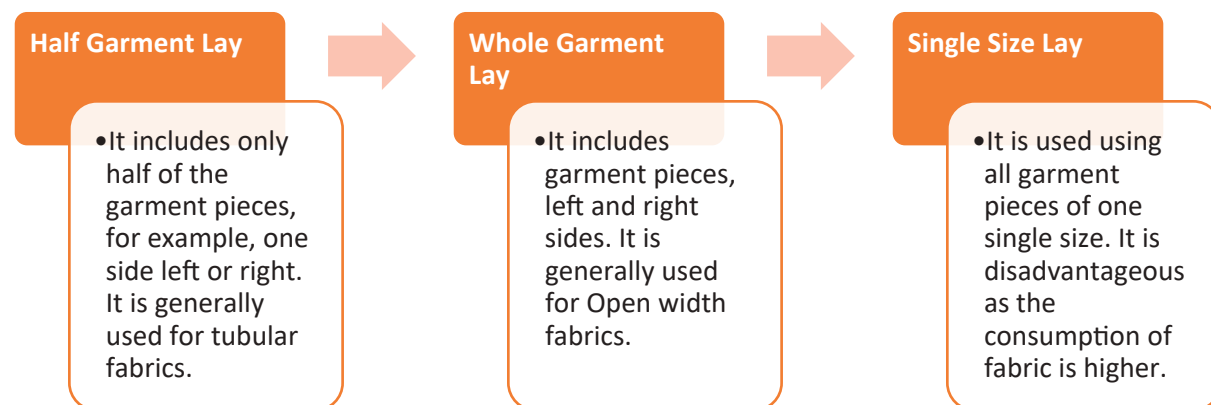


Fig. 2.1.2: Types of lay plan

Types of Lay

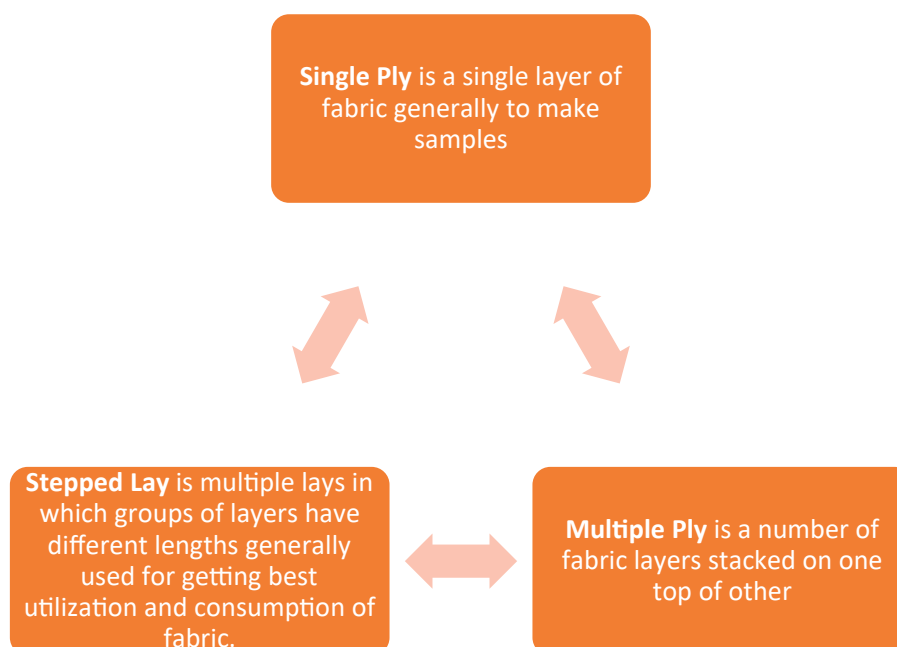


Fig. 2.1.3: Types of lay

Methods of Fabric Layering

The fabric layering process goes through two methods in the garment industry. They are:

1. **Manual Method:** The manual spreading method works well for manufacturing on a small scale. All types of fabrics, especially those with complicated patterns and complex structures, can be spread by hand. Manual cutting is frequently utilised in large-scale production when working with high-cut pile textiles and elaborate patterns. Although technical equipment for manual spreading is less expensive than for automated spreading, productivity is lower.

In order to ensure that every ply in a spread is positioned correctly, two people move the fabric plies across the spreading table while spreading the spread by hand. They search for flaws in the fabric while doing this and decide to cut them out or leave. After the spread, they also cut the fabric and count the number of plies needed. They make sure the pattern is consistent across all of the fabric plies in the spread if the cloth has a complex design.

The characteristics of a fabric, as well as the abilities and experience of the workers, affect the pace and quality of spreading. Special equipment is not required for manual spreading. Although any type of fabric can be laid, the procedure is labour-intensive and requires skill. In small businesses, manual spreading is utilised; in larger businesses, it is used when spreading textiles with various complex patterns is necessary.



Fig. 2.1.4: Manual method of fabric layering

2. Mechanical Method: Machinery is used to lay out some fabric layers. There are two types of mechanical methods. For instance:

- **Semi-Automatic Method:** Both manual and machine labour are used in this process. The cloth is commonly unrolled and guided by machines in semi-automatic mechanical spreading. In the meantime, human operators handle tasks like adjusting fabric layers as needed, eliminating wrinkles, and matching edges.



Fig. 2.1.5: Semi-Automatic method

- **Full-Automatic:** In the apparel sector, a fully automated fabric-spreading machine is a highly automated procedure that is carried out by machinery. Most of the work is done by machines here.



Fig. 2.1.6: Full-Automatic machine

Forms of Layering

Fabric lays are divided into two types:

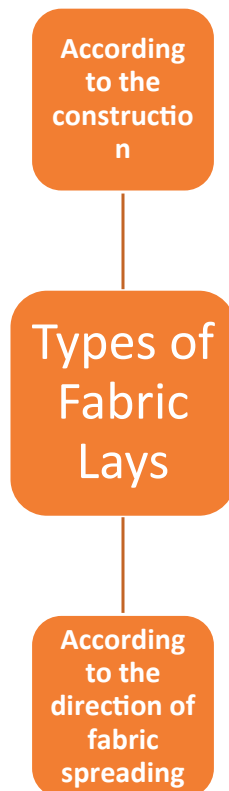


Fig. 2.1.7: Types of fabric lays

1. **According to the construction:** This type of fabric lay is also divided into two types such as straight lays and stepped lays.

- **Straight lay:** Here, each piece of fabric is spread according to marker length, i.e., all plies can be the same length, so one marker is used.

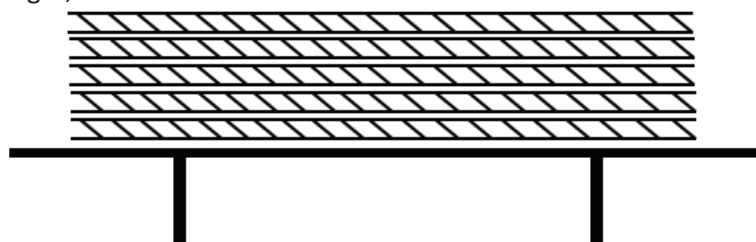


Fig. 2.1.8: Straight lay

- **Stepped lay:** When fabric plies are placed up in varying lengths, a step may appear because they are not spread out according to marker length. Different processes require different kinds of markers. Due to fabric waste and the difficulty of creating it, its use is significantly reduced.

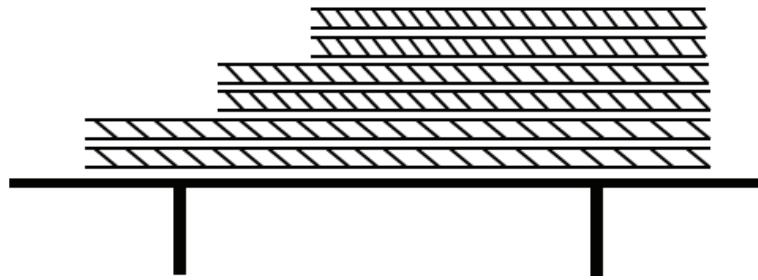


Fig. 2.1.9: Stepped lay

The difference between straight and stepped lay is as follows:

Straight lay	Stepped lay
Each ply is spread according to marker length.	Ply of fabric lay is not spread according to marker length.
Mostly used	Rarely used
Fabric wastage is less.	Fabric wastage is more.
Fabric spreading is simple.	Fabric spreading is difficult.
One marker is used.	Different types of marker are used.

Table 2.1.1: Difference between straight and stepped laying

2. According to the direction of spreading:

- **One way of spreading (Face to underside):** This type of fabric is laid wider and more open. The fabric is always spread here in the same direction. Ideal for fabrics with a nap or directional print, such as velvet or corduroy, where consistency in pattern orientation is crucial.

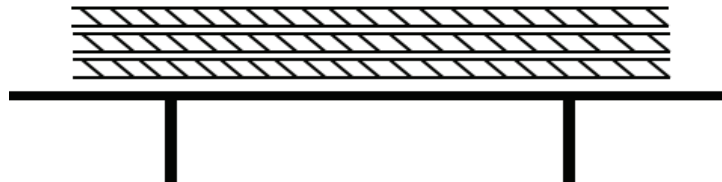


Fig. 2.1.10: One way laying

- **Laying-up in pairs (Face to face):** In this method, fabric plies are laid with their face sides together, ensuring that the right sides of the fabric face each other. Suitable for fabrics with a distinct right and wrong side, facilitating symmetrical cutting.

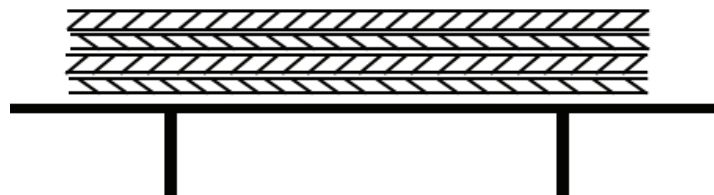


Fig. 2.1.11: Face-to-Face laying

- **Lap (Continuous, Zigzag) lying:** The fabric is laid continuously in a zigzag manner without cutting at the ends, folding back on itself at each turn. It is commonly used for tubular or open-width knit fabrics, allowing for efficient spreading without tension.

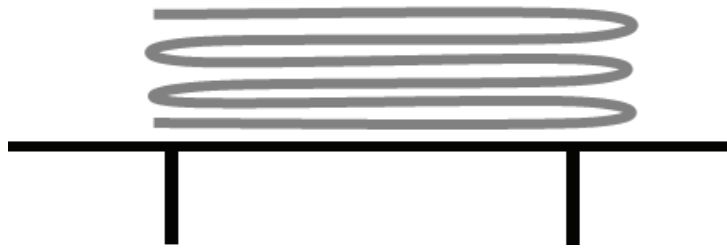


Fig. 2.1.12: Zigzag lay

2.1.2 Laying Procedures of Different Fabrics

The apparel industry is one of the most significant sectors in India, deeply rooted in the country's cultural, economic, and industrial fabric. As one of the largest textile producers in the world, India has a rich legacy of fabric production, ranging from traditional handloom textiles to modern synthetic and blended materials. The diversity of fabrics used in apparel manufacturing is vast, with different materials requiring specific handling techniques to ensure quality and efficiency during the production process.

Classification of Fabrics in India

Fabrics can be broadly classified into three categories:

Category	Fabric Type	Examples	Key Characteristics
Natural Fabrics	 Cotton	Khadi, Muslin, Cambric	Soft, breathable, absorbent, prone to shrinkage
	 Silk	Banarasi, Kanjeevaram, Muga	Luxurious, smooth texture, high tensile strength

Category	Fabric Type	Examples	Key Characteristics
	 Wool	Pashmina, Cashmere, Tweed	Warm, elastic, moisture-wicking
	 Linen	Chanderi Linen, Flax Linen	Crisp texture, lightweight, breathable
	 Jute	Jute Blends, Gunny Cloth	Coarse, strong, biodegradable
Synthetic Fabrics	 Polyester	Sportswear, Uniforms	Durable, wrinkle-resistant, low moisture absorption

Category	Fabric Type	Examples	Key Characteristics
	 Nylon	Activewear, Luggage Fabrics	Strong, stretchable, lightweight
	 Acrylic	Artificial wool, Sweaters	Soft, warm, retains shape
	 Rayon	Artificial Silk, Viscose	Smooth, semi-synthetic, drapable
Blended Fabrics	 Poly-Cotton	Readymade garments, Sarees	Combines durability of polyester with softness of cotton

Category	Fabric Type	Examples	Key Characteristics
	 Wool-Silk Blend	Luxury Suits, Shawls	Warm yet breathable, soft finish
	 Lycra-Cotton	Stretch Denim, Activewear	Elastic, comfortable, durable

Table 2.1.2: Types of Fabrics

Laying Procedures for Different Fabrics

One of the most crucial steps in apparel manufacturing is fabric laying, a process that ensures fabric is spread out correctly before cutting. The quality of the laying process directly impacts pattern alignment, material wastage, and overall garment accuracy. Proper fabric laying techniques are essential in both mass production settings (such as export-driven garment factories) and artisanal or small-scale manufacturing units (such as khadi and handloom sectors).

India’s apparel manufacturing landscape is a blend of traditional craftsmanship and modern technology, with automated fabric laying systems being adopted in large-scale textile mills while manual laying techniques remain integral to heritage textiles. Given India’s dominance in both natural fibre production (such as cotton and silk) and synthetic fabrics (such as polyester and blends), understanding the different laying procedures is crucial for efficient garment production.

- 1. **Laying Procedures for Natural Fabrics:** Natural fabrics like cotton, silk, wool, and linen have distinct properties that influence their laying method.

Fabric Type	Laying Procedure	Challenges & Considerations
 Cotton (e.g., Handloom Cotton, Khadi)	Single-ply laying is preferred for handloom fabrics to maintain alignment. Manual layering is done to prevent tension.	Shrinkage is common, so pre-shrinking is advised. Manual laying prevents stretching.
 Silk (e.g., Banarasi, Kanjeevaram, Muga)	The flat laying method uses tissue paper between layers to avoid slippage. Lay in small stacks (10-15 layers).	High risk of shifting due to smooth texture. Requires manual handling and careful alignment.
 Wool (e.g., Pashmina, Cashmere, Tweed)	Relaxation before laying is necessary to prevent shrinkage. Layered in flat piles with low tension.	The fabric expands or contracts easily, needing careful measurement and control.
 Linen & Jute (e.g., Chanderi Linen, Jute blends)	Manual single-layer spreading to prevent fraying. Heavyweights require automated spreading machines.	Jute is stiff, so it requires controlled spreading. Linen wrinkles easily.

Table 2.1.3: Laying procedures for natural fabrics

- 2. Laying Procedures for Synthetic Fabrics:** Synthetic fabrics, including polyester and nylon, have high elasticity and strength, requiring special handling.

Fabric Type	Laying Procedure	Challenges & Considerations
 Polyester (e.g., Sportswear, School Uniforms)	Automated spreading machines are used for even tension. Multiple-layer spreading (50-100 layers).	Prone to static electricity, which can cause sticking or misalignment.
 Nylon & Spandex (e.g., Lycra sportswear, Stretch denim)	Relaxation is required before laying to prevent shrinkage. Spread in small piles to reduce stretch deformation.	High elasticity makes fabric prone to shape distortion. Careful manual adjustment is needed.
 Acrylic & Rayon (e.g., Artificial silk, Faux wool sweaters)	Laid in short stacks with vacuum table support to reduce movement.	Susceptible to static cling and stretching during spreading.

Table 2.1.4: Laying procedures for synthetic fabrics

- 3. Laying Procedures for Blended Fabrics:** Blended fabrics combine two or more fibres, offering unique textures and elasticity.

Fabric Type	Laying Procedure	Challenges & Considerations
 Poly-cotton (e.g., Readymade garments, Uniforms)	Multiple-layer laying (50-70 layers) using automated machines. Fabric must be aligned manually to avoid shifting.	Uneven blending can cause variation in thickness across the lay.
 Wool-Silk Blends (e.g., Designer garments, Sarees)	Flat, single-ply laying with tissue paper separation.	Requires extreme care as silk-wool blends are delicate and prone to stretching.
 Lycra-Cotton (e.g., Stretch denim, Activewear)	Manual layer stacking with controlled tension to prevent overstretching.	Excessive handling can distort the stretch factor.

Table 2.1.5: Laying procedures for blended fabrics

2.1.3 Procedures for Issuance and Return of Fabric

Fabric is the backbone of the apparel industry, forming the foundation of every garment produced. In India, where the textile and apparel sector is one of the largest contributors to employment and exports, efficient fabric management is crucial. The success of a garment manufacturing unit depends not just on high-quality fabric but also on how well it is handled, stored, and utilised throughout the production process.

One of the key professionals responsible for fabric handling is the layerman (fabric)—a specialist who ensures that fabric is properly laid out before cutting, minimising defects and wastage. However, before the laying process begins, the fabric must be issued from the store in a systematic manner, ensuring that the right material, in the right quantity and quality, reaches the production floor. Similarly, after the fabric is used, any excess or defective material must be returned to the store for proper accounting and inventory management.

- 1. Issuance of Fabric to the Layerman:** The issuance of fabric follows a systematic procedure to maintain accuracy, accountability, and minimal wastage.

Step-by-Step Fabric Issuance Process

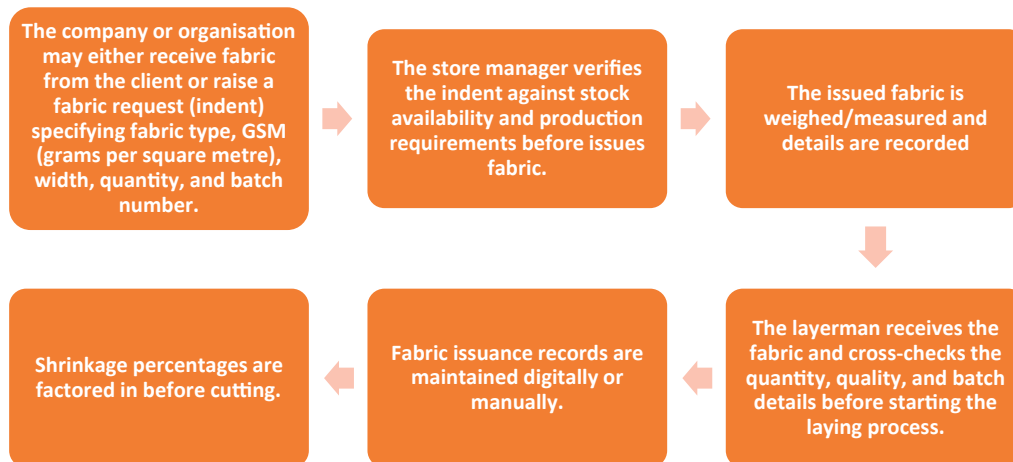


Fig. 2.1.13: Fabric issuance process

- 2. Return of Unused or Defective Fabric to the Store:** After the fabric laying and cutting process, excess or defective fabric must be returned to the store with proper documentation.

Step-by-Step Fabric Return Process

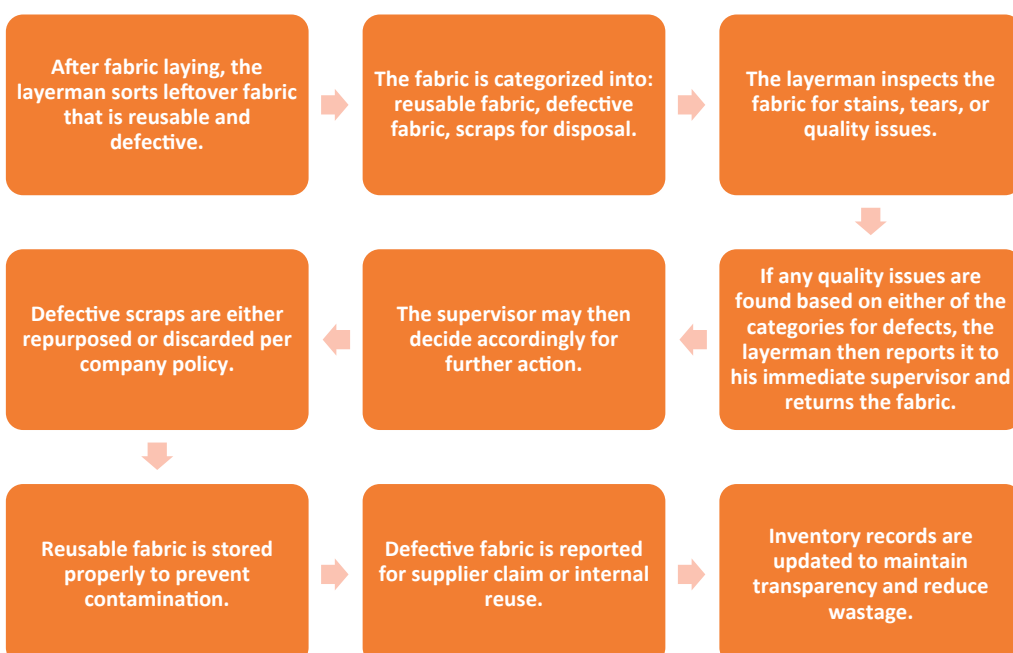


Fig. 2.1.13: Fabric return process

2.1.4 Significance of the Fabric Laying Process

The fabric laying process, also known as fabric spreading or lay planning, is a crucial step in the textile manufacturing process. This process holds significant importance due to the country's large textile industry.

According to the Ministry of Textiles, Government of India, the Indian textile industry is one of the largest in the world, accounting for approximately 5% of the country's GDP and 14% of its industrial production (Ministry of Textiles, 2020).

The fabric laying process involves laying out fabric layers on a cutting table to maximise fabric utilisation and minimise waste. This process is critical in India, where fabric waste can have significant environmental and economic impacts.

A study by the National Institute of Fashion Technology (NIFT) found that the Indian textile industry generates approximately 1.4 million tons of fabric waste annually, with an estimated value of over ₹10,000 crores (NIFT, 2019).

Effective fabric laying can help reduce this waste by optimising fabric usage and minimising cutting errors. This, in turn, can lead to cost savings for manufacturers, as well as reduced environmental impacts.

In addition, the fabric laying process can also impact the quality of the final product. Proper fabric laying ensures that fabrics are cut accurately and efficiently, resulting in higher-quality garments and textiles.

Importance of the Fabric Laying Process

1. Ensures Precision in Cutting

- The quality of a garment depends on how accurately the fabric is laid before cutting.
- Proper alignment of fabric layers ensures that all cut pieces are uniform, avoiding distortions and misalignments.
- This is particularly important in mass production, where a single error can affect thousands of garments.

2. Reduces Fabric Wastage

- India's apparel industry operates on tight margins, making fabric utilisation a key cost factor.
- Efficient laying techniques optimise material use, ensuring that fabric is spread to maximise yield per roll.
- Marker planning is used to reduce wastage by arranging patterns efficiently.

3. Maintains Fabric Quality

- Improper fabric laying can cause tension, wrinkles, or misalignment, leading to defective garments.
- Delicate fabrics like silk, georgette, or chiffon, which are widely used in Indian ethnic wear, require special handling to prevent damage.
- Laying methods like relaxed spreading allow the fabric to settle naturally and prevent shrinkage.

4. Supports High-Volume Production

- India is a leading exporter of textiles, supplying for global brands.
- Efficient fabric laying enables bulk production without compromising quality.
- Automated laying machines are increasingly used in large garment factories to maintain speed and accuracy.

5. Prevents Colour and Pattern Mismatch

- Many Indian fabrics, such as block prints, handloom weaves, and intricate embroideries, require careful pattern matching.

- Plaid, stripes, and printed fabrics must be aligned correctly during laying to ensure a consistent final look.
- Proper laying prevents shade variation issues, which are common in large fabric rolls.

6. Reduces Rework and Improves Profitability

- Errors in fabric laying lead to cutting mistakes, requiring additional rework and increasing production costs.
- By ensuring a well-planned laying process, factories save time and labour, ultimately improving overall profitability.

7. Enhances Worker Efficiency and Safety

- In India, garment factories employ both skilled and semi-skilled workers, and efficient laying procedures reduce manual workload.
- Using mechanised fabric spreading machines reduces strain and fatigue for workers, improving their productivity.
- Proper handling also minimises fabric dust and fibre exposure, ensuring a safer working environment.

8. Essential for Compliance and Sustainability

- Many international brands sourcing from India require sustainable production methods.
- Efficient fabric laying reduces waste, aligning with eco-friendly manufacturing practices.
- Compliance with industry standards ensures that Indian factories remain competitive in the global apparel market.

Role of Fabric Laying in Different Apparel Segments

Apparel Type	Significance
Mass Production (Fast Fashion, Uniforms)	Ensures uniform cutting for bulk production, reducing fabric waste.
Luxury and Designer Garments	Precision in laying ensures the alignment of intricate patterns and premium fabric designs.
Traditional Indian Wear (Sarees, Kurtas, Lehengas)	Special handling is required for delicate fabrics like silk and chiffon to prevent damage.
Denim and Heavy Fabric Apparel	Requires layered spreading to maintain consistency in cutting and prevent shrinkage.

Table. 2.1.6: Role of fabric laying in different apparel segments

2.1.5 Procedure of Fabric Laying

Fabric laying is a critical step in the apparel manufacturing process, ensuring that the material is properly aligned before cutting. In India, where textile production is a significant industry, fabric laying methods vary based on fabric type, garment design, and production scale. The process requires precision, efficiency, and minimal fabric wastage, which are crucial for cost-effective garment manufacturing.

1. Preparation Before Laying: Before laying the fabric, several pre-requisites are taken care of:

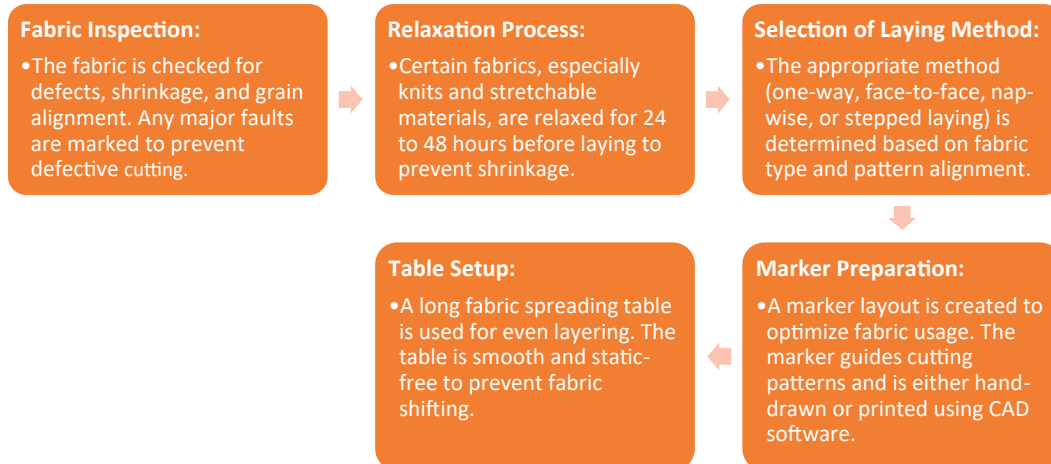


Fig. 2.1.14: Preparation before laying

2. Laying the Fabric

- **Spreading the Fabric:** The fabric is unrolled and spread over the cutting table, either manually or using an automatic fabric spreading machine.

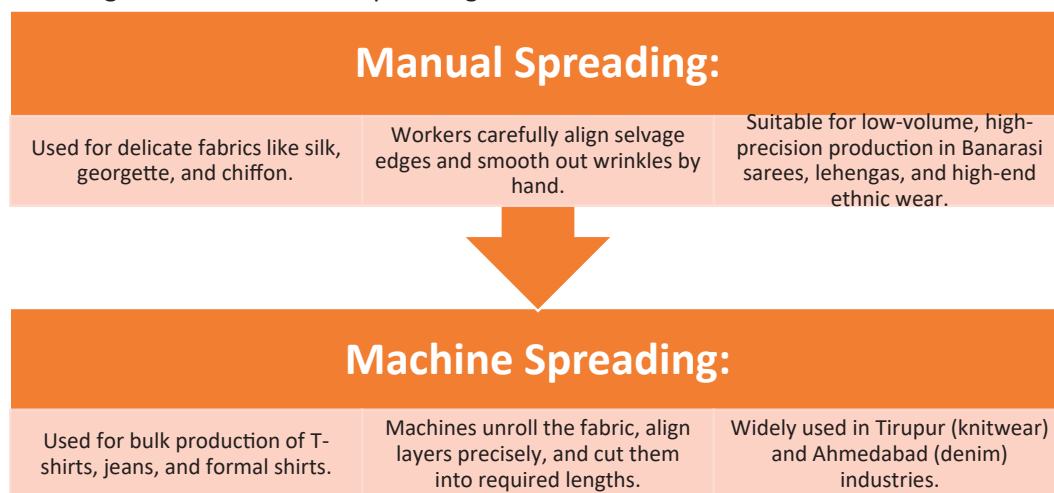


Fig. 2.1.15: Ways of spreading the fabric



Fig. 2.1.16: Fabric laying on a machine

- **Ensuring Alignment and Grain Direction**



Fig. 2.1.17: Ensuring alignment and grain direction

- **Numbering and Sticker Placement**

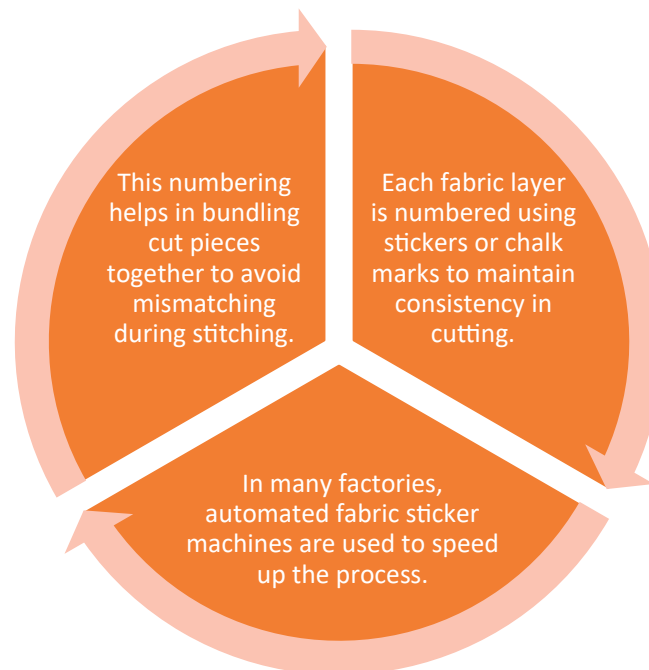


Fig. 2.1.18: Numbering and sticker placement

3. Cutting Preparation:

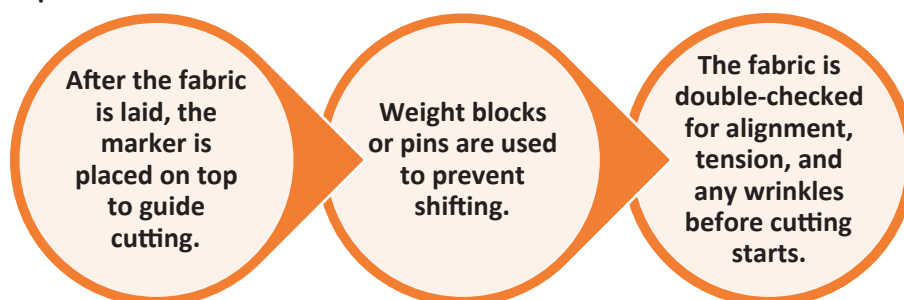


Fig. 2.1.19: Cutting process

4. Final Inspection and Cutting: Once the fabric is laid properly:

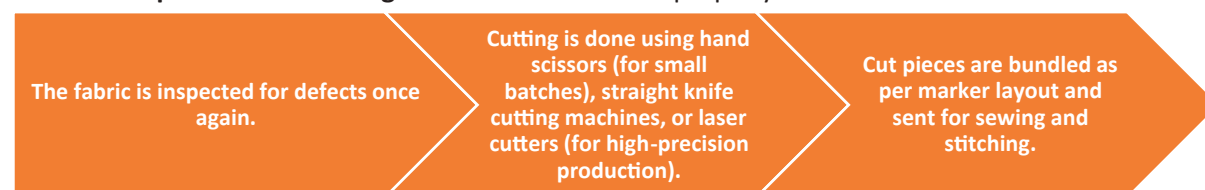


Fig. 2.1.20: Final inspection and cutting process

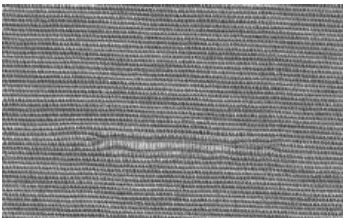
2.1.6 Types of Fabric Faults

Fabric is the foundation of the apparel industry, determining the quality, durability, and overall aesthetics of the final garment. In India's fast-paced and competitive textile sector, ensuring fabric quality is crucial to maintaining production standards and reducing material wastage. From high-end fashion brands to large-scale textile manufacturers, every stage of fabric handling must be meticulous, starting with the fabric laying process.

One of the most critical responsibilities in this process is identifying fabric faults, which, if undetected, can lead to defective garments, production delays, and financial losses. A layerman (Fabric) plays a key role in ensuring that only high-quality fabric moves forward in the production cycle. Various defects such as holes, slubs, knots, and misprints can occur due to manufacturing errors, improper handling, or inconsistencies in raw materials. The ability to identify and address these defects early in the process ensures smooth cutting, stitching, and finishing in garment production.

Basic Fabric Faults and Identification Methods

Fabric Fault	Description	Identification Method
 Holes	Small or large openings in the fabric are caused by broken yarns, weak fibres, or damage during production.	- Holding fabric against light to spot irregular transparency. - Running fingers over the surface to detect gaps.
 Slubs	Thick places in the yarn appear as uneven bumps in the fabric. Occurs due to irregular spinning or improper fibre blending.	- Visual inspection under proper lighting. - Running hands over fabric to feel bumps or inconsistencies.

Fabric Fault	Description	Identification Method
 Knots	Unwanted knots formed during spinning or weaving, creating small lumps on the surface.	• Checking for raised, rough spots by touch. • Examine the fabric closely for irregular knots.
 Misprints	Printing defects such as smudges, double prints, or missing patterns.	• Comparing print alignment with the standard fabric. • Checking pattern symmetry and colour consistency.
 Oil Stains	Greasy spots are caused by machine oil during production.	• Holding fabric at different angles to identify shine or dark stains. • Rubbing fabric lightly to see if the stain spreads.
 Warp and Weft Faults	Irregular tension in yarns leads to distortions in fabric structure.	• Examining for wavy, uneven, or missing yarns. • Checking alignment of weave under light.
 Uneven Dyeing	Patches of uneven colour due to poor dye absorption or chemical imbalances.	• Holding fabric at different angles to observe colour variations. • Comparing sections to ensure uniformity.

Fabric Fault	Description	Identification Method
 Fabric Snags	Loops or pulled yarns caused by rough handling or mechanical faults.	- Running fingers gently over fabric to detect loose threads. - Checking for pulled yarns that stand out from the weave.
 Selvedge Defects	Wavy, torn, or frayed fabric edges that affect cutting accuracy.	- Inspecting the fabric edges for irregularities. - Stretching selvedge slightly to check for weakness.

Table. 2.1.7: Basic fabric faults

2.1.7 Quality Procedures to Identify Basic Fabric Fault

Any defects in the fabric can lead to production inefficiencies, increased costs, and potential customer dissatisfaction. In the fast-paced textile and garment industry, where India is one of the leading global exporters, ensuring fabric quality is not just about maintaining standards but also about sustaining a competitive edge.

Fabric inspection is an essential step in the pre-production stage, ensuring that only high-quality material moves forward for cutting and stitching. A layerman (fabric) must have the knack for identifying and rectifying defects before the fabric is used in garment production.

Procedure	Details
Visual Inspection	- Look for any visible defects, such as stains, tears, or unevenness. - Inspect the fabric's surface for any defects, such as pilling, snagging, or runs.
Check Fabric Specifications	- Check the fabric's weight to ensure it meets the required specifications. - Verify the fabric's width to ensure it meets the required specifications. - Inspect the fabric's thickness to ensure it meets the required specifications.
Inspect Fabric Grain	- Inspect the warp and weft threads to ensure they are straight and even. - Verify that the fabric is not skewed, which can affect the garment's fit and appearance.

Procedure	Details
Check Fabric Density	- Inspect the fabric's weave to ensure it is even and consistent. - Verify that the fabric's knit is even and consistent.
Perform Fabric Tests	- Perform a tensile strength test to ensure the fabric meets the required strength standards. - Conduct a tear resistance test to ensure the fabric meets the required tear resistance standards. - Perform a colourfastness test to ensure the fabric's colour meets the required colourfastness standards.
Document Fabric Faults	- Document any fabric faults found during the inspection, including their location, size, and type. - Take photographs of any fabric faults for further analysis or documentation.

Table 2.1.8: Fabric inspection steps

2.1.8 Types of Markers Used in Fabric Layering

In the apparel manufacturing process, precision is key to ensuring optimal fabric utilisation and minimising material wastage. One of the most critical steps in fabric laying is marker making, which involves creating a guide for cutting fabric layers accurately. A marker is a planned layout of pattern pieces arranged on fabric to maximise efficiency, reduce waste, and ensure consistency in garment production.

Marker making plays a crucial role in India's textile industry, where high-volume apparel manufacturing demands precision and cost-effectiveness. Depending on the type of fabric, garment design, and production scale, different types of markers are used. These markers vary in their purpose—some help in reducing fabric wastage, while others aid in maintaining grainline accuracy or ensuring symmetrical pattern alignment.

A layerman (fabric) must be well-versed in different marker types to execute the layering process efficiently. The selection of the right marker depends on fabric width, fabric texture, garment design, and cutting method. The following table provides an overview of the various types of markers used in fabric layering and their specific applications.

Type of Marker	Description	Uses in Fabric Layering
Open Marker	A marker made without fold lines is used when fabric is spread in a single layer.	Suitable for single-layer fabric cutting, ensuring minimal material waste.
Closed Marker	A marker where patterns are mirrored along the fold line for symmetrical designs.	Used for folded fabrics to achieve symmetry in garments like shirts and skirts.
Nap-Up Marker	All pattern pieces are placed in the same direction to maintain fabric texture and design.	Essential for fabrics with a directional pattern, pile, or nap (e.g., velvet, corduroy).
Nap-Down Marker	Patterns are placed in opposite directions to optimise fabric use.	Used when texture or nap direction is not critical, reducing fabric wastage.

Type of Marker	Description	Uses in Fabric Layering
Mixed Marker	A combination of nap-up and nap-down placements.	Used when handling both directional and non-directional fabrics in one layout.
Single-Size Marker	A marker made for one specific garment size.	Ideal for small-scale or custom production, ensuring precision for a single size.
Multi-Size Marker	A marker that accommodates multiple sizes within a single layout.	Used for bulk production, allowing different sizes to be cut simultaneously.
Blocked Marker	Arrange patterns in a block format before cutting.	Used in mass production for efficient cutting and easy handling.
Continuous Marker	A marker designed for continuous fabric spreading.	Ideal for long fabric rolls, improving cutting efficiency and reducing time.
Computerised Marker	Digitally created using CAD (Computer-Aided Design) software for maximum precision.	Ensures highly accurate pattern placement, reducing waste and optimising efficiency.

Table 2.1.9: Types of markers and application

2.1.9 Fabric Grouping Procedures

The quality and efficiency of garment production depend heavily on the careful handling of fabric before cutting and stitching. One of the most critical steps in this process is fabric grouping, which involves categorising fabrics based on specific characteristics to ensure consistency, efficiency, and minimal wastage during production.

What is Fabric Grouping?

Fabric grouping is the systematic process of sorting and categorising fabrics based on specific characteristics to ensure uniformity, efficiency, and quality in garment production. It is a crucial step before fabric spreading and cutting, as different fabrics have distinct properties that affect how they behave during the production process.

Fabric grouping is significant in mass production, as any inconsistency in shade, width, or weight can lead to defective garments, production inefficiencies, and material wastage. This step ensures that garments are visually and structurally consistent, meeting industry standards, consumer expectations, and brand quality guidelines.



Fig. 2.1.21: Grouping fabrics based on specific characteristics

Fabric Grouping Procedures in Apparel Production

Fabric Grouping Procedure	Description	Application in Apparel Production
Grouping by Colour Shade (Dye Lot Matching)	Fabrics are sorted based on dye lot to ensure uniform shade throughout the garment batch.	Used in large-scale apparel production to prevent shade variations in garments like shirts, trousers, and sarees.
Grouping by Fabric Type	Fabrics with similar compositions (e.g., cotton, polyester, silk) are grouped together.	Ensures consistent sewing, finishing, and garment properties. Common in multi-fabric garment production.
Grouping by Fabric Width	Fabrics of the same width are grouped to optimise marker efficiency and reduce wastage.	Helps in efficient cutting and layout planning, especially in bulk production.
Grouping by Fabric Weight (GSM - Grams per Square Metre)	Fabrics with similar GSM (lightweight, medium-weight, heavy-weight) are grouped together.	Ensures consistency in drape, durability, and comfort of the final product.
Grouping by Pattern Orientation	Striped, checked, or printed fabrics are grouped to align patterns properly.	Ensures aesthetic consistency in garments like suits, formal shirts, and ethnic wear.
Grouping by Stretchability	Elastic and non-elastic fabrics are grouped separately to prevent cutting and stitching inconsistencies.	Essential for activewear, leggings, and knitwear production.
Grouping by Shrinkage Rate	Fabrics with similar shrinkage percentages (pre-shrunk vs. unprocessed) are grouped together.	Prevents post-production garment size variations. Used in high-quality apparel production.
Grouping by Surface Texture and Finish	Smooth, rough, or specialty-finished fabrics (e.g., brushed, satin, denim) are grouped separately.	Ensures uniform feel and appearance across the garment batch. Common in premium fabric processing.
Grouping by End-Use and Functionality	Fabrics are grouped based on their intended use, such as casual wear, sportswear, or industrial wear.	Ensures production alignment with functional requirements like breathability, water resistance, or thermal properties.

Table 2.1.10: Fabric grouping procedures

Role of the Layerman in Fabric Grouping

- The layerman ensures that fabrics from the same group (same dye lot, width, weight, shrinkage, etc.) are used together to maintain uniformity in the final garment.
- Proper fabric grouping helps the layerman optimise fabric usage, reducing material wastage during spreading and cutting.

- The layerman inspects and sorts fabric rolls according to the grouping criteria before laying them on the cutting table.
- Depending on the type of fabric (woven, knit, stretchable), the layerman adjusts laying techniques accordingly.
- By grouping fabrics properly, the layerman ensures that issues like shade variation, mismatched patterns, and inconsistent shrinkage are avoided.
- Well-grouped fabrics make marker planning and cutting more precise, improving garment fit and reducing defects.

2.1.10 Procedure to Fill in a Lay Sheet

Efficient fabric management is crucial for ensuring quality production and minimising material wastage. One of the most important aspects of fabric handling is record-keeping, which allows manufacturers to track fabric consumption, detect defects, and optimise resource usage. Among the key documents used in garment manufacturing, the lay sheet is a vital record that ensures accuracy and consistency in fabric laying before cutting.

What is a Lay Sheet?

A lay sheet is a critical document used in apparel production to record essential details about fabric laying. It ensures accuracy, traceability, and consistency in fabric usage while minimising errors. The Layerman (Fabric) is responsible for filling out the lay sheet to maintain records of fabric consumption, defects, marker details, and laying techniques.

Key Functions of a Lay Sheet

A lay sheet serves several important functions in garment production:

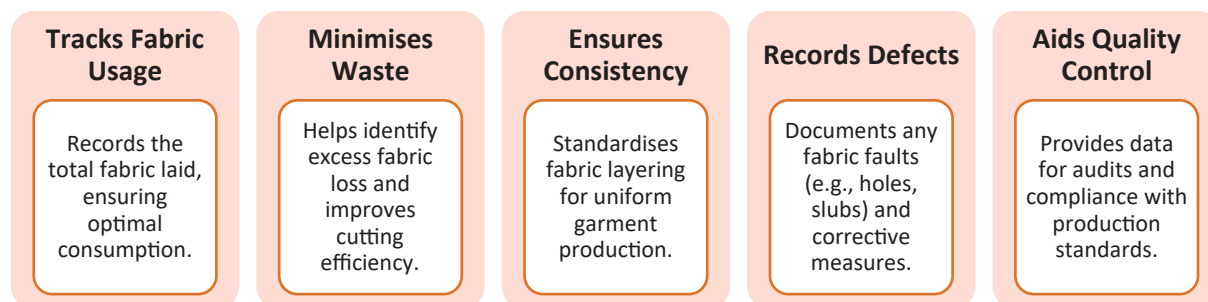


Fig. 2.1.22: Functions of a lay sheet

Information Recorded in a Lay Sheet

A typical lay sheet contains the following details:

Section	Details Recorded
Basic Information	Factory name, date, order number, buyer name, style number
Fabric Details	Fabric type, lot number, width, GSM (grams per square meter)
Marker Specifications	Marker number, length, width, number of pieces per marker
Laying Information	Laying method, number of plies, lay length and height

Section	Details Recorded
Fabric Utilisation	Total fabric used, usable fabric, defective fabric, wastage %
Defect Tracking	Types of defects found (holes, knots, shade variations)
Final Verification	Supervisor's approval and quality control remarks

Table 2.1.11: Information Recorded in a Lay Sheet

Procedure for Filling in a Lay Sheet

- 1. Collect Required Information:** Before filling out the lay sheet, the layerman gathers the necessary information, including:

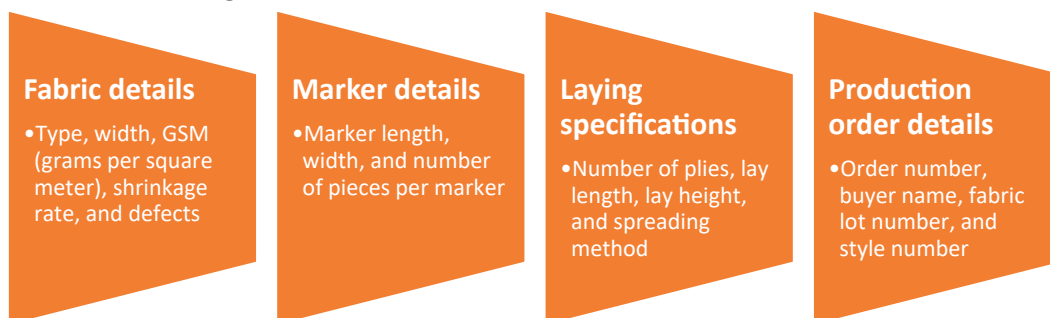


Fig. 2.1.23: Information for filling in a lay sheet

- 2. Fill in the Basic Details:** The layerman records the general production details at the top of the lay sheet:

Field	Description
Factory Name	Name of the garment production unit
Date	Date of fabric laying
Order Number	Unique production order number
Buyer Name	Name of the client or brand
Style Number	Garment style being produced
Fabric Type	Cotton, polyester, silk, blended fabric, etc.
Fabric Lot Number	Batch number of the fabric roll

Table 2.1.12: Basic details to be filled in a lay sheet

- 3. Enter Marker and Lay Details:** The layerman records marker-related specifications for accuracy in cutting:

Field	Description
Marker Number	Unique identification for the marker
Marker Length (cm)	Length of the marker used for fabric cutting
Marker Width (cm)	Width of the marker

Field	Description
Number of Pieces per Marker	Total number of garment components in the marker
Laying Method	Face-to-face, single-ply, zig-zag, or tubular laying
Number of Plies (Layers)	Total fabric layers laid for cutting
Lay Length (cm)	Total length of the fabric laid
Lay Height (cm)	Height of the fabric stack before cutting
Fabric Wastage (%)	Percentage of fabric lost during laying

Table 2.1.13: Marker and lay details

4. Record Fabric Utilisation and Defects: The Layerman inspects and documents any fabric faults:

Field	Description
Total Fabric Used (meters)	Total meters of fabric consumed
Usable Fabric (meters)	Fabric successfully used for production
Defective Fabric (meters)	Fabric discarded due to defects
Type of Defects Found	Holes, knots, slubs, shading variations, etc.
Corrective Actions Taken	Rejection, cutting around defects, or quality control measures

Table 2.1.14: Documenting any fabric faults

5. Final Verification and Approval:

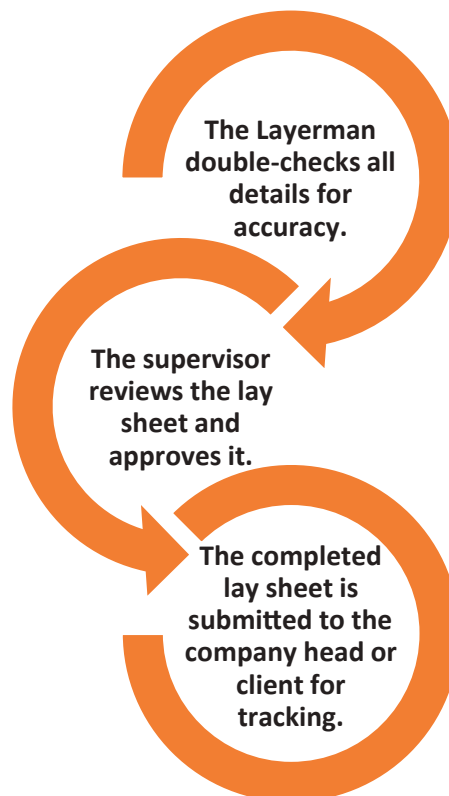


Fig. 2.1.24: Verification and approval

2.1.11 Common Fabric Defects During Laying Process

A crucial aspect of this process is addressing fabric inconsistencies and challenges, such as ensuring seamless joins when fabric rolls end, managing leftover fabric efficiently, and identifying defects that could impact garment quality. Techniques such as splicing, handling end bits, managing off-cuts, and correcting bowing play a vital role in optimising material usage and maintaining garment consistency. Many factories adopt advanced methods, including computer-aided fabric laying systems, laser cutting, and fabric relaxation techniques, to improve precision. However, manual expertise in fabric handling remains irreplaceable, as workers ensure each layer is perfectly aligned and free from defects before cutting begins.

Processes to address fabric inconsistencies are:

1. **Splicing in Fabric Laying:** Cutting fabric across its breadth and overlapping layers between a lay's two ends is known as splicing. Sometimes, lay splicing is necessary to prevent fabric flaws from getting into the garment's components. Cut ends are dragged back to overlap plies as far back as the subsequent splicing point after splicing. In order to cover whole garment components, the overlapping length is dependent on the splicing mark.

Splicing is also utilised when one roll of fabric stops in the centre of the marking, and the length of the end portion is sufficient to cover at least one complete piece of clothing. The splicing mark is where the next roll begins to spread.

Splicing Process:

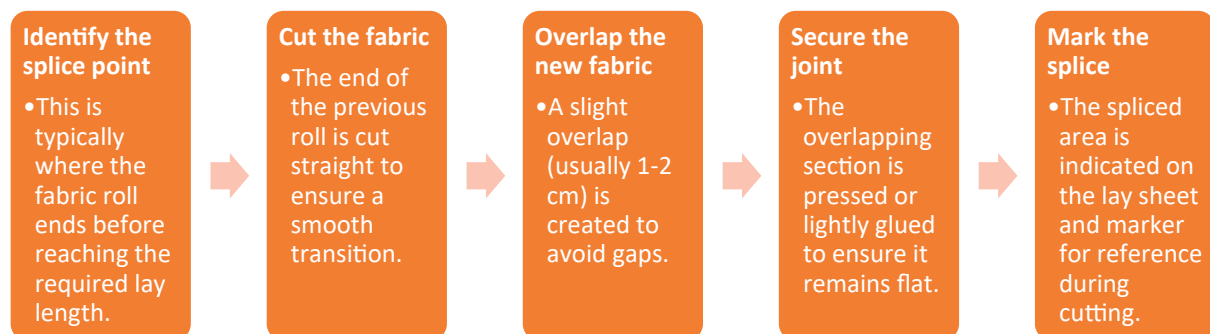


Fig. 2.1.25: Splicing process

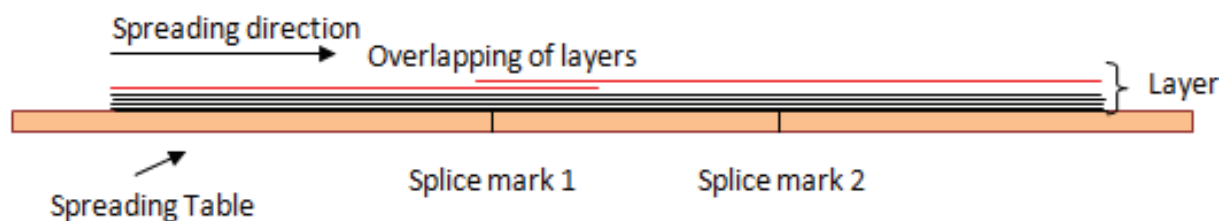


Fig. 2.1.26: Splicing process

Importance of Splicing

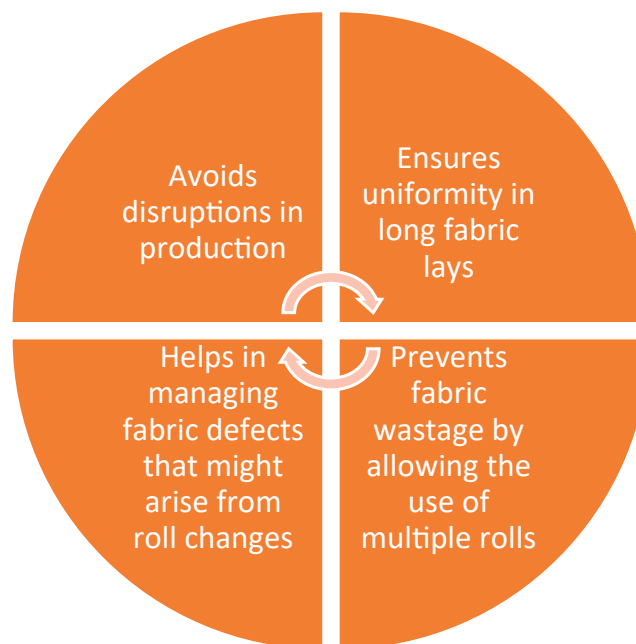


Fig. 2.1.27: Importance of splicing

- 2. End Bits in Fabric Laying:** A roll of cloth is unfolded and placed on the cutting table prior to cutting. The marker length, sometimes called as the lay length, is fixed at a specific length. The term "end bits" refers to the portion of fabric at the end of each roll that is too short to lay on the marking. For instance, Let's say you have a 61-meter roll of fabric. The marker is five meters long. After the 12th layer is layered, you will have 1 metre of fabric as the final bit when you lay the fabric opening that roll.

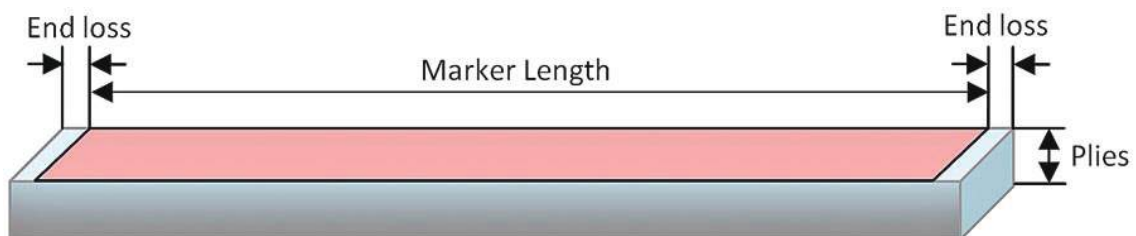


Fig. 2.1.28: End bits

Handling End Bits:

Segregation

- End bits are collected separately and categorized based on fabric type and width.



Utilisation Planning

- They are used for small garment components like collars, cuffs, pocket linings, or trims.



Re-Laying

- In some cases, end bits are integrated into the fabric lay by using manual patching or splicing techniques.



Inventory Tracking

- End bits are recorded to ensure maximum fabric usage.

Fig. 2.1.29: Handling end bits

Significance of Managing End Bits



Fig. 2.1.30: Importance of managing end bits

- 3. Off-Cuts in Fabric Laying:** Off-cuts are irregularly shaped fabric pieces left after cutting the garment patterns. These are different from end bits because they result from marker inefficiency rather than roll endings.

Managing Off-Cuts

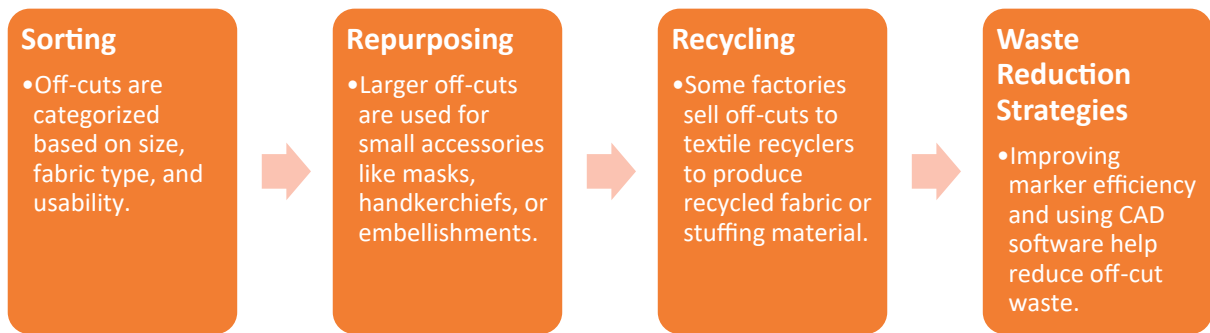


Fig. 2.1.31: Managing off-cuts

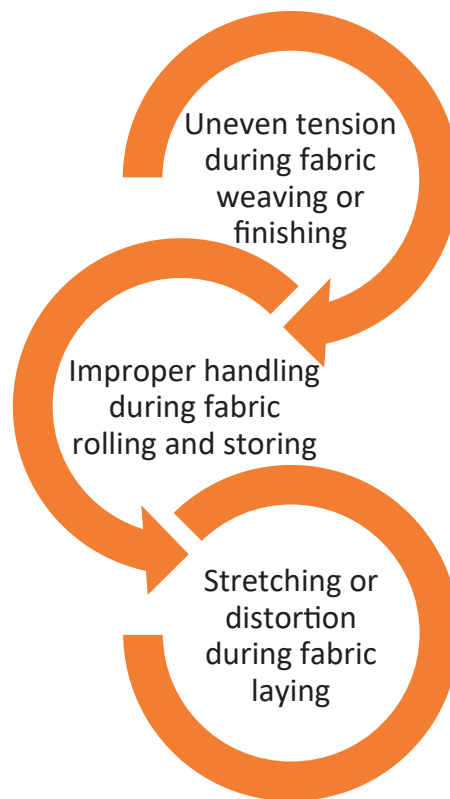
Significance of Off-Cuts



Fig. 2.1.32: Significance of off-cuts

- 4. Bowing in Fabric Laying:** Bowing is a fabric defect. Bowing is the term used to describe the displacement of the fabric's weft thread off a line perpendicular to the selvage. Throughout the fabric's width, this weft displacement creates one or more arcs. Bowing can be called a defect, but in the case of some woven patterns (2/2 Twills), bowing is being introduced (During fabric processing) in fabric to avoid residual bowing in the final finished fabric.

Causes of Bowing



Correcting Bowing in Fabric Laying

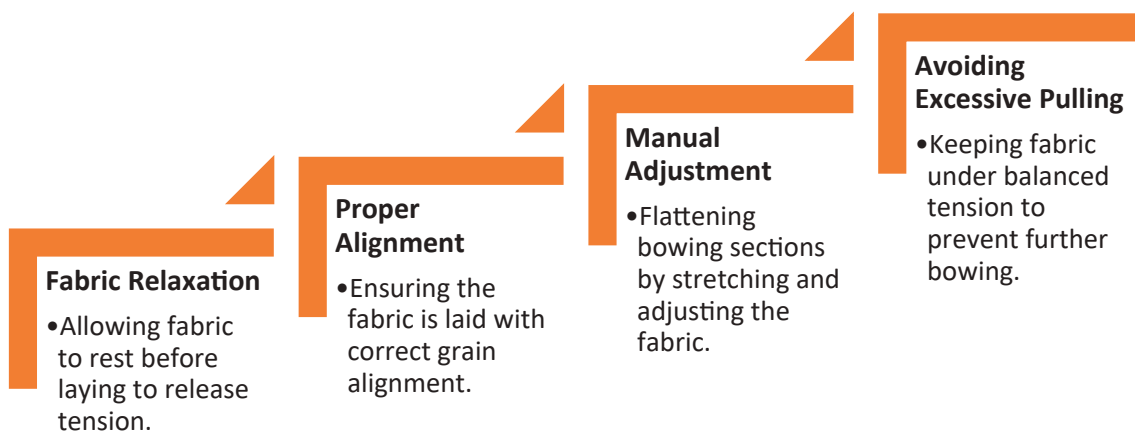


Fig. 2.1.33: Correcting bowing in fabric laying

Why Managing Bowing is Important?



Fig. 2.1.34: Importance of bowing

Testing Procedure for Bowing Defects

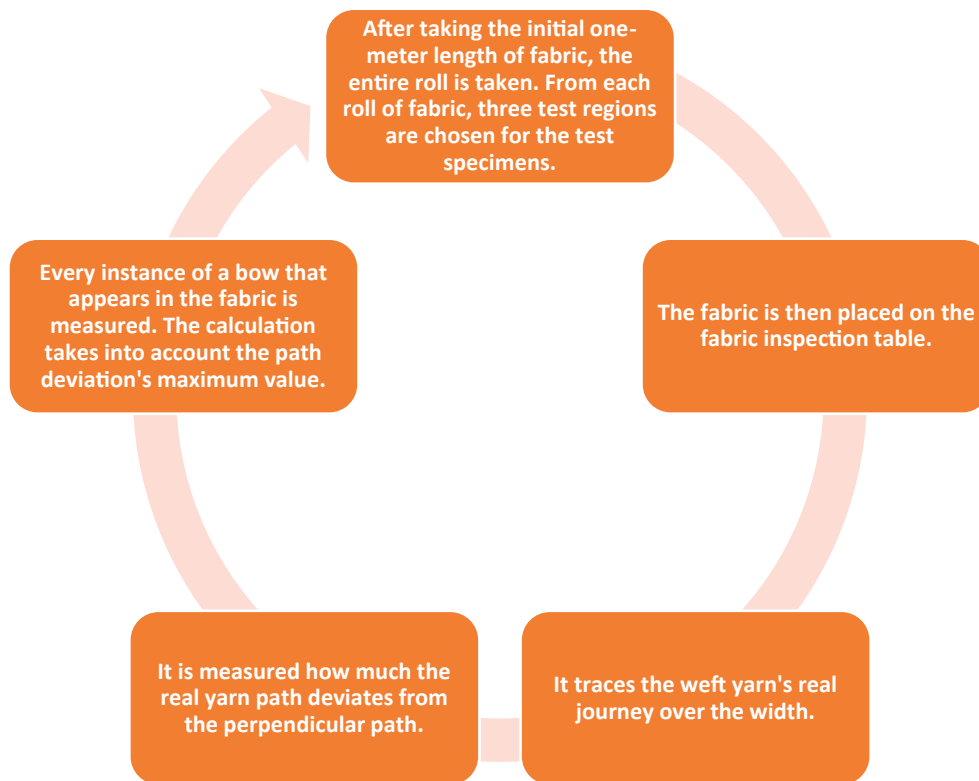


Fig. 2.1.35: Testing procedure for bowing defects

As per the picture below, we can see distortion at the centre of the fabric marked as 'b' and the total fabric width being 'd'. Bowing can be calculated as below:

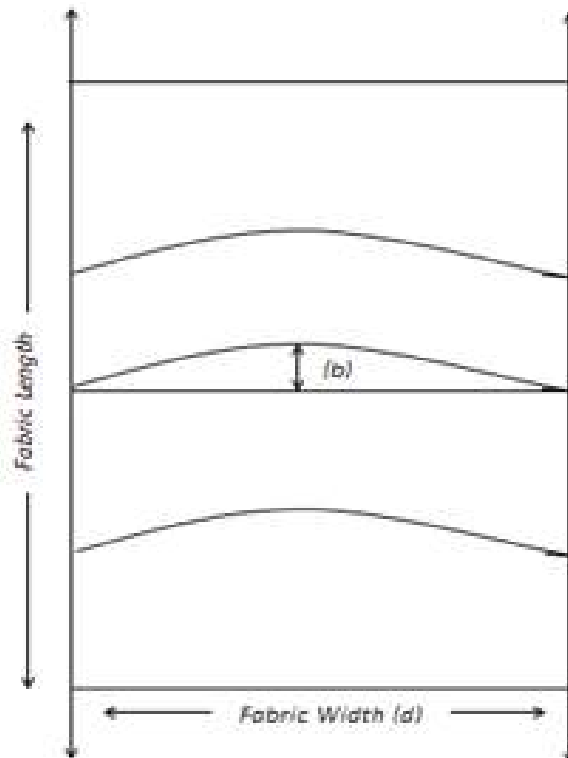


Fig. 2.1.36: Measurement of bowing

A few other defects that a layerman may encounter in the process are:

1. Horizontal lines: This fabric flaw is identified by asymmetrical, side-to-side lines. Horizontal lines in fabric flaws are typically caused by:

- The bobbin, which is the barrel that holds yarn in place, has flaws.
- Thread tension, which seems irregular



Fig. 2.1.37: Horizontal lines on the fabric

2. Shade variation: Shade variation, which is characterised by a change in colour and shade depth from roll to roll or piece to piece, is one of the more noticeable visual flaws observed on raw textiles. Fabric flaws are the reason behind shade variance in fabrics. These are typically caused by:

- Mixing of production-related textiles
- Changes in the production process concerning speed and duration
- Cutting, bundling, and/or numbering mistakes
- Uneven stretching of the cloth



Fig. 2.1.38: Shade variation on fabric

3. Dirt/stains: Spots or patches of varying colour are known as stains, and they are rather prevalent in dyed textiles. Stains can appear at any point during or after manufacture if textiles are not stored in an area with sufficient protection thus, they are never completely safe from them.

Almost anything can cause stains to form on textiles. Known sources include dyes, oil from machinery, and dirt from the industrial floor. As long as suppliers are watchful over the quality of the cloth, stains are comparatively simple to detect and avoid.



Fig. 2.1.39: Dirt/stains on fabric

Needle lines: Defective needles are a direct cause of needle lines. Needle latches, hooks or stems might be:

- Mixed
- New
- Dirty or contaminated with lint
- Bent
- Worn

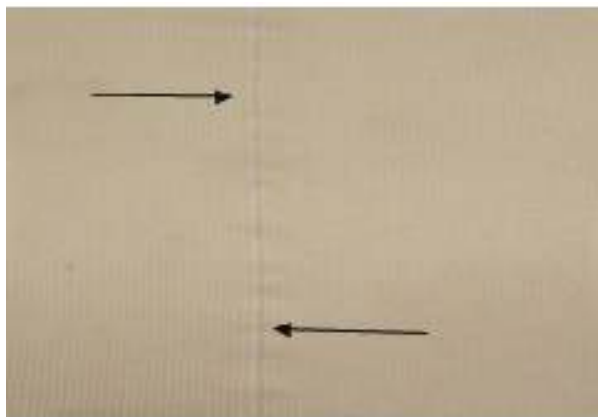


Fig. 2.1.40: Needle lines on fabric

4. **Crease marks:** A noticeable distortion in the fabric is called a crease mark. A crease mark is unlikely to show up throughout the course of a roll. Instead, it just shows up in one place on the fabric. The finished product will have a crease mark if the final pressing is unable to return the fabric to its natural state. Another issue related to this fabric flaw is discolouration.



Fig. 2.1.41: Crease marks on fabric

2.1.12 Fabric Folding Procedures

From traditional handwoven textiles to mass-produced industrial fabrics, proper fabric handling at every production stage is essential to maintain quality and efficiency. One of the most critical processes in fabric management is fabric folding, which ensures materials remain pristine while facilitating seamless storage, transport, and further processing.

Fabric folding is not merely about organising textiles; it is a precision-driven process that affects everything from fabric longevity to the ease of cutting and sewing in garment manufacturing. Different fabrics, such as delicate silks, sturdy denim, and stretchy knits, require specific folding techniques to prevent creasing, fraying, or distortion. Manufacturers and retailers follow standardised folding methods to enhance efficiency, reduce waste, and protect the fabric's structural integrity.

1. Accordion Folding:

- **Description:** Accordion folding involves folding fabric into pleats, creating a compact, rectangular shape.
- **Use:** Ideal for storing fabrics like cotton, linen, and silk.
- **Benefits:** Helps prevent wrinkles, saves storage space, and maintains fabric quality.
- **Step-by-Step:**
 - Lay the fabric flat on a surface.
 - Fold the fabric into pleats, creating a compact shape.
 - Continue folding until the desired size is reached.



Fig. 2.1.42: Accordion folding

2. Rolling Folding:

- **Description:** Rolling folding involves rolling fabric into a cylindrical shape.
- **Use:** Often used for storing fabrics like knits, fleece, and towels.
- **Benefits:** Helps prevent wrinkles, saves storage space, and maintains fabric quality.

- **Step-by-Step:**
 - Lay the fabric flat on a surface.
 - Roll the fabric into a cylindrical shape.
 - Secure the roll with a band or clip if needed.



Fig. 2.1.43: Rolling folding

3. KonMari Folding:

- **Description:** KonMari folding involves folding the fabric into small rectangles that can be stood up in a drawer.
- **Use:** Ideal for storing clothing items like t-shirts and socks.
- **Benefits:** Helps prevent wrinkles, saves storage space, and maintains fabric quality.
- **Step-by-Step:**
 - Lay the fabric flat on a surface.
 - Fold the fabric into a small rectangle.
 - Stand the folded fabric up in a drawer.



Fig. 2.1.44: KonMari folding method

4. Military Folding:

- **Description:** Military folding involves folding fabric into a compact, rectangular shape with multiple folds.
- **Use:** Ideal for storing items like blankets and towels.
- **Benefits:** Helps prevent wrinkles, saves storage space, and maintains fabric quality.
- **Step-by-Step:**
 - Lay the fabric flat on a surface.
 - Fold the fabric into a compact shape with multiple folds.
 - Secure the folded fabric with a band or clip if needed.



Fig. 2.1.45: Military folding

5. Folding with a Board:

- **Description:** Folding with a board involves using a folding board to create crisp, sharp folds.
- **Use:** Ideal for folding items like dress shirts and pants.
- **Benefits:** Helps create crisp, sharp folds and saves storage space.
- **Step-by-Step:**
 - Place the fabric on a folding board.
 - Fold the fabric using the board as a guide.
 - Create crisp, sharp folds.



Fig. 2.1.46: Folding with a board

6. The "Bundle Fold":

- **Description:** The "bundle fold" involves folding fabric into a compact, cylindrical shape.
- **Use:** Often used for storing items like clothing and textiles.
- **Benefits:** Helps prevent wrinkles, saves storage space, and maintains fabric quality.
- **Step-by-Step:**
 - Lay the fabric flat on a surface.
 - Fold the fabric into a compact shape.
 - Roll the folded fabric into a cylindrical shape.



Fig. 2.1.47: Bundle fold method

7. The "File Fold"

- **Description:** The "file fold" involves folding fabric into a compact, rectangular shape.
- **Use:** Often used for storing items like clothing and accessories.
- **Benefits:** Helps prevent wrinkles, saves storage space, and maintains fabric quality.
- **Step-by-Step:**
 - Lay the fabric flat on a surface.
 - Fold the fabric into a compact shape.
 - Create a rectangular shape.



Fig. 2.1.48: File fold method

8. The "Wrap Fold":

- **Description:** The "wrap fold" involves folding fabric around an item, creating a compact, rectangular shape.
- **Use:** Often used for storing items like clothing, textiles, and gifts.
- **Benefits:** Helps prevent wrinkles, saves storage space, and maintains fabric quality.
- **Step-by-Step**
 - Lay the fabric flat on a surface, with one corner pointing up.
 - Place the item to be wrapped in the centre of the fabric.

- Fold the top corner of the fabric down over the item.
- Fold in the sides and then roll the fabric up to create a compact shape.
- Secure the wrap with a pin, clip, or tie if needed.



Fig. 2.1.49: Wrap fold

Significance of Fabric Folding in the Apparel Industry

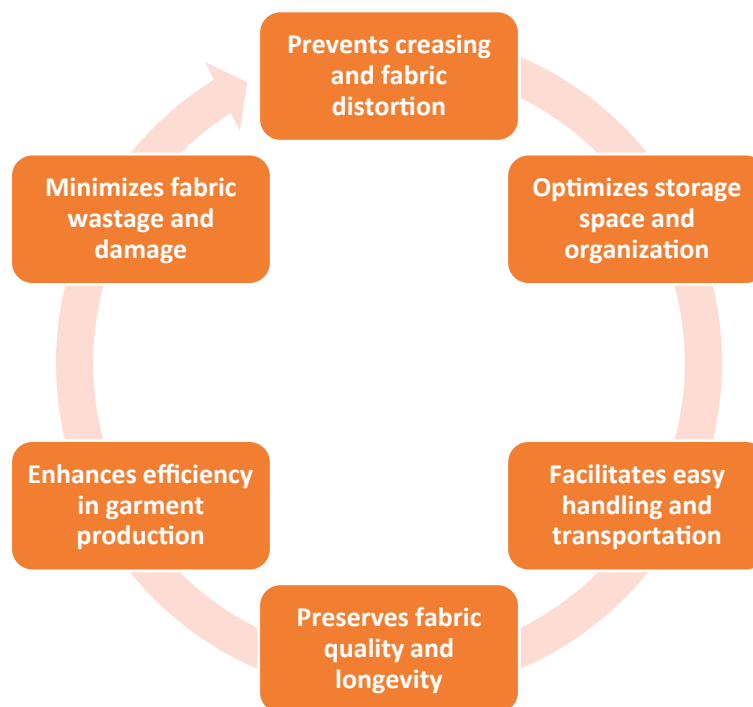


Fig. 2.1.50: Importance of fabric folding

1. Prevention of Creasing and Wrinkling

- Proper folding techniques help prevent creases, which can impact fabric quality and lead to defects in final garments.
- For example, silk and chiffon require careful book or box folding to maintain smoothness.

2. Optimised Storage and Space Utilisation

- Fabrics folded systematically occupy less space and can be stacked efficiently in warehouses and retail stores.
- Roll folding is common for bulk fabric storage in mills and export houses.

3. Ease of Transport and Handling

- Folded fabrics are easier to handle, reducing transportation costs and the risk of damage.
- Zigzag folding is preferred for quick fabric handling in mass garment production units.

4. Fabric Quality Maintenance

- Proper folding techniques reduce dust, moisture, and light exposure, preserving fabric quality over time.
- Box folding is often used for premium and high-end luxury textiles in India.

5. Improved Efficiency in Production

- Well-folded fabrics allow smooth and uninterrupted production, as workers can easily access and use the material.
- Roll-folded denim and synthetic fabrics are commonly used in denim manufacturing hubs like Tiruppur and Ahmedabad.

6. Minimising Waste and Damage

- Correct folding methods prevent unnecessary fabric wastage by reducing fraying, stretching, or tearing.
- Tube folding is used in hosiery and knitwear production to prevent fabric edges from fraying.

2.1.13 Basic Visual Inspection Procedures

Fabric is the heart of the apparel industry. Every piece of clothing, whether a simple cotton shirt or an intricate embroidered saree, starts with fabric selection. But before this fabric moves into cutting and stitching, it must be checked for quality. Imagine creating a beautiful garment, only to realise later that the fabric has holes, colour inconsistencies, or misaligned prints—this would lead to waste, rework, and financial loss. That's where fabric inspection comes in.

A layerman plays a crucial role in this process, acting as the first line of defence against fabric defects. The inspection is typically carried out under proper lighting conditions and with the aid of specific tools.

Preparation Checklist Before Inspection**Well-lit inspection area**

- Ensures defects are visible under proper lighting.

**Fabric inspection table**

- Provides a flat and stable surface for detailed examination.

**Measuring tape/ruler**

- Helps check fabric width, length, and alignment.


Magnifying glass

- Aids in detecting fine defects such as micro-slubs or broken yarns.


Marker or chalk

- Marks detected defects for further action.


Fabric swatch book

- Serves as a reference for quality and consistency.


Defect recording sheet or logbook

- Documents defects for further analysis.


Gloves (for delicate fabrics)

- Prevents contamination of sensitive materials like silk or chiffon.


Lint roller/brush

- Removes unwanted particles before inspection.

Fig. 2.1.51: Preparation checklist before inspection

Visual Inspection Procedures for Identifying Defects

Inspection Step	Description	Common Defects Identified
Surface Examination	Fabric is unrolled and examined under proper lighting for visible flaws.	Stains, holes, oil spots, fabric knots.
Fabric Transparency Check	Light is passed through the fabric to detect inconsistencies in weave or density.	Thin patches, uneven dyeing, transparency issues.
Tension Test	Fabric is stretched slightly to assess elasticity and detect hidden weak spots.	Weak yarns, broken threads, snags.
Grainline and Bowing Check	Fabric grain is examined to ensure proper alignment and avoid skewing.	Bowing, skewing, off-grain defects.
Selvage and Edge Inspection	Edges of the fabric roll are checked for fraying, misalignment, or rough finishing.	Selvage tear, fraying, edge curling.
Pattern and Print Analysis	For printed or woven designs, alignment and consistency are verified.	Misprint, pattern shift, double printing.
Fabric Feel and Texture Test	Fabric is touched and checked for uniform texture.	Uneven surface, rough patches, inconsistent weaving.

Inspection Step	Description	Common Defects Identified
Dye and Colour Consistency Check	Different sections of the fabric are compared for uniform dyeing.	Colour fading, uneven dyeing, shade variation.
Pilling and Abrasion Resistance Test	Fabric is rubbed gently to assess its resistance to pilling and wear.	Pilling, abrasion marks, loose fibres.
Defect Marking and Documentation	Any defects found are marked with chalk or stickers and recorded for further processing.	All identified defects are categorised for quality grading.

Table 2.1.15: Inspection procedures for identifying defects

2.1.14 Laying Up Allowance and its Significance

Every stage of apparel production—from fabric laying and cutting to stitching and finishing—depends on precise fabric usage to minimise waste and maximise efficiency. However, fabric is not always predictable; variations in texture, width, shrinkage, and handling techniques can lead to inconsistencies during production. To counter these challenges, manufacturers incorporate strategic allowances to ensure smooth operations and avoid fabric shortages. One such critical allowance in the apparel industry is laying up allowance.

What is Laying Up Allowance?

Laying up allowance refers to the extra fabric length added beyond the actual marker length to compensate for potential inconsistencies in the laying process. These inconsistencies may arise from fabric shrinkage, relaxation, misalignment, or end-of-lay fabric movement.

This allowance is usually measured in centimetres or inches, depending on fabric type and laying method. The amount of laying up allowance required depends on factors such as fabric elasticity, thickness, and the type of garment being produced. Laying up allowance is particularly important in bulk production, where minor errors can lead to significant fabric wastage, financial losses, and production delays.

Significance of Laying Up Allowance

Prevents Fabric Shortages	Ensures that there is enough material to accommodate errors, alignment issues, and shrinkage, reducing the risk of production delays.
Improves Cutting Accuracy	Provides extra fabric to correct any minor shifts or misalignments in layered fabric piles, leading to precise cutting and minimal errors.
Reduces Fabric Wastage	By accounting for expected losses beforehand, manufacturers can optimise material usage and reduce unnecessary wastage, leading to cost savings.
Enhances Efficiency in Production	Ensures that production continues smoothly without interruptions due to fabric shortages, ultimately improving workflow and productivity.
Essential for Different Fabric Types	Some fabrics, such as knits and delicate woven materials, require higher laying up allowances due to their tendency to stretch, shrink, or distort during the laying process.

Accommodates Fabric Faults and Defects

Allows room for adjustments if defects like stains, holes, or weaving faults are detected, ensuring that defective sections can be eliminated without affecting production.

Ensures Uniformity in Garments

Helps maintain consistency in fabric alignment and pattern placement, ensuring that the final garments meet quality standards and customer expectations.

Fig. 2.1.52: Significance of laying up allowance

Laying Up Allowance Considerations

Laying up allowance varies based on fabric type, manufacturing setup, and garment design. For example:

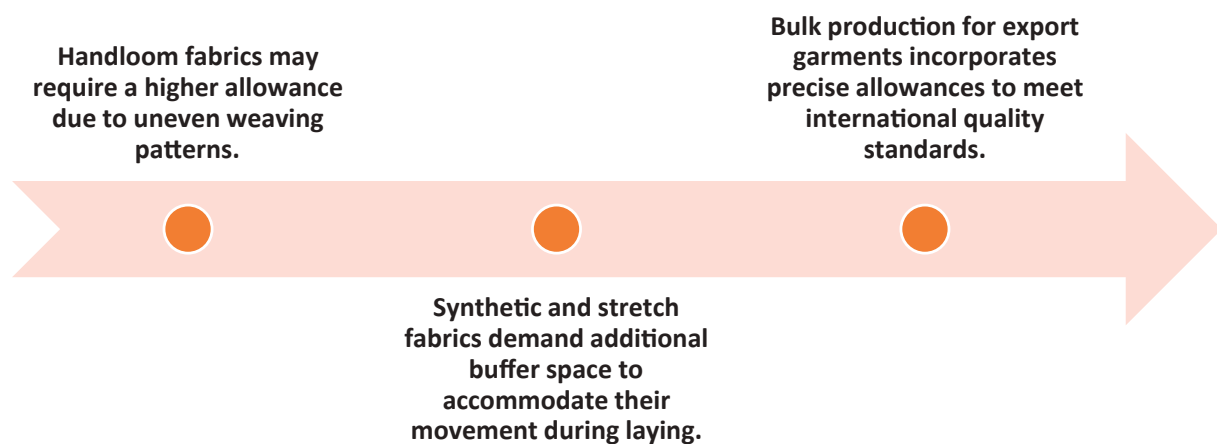


Fig. 2.1.53: Laying up allowance considerations

UNIT 2.2: Work Planning and Waste Management

Unit Objectives

By the end of this unit, the participants will be able to:

1. Review and discuss agreed-upon work targets with the supervisor, including any special instructions.
2. Analyse the importance of carrying out operations at a rate that maintains workflow and meets production targets.
3. Illustrate the process of straightening the fabric edge as per procedures.
4. Examine the metric system and its applications in fabric handling.
5. Explain procedures for minimising waste and their significance.
6. Discuss guidelines for proper storage and disposal of waste materials.
7. Conform to company quality standards in all fabric handling processes.

2.2.1 Coordinating with Supervisor to Complete Agreed-Upon Work Targets

A layerman (fabric) plays a crucial role in the early stages of garment manufacturing by preparing and laying fabric for cutting. This process directly impacts material utilisation, production timelines, and overall quality. To achieve optimal results, the layerman must review work targets with the supervisor and check for any special instructions before starting the fabric laying process. The layerman must coordinate closely with supervisors to align on daily targets, address specific fabric handling requirements, and implement necessary adjustments based on the type of fabric, order specifications, and cutting techniques. The procedure for reviewing work targets and checking special instructions is as follows:

1. Receiving Work Assignments from the Supervisor

- The supervisor provides the layerman with work targets based on the production schedule.
- These targets include the number of layers to be spread, fabric type, marker length, and cutting specifications.
- The layerman records these details in a work log or lay sheet for tracking purposes.

2. Understanding Special Instructions

- **Checking Fabric Specifications:** Special handling instructions may be given for delicate fabrics like silk, chiffon, or stretchable materials.
- **Marker Placement Requirements:** If a nap-up or nap-down marker is required, the supervisor will specify it.
- **Pattern Matching Guidelines:** Some orders, especially those involving prints and plaids, require precise pattern alignment.
- **Fabric Relaxation Instructions:** Certain fabrics, such as knits, require relaxation time before layering to avoid shrinkage.
- **Splicing and Waste Management:** Instructions may include splicing techniques to minimise fabric wastage.

3. Verifying Fabric Availability and Condition

- The layerman checks the fabric inventory to ensure the correct fabric type and quantity are available.
- A quick visual inspection is done to identify any major defects, such as stains or holes.
- If any issues are found, the layerman informs the supervisor before proceeding.

4. Confirming Equipment Readiness: The layerman ensures that:

- The fabric spreading table is clean and free of obstructions.
- The spreading machine (if used) is functioning properly.
- The cutting markers, numbering stickers, and measurement tools are available.
- Safety gear (if applicable) is in place.

5. Final Approval Before Starting Work

- After reviewing all work targets and special instructions, the layerman confirms with the supervisor before beginning the layering process.
- Any changes in the production plan or urgent order adjustments are discussed at this stage.
- The layerman may request clarifications to ensure accurate execution of the work.

2.2.2 Strategies to Ensure Efficient Operations and Meet Production Targets

With increasing demand from both domestic and international markets, garment manufacturers must operate at peak efficiency to meet strict deadlines and maintain quality standards. The production process involves multiple stages, from fabric selection and cutting to stitching and finishing, each requiring precision and coordination.

At the heart of this workflow is the layerman (fabric), a key professional responsible for preparing and laying fabric accurately before the cutting process begins. Any delay or inefficiency in this stage can disrupt the entire production cycle, leading to wasted fabric, production bottlenecks, and missed deadlines.

To ensure a smooth workflow and achieve production targets, layermen must follow structured procedures, use appropriate fabric-laying techniques, and coordinate effectively with other departments. Their ability to maintain speed, accuracy, and fabric integrity is essential for ensuring that garment factories operate efficiently and remain competitive in the fast-paced apparel sector.

The strategies to ensure efficient operations and meet production targets are as follows:

Technique	Features	Description
Planning and Preparation	Study production schedules	Understand production targets, deadlines, and workflows to plan fabric preparation and cutting activities accordingly.
	Prepare fabric table and other equipment	Make sure the table is clean and that the lighting is bright enough. Ensure that tools such as scissors and and roll stands to unwind fabrics are kept close by. Also, make sure to check that the automatic machines are in working condition.

Technique	Features	Description
	Prepare fabric requirements	Calculate fabric requirements for each style, taking into account fabric utilisation, shrinkage, and other factors (e.g., knits need relaxation time before laying).
	Maintain fabric inventory	Ensure that sufficient fabric stock is available to meet production demands.
	Use automated fabric cutting machines	Invest in automated fabric-cutting machines to increase efficiency and accuracy.
Reducing Wastage and Handling Fabric Efficiently	Minimise End Loss	The fabric should be laid to match marker length precisely to reduce waste.
	Use Proper Splicing Techniques	Joining fabric pieces seamlessly avoids material wastage and ensures pattern consistency.
	Ensure Marker Accuracy	Lay markers must be aligned with minimal deviation to prevent cutting errors.
	Monitor Fabric Quality	Regular checks for holes, slubs, and weaving defects prevent the rejection of garments later.
Coordinating with Cutting and Stitching Teams	Align Laying Speed with Cutting Operations	If fabric is laid too slowly, cutting teams will be delayed, affecting the entire production process.
	Communicate with Stitching Units	Understanding their fabric needs can avoid bottlenecks and ensure continuous workflow.
	Adjust to Urgent Orders	Sometimes, certain fabric layers must be prioritised; being flexible helps meet urgent production deadlines.
Maintaining Work Speed Without Compromising Quality	Set Time Limits for Each Layering Task	Keeping track of time ensures that the required output is met.
	Use Checklists to Avoid Rework	Quickly verifying fabric alignment and defects can prevent errors that lead to production delays.
	Adapt to New Technologies	Learning to operate automated fabric-laying machines boosts efficiency and maintains consistency.

Technique	Features	Description
Following Safety and Compliance Guidelines	Avoid Fabric Tension Issues	Incorrect laying can cause stretching or shrinkage, leading to defects in final garments.
	Ergonomic Work Practices	Standing for long hours and improper lifting can lead to fatigue; proper posture and breaks enhance efficiency.
	Follow Company Regulations	Compliance with workplace standards ensures smooth inspections and uninterrupted workflow.

Table 2.2.1: Strategies to ensure efficient operations

2.2.3 Process of Straightening the Fabric Edge

Fabric is typically supplied in rolls or bales, and due to handling, transportation, or inherent fabric properties, it may develop distortions such as curling, bowing, or skewing. If not corrected before cutting, these irregularities can result in defects in the final garment, leading to fabric wastage, shape distortion, or misaligned patterns. Hence, straightening the fabric edge is an essential preparatory step that ensures accurate cutting and minimal material loss.

In India, where the apparel industry is diverse—ranging from small-scale tailoring units to large export-oriented garment factories—the process of fabric edge straightening is often a combination of manual expertise and mechanical precision. The layerman (fabric) plays a pivotal role in this process, ensuring that the fabric is perfectly aligned to optimise production efficiency.

Typically, the fabric does not arrive perfectly aligned and straight from the store. When fabric is woven, knitted, dyed, or printed, tension is applied. The yarns' positions may shift during these procedures, causing the fabric to become unbalanced. A garment's drape will be incorrect if it is cut and stitched with yarn that is not straight. Thus, it's crucial to ensure the yarn is positioned correctly before cutting. The term "straightening" refers to repositioning the displaced yarns. At right angles, the yarns must interlace.

What is Meant by Fabric Edge Straightening?

Straightening the fabric edge refers to properly aligning the fabric's edges before cutting, stitching, or further processing to ensure precision and quality in garment production. This step is crucial in textile and apparel manufacturing as it prevents misalignment, fabric distortion, and unnecessary wastage.

When fabric is rolled, stored, or transported, it may develop uneven edges due to fraying, skewing, or bowing. Before fabric layering and cutting, the edges must be straightened so that the grain of the fabric aligns correctly with the cutting patterns. This ensures the final garment has the intended shape, fit, and durability.

Why is Fabric Edge Straightening Important?

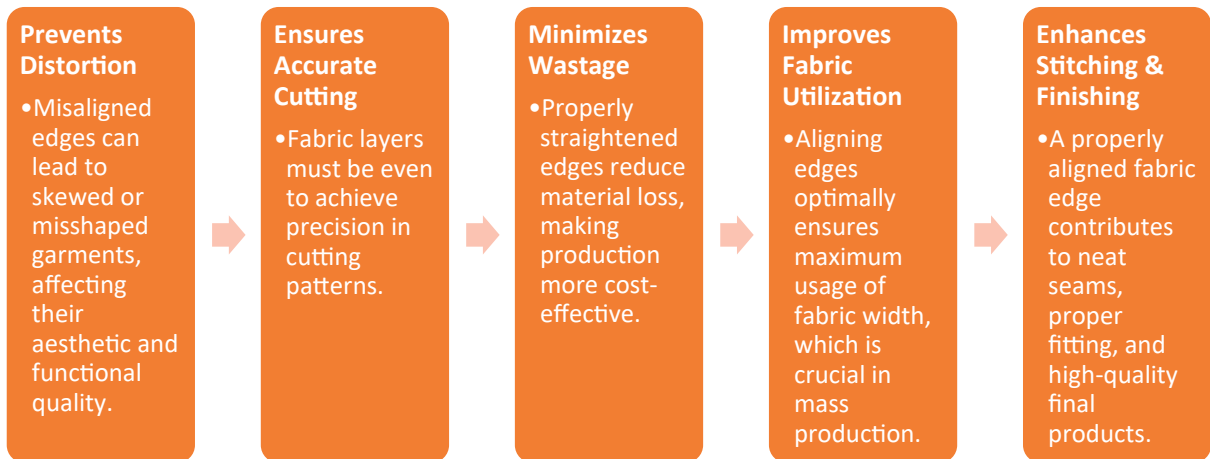


Fig. 2.2.1: Importance of fabric edge straightening

Structure of Woven Fabrics

Before starting the process, it is essential to understand the structure of woven fabrics is based on three fundamental components: warp, weft, and selvage.

Component	Definition	Characteristics	Importance	Example
Warp	The longitudinal (lengthwise) yarns run parallel to the fabric's selvage.	Stretched tightly on a loom during weaving.	Determines fabric strength and structure.	In Banarasi silk, the warp threads are often made of fine silk or zari (gold/silver threads) to create intricate patterns.
		More durable and less stretchable than weft.	Used for aligning patterns in garment making.	
		Often finer and stronger as they bear the weaving tension.		
Weft (Woof or Filling Yarn)	The Horizontal (width-wise) yarns that interlace with the warp threads in weaving.	Looser than warp, allowing more flexibility and stretch.	Adds softness and flexibility to the fabric.	In Chanderi fabric, cotton warp is combined with silk or zari weft to create a lightweight, glossy texture.
		It can be thicker or decorative, adding texture or design.	Determines fabric drape and appearance.	

Component	Definition	Characteristics	Importance	Example
Selvage (Selvedge)	The finished edge of the fabric prevents fraying and unravelling.	Stronger and tighter than the rest of the fabric.	Prevents fabric from fraying.	Many traditional Indian handloom fabrics, like Kanjeevaram silk, have intricately woven golden selvages that enhance their authenticity and beauty.
		It can have markings, brand names, or different colours for identification.	Helps in identifying the fabric grain direction for proper cutting.	
Grain	The direction of threads in woven fabric is based on warp and weft placement.	Includes straight grain, cross-grain, and bias grain.	Determines how the fabric drapes and stretches.	Traditional handloom cotton sarees require precise grain alignment for draping.
		Proper alignment ensures garment durability.	Ensures accurate pattern placement in garment making.	
True Bias	A diagonal direction at 45° to the warp and weft.	Offers maximum stretch and flexibility.	Important for bias-cut garments.	Bias-cut lehengas and sarees drape beautifully due to the natural stretch of the true bias.
		Used for creating flowy, draped designs.	Helps in contouring to body shape.	

Table 2.2.2: Structure of woven fabrics

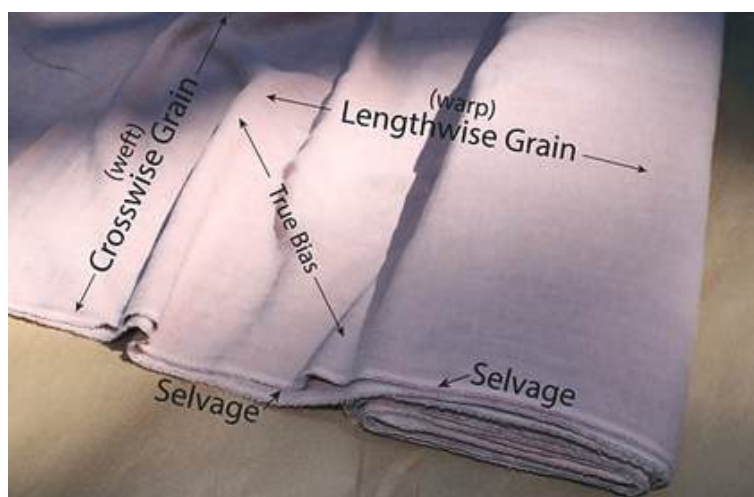


Fig. 2.2.2: Structure of woven fabrics

Process of Straightening Fabric Edges

- 1. Inspect the fabric:** Firstly, place the cloth on a large table, push with your fingertips, and smooth out any creases to see if it is straight. The fabric should be folded lengthwise. The fabric is considered straight if the raw edges meet the table's ends and the two selvages evenly meet the table's side. Straighten the fabric if not.
- 2. Tearing the fabric:** The fabric should be folded in half lengthwise, ensuring that the selvages are aligned flush with each other. It is likely that the cut edges will appear slightly uneven and may not match up perfectly. A small snip should be made a few centimetres from the edge near one of the cut edges. The fabric can then be ripped across its width, which will help establish a straight grain line. Any loose threads should be removed to achieve a clean edge. The fabric should then be folded again, aligning the selvages and cut edges. When properly aligned, the fabric should lay flat without any wrinkles. If wrinkles or misalignment persist, the fabric is still off-grain and requires further adjustment.



Inspect and fold the fabric half lengthwise



Snip the edge



Cut any loose threads



Fold the fabric again aligning both the selvages and cut edges

Fig. 2.2.3: Method to snip the edge of the fabric

- 3. Pulling a thread:** Some fabrics do not tear easily. In such cases, a thread can be pulled out to create a guideline for cutting. Near one cut end, a small snip should be made to locate a single thread across the fabric's width. This thread should then be carefully pulled out along the entire width. If the thread does not come out smoothly in one attempt, it may bunch up slightly. In such instances, it should be gently pulled every few inches, creating a visible guideline. The fabric can then be cut along this line until the opposite edge is reached.

Removing a single thread in this manner helps establish a straight reference line across the fabric. This line can then be used as a guide to cut precisely across the width.

Once the fabric has been cut, it should be folded lengthwise again, aligning the selvages. If the fabric does not align properly, the stretching method can be used to correct any distortion.



Pull a thread



Cut across the fabric

Fig. 2.2.4: Method to pull the thread

4. **Stretching:** Another approach to consider if ripping or pulling a thread is unsuccessful is to stretch the fabric. The fabric should be folded in half with the selvages aligned once again. If the grain is misaligned, one of the corners will appear shorter. Holding the shorter corner in one hand and the opposite corner in the other, the fabric should be gently stretched along the bias. It should then be folded in half again to check if the edges are aligned. This process can be repeated until proper alignment is achieved; however, caution must be exercised to avoid excessive stretching, as it may distort any printed patterns on the fabric.



Fig. 2.2.5: Method to stretch fabric

5. **Ironing:** If the fabric is still not aligning properly, ironing can be attempted. The selvages and cut edges at one end should be pinned together. Using the steam setting on an iron, the fabric should be pressed starting from the selvage edge while gently pushing it towards the fold. In some cases, pulling the fabric on the bias in the required direction may be necessary to straighten it. This process of pulling and pressing should continue until the entire length of the fabric is aligned.



Fig. 2.2.6: Method to iron the fabric

2.2.4 Metric System and its Applications in Fabric Handling

Precision and accuracy are fundamental in the textile and garment industry, where even a small miscalculation in fabric handling can lead to defects, material wastage, and production inefficiencies. From measuring fabric rolls to ensuring perfect alignment during layering, every step in fabric preparation requires a standardised and reliable measurement system. This is where the metric system plays a crucial role. Fabric handlers, particularly layermen (fabric), rely on the metric system to ensure correct fabric lengths, weights, and alignments before cutting and sewing. Understanding and applying metric measurements improves efficiency and ensures high-quality production, reducing errors and optimising resource utilisation.

Metric System Unit	Definition	Applications in Fabric Handling
Meter (m)	Unit of length	Measuring fabric width, length, and yardage
Gram (g)	Unit of weight	Measuring fabric weight, density, and yarn count
Square Meter (m²)	Unit of area	Calculating fabric coverage and consumption
Kilogram (kg)	Unit of weight (1,000 g)	Measuring large quantities of fabric
Millimeter (mm)	Unit of length (1/1,000 m)	Measuring fabric thickness and yarn diameter
Grams per Square Meter (g/m²)	Unit of fabric density	Determining fabric weight, thickness, and suitability for specific applications
Threads per Centimeter (tp/cm)	Unit of fabric weave density	Measuring fabric weave density and quality
Denier (den)	Unit of yarn weight	Measuring yarn weight and thickness
Tex (tex)	Unit of yarn weight	Measuring yarn weight and thickness

Table 2.2.3: Applications of the metric system

How the Metric System Helps the Layerman (Fabric)

1. Enhances Accuracy and Precision

- Fabric lengths and widths are measured in metres and centimetres, ensuring that the required amount of fabric is used without excess wastage.
- Helps in precise fabric layering by aligning layers based on accurate measurements.

2. Standardisation Across Orders

- The GSM measurement allows a layerman to differentiate between different types of fabric and adjust handling techniques accordingly.
- The use of kilograms for fabric rolls ensures correct weight measurement for bulk handling.

3. Reduces Material Wastage

- Accurate measurement of fabric in square metres helps calculate material consumption efficiently.
- Prevents errors in cutting and ensures economical fabric usage.

4. Ensures Consistency in Fabric Handling

- Fabric tension, measured in Newtons (N), ensures proper laying techniques are followed to prevent stretching or misalignment.
- Helps in following standardised industrial procedures while layering different types of fabric.

5. Improves Work Efficiency

- Since the metric system is decimal-based, calculations are simple and quick, allowing a layerman to complete tasks more efficiently.
- Ensures that fabric is measured, aligned, and prepared correctly for smooth workflow in garment production.

6. Assists in Quality Control

- Using the metric system for defect detection, a layerman can check fabric consistency and identify issues such as fabric bowing, off-grain alignment, or incorrect length before cutting.

2.2.5 Proper Disposal of Waste Materials

India's textile and apparel industry is one of the largest in the world, contributing significantly to the economy through exports, employment, and domestic consumption. However, fabric waste management has become a crucial concern with large-scale fabric production and garment manufacturing. Efficient fabric handling ensures manufacturers minimise waste, optimise costs, and maintain sustainability standards.

Even a slight miscalculation in layering, cutting, or handling can lead to substantial material wastage in fabric processing. Since fabric accounts for nearly 60-70% of the total garment production cost (as reported by the Textile Value Chain), reducing waste becomes a priority for manufacturers. Poor fabric utilisation leads to financial losses and has a negative environmental impact, increasing textile landfill waste and pollution.

Layermen (fabric), responsible for laying, handling, and preparation, play a key role in minimising material wastage. Following structured procedures, ensuring accurate marker planning, and carefully handling fabric defects can significantly enhance fabric efficiency and reduce unnecessary losses.

How Waste is Generated in Fabric Handling

Fabric waste is formed due to several reasons:

Cutting Errors

- Mistakes in marker layout, improper alignment, or incorrect measurements can lead to unnecessary fabric loss.

Fabric Defects

- Holes, stains, and weaving faults can render sections of the fabric unusable.

Improper Marker Placement

- Inefficient marker arrangements result in excessive gaps and fabric loss.

End Bits and Off-Cuts

- Small, irregular fabric pieces left over after cutting are often discarded as waste.

Selvage Waste

- The selvage edge of the fabric, which may be too thick or unsuitable for stitching, is typically removed.

Splicing Errors

- Poor handling of spliced fabric pieces leads to wastage.

Improper Fabric Utilization

- Incorrect layering or folding techniques can cause misalignment and excessive consumption of material.

Fig. 2.2.7: Causes of fabric wastage



Fig. 2.2.8: Fabric waste

Procedures for Minimising Waste in Fabric Handling

Procedure	Characteristics	Key Measures
Accurate Fabric Measurement	Incorrect fabric measurements lead to excess fabric usage or shortages, resulting in waste or production delays.	Measure fabric precisely using calibrated measuring tapes or digital fabric meters.
		Use the metric system (meters, grams, or centimetres) to ensure accuracy in measurement and standardisation across production units.
		Verify the width and length of fabric rolls before cutting to avoid miscalculations.
		Account for fabric shrinkage before making cuts to prevent excess fabric loss.
		Record all fabric measurements systematically to track usage and improve efficiency.
Optimised Fabric Layout	Poor layout can lead to excessive fabric wastage, inefficient pattern placement, and production inconsistencies.	Use computer-aided design (CAD) software to generate precise fabric layouts, reducing human errors in planning.
		Arrange fabric markers (templates for cutting) to ensure minimal gaps between pattern pieces.
		Align pattern pieces correctly based on fabric grain and nap direction to avoid distortion or misalignment.
		Utilise layered cutting techniques to maximise fabric efficiency, especially for bulk production.

Procedure	Characteristics	Key Measures
		If manual planning is used, employ techniques like block fusing and tight-fit pattern placement to reduce excess material wastage.
Efficient Cutting Techniques	Improper cutting can lead to excessive off-cuts, fabric damage, and misaligned pieces, which increase waste.	Choose the right cutting method depending on fabric type: • Straight cutting: Used for woven fabrics to minimise fraying. • Bias cutting: Ensures flexibility for stretchable fabrics and reduces material waste. • Marker making: Helps in systematically arranging patterns for cutting efficiency.
		Ensure the cutting equipment is sharp and well-maintained to achieve clean edges and minimise fabric fraying.
		Reduce the number of unnecessary cuts by following precise cutting guidelines and marker layouts.
		Implement splicing techniques where necessary to join fabric sections efficiently without excessive waste.
Fabric Scrap Management	Fabric scraps and off-cuts can contribute significantly to industrial waste if not managed properly.	Sort and categorise fabric scraps based on type, size, weight, and colour.
		Reuse viable fabric pieces for: • Interlining: Reinforcing inner layers of garments. • Insulation materials: Used in upholstery and industrial applications. • Crafting and patchwork: Repurposed for smaller textile items like accessories or home decor.
		Implement fabric recycling programs in collaboration with textile waste management companies.
		Properly dispose of non-reusable scraps following sustainable waste management guidelines.

Procedure	Characteristics	Key Measures
Regular Inventory Management	Mismanaged fabric inventory leads to over-purchasing, fabric deterioration, and inefficient storage, all of which contribute to wastage.	Conduct frequent inventory checks to assess fabric stocks and usage trends.
		Identify leftover and excess fabric that can be repurposed for new production runs.
		Monitor fabric quality to detect defects early before they lead to unusable waste.
		Optimise storage conditions to prevent fabric damage due to moisture, dust, or improper handling.
		Adjust fabric ordering and production plans based on demand forecasts and inventory levels.

Table 2.2.4: Procedures for minimising waste

Significance of Waste Minimisation in Fabric Handling

- **Cost Reduction** : Fabric is one of the most expensive raw materials in garment production. Reducing waste directly lowers material costs.
- **Improved Efficiency** : Optimised fabric usage speeds up production and minimises time spent handling excess waste.
- **Environmental Sustainability** : Waste reduction contributes to sustainable practices by decreasing textile landfill waste and conserving resources.
- **Higher Profit Margins** : Less fabric wastage means more garments produced per roll of fabric, leading to higher revenue.
- **Better Quality Control** : Ensuring accurate layering and cutting minimises defects, improving final product quality.
- **Compliance with Industry Standards** : Many brands and manufacturers follow zero-waste or sustainable fashion policies, making waste minimisation an essential practice.

2.2.6 Storage and Disposal of Waste Materials

The Indian textile industry is one of the largest in the world, contributing significantly to employment and economic growth. However, with its vast scale of production, it also generates substantial amounts of waste, including fabric scraps, chemical residues, plastic packaging, and dust particles. If not managed properly, this waste can lead to serious environmental hazards, health risks for workers, and non-compliance with government regulations.

Understanding proper waste disposal methods is crucial for layermen (fabric), who are responsible for handling and preparing fabrics in textile manufacturing units. Responsible waste management contributes to a cleaner and safer workplace.

Types of Waste Generated in Fabric Handling

Before implementing disposal guidelines, it is essential to understand the types of waste generated during fabric handling:



Fabric Scraps and Cuttings

- Leftover pieces from fabric rolls, cutting operations, and defective fabrics.



Paper and Cardboard Waste

- Used for packaging, labels, invoices, and pattern sheets.



Plastic and Packaging Materials

- Includes polybags, plastic wraps, and synthetic packing materials.



Hazardous Waste

- Chemicals used for fabric treatment, dyes, adhesives, and synthetic coatings.



Dust and Lint

- Fine fabric particles generated during fabric handling, cutting, and storage.

Fig. 2.2.8: Types of waste generated in fabric handling

1. **Classification and Segregation of Waste Materials:** Proper waste management begins with effective segregation to ensure that different types of waste are stored separately, facilitating appropriate disposal or recycling. Waste materials should be classified into the following categories:



Fabric Waste

- **Fabric Scraps:** Small pieces of fabric leftover from cutting or trimming processes.
- **Defective Fabric:** Materials with quality issues such as stains, incorrect dyeing, or weaving defects.
- **Offcuts and Trimmings:** Leftover edges from fabric cutting, which may still be reusable.



Paper and Packaging Waste

- **Cardboard Boxes:** Used for packaging fabric rolls and garment shipments.
- **Labels and Tags:** Waste generated from garment labeling and branding.
- **Instruction Manuals and Paper Waste:** Documents related to fabric handling that may need proper disposal.



Plastic and Synthetic Waste

- **Plastic Wraps and Bags:** Used in packaging and storing fabric rolls.
- **Synthetic Threads and Fibers:** Leftover material from fabric processing and stitching.



Hazardous Waste

- **Chemical Residues:** Includes dye, adhesives, and chemical treatments used in fabric processing.
- **Oil and Grease Waste:** From machinery used in fabric handling.
- **Flammable Materials:** Certain synthetic fibers and chemical-treated fabrics pose a fire hazard.

Fig. 2.2.9: Segregation of waste materials

Waste materials should be sorted at the source to facilitate proper disposal. Clearly marked bins should be provided for different categories:

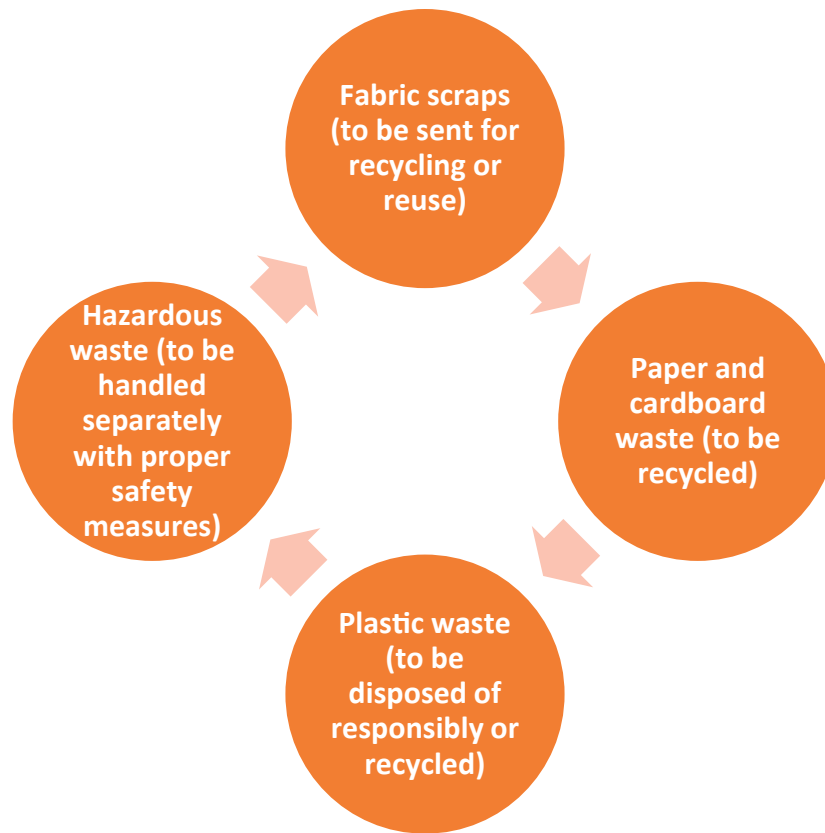


Fig. 2.2.10: Different categories of waste materials

2. Designated Storage Areas for Waste Materials: To maintain an organised and efficient workspace, waste materials should be stored in designated areas. Key factors to consider when setting up storage spaces include:

Clearly Marked Storage Zones	Accessibility and Safety Considerations	Protection from Environmental Factors
•Assign separate, clearly labeled storage bins for different types of waste. •Use color-coded bins or labels to differentiate fabric scraps, hazardous waste, and recyclables.	•Storage areas should be located in easily accessible yet non-obstructive zones within the facility. •Hazardous waste storage should be positioned away from workstations and high-traffic areas to minimize health risks. •Fire exits and emergency routes should remain unobstructed by waste storage areas.	•Weather Protection: Waste storage should be in a covered area to prevent damage from rain, dust, or sunlight. •Pest Control: Fabric scraps and paper waste attract rodents and insects; proper sealing of bins is essential. •Ventilation: Chemical waste storage areas should have proper ventilation to prevent harmful fumes from accumulating.

Fig. 2.2.11 : Designated storage areas for waste materials

3. Proper Containers and Treatment for Waste: Different types of waste require appropriate storage containers to ensure safety and facilitate handling.



Fabric and Paper Waste Storage

- Use large bins with lids to collect fabric scraps and paper waste to prevent scattering.
- Stackable storage containers can save space and make waste organization easier.
- Recyclable materials should be stored in separate bins designated for reuse.



Hazardous Waste Storage

- **Leak-Proof Containers:** Chemical waste and flammable materials should be stored in sealed, non-reactive containers.
- **Labeling:** Hazardous waste containers must be clearly marked with warning signs and instructions for handling.
- **Spill Prevention:** Secondary containment systems, such as drip trays, should be used to catch accidental spills.



Plastic and Synthetic Waste Storage

- Large, clear bags should be used for storing plastic waste to ensure visibility and prevent mix-ups.
- Synthetic fibers should be bundled securely to prevent them from dispersing in the workspace.



Treatment of Liquid Waste:

- Factories using dyes and chemicals should have effluent treatment plants (ETPs) to treat wastewater before disposal.
- Strict compliance with the Water (Prevention and Control of Pollution) Act, 1974 is necessary to avoid environmental damage.

Fig. 2.2.12: Designated storage areas for waste materials

4. Proper Containers and Treatment for Waste: Different types of waste require appropriate storage containers to ensure safety and facilitate handling.

Scheduled Waste Removal

- Implement a waste disposal schedule to prevent waste accumulation and ensure a clean workspace.
- Assign workers responsible for overseeing waste storage and removal.

Pest and Fire Prevention

- Conduct regular pest control measures to prevent infestations in fabric waste storage areas.
- Keep flammable waste materials away from heat sources and install fire extinguishers in storage areas.

Monitoring and Compliance

- Conduct routine inspections to ensure proper segregation and adherence to storage guidelines.
- Train workers on waste storage protocols to improve compliance and efficiency.

Fig. 2.2.13: Proper containers for waste storage

5. Disposal of Fabric Waste: Fabric waste forms a significant portion of textile waste and must be managed efficiently:

- **Recycling:**
 - Cotton, polyester, and woollen fabric scraps can be recycled into new textiles or insulation materials.
 - Industries can collaborate with fabric recycling units or NGOs that repurpose textile waste.



Fig. 2.2.14: Fabric recycling NGOs

- **Upcycling and Repurposing:**
 - Large fabric scraps can be used for making accessories like bags, quilts, or home décor.
 - Apparel manufacturers can incorporate waste fabrics into new designs to promote sustainable fashion.
- **Disposal through Authorised Waste Collectors:**
 - Textile industries should partner with government-approved waste management agencies to safely dispose of non-recyclable fabric waste.

6. Disposal of Packaging Waste:

- **Paper and Cardboard:**
 - Paper and cardboard boxes should be flattened and sent for recycling.
 - Paper waste should not be mixed with food or chemical waste to maintain recyclability.
- **Plastic Packaging and Polybags:**
 - Single-use plastics should be minimised, and biodegradable alternatives should be encouraged.
 - Plastic waste should be collected and sent to recycling facilities instead of being dumped in landfills.

Here is a list of alternatives instead of plastic:



Cotton



Jute



Newspaper



Nylon



Banana fibre

Fig. 2.2.15: Alternatives to plastic

7. Disposal of Dust and Lint: Dust and lint, though small in volume, can cause respiratory hazards and fire risks. Proper disposal includes:

- **Using Dust Collection Systems:** Installing vacuum or filter-based dust collection systems in fabric handling areas.



Fig. 2.2.16: Dust collection systems

- **Regular Cleaning and Safe Disposal:** Collecting and disposing of fabric dust in covered bins to prevent airborne contamination.
- **Avoiding Open-Air Disposal:** Lint should never be discarded in open areas, as it contributes to air pollution.

8. Compliance with Indian Regulations for Waste Storage: In India, textile and apparel industries must comply with government regulations for waste management. Some key regulations include:



Fig. 2.2.17: Indian regulations for waste storage

2.2.7 Methods to Conform to Company Quality Standards

Maintaining high-quality standards ensures that the final product meets customer expectations and industry regulations. Fabric handling is a critical stage in the production process, as even minor inconsistencies or defects can lead to significant losses, delays, and rework. Proper fabric management, including inspection, laying, cutting, and storage, directly impacts the efficiency of production and the quality of finished garments.

Companies establish stringent quality control measures to handle every fabric roll precisely. Layermen (fabric) must know and adhere to these standardised procedures and best practices, which are vital to minimising errors, reducing fabric wastage, and optimising workflow. The following methods help in achieving these objectives:

Methods	Description
Understand Company Quality Standards	Familiarise yourself with the company's quality policy and procedures.
	Understand the quality standards for fabric handling, storage, and transportation.
Inspect Fabrics Before Handling	Conduct thorough visual inspections to identify defects such as slubs, holes, knots, or stains.
	Verify fabric weight, width, and length against the invoice or delivery challan.
	Mark defective areas and report them to supervisors before proceeding with the laying process.
Ensuring Correct Fabric Relaxation	Allow fabric to relax for a specified duration (typically 24-48 hours) to prevent shrinkage or distortion after cutting.
	Follow relaxation guidelines based on fabric type (knits require more relaxation time than woven fabrics).
Accurate Fabric Measurement	Use accurate measuring tools, such as tape measures or electronic measuring devices.
	Measure fabrics in accordance with the company's measurement procedures.
Adhering to Marker Placement Guidelines	Follow company-approved marker layouts to optimise fabric utilisation and reduce waste.
	Use computerised marker-making systems where available, ensuring precise alignment and minimal wastage.
Implementing Correct Fabric Laying Techniques	Maintain consistency in fabric tension to avoid puckering or stretching.
	Ensure proper alignment by matching warp, weft, and grain lines during fabric laying.
	Use appropriate laying methods (single-ply, zig-zag, stepped, or tubular layering) as per fabric requirements.

Methods	Description
Use Standardised Cutting Techniques	Use efficient cutting techniques, such as straight cutting or bias cutting.
	Ensure precision in manual or automated cutting to maintain consistency in fabric panels.
	Minimise fabric waste by optimising cutting layouts.
Proper Fabric Handling and Transportation	Handle fabrics carefully to prevent damage, creasing, or stretching.
	Use proper transportation methods, such as fabric rolls or bags, to prevent fabric damage.
Proper Fabric Storage	Store fabrics in a clean, dry, and well-ventilated area to avoid contamination.
	Follow stacking guidelines to prevent fabric distortion or creasing.
	Use proper storage racks, shelves, or bins to prevent fabric damage or creasing.
Maintaining Proper Documentation and Reporting	Record fabric issuance, defects, and consumption details accurately in company logbooks.
	Report any irregularities or quality concerns to the production supervisor immediately.
Regular Quality Checks	Conduct regular quality checks on fabrics during handling, storage, and transportation.
	Identify and address any quality issues promptly.
Maintain Cleanliness and Hygiene	Maintain a clean and hygienic work environment.
	Ensure that all equipment and tools are clean and well-maintained.
	Wear appropriate protective gear (gloves, masks) while handling delicate or chemically treated fabrics.

Table 2.2.5: Methods to conform to company quality standards

UNIT 2.3: Equipment Handling and Maintenance

Unit Objectives

By the end of this unit, the participants will be able to:

1. List the equipments used in fabric laying.
2. Explain the manufacturer's instructions for setting up, adjusting, and operating equipment.
3. Illustrate the process of setting up a fabric laying-up machine as per operating procedures.
4. Discuss the importance of ensuring that the fabric roll is loaded onto the laying table as per standard procedures.
5. Analyse the significance of levelling fabric according to process requirements.
6. Identify methods to prevent fabric damage during movement and handling.
7. Examine the procedures for placing markers on the laying table correctly.

2.3.1 Equipment Used in Fabric Laying

A well-executed fabric laying process ensures that the material remains free from distortions, wrinkles, and misalignments, which can affect the accuracy of cutting and stitching. To achieve precision and consistency, layermen (fabric) rely on specialised equipment that helps streamline the laying process while minimising fabric wastage and errors. These tools range from basic manual instruments to advanced automated machines, each serving a specific function in ensuring the smooth handling of fabric before cutting.



Fabric Spreading Table: A long, smooth table designed for spreading fabric evenly.



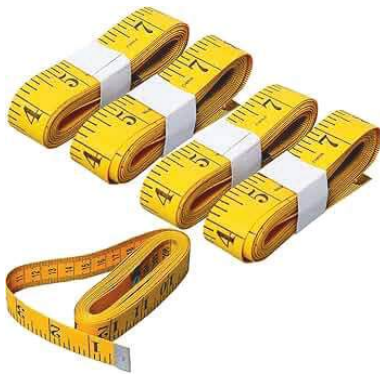
Roll Stand: Helps to unwind fabric for easy spreading.



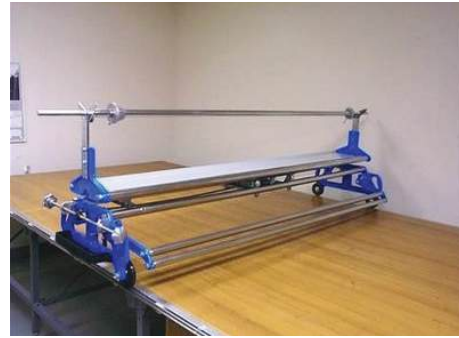
Fabric Scissor: Used for cutting threads or fabric manually.



Rotary Cutter: A tool used to cut through fabric with precision.



Measuring Tools (Scales, Tape Measures): Standard tools for checking fabric width and length.



Manual Spreader: A handheld tool for manually spreading fabric layers, useful for small-scale or intricate fabric laying.



Tension Control Device: Attached to fabric laying machines to control tension and prevent fabric stretching or distortion during spreading.



Weight Bars or Clamps: Heavy bars or clamps are placed on fabric layers to prevent shifting during the laying process.



Markers and Templates: Pre-designed patterns placed on fabric layers to guide cutting accuracy and minimise fabric wastage.



Laser Cutting Machine: A high-precision machine used for cutting fabric.



Spreading Machine: An automatic machine used to lay and cut fabric efficiently.



Label Applicator: Used for applying labels to fabric layers for identification and tracking.



Yarn: Required for bundling and securing fabric layers.



Lights and Electricity: Essential for ensuring accuracy and efficiency in fabric handling operations.

Fig. 2.3.1: Equipment used in fabric laying

2.3.2 Maintenance of Equipment According to Manufacturer's Instructions

The efficiency and longevity of fabric-handling equipment depend on proper maintenance. Layermen (fabric) work with various machines and tools, such as fabric spreading machines, cutting tables, vacuum tables, and measuring tools. As per the manufacturer's specifications, regular maintenance is essential to ensure these machines function smoothly, prevent breakdowns, and maintain fabric quality. Failure to follow proper maintenance procedures can lead to costly repairs, production delays, and safety hazards.

1. Routine Cleaning and Lubrication

- Regular cleaning of fabric-cutting and spreading machines prevents dust and lint build-up, ensuring smooth operation.
- Lubrication of moving parts (as specified in the equipment manual) reduces friction and wear, preventing mechanical failure.

2. Alignment and Calibration

- Machines such as automated fabric spreaders and cutting machines require periodic alignment checks to ensure precision.
- Calibration should be done per the manufacturer's recommended schedule to maintain fabric laying and cutting accuracy.

3. Electrical and Mechanical Inspections

- Check electrical connections, wiring, and control panels for any loose or damaged parts.
- Inspect mechanical components, such as gears and rollers, for signs of wear and replace them as needed.

4. Replacement of Worn-Out Parts

- Manufacturers provide guidelines on the lifespan of machine components, such as blades, belts, and motors.
- Timely replacement of worn-out parts prevents unexpected breakdowns and ensures consistent performance.

5. Software and Firmware Updates (for Automated Machines)

- Manufacturers often release updates for digitally controlled fabric spreading and cutting machines to enhance efficiency and accuracy.
- Layermen should ensure that software and firmware are updated as the manufacturer recommends.

6. Storage and Handling Precautions

- Proper storage of tools and equipment in dust-free and moisture-free environments extends their lifespan.
- Avoid exposure to extreme temperatures and humidity, as they may affect the performance of machines.

7. Safety Checks and Compliance

- Regularly inspecting emergency stop mechanisms, guards, and safety sensors helps prevent workplace accidents.
- Adherence to safety protocols as specified in the manufacturer's manual ensures a safe working environment.

8. Documentation and Maintenance Records

- Maintain logs for routine maintenance, repairs, and part replacements to track equipment performance.
- Keeping records helps identify recurring issues and schedule preventive maintenance accordingly.

2.3.3 Setting Up the Fabric Laying Up Machine

Precision in fabric handling is crucial to maintaining quality and efficiency. Before the cutting process begins, fabrics must be laid out systematically to ensure they are free from wrinkles, distortions, or tension issues that could affect garment construction. A well-organised fabric laying process minimises material wastage, improves production efficiency, and maintains fabric integrity.

What is a Fabric Laying Up Machine?

A fabric laying-up machine is a specialised piece of equipment used in the textile and garment industry to spread fabric layers evenly before the cutting process. It is designed to ensure that the fabric is laid smoothly, without tension, wrinkles, or distortions, allowing for precise cutting and minimal material wastage. These machines are commonly used in mass garment production, where consistency and efficiency are crucial.

Functions of a Fabric Laying Up Machine

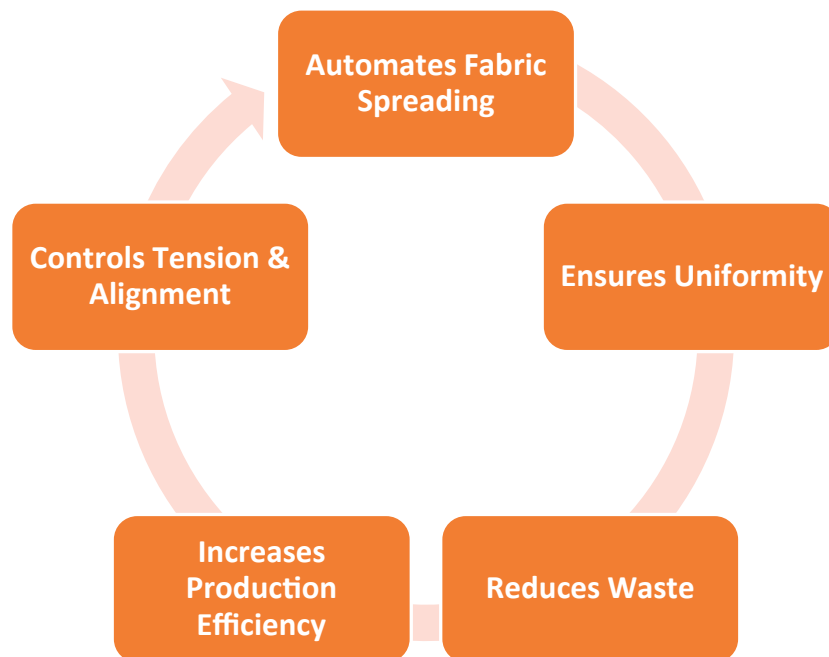


Fig. 2.3.2: Functions of a fabric laying up machine

Step-by-Step Process of Setting Up the Fabric Laying Machine

Steps	Process
Machine Inspection and Pre-Setup Checks	Ensure the fabric laying machine is clean and free from dust, lint, or previous fabric residues.
	Check all machine components, including rollers, clamps, conveyor belts, and tension bars, for wear or damage.
	Verify that electrical connections are secure and there are no loose wires or exposed circuits.
	Inspect safety mechanisms, such as emergency stop buttons and automatic shut-off features.
Loading the Fabric Roll	Lift the fabric roll using the machine's loading arms or manually (if the machine is semi-automatic).
	Align the fabric roll correctly on the rollers to ensure even feeding and minimise distortion.
	Secure the roll in place using the machine's locking system to prevent unnecessary movement.
Adjusting Fabric Tension and Feed Mechanism	Set the fabric tension according to the fabric type (e.g., knit fabrics require lower tension than woven fabrics).
	Adjust the feed rollers and tension bars to ensure smooth and even unwinding of the fabric.
	Avoid excessive tension that may cause stretching or distortion in delicate fabrics.

Steps	Process
Setting Up the Laying Mode and Spreading Type	Choose the appropriate laying method based on the fabric type and production requirements: • One-Way Laying: Fabric is spread in a single direction suitable for directional prints. • Zig-Zag or Face-to-Face Laying: Fabric is laid back and forth, commonly used for non-directional fabrics. • Nap-One-Way or Nap-Two-Way Laying: Ensures fabric texture consistency, especially for fabrics like velvet.
	Input the required laying length, width, and number of plies into the machine settings.
Aligning the Fabric Edge and Controlling Fabric Movement	Ensure the fabric edges are appropriately aligned with the markers or cutting guides.
	Adjust edge control sensors (if available) to detect fabric misalignment and auto-correct.
	Place weights or clamps at the start of the laying process to prevent shifting.
Ensuring Proper Cutting Mechanism Setup	Adjust the cutter to match the fabric thickness if the machine has an automatic cutting system.
	Verify that cutting blades are sharp and free from any obstructions.
	Set the cutting position to ensure uniform fabric ends.
Conducting a Trial Run and Final Adjustments	Perform a test spread with a small section of fabric to check for alignment, tension, and feeding issues.
	Inspect for wrinkles, fabric pulling, or distortions and make necessary tension or alignment adjustments.
	If using an automatic machine, confirm the machine programming and settings are correctly entered.
Safety and Compliance Check	Ensure all safety protocols are followed, including wearing appropriate protective gear.
	Confirm that all machine guards and covers are securely in place.
	Check for compliance with company and industry standards before initiating full-scale fabric spreading.
Starting the Fabric Laying Process	Once all adjustments are complete, begin the fabric spreading process at a controlled speed.
	Continuously monitor the machine's performance and fabric quality during operation.
	Make periodic checks to correct any defects, such as edge misalignment or excessive tension.

Table. 2.3.1: Process of setting up the fabric laying machine

2.3.4 Loading Fabric Roll onto Laying Table

Before cutting or pattern marking begins, the first step is ensuring the fabric roll is correctly loaded onto the laying table. This process lays the foundation for accurate cutting, smooth production flow, and high-quality finished products.

Incorrect fabric loading can lead to misalignment, tension irregularities, and material wastage, disrupting production and increasing costs. Layermen (fabric) must follow standardised procedures to ensure the fabric is correctly positioned, adequately tensioned, and aligned according to production requirements. A systematic approach to fabric loading helps maintain consistency, reduces defects, and improves overall operational efficiency.

What is Meant by a Fabric Roll?

A fabric roll refers to a continuous length of fabric wound around a cylindrical core (usually made of cardboard or plastic) for easy storage, transportation, and handling in the textile and garment industry. Fabric rolls are commonly used in mass production, ensuring that large quantities of fabric are available in a manageable form for cutting, layering, and sewing.

Key Features of a Fabric Roll

Material:

- Can be made of cotton, silk, polyester, wool, or blended fabrics.

Width:

- According to Jenny Doan this typically ranges from 36 inches to 60 inches, with 36 inches being referred to as one yard and 60 inches as 1.5 yards of fabric. Different types of fabrics have varying widths, such as quilting cotton (42-44 inches), apparel fabrics (60 inches or more), and upholstery fabrics (110 inches or more), which impact fabric yield and pattern layout during cutting.

Length:

- Varies based on production needs, often measured in yards or meters.

Weight:

- Determined by the fabric's thickness, GSM (grams per square meter), and composition.

Packaging:

- Wrapped in plastic or paper coverings to prevent dust and moisture damage.

Fig. 2.3.3: Features of a fabric roll

Uses of Fabric Rolls

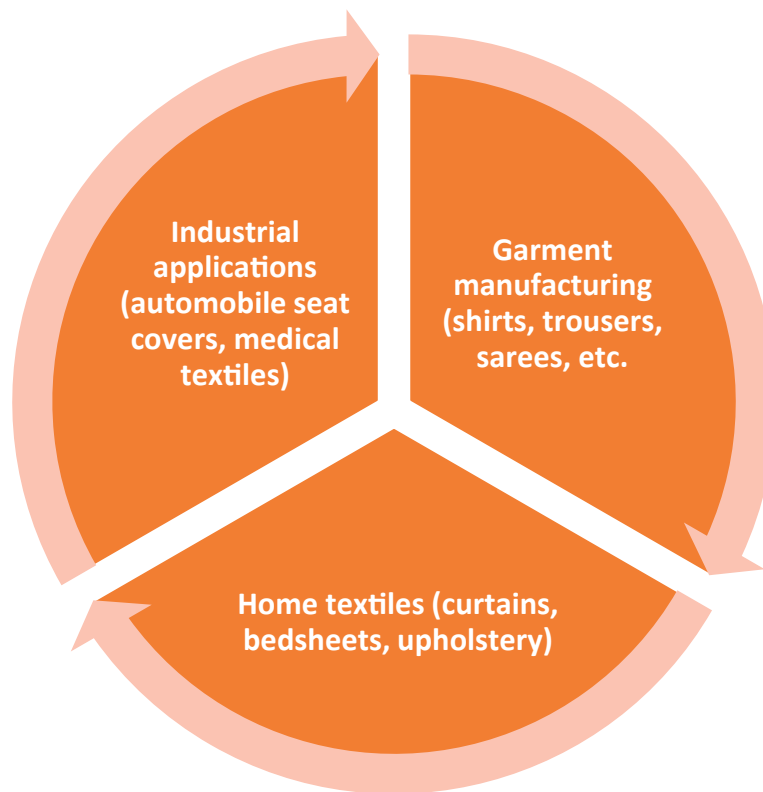


Fig. 2.3.4: Uses of fabric rolls

Procedure for Loading the Fabric Roll onto the Laying Table

Steps	Procedure
Preparation Before Loading	Inspect the fabric for defects such as holes, slubs, or uneven tension before loading.
	To prevent contamination, the laying table must be free of dust, debris, or moisture.
	Confirm fabric type, width, and orientation based on the production order and marker requirements.
Positioning the Fabric Roll	Place the fabric roll onto the designated holder of the laying-up machine or manually align it on the table.
	Use clamps or locking mechanisms to prevent unnecessary movement.
	Ensure the roll is aligned centrally with the laying table to avoid skewing during spreading.
Setting Up the Machine (If Using a Fabric Laying Up Machine)	Ensure the fabric is neither too tight nor too loose to prevent distortions.
	Adjust sensors or guides to maintain straight edges while spreading.

Steps	Procedure
	Adjust machine speed based on the fabric type to ensure smooth laying.
Pulling the Fabric for Initial Alignment	Pull the fabric over the table to check for proper alignment and tension.
	Ensure that both edges are straight and parallel to the table's reference lines.
	Manually or using automated spreaders, remove any wrinkles before starting the full laying process.
Verification Before Starting Laying Process	Ensure the fabric is lying flat without distortions.
	If working with napped or patterned fabrics, ensure the correct orientation.
	Verify that the fabric width matches the cutting marker's requirements.

Table. 2.3.5: Steps for loading the fabric roll onto the laying table

2.3.5 Levelling the Fabric as Per the Process Requirements

Fabric levelling is a crucial step in the garment manufacturing process, ensuring that the fabric lays flat, even, and aligned before cutting. Proper levelling prevents defects such as skewing, bowing, or misalignment, which can lead to inaccuracies in cutting, fabric wastage, and inconsistencies in the final product. In high-volume apparel production, even minor distortions in fabric placement can result in significant material loss and compromised quality.

Layermen (fabric) play a vital role in ensuring that the fabric is correctly positioned, aligned with the grain, and free from tension irregularities. Following systematic levelling procedures helps maintain production efficiency, uphold quality standards, and reduce rework. The process involves inspecting the fabric roll, controlling tension, aligning selvages, and using appropriate spreading techniques to achieve a flawless fabric layout.

Steps to Ensure Fabric is Levelled

Steps	Procedure
Pre-Inspection of Fabric Roll	Check the fabric roll for defects such as bowing, skewing, or uneven tension before laying.
	Inspect selvage edges for distortions that may cause misalignment.
	Verify fabric specifications against the marker and production requirements.
Correct Positioning of Fabric Roll	Place the fabric roll centrally on the laying-up machine or table.
	Ensure the roll is secured correctly to prevent shifting during laying.
	Adjust roll holders or brakes to control fabric tension.

Steps	Procedure
Aligning the Fabric on the Table	Use guides, clamps, or alignment markers to ensure straight positioning.
	Align selvage edges parallel to the table edges to prevent skewing.
	Check for any slack or tightness along the width of the fabric.
Controlling Fabric Tension	Maintain even tension throughout the roll to avoid stretching or loosening.
	Use tension control settings on fabric spreading machines to regulate flow.
	Manually smooth out wrinkles or folds during manual laying.
Checking for Skewing or Bowing	Examine fabric layers visually to identify any misalignment or distortions.
	Adjust the roll or reposition the fabric to correct any unevenness.
	If necessary, pull the fabric along the bias to straighten it.
Using Fabric Spreading Techniques	Apply the appropriate spreading technique (one-way, zig-zag, stepped, or tubular spreading) based on fabric type and marker layout.
	Ensure even and smooth spreading without air pockets or folds.
Verifying Nap and Grain Direction	Follow the correct nap-up or nap-down marker requirements.
	Ensure the fabric grain is aligned correctly to prevent distortion in finished garments.
Final Inspection and Adjustment	Conduct a final check for levelling before proceeding to cutting.
	Adjust the fabric manually or using machine controls to ensure uniformity.
	Reconfirm alignment with the cutting marker and process requirements.

Table 2.3.6: Steps to ensure the fabric is levelled

2.3.6 Importance of Proper Fabric Handling

Fabric is one of the most valuable raw materials in the textile and apparel industry. Its quality directly impacts the final product's appearance, durability, and overall value. However, fabric is also highly susceptible to damage during movement and handling, leading to defects such as tearing, creasing, fraying, and contamination. Even minor mishandling can result in significant material loss, increased production costs, and compromised quality.

Layermen (fabric) are crucial in maintaining fabric integrity throughout the handling process, from storage and transportation to spreading and cutting. By following industry best practices, they can ensure the fabric remains optimal, preventing unnecessary wastage and maintaining high production standards. Proper handling techniques improve efficiency and contribute to sustainability by reducing material loss.

The following section outlines essential steps and precautions that layermen (fabric) must take to ensure the fabric is not damaged during movement and handling in a manufacturing setup.

Best Practices for Preventing Fabric Damage During Movement and Handling

Steps	Practices
Proper Lifting and Carrying Techniques	Always lift fabric rolls with appropriate support, avoiding excessive bending or folding.
	Use trolleys, fabric roll carriers, or lifting equipment to transport heavy rolls.
	Ensure rolls are carried with two people if they are too large to handle alone.
Use of Fabric Handling Equipment	Utilise fabric spreading machines, trolleys, and roll feeders to minimise direct handling.
	Ensure all machinery used for handling is clean and free from sharp edges that could damage the fabric.
Maintaining a Clean and Dry Work Environment	Ensure the storage and movement areas are free from dust, dirt, and moisture to prevent fabric contamination.
	Keep hands clean and avoid handling fabric with oily or dirty gloves.
Avoiding Excessive Stretching or Pulling	Handle fabric gently to prevent distortion, stretching, or grain misalignment.
	Do not drag fabric rolls on rough surfaces to avoid snags and fraying.
Proper Storage of Fabric Rolls	Store fabric rolls on designated racks or pallets to avoid ground contact and damage.
	Keep rolls covered with protective plastic or fabric covers to prevent dust accumulation.
Preventing Creases and Wrinkles	Lay fabric flat or roll it properly instead of folding to avoid creases.
	Use tension-controlled fabric spreaders to ensure the fabric is smooth before cutting.
Checking for Fabric Defects Before and After Handling	Inspect fabric before and after moving it to identify any defects like tears, stains, or knots.
	Report any damage immediately to supervisors for corrective action.
Following Manufacturer Guidelines for Fabric Type	Different fabrics require different handling techniques (e.g., delicate fabrics like silk need extra care compared to denim).
	Follow manufacturer recommendations for handling specific fabric types.

Table 2.3.7: Steps for preventing fabric damage during movement and handling

2.3.7 Placing Markers Appropriately on the Laying Table

Minimising material wastage is a critical part of the apparel manufacturing process. Before fabric pieces are cut for production, a marker—a planned layout of patterns—is placed on the fabric to guide the cutting process. The accuracy of this placement directly affects fabric utilisation, garment fit, and overall efficiency.

Markers serve as blueprints for cutting fabric according to pattern specifications, helping to maximise fabric utilisation and maintain consistency in garment production. Layermen (fabric) ensure that these markers are positioned accurately, aligned with the fabric grain, and secured properly to prevent misalignment during cutting. Any errors in marker placement can lead to fabric wastage, distorted garment pieces, or defects in the final product. Layermen must follow a structured approach while handling and positioning markers to achieve efficiency and precision. This involves checking the fabric alignment, ensuring correct grain direction, securing markers properly, and adhering to manufacturer guidelines. Below are the key steps they should follow:

Steps	Practices
Preparation Before Marker Placement	Layermen must check the work order, pattern specifications, and fabric type before placing the markers.
	Ensure the fabric is laid evenly without wrinkles, distortions, or tension issues.
	Confirm that the fabric grain and selvage are aligned to prevent defects in the final garment.
	If multiple plies are used, ensure they do not exceed the specified height for accurate cutting.
Marker Selection and Verification	Select the appropriate marker based on fabric type, garment design, and pattern specifications.
	Ensure the marker contains all necessary details, such as grain direction, notches, and pattern layout.
	Verify that the marker length matches the fabric lay length to avoid discrepancies.
	For patterned or directional fabrics, layermen must ensure proper alignment to maintain design consistency in the final garment.
	Secure the markers with appropriate tools to prevent shifting during the cutting process.
Quality Checks and Compliance	Layermen should double-check marker alignment before approving for cutting.
	If discrepancies are found, markers should be repositioned per guidelines before proceeding.
	Markers should be consistently placed across all fabric layers in multi-ply spreading to maintain uniformity.
	Ensure that the marker placement adheres to manufacturer guidelines and industry best practices.

Table 2.3.8: Key steps for proper placement of markers on the laying table

UNIT 2.4: Workplace Safety and Organisation

Unit Objectives

By the end of this unit, the participants will be able to:

1. Examine the types of workplace hazards that a layerman may encounter.
2. Discuss the organisation's policies and procedures for maintaining a clean and safe work area.
3. Illustrate the process of selecting and sorting tools and materials as per work instructions.
4. Examine the importance of maintaining the cleanliness of tools and equipment (Scissors, End Cutter, Marker, Measuring Tape, Ruler, etc.).
5. Analyse the protocol and format for reporting work-related risks and problems.
6. Identify the designated contact person for addressing procedural or product-related queries and resolving equipment issues.

2.4.1 Common Workplace Hazards Facing Layermen (Fabric)

Layermen (fabric) are responsible for spreading fabric rolls accurately, ensuring proper alignment, and preparing materials for cutting. However, their role also exposes them to various workplace hazards affecting their health, safety, and productivity.

From handling heavy fabric rolls and operating machinery to working in environments with dust, chemicals, and repetitive motions, layermen face multiple risks daily. These hazards can lead to injuries, long-term health issues, and operational inefficiencies without proper safety measures and awareness.

The following sections explore the different types of hazards that layermen (fabric) encounter:

1. **Physical Hazards:** These hazards result from unsafe working conditions and can lead to injuries.

Slips, Trips, and Falls:

- Loose fabric scraps on the floor can cause slipping.
- Uneven or cluttered surfaces around the fabric laying area can lead to tripping.
- Poor lighting may increase the risk of falls.

Heavy Lifting and Strain Injuries:

- Lifting heavy fabric rolls improperly can cause back and muscle strain.
- Repetitive movements during fabric laying can lead to musculoskeletal disorders.

Sharp Tools and Cutting Hazards:

- Use of scissors, knives, and rotary cutters can result in hand injuries.
- Improper handling of cutting tools can lead to deep cuts or puncture wounds.

Fig. 2.4.1: Physical hazards

2. **Mechanical Hazards:** These hazards arise from the use of machinery in the fabric laying process.

Fabric Laying Machine Accidents:

- Improper machine operation can cause entanglement of hands or clothing.
- Sudden machine malfunctions can lead to unexpected injuries.

Equipment Malfunction and Breakdowns:

- Faulty machinery can cause unintended motion, leading to accidents.
- Unmaintained tools can break during use, causing potential harm.

Fig. 2.4.2: Mechanical hazards

3. Chemical Hazards: Exposure to chemicals used in textile processing can be harmful to health.**Fabric Treatments and Dyes:**

- Some fabrics contain chemicals that may cause skin irritation or allergic reactions.
- Inhalation of chemical fumes from dyes and adhesives can affect respiratory health.

Cleaning Agents and Solvents:

- Improper handling of cleaning agents can lead to burns or eye injuries.
- Long-term exposure to certain chemicals may cause chronic health issues.

*Fig. 2.4.3: Chemical hazards***4. Fire and Electrical Hazards:** Textile factories are prone to fire and electrical hazards due to fabric flammability.**Fire Risks:**

- Fabric, lint, and paper scraps can easily catch fire if exposed to open flames or sparks.
- Overheating of machinery can increase fire risks.

Electrical Hazards:

- Damaged or exposed electrical wiring can cause shocks or electrocution.
- Overloading electrical outlets with multiple machines can lead to short circuits.

*Fig. 2.4.4: Fire and electrical hazards***5. Ergonomic Hazards:** Poor working postures and repetitive tasks can lead to long-term physical strain.**Repetitive Motion Injuries:**

- Continuous laying of fabric can cause strain on hands, wrists, and shoulders.
- Prolonged standing without proper footwear support may lead to leg and back pain.

Poor Workstation Ergonomics:

- Incorrect table height can cause posture-related discomfort.
- Lack of adjustable seating options may result in spinal issues over time.

*Fig. 2.4.5: Ergonomic hazards***6. Environmental Hazards:** Factors in the work environment can also pose risks to layermen.**Poor Ventilation and Air Quality:**

- Accumulation of fabric dust and fibers can cause respiratory issues.
- High humidity levels may lead to fabric degradation and discomfort.

Noise Pollution:

- Continuous operation of machinery can lead to hearing damage over time.
- Loud work environments can increase stress and reduce concentration.

Fig. 2.4.6: Environmental hazards

7. Psychological and Workplace Hazards: Stress and fatigue can impact well-being and efficiency.

Work Pressure and Fatigue:

- Strict production deadlines may cause stress and exhaustion.
- Insufficient breaks or long working hours can lead to burnout.

Lack of Proper Training:

- Inadequate safety training can increase the risk of workplace accidents.
- Unfamiliarity with machine handling can lead to mistakes and injuries.

Fig. 2.4.7: Psychological and workplace hazards

2.4.2 Procedures for Maintaining a Clean and Safe Work Area

A clean and safe work environment is essential in the textile and garment industry, where fabric handling, cutting, and laying operations involve constant exposure to dust, fibres, sharp tools, and heavy machinery. Proper workplace maintenance ensures workers' safety and health and enhances productivity and compliance with legal regulations.

Textile sector organisations must follow specific policies and procedures aligned with national labour laws, workplace safety guidelines, and environmental regulations. Layermen (fabric), responsible for fabric handling and preparation, must strictly adhere to these protocols to minimise risks, prevent workplace hazards, and ensure compliance with industry standards. The procedures for maintaining a clean and safe work area are as follows:

1. Compliance with Indian Labour and Workplace Safety Laws: Several laws and regulations govern workplace safety and cleanliness in the textile industry in India:



Fig. 2.4.8: Indian labour and workplace safety laws

2. Regular Cleaning Procedures in Fabric Handling Areas: Layermen (fabric) must follow strict cleaning guidelines to maintain hygiene and prevent hazards:

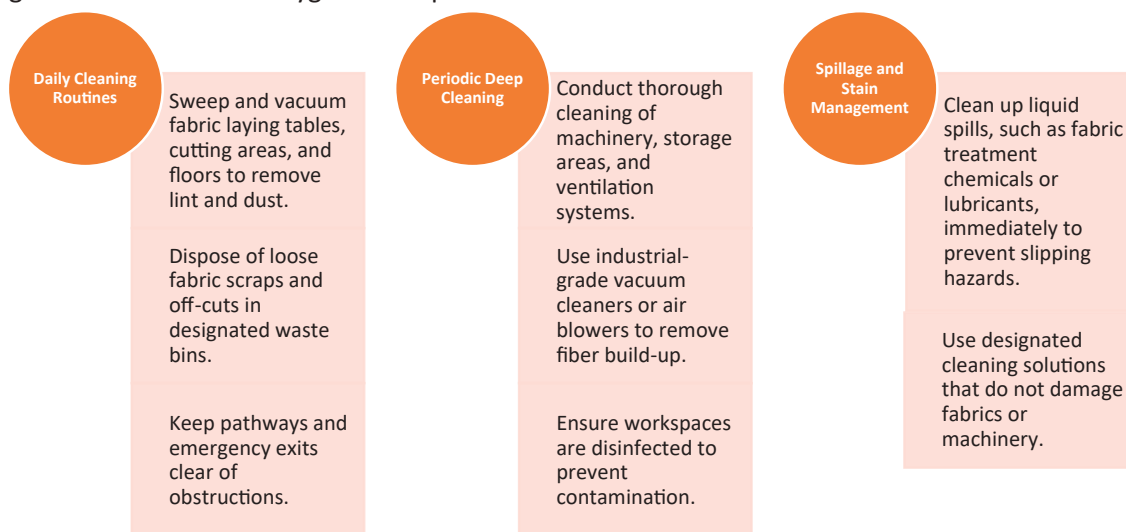


Fig. 2.4.9: Cleaning procedures in fabric handling areas

3. Safety Measures for Layermen (Fabric) in Fabric Handling:

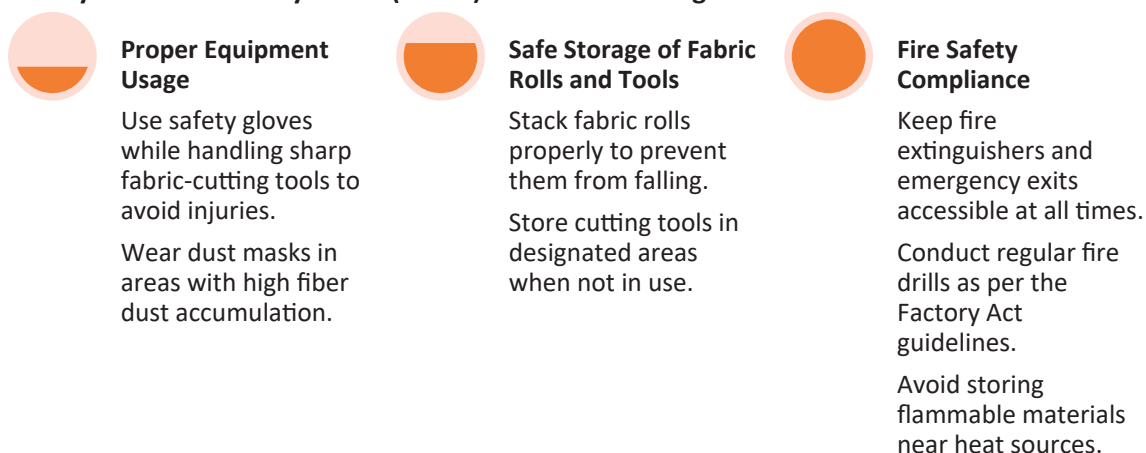


Fig. 2.4.10: Safety measures for layermen

4. Waste Management and Disposal Procedures: Layermen (fabric) must ensure responsible waste disposal in compliance with environmental laws:



Fig. 2.4.11: Waste management and disposal procedures

- 5. Emergency Preparedness and First Aid:** Layermen are trained to handle workplace emergencies efficiently:

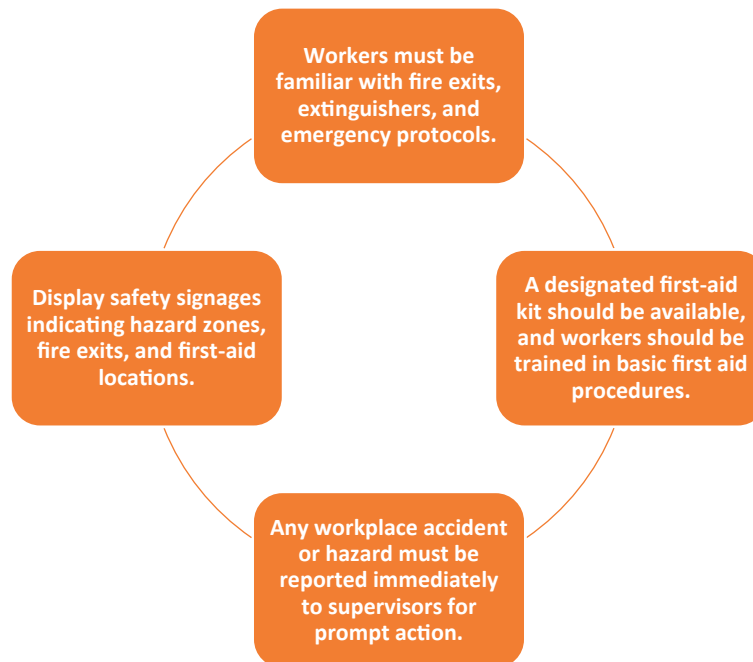


Fig. 2.4.12: Emergency preparedness

2.4.3 Sorting the Tools and Materials for Fabric Laying

Fabric laying is a critical process where any material selection or tool organisation mistake can lead to defects, wastage, and production delays. A well-organised workstation, along with the proper selection and arrangement of tools and materials, directly impacts productivity, reduces material wastage, and maintains the accuracy of fabric layers. Layermen (fabric) must adhere to work instructions to ensure that the right tools are used and that materials are handled systematically. A structured approach to selecting and sorting tools and materials for the task is given below:

1. Understanding Work Instructions

- Carefully review the provided work instructions, which include details on fabric type, layering method, marker placement, and production requirements.
- Identify any special handling or quality standards specified for the task.
- Confirm any additional instructions from the supervisor or quality control team.

- 2. Selecting the Required Tools:** The appropriate tools depend on the type of fabric and laying method. Key tools include:



Measuring Tools

- Tape measures, rulers, and fabric scales to ensure accurate dimensions.



Cutting Tools

- Scissors, fabric cutters, or electric cutting machines for precise cutting.



Marking Tools

- Chalk, markers, and fabric pens for alignment and marking guidelines.



Clamping and Holding Tools

- Pins, weights, and clamps to keep fabric layers in place.



Laying Equipment

- Spreading machines, rollers, and tables as required for the fabric type.

Fig. 2.4.13: Tools for fabric laying

3. Sorting and Checking Fabric Rolls

- Identify the correct fabric roll as per specifications (type, colour, pattern, and grain direction).



Fig. 2.4.14: Fabric rolls

- Check for visible defects, such as stains, holes, or irregular textures.
- Verify that the fabric roll length meets production requirements.

4. Arranging Materials for Efficiency

- Sort fabric rolls in order of use to maintain a smooth workflow.
- Place tools within easy reach to minimise delays during the laying process.



Fig. 2.4.15: Tools that help in fabric laying

- Organise markers, templates, and cutting guides based on the production plan.

5. Ensuring Compliance with Safety and Quality Standards

- Inspect all tools for sharpness, cleanliness, and proper functioning before use.
- Ensure that all tools are stored safely when not in use to prevent accidents.
- Follow organisational guidelines for handling materials to reduce waste and maintain efficiency.

2.4.4 Cleaning and Maintenance of Tools

In the fabric laying, tools and equipment such as scissors, end cutters, markers, measuring tapes, and rulers play a crucial role in ensuring precision and efficiency. Proper maintenance and cleanliness of these tools are essential to achieve accurate fabric cutting, prevent damage to materials, and maintain workplace safety.

A well-maintained set of tools minimises errors, enhances productivity, and reduces the risk of contamination, particularly in industries where fabric cleanliness is critical. Poorly maintained tools can lead to inaccurate measurements, frayed fabric edges, or workplace injuries due to blunt or malfunctioning equipment. Additionally, keeping tools clean enhances their durability, reduces the risk of contamination, and ensures compliance with quality standards in garment manufacturing.

The following points highlight the significance of keeping fabric handling tools and equipment clean:



Fig. 2.4.16: Significance of keeping fabric handling tools and equipment clean

1. Ensures Accuracy and Precision

- Measuring tools such as measuring tapes and rulers must be kept clean and free from dust or ink smudges to provide accurate readings.
- Dirt or fabric residues on scissors and end cutters can cause uneven cuts, leading to material wastage.

2. Prevents Fabric Contamination

- Unclean scissors, markers, and rulers may carry dust, oil, or ink stains, which can transfer onto the fabric and result in quality defects.
- Markers and chinks should be stored properly to avoid accidental staining of materials, especially light-coloured fabrics.

3. Increases the Lifespan of Tools

- Regularly cleaning and oiling end cutters and scissors prevents rust and ensures smooth operation.
- Measuring tapes that are wiped down and appropriately stored last longer and maintain flexibility.

4. Enhances Workplace Safety

- Blunt or dirty cutting tools require more force, increasing the risk of slips and injuries.
- Scissors and end cutters should be cleaned and stored safely when not in use to prevent accidents.

5. Improves Workflow Efficiency

- Well-maintained tools reduce the chances of interruptions due to dull blades, stuck measuring tapes, or broken markers.
- Workers can complete tasks faster and more accurately when tools are in optimal condition.

6. Complies with Industry Standards

- Factory safety regulations and quality control measures require that tools and equipment be maintained in a hygienic condition.
- Adhering to cleanliness standards helps meet export and compliance requirements in textile production.

2.4.5 Protocol for Reporting Work-Related Risks/ Problems

Identifying and reporting work-related risks and problems is critical to maintaining workplace safety, ensuring smooth operations, and complying with regulatory standards. Layermen (fabric), who handle fabric laying and preparation, may encounter issues such as fabric defects, equipment malfunctions, workplace hazards, and operational inefficiencies.

A well-defined protocol for reporting such risks ensures that problems are addressed promptly, preventing accidents, reducing waste, and improving productivity. Organisations typically follow a structured reporting format with clear documentation of the issue, its impact, and the necessary corrective actions.

The protocol and the standard format used for reporting work-related risks and problems are as follows:

Steps	Protocol
Identify the Issue	Observe and document the nature of the problem (e.g., fabric defect, safety hazard, machine failure).
	Assess the potential impact on production, safety, or quality.
Immediate Action (If Required)	If the issue poses an immediate risk (e.g., fire hazard, injury risk), inform the supervisor or safety officer immediately.
	Stop operations in affected areas if necessary to prevent further damage or accidents.
Inform the Supervisor	Report the issue verbally or through the designated reporting channel (e.g., logbook, digital system, or direct communication).
	Provide preliminary details about the problem and its urgency.
Document the Issue in the Reporting Format	Fill out the standard reporting form, ensuring all necessary details are included.
	Attach supporting evidence such as photographs, videos, or sample materials.
Follow Up on Resolution	Track the progress of corrective actions and confirm that the issue has been addressed.
	Provide additional feedback if further improvements are needed.

Steps	Protocol
Record-keeping and Compliance	Maintain records of reported issues for future reference, audits, and compliance with safety regulations.
	Participate in safety training and improvement initiatives based on reported issues.

Table 2.4.1: Protocol for reporting work-related risks/problems

2.4.6 Point of Contact in Case of Queries and Issues

In the fabric laying process, layermen (fabric) needs to have clear communication channels for addressing queries related to procedures, product specifications, and equipment issues. Proper guidance ensures smooth workflow, compliance with quality standards, and timely resolution of technical problems. The following are the key contact persons and their responsibilities in case of any concerns:

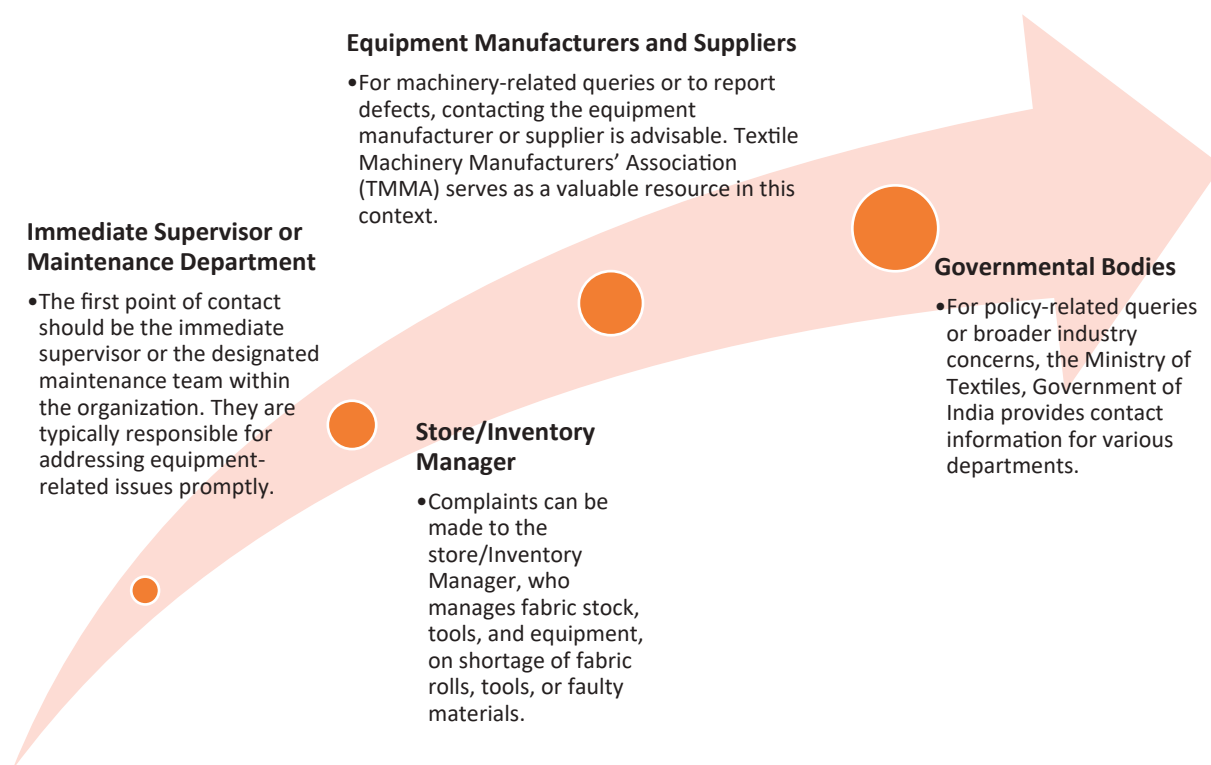


Fig. 2.4.17: Key contact persons in case of any concerns

Summary

- Organisations follow specific policies and procedures to maintain a clean and hazard-free workplace.
- Manufacturer guidelines help set up, operate, and maintain equipment safely.
- Different fabrics require specific laying techniques to ensure accuracy in production.
- Proper fabric issuance, return, and storage minimise waste and maintain efficiency.
- Identifying fabric faults like holes and slubs ensures quality standards are met.
- Marker placement, splicing, and fabric folding are crucial in precision cutting.
- To avoid damage, a fabric laying-up machine must be set up and operated correctly.
- Work instructions guide selecting, sorting, and maintaining tools and equipment.
- Achieving work targets requires effective workflow management and adherence to timelines.
- Reporting risks, defective tools, and procedural queries helps maintain workplace safety.
- Proper waste management and disposal practices contribute to a clean work environment.
- Following quality standards ensures efficiency in fabric handling and overall production.

Exercise

Multiple-choice Question:

1. What is the purpose of following manufacturer guidelines in equipment handling?
 - a. To increase fabric wastage
 - b. To ensure safety and efficiency
 - c. To ignore maintenance needs
 - d. To delay production
2. Which of the following is a basic fabric fault?
 - a. Slubs
 - b. Sharp edges
 - c. Straight folds
 - d. Proper alignment
3. Why is proper marker placement necessary in fabric laying?
 - a. To reduce fabric wastage
 - b. To delay production
 - c. To create random patterns
 - d. To avoid fabric storage
4. What is the significance of maintaining clean tools and equipment?
 - a. It prevents damage and ensures efficiency
 - b. It increases operational costs
 - c. It makes fabric laying more difficult
 - d. It slows down the work process
5. How does effective workflow management impact production?
 - a. It reduces efficiency
 - b. It improves productivity and quality
 - c. It increases fabric wastage
 - d. It causes delays in operations

Descriptive Questions:

1. What are the organisation's policies for maintaining workplace cleanliness and safety?
2. How do you interpret the manufacturer's guidelines for setting up and operating equipment?
3. Why is the fabric laying process important in garment production?
4. What steps are involved in fabric issuance, return, and storage to reduce waste?
5. How can basic fabric faults be identified and rectified during quality inspection?

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Scan the QR codes or click on the link to watch the related videos



<https://youtu.be/U1w1GRcqr38>

Understanding Fabric Layering Process



<https://youtu.be/MwR23XkXQTM>

Metric Concepts in the Apparel Industry



<https://youtu.be/YtFjZwzAMLw>

Fabric Handling



<https://youtu.be/POlQ27GQZp0>

Textile Apparel Hazard Management



3. Maintain health, safety and secure work place with Gender and PWD Sensitisation



Unit 3.1 - Workplace Safety and Emergency Preparedness

Unit 3.2 - Equipment Handling and Workplace Efficiency

Unit 3.3 - Waste Management, Hygiene and Health Awareness

Unit 3.4 - Inclusion and Accessibility for Persons with Disabilities (PwD)



Key Learning Outcomes

By the end of this module, the participants will be able to:

1. Elaborate on safe working practices for cleaning and maintaining equipment.
2. Describe the effects of contamination on products, such as machine oil and dirt.
3. Identify different ways to minimise wastage in the workplace.
4. Explain health and safety practices applicable at the workplace.
5. Follow environment management system-related procedures effectively.
6. List potential hazards, risks, and threats based on operational nature.
7. Describe potential accidents, emergencies, and responses to these scenarios.
8. Demonstrate periodic walk-throughs to keep the work area hazard-free.
9. Seek clarifications from supervisors when facing perceived risks.
10. State organisational procedures for safe handling of equipment and machines.
11. Describe proper disposal methods for waste and by-products.
12. Explain actions required during mock drills, evacuations, or actual emergencies.
13. Ensure work areas are hazard-free and set up equipment as per job requirements.
14. Carry out visual inspections to ensure product quality and defect-free output.
15. Work in conformance with company quality standards and legal requirements.
16. Store materials and equipment following manufacturer and organisational guidelines.

UNIT 3.1: Workplace Safety and Emergency Preparedness

Unit Objectives

By the end of this unit, the participants will be able to:

1. Elaborate on safe equipment cleaning and maintenance.
2. Elucidate healthy and safe workplace practices.
3. Outline workplace hazards, risks, and threats.
4. Describe accident handling and emergency response.
5. Explain shutdown and evacuation procedures.
6. Illustrate emergency response and mock drills.
7. Demonstrate ways to minimise workplace risks.

3.1.1 Safe Equipment Cleaning and Maintenance

Safe equipment cleaning and maintenance ensure tools and machines function properly and last longer. In the apparel industry, a layerman spreads fabric smoothly before cutting, requiring well-maintained equipment. Poor maintenance can cause fabric defects, safety risks, and production delays. The following are the Key Practices for Safe Equipment Cleaning and Maintenance:

- **Checking Tool and Equipment Safety**

Checking tool and equipment safety ensures machines function correctly to prevent accidents. Before use, inspecting for damage like loose parts or dull blades avoids risks. Reporting issues to supervisors ensure timely repairs and safe operations.

- **Selecting the Right Tools and Equipment**

Selecting the right tools ensures accuracy and efficiency in fabric cutting and laying. Using sharp blades prevents rough edges and reduces fabric wastage. Properly calibrated machines maintain consistency and avoid errors in production.

- **Sorting and Organising Tools Properly**

Sorting and organising tools prevent mix-ups and ensure easy access. Storing cutting tools in designated areas reduces accidents and extends their lifespan. A well-arranged workstation improves workflow and minimises delays.

- **Regular Cleaning and Maintenance**

Regular cleaning removes dust, lint, and oil build-up to maintain machine efficiency. Following manufacturer guidelines for servicing prevents breakdowns and extends equipment life. A clutter-free workspace improves safety and enhances productivity.

Serial No.	Equipment Name	Date	Frequency	Service Engineer name	Service Done	Status

Table 3.1.1: Sample Equipment Check and Maintenance Checklist

3.1.2 Healthy and Safe Workplace Practices

Healthy and safe workplace practices protect employees by reducing risks, maintaining cleanliness, and ensuring safety. A layerman in the apparel industry must follow proper protocols to keep the workspace organised and hazard-free. This prevents accidents, protects workers, and ensures high-quality production. The following are the stages to maintain a Healthy and Safe Workplace:

- **Obtain and Check Work Ticket Data**

Obtaining and checking work ticket data ensures the layerman has all necessary job details before starting. The work ticket includes materials, tools, and instructions required for the task. Following these guidelines ensures accuracy and efficiency in work.

- **Set-Up Workstation Safely**

Setting up the workstation safely involves checking for hazards like clutter or defective equipment. Tools should be arranged properly, and machines should be positioned correctly for smooth operations. A well-organised workspace reduces accidents and improves productivity.

- **Use the Right Tools and Equipment**

Using the right tools and equipment ensures accuracy and safety in tasks. Sharp cutting tools should be in good condition for fabric cutting. Regular tool checks help prevent accidents and ensure efficiency.

- **Follow Safety and Health Guidelines**

Following safety and health guidelines includes wearing protective gear and operating machines correctly. Adhering to safety protocols prevents injuries and workplace hazards. A safe environment benefits all workers.

- **Report and Address Safety Hazards**

Reporting and addressing safety hazards help maintain a secure workspace. Any defective tools, unsafe conditions, or potential risks should be reported immediately. Fixing hazards promptly prevents accidents and keeps the workplace safe.

- **Maintain Cleanliness and Hygiene**

Maintaining cleanliness and hygiene involves regularly cleaning workspaces to remove fabric lint and dust. A clean environment prevents machine malfunctions and promotes worker health. A hygienic workspace ensures smooth and safe operations.

Order ID	Description	Requested By	Assigned To	Priority	Start Date	End Date	% Complete	Status	Comments
				Low	00/00/00	00/00/00	50%	Not Started	
				Med			100%	In Progress	
				High			20%	Complete	
							0%	Needs Review	
							75%	Approved	
								Overdue	
								On Hold	

Fig. 3.1.1: Sample Job-Order Ticket Template

3.1.3 Identifying Workplace Hazards, Risks, and Threats

A workplace hazard is any condition, substance, or action that can cause injury or illness, such as slippery floors or toxic chemicals. A workplace threat involves deliberate harm, like violence or intimidation, while a workplace risk is the likelihood and severity of damage from a hazard. The following table shows the standard protocol for identifying workplace hazards, risks, and threats in the apparel industry:

Stages	Description of Stages	Identifying the Source of Hazard	Identifying the Source of Threat	Identifying the Probability of Harm Risks
Obtain Work Ticket and Job Card Information	Review job details to understand tasks, risks, and required materials.	Identify hazards related to fabric, tools, and processes.	Detect threats from specific equipment or materials.	Assess risks based on job requirements.
Assess the Work Area for Potential Hazards	Check for hazards like clutter, faulty equipment, or poor conditions.	Identify risks from sharp objects, spills, or unstable setups.	Recognise threats from improper storage or unstable workstations.	Determine the likelihood of injuries like trips or electrical shocks.
Evaluate Equipment and Tools for Safety	Inspect tools and machines for defects and ensure safe operation.	Identify broken or malfunctioning tools as hazards.	Spot threats from unsafe or faulty equipment.	Assess accident risks due to improper tool use.
Identify Environmental and Ergonomic Risks	Check lighting, ventilation, and workstation setup to prevent strain.	Identify poor lighting, noise, or uncomfortable workspaces as hazards.	Detect threats from improper posture, noise, or ventilation.	Measure risks of discomfort, fatigue, or long-term injuries.
Recognise Safety Risks with Materials	Identify risks like fabric contamination, sharp edges, or improper storage.	Spot hazards from incorrect material handling or storage.	Identify threats from heavy rolls, clutter, or sharp materials.	Assess risks of injury from handling or improper storage.

Table 3.1.2: Hazard, Threat, and Risks Checklist

3.1.4 Handling Accidents and Emergency Situations

A workplace accident is an unplanned event causing injury or damage due to unsafe conditions, human error, or equipment failure. A workplace emergency is a sudden incident like a fire or chemical spill that requires immediate action to prevent harm. The following are the different types of workplace accidents and emergency situations that happen in the apparel industry that a layerman must be aware of:

Type of Accident/Emergency	Description
Cuts and Lacerations	Injuries are caused by sharp tools, needles, or cutting blades used in fabric cutting and sewing processes.
Electrical Shocks	Accidental contact with exposed or faulty electrical wiring and equipment.
Slips, Trips, and Falls	Accidents caused by wet floors, obstacles, or improperly stored materials that lead to falling injuries.
Fire Hazards	Fires may occur due to electrical malfunctions, flammable materials, or negligence in the work area.
Chemical Spills	Accidental leakage of chemicals, dyes, or cleaning agents used in the production process.
Machine Malfunctions	Malfunctioning sewing machines, cutters, or other heavy equipment cause accidents.
Ergonomic Injuries	Injuries caused by poor posture, repetitive motions, or improper workstation setup leading to strain.
Exposure to Hazardous Fumes	Breathing in harmful fumes from chemicals, dyes, or other substances used in production.
Falling Objects	Injuries are caused by objects like heavy tools or fabric rolls falling from shelves or workstations.
Heat Stress and Dehydration	Health issues from working in hot or poorly ventilated environments lead to exhaustion.

Table 3.1.3: Common workplace emergencies

An accident and emergencies response plan ensures worker safety by outlining steps to minimise harm and provide immediate assistance. In the apparel industry, it helps prevent injuries from hazards like machine malfunctions, slips, and chemical exposure. The following represents a small checklist of accident and emergency response in the workplace:

Type of Accident/Emergency	Emergency Response Plan
Cuts and Lacerations	Apply direct pressure to control bleeding. Clean the wound, and if necessary, seek medical attention.
Electrical Shocks	Turn off the power supply immediately, call for medical help, and avoid direct contact with the victim until safe.
Slips, Trips, and Falls	Check for injuries, assist the person to safety, and report the incident for further investigation.
Fire Hazards	Evacuate the area immediately, use fire extinguishers if safe, and alert the fire department to control the situation.
Chemical Spills	Evacuate the area, contain the spill if possible, wear PPE, and call the appropriate emergency services for containment.
Machine Malfunctions	Shut down the machine to stop further damage, report the malfunction, and perform necessary maintenance.

Type of Accident/Emergency	Emergency Response Plan
Ergonomic Injuries	Assist the injured person, provide comfort, and arrange for medical evaluation if necessary.
Exposure to Hazardous Fumes	Evacuate the area, ensure fresh air, and seek medical attention for anyone showing symptoms of exposure.
Falling Objects	Move the person from danger, check for injuries, and report the incident for a workplace safety review.
Heat Stress and Dehydration	Provide water and a calm environment, encourage breaks, and seek medical help if symptoms worsen or persist.

Table 3.1.4: Accident and emergency response stages

3.1.5 Following Shutdown and Evacuation Procedures

During emergencies, shutdown and evacuation procedures ensure safety and prevent further damage. Proper planning helps minimise risks, reduce panic, and quickly respond to crises. The following are the standard stages that need to be followed:

- **Identifying the Emergency**

Recognising danger signs like smoke, unusual smells, or alarms is the first step in handling emergencies. Staying alert and reporting to authorities ensures immediate action and prevents harm.

- **Initiating Shutdown Procedures**

Operations should be shut down safely to prevent further risks, especially in fire, gas leaks, or unstable structures. Machinery and hazardous processes must be stopped following safety protocols.

- **Alerting and Communicating**

Alarms, announcements, or emergency messages should be used to warn others quickly. Employees must listen to safety officers and follow instructions without delay.

- **Evacuating the Premises**

Evacuation should be calm and orderly, using marked emergency exits and avoiding elevators. Assisting those with special needs ensures everyone's safety.

- **Reaching the Assembly Point**

People should gather at the designated safe area for headcounts and further instructions. Any missing persons or injuries must be reported to emergency responders.

- **Post-Emergency Actions**

No one should re-enter until authorities confirm safety. A post-emergency assessment helps identify hazards and improve future response plans.

EMERGENCY EVACUATION PLAN CHECKLIST			
FREQUENCY	NAME OF PROJECT	DATE	
MONTHLY			
ITEMS TO CHECK		COMPLIANCE	
		YES	NO
Emergency Plan developed for project and updated as per site activities and response.			
Are names and phone numbers of emergency response team displayed on site and offices?			
Is an updated emergency evacuation map posted on strategic locations on site and offices?			
Do emergency response team members know recent amendment and updates? emergency plan?			
Is emergency plan notified to project management, all staff, workers, consultants & sub-contractor?			
Are emergency response team member trained in (First-Aid, Fire Fighting and Response Procedure).			
Are alarm devices audible above normal background noise and identifiable to all personnel?			
Is Alarm activating button or area not obstructed?			
Alarms are checked and in working condition and signs posted near push buttons.			
Are exit areas / doors / walkways / routes clearly marked 'Exit' and kept clean.			
Are exit doors are in good operating condition.			

Fig. 3.1.2: Emergency evacuation plan checklist

3.1.6 Emergency Response and Mock Drills

Emergency response involves managing and reducing risks during hazards, accidents, or threats. Mock drills are simulated exercises that train individuals and organisations to respond effectively in emergencies. The following are different types of emergency responses and mock drills to tide over sudden hazards and safety breaches:

1. Emergency Response

Emergency response includes immediate actions to control and minimise damage in critical situations like fires, medical emergencies, or industrial accidents. Quick and well-coordinated responses save lives, protect assets, and reduce disaster impact. The following are the different types of emergency responses:

- **Fire Emergency Response**

Fire emergency response involves evacuation, fire control, and extinguishing fires using resources like fire extinguishers and sprinkler systems. Employees, fire personnel, and building management coordinate actions such as raising alarms and ensuring safe exits.

- **Medical Emergency Response**

Medical emergency response addresses health crises like heart attacks or injuries using first aid kits and trained responders. Employees, medical staff, and first responders provide immediate care and contact emergency services.

- **Chemical Spill Response**

Chemical spill response includes containment and neutralising hazardous leaks using spill kits and protective gear. Chemical safety officers and employees follow protocols to seal affected areas and evacuate if necessary.

- **Electrical Hazard Response**

Electrical hazard response involves handling power failures, short circuits, and electrocution risks using insulated tools and backup generators. Electricians and safety officers cut power sources and secure hazardous areas.

- **Workplace Violence Response**

Workplace violence response includes actions to address threats, aggression, or physical harm using security personnel and surveillance systems. HR, security teams, and employees follow protocols to report incidents and ensure safety.

- **Cybersecurity Emergency Response**

Cybersecurity response protects IT infrastructure and sensitive data using firewalls and security teams. IT professionals isolate compromised systems, reset passwords, and enhance security measures.

- **Terrorist Threat Response**

Terrorist threat response involves security measures like surveillance and evacuation plans. Law enforcement and security agencies coordinate actions to report threats and protect individuals.

- **Pandemic Emergency Response**

Pandemic response includes measures to control infectious disease spread using PPE kits and medical protocols. Healthcare professionals enforce hygiene practices and provide medical support.

- **Natural Disaster Emergency Plan**

A natural disaster emergency plan includes actions and resources needed to protect lives and property during disasters like floods, earthquakes, and storms. It ensures preparedness, quick response, and effective recovery with disaster safety agencies.

Emergency Action Plan

- Organization/Company Name: _____
- Address: _____
- Contact Information: _____

I. Purpose and Scope

- Purpose of the Emergency Action Plan (EAP):
- Scope of the EAP (types of emergencies covered):

II. Emergency Response Team

- Names and roles of emergency response team members

1. _____
2. _____
3. _____

- Contact information for each team member

1. _____
2. _____
3. _____

III. Emergency Contact Information

- Local emergency services (fire, police, medical):
- Nearest hospital or emergency medical facility:
- Utility companies (gas, electric, water):
- Other relevant contacts (building management, security):

2. Mock Drills

Mock drills simulate emergencies to improve preparedness and reduce disaster impact. Regular drills help identify weaknesses and ensure that stakeholders understand their roles. The following are the different types of mock drills:

- **Fire Drill**

Fire drills simulate evacuations to train people for real fire emergencies using alarms and exit signs. Employees and fire officers practice safe exits and headcounts.

- **Evacuation Drill**

Evacuation drills use alarm systems and exit maps to help people practice safe exits during earthquakes, floods, or fires. Employees, students, and security staff follow designated routes.

- **First Aid Drill**

First aid drills train individuals to provide medical assistance using first-aid kits and AEDs (Automated External Defibrillators). Employees and healthcare professionals practice assessing conditions and administering aid.

- **Chemical Spill Drill**

Chemical spill drills prepare workers to handle hazardous leaks safely using containment kits and protective gear. Employees and safety officers neutralise spills and evacuate affected areas.

- **Electrical Safety Drill**

Electrical safety drills train individuals on handling power hazards using insulated tools and emergency shutdowns. Electricians and safety officers practice identifying and securing electrical risks.

- **Cybersecurity Drill**

Cybersecurity drills test responses to cyber threats using firewalls and security teams. IT professionals detect phishing attempts, isolate breaches, and strengthen security.

- **Natural Disaster Response Drill**

A natural disaster response drill prepares individuals to act quickly during emergencies like earthquakes, floods, or cyclones. It involves practising evacuation, using emergency kits, and coordinating with rescue teams to ensure safety.

- **Terrorist Attack Response Drill**

A terrorist attack response drill trains people to react calmly and follow security protocols during threats. It includes lockdown procedures, evacuation plans, and coordination with law enforcement to minimise casualties.

- **Health Emergency Drill**

Health emergency drills prepare individuals for pandemics and disease outbreaks using PPE and medical response teams. Healthcare professionals implement hygiene measures and provide medical support.

Emergency Preparedness
Mock drill Plan

Format No.:

SR NO	PLAN MONTH	ACTUAL DATE	HAZARD / SCENARIO	LOCATION / AREA	PEOPLE INVOLVEMENT	TYPE OF EXERCISE	REMARKS
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							

Fig. 3.1.3: Drill Plan Template

3.1.7 Minimising Workplace Health and Safety Risks

- Concept of Workplace Health and Safety Risks**

Workplace health and safety risks include hazards like falls, chemical exposure, and ergonomic issues that can harm employees and equipment. Managing these risks through hazard identification, safety measures, and regulatory compliance ensures a safe work environment. Agencies like the Ministry of Labour and Employment, BIS, NSC, OSH Directorate, and ILO set safety guidelines in India. The following are the different types of workplace health and safety risks:

Type of Risk	Description	How They Are Caused	Potential Harm
Physical Risks	Hazards related to the work environment.	Slips, trips, falls, noise, extreme temperatures.	Injuries, fractures, hearing loss, burns.
Chemical Risks	Exposure to harmful substances.	Handling toxic chemicals with poor ventilation.	Poisoning, respiratory issues, skin diseases.
Biological Risks	Exposure to harmful microorganisms.	Contact with bacteria, viruses, or fungi.	Infections, allergies, serious illnesses.
Ergonomic Risks	Risks due to poor workplace design.	Repetitive tasks, poor posture, improper lifting.	Muscle strain, chronic pain, long-term injuries.
Psychosocial Risks	Stress-related risks affecting mental health.	High workload, harassment, job insecurity.	Anxiety, depression, reduced productivity.
Electrical Risks	Hazards related to electrical systems.	Faulty wiring, overloaded circuits, wet conditions.	Electric shocks, burns, fires.
Fire and Explosion Risks	Risks of fires and explosions in the workplace.	Flammable materials, gas leaks, faulty equipment.	Burns, property damage, fatalities.
Mechanical Risks	Hazards from machinery and equipment.	Unguarded machines, lack of maintenance.	Cuts, amputations, crush injuries.
Radiation Risks	Exposure to harmful radiation.	X-rays, UV exposure, radioactive materials.	Skin damage, cancer, radiation sickness.
Workplace Violence Risks	Threats or harm from others in the workplace.	Conflicts, physical assaults, harassment.	Injuries, psychological trauma, loss of morale.

Table 3.1.5: Different types of workplace health and safety risks

- Standard Protocols to minimise workplace hazards and safety risks**

Workplace safety is ensured through risk assessments, training, PPE, emergency plans, and audits. Key regulations include the Factories Act, 1948 for worker safety, the OSH Code, 2020 for industry-wide safety standards, and BIS – IS 14489:1998 for systematic safety audits and compliance.

- **Safety Audit Checklist**

A Safety Audit Checklist is a structured tool to assess workplace safety, identify hazards, and ensure compliance with regulations. Key components include workplace safety policies, hazard identification, employee training, PPE use, emergency preparedness, equipment safety, electrical safety, ergonomics, fire safety, and incident reporting. Safety audits follow pre-audit planning, on-site inspection, hazard assessment, audit reporting, and corrective actions to maintain a safe and legally compliant work environment.

ENVIRONMENT HEALTH AND SAFETY AUDIT PLAN

AUDIT CODE	CHECKLIST POINTS	RESPONSIBILITY	AUDITOR	SIGNATURE	
				AUDITEE	AUDITOR
1.	Construction Works / Layout Management / Project Planning				
2.	Construction Layout check points				
3.	Employee facility & Welfare				
4.	Supply of air in Rooms / Work stations / Colonies				
5.	Water management				
6.	Equipment planning				
7.	Electrical Works				
8.	Natural Fuel Resources / Fuel Resources				
9.	Machinery Planning				
10.	Process equipment maintenance				
11.	Solid waste / Liquid waste disposal				
12.	Cleaning and sanitisation / house keeping works				
13.	Manufacturing process / Manufacturing facilities / manufacturing process monitoring & controls				
14.	Quality Assurance & Quality Control (In process / Finish Products)				
15.	Prevention of cross contamination				
16.	Packing / Packing Materials Controls				
17.	Purchasing / Procurement Process & Controls				
18.	R.M Purchasing / Consumable Purchasing Quality Management				
19.	Processing, Handling and storage of products				
20.	Material management				
21.	Finished product storage & Finish goods transportation				
22.	Health & Safety Management				
23.	Environmental Controls				

Fig. 3.1.4: General safety audit checklist template

- **Methods to minimise workplace health and safety risks**

Organisations minimise workplace risks through risk assessments, PPE use, emergency preparedness, and training as mandated by safety laws. Safety audits following BIS – IS 14489:1998 help identify hazards, ensure compliance, and implement corrective actions, with Safety Officers or Facility Managers overseeing the process.

Type of Risk	Stages of Safety Audits & Risk Management Methods
Physical Risks	Identify areas with excessive noise, heat, or vibrations and assess risks of prolonged exposure. Implement noise control, ergonomic solutions, and periodic safety training to minimise health effects.
Chemical Risks	List hazardous chemicals, inspect storage and handling, and assess exposure risks. Ensure proper ventilation, PPE usage, and compliance with chemical safety regulations.
Biological Risks	Identify exposure risks to bacteria, viruses, or mould and check sanitation measures. Implement hygiene protocols, vaccinations, and regular health monitoring to prevent infections.

Type of Risk	Stages of Safety Audits & Risk Management Methods
Ergonomic Risks	Assess job roles with repetitive tasks or poor posture and inspect workstation setups. Provide ergonomic chairs, posture training, and frequent breaks to prevent musculoskeletal disorders.
Psychosocial Risks	Identify stress factors like workload or harassment and conduct employee surveys. Implement mental health support, counselling, and workload management policies.
Electrical Risks	Inspect high-risk electrical areas for exposed wires and faulty connections, assessing fire and electrocution risks. Conduct regular inspections, train employees, and ensure circuit protection devices.
Fire and Explosion Risks	Identify fire-prone areas, inspect fire extinguishers and exits, and evaluate fire spread risks. Conduct fire drills, improve suppression systems, and train employees in fire safety.
Mechanical Risks	Inspect workplaces with heavy machinery for safety hazards like entanglements or crush injuries. Implement lockout-tag-out procedures, train operators, and enforce PPE use.
Radiation Risks	Identify radiation sources, measure exposure levels, and assess long-term risks. Implement shielding measures, monitor exposure, and provide radiation safety training.
Workplace Violence Risks	Identify areas prone to violence, review security measures, and assess internal and external threats. Strengthen security protocols, provide de-escalation training, and enforce anti-violence policies.

Table 3.1.6: Methods to minimise workplace health and safety risks

UNIT 3.2: Equipment Handling and Workplace Efficiency

Unit Objectives

By the end of this unit, the participants will be able to:

1. Describe safe equipment and machine handling practices to prevent workplace injuries.
2. Illustrate the process of checking and using proper tools for specific apparel industry tasks.

3.2.1 Safe Equipment and Machine Handling

Safe equipment and machine handling are crucial for workplace safety and efficiency, achieved through correct usage and regular maintenance. Properly handling specialised and general tools is essential in the apparel industry to prevent injuries and maintain smooth operations. The following are the standard methods for maintaining safe equipment and machine handling:

- **Industry-Specific Equipment in the Apparel Industry**

- **Sewing Machine**

Sewing machine safety centres on pre-use checks, safe operation, and consistent maintenance. Before sewing, inspect components like the needle and tension; during use, keep fingers clear and guide the fabric smoothly. Regular maintenance, including cleaning lint and oiling, and proper shutdown procedures, ensures operator safety and machine longevity.



Fig. 3.2.1: Industrial sewing machine

- **Cutting Machine**

Cutting machine safety demands pre-use inspections for blade sharpness and guard placement and safe operation using protective gear and stable surfaces. Post-use maintenance, including blade cleaning and secure storage, ensures worker safety and machine longevity.



Fig. 3.2.2: Industrial cutting machine

o **Ironing Press**

Ironing press safety requires pre-use checks of temperature and water levels and safe operation to avoid burns and fabric damage. Consistent maintenance, including cleaning and descaling, alongside proper shutdown procedures, ensures safe and effective garment care.



Fig. 3.2.3: Industrial ironing press

o **Overlock Machine**

Overlock machine safety mandates pre-use checks for thread tension and blade sharpness and careful operation to avoid contact with moving parts. Regular maintenance, including cleaning and oiling, and proper shutdown procedures ensure safe edge finishing.



Fig. 3.2.4: Industrial overlock machine

- **Non-Industry-Specific Equipment Used in the Apparel Industry**

- **Scissors and Fabric Cutters**

Scissors and fabric cutter safety involves pre-use checks for blade sharpness and secure handles, followed by safe operation using proper techniques and avoiding excessive force. Regular maintenance, including cleaning and sharpening, alongside secure storage, prevents injuries.

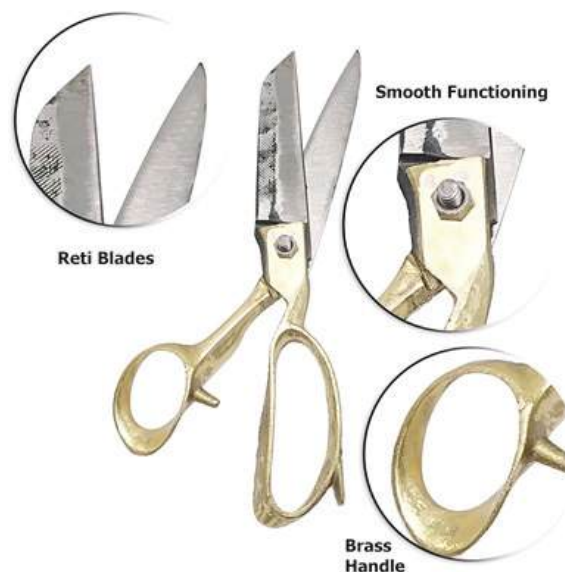


Fig. 3.2.5: Scissors and fabric cutters

- **Measuring Tape**

Measuring tape safety focuses on pre-use checks for clear markings and damage and careful operation on flat surfaces to avoid stretching. Regular cleaning and neat storage in a dry, secure location ensures accuracy and longevity.



Fig. 3.2.6: Industrial Measuring Tape

- **Shears**

Shear safety demands pre-use checks for blade sharpness and a secure pivot, followed by safe operation with proper hand positioning on flat surfaces. Regular maintenance, including cleaning, oiling, rust prevention, and closed-blade storage in designated holders, minimises injury risks.



Fig. 3.2.7: Shears

- **Marking Tools (Chalk, Fabric Pens)**

Marking tool safety emphasizes pre-use checks for suitability and damage and careful operation using light pressure to prevent fabric harm. Regular cleaning and storage in dry conditions ensures tool longevity and prevents unintended fabric marking.



Fig. 3.2.8: Fabric Chalks and Pens

For other miscellaneous equipment, the layerman can follow the same format of the checklist and collaborate with the respective departments in the organisation.

3.2.2 Checking and Using Proper Tools

Using the right tools in the apparel industry ensures efficiency, precision, and safety during garment production. A tool and equipment safety checklist helps maintain tool quality, reduce workplace hazards, and ensure compliance with safety standards. Workers must follow proper handling practices to prevent injuries and equipment damage. Regular inspection and maintenance enhance productivity and prolong the lifespan of tools.

- **Tool and Equipment Safety Checklist**

A Tool and Equipment Safety Checklist ensures tools are inspected, used, and maintained safely, reducing risks from faulty equipment. Pre-Use Inspection checks for damage, defects, or wear to prevent injuries. Safe Operation follows guidelines to avoid accidents like cuts or burns. Maintenance involves regular cleaning, sharpening, and oiling to ensure efficiency and longevity. Shutdown Protocol ensures proper storage, preventing damage and maintaining organisation. The following represents the standard method to check and use tools required by a layman in the apparel industry:

Equipment	Sub-Parts	Tool Usage	Safety Protocol	Image
Sewing Machine	Needle	Pierces fabric to create stitches.	Keep fingers away, check for bends, and replace regularly.	
	Presser Foot	Holds fabric in place while stitching.	Check the attachment, apply steady pressure, and clean often.	
	Bobbin & Case	Supplies lower thread to ensures proper tension.	Place correctly, clean after use, and store securely.	
	Feed Dogs	Moves fabric forward for even stitching.	Keep hands clear, clean lint, and lubricate regularly.	
	Tension Control	Adjusts thread tightness for balanced stitches.	Check before sewing, smooth adjustments, and turn off after use.	

Equipment	Sub-Parts	Tool Usage	Safety Protocol	Image
Cutting Machine	Cutting Blade	Cuts fabric layers cleanly.	Check sharpness, use protective gloves, and store safely.	
	Motor	Powers the blade efficiently.	Check for overheating, avoid continuous use, and unplug after use.	
	Safety Guard	Prevents accidental blade contact.	Keep securely in place, inspect regularly.	
	Handle	Provides grip and control.	Check for cracks, handle securely, and store properly.	
Ironing Press	Heating Plate	Removes wrinkles and sets creases.	Clean before use, keep hands away, and unplug after use.	
	Pressure Lever	Controls ironing pressure.	Lubricate regularly and lock after use.	
	Temperature Control	Adjusts heat settings for safe use.	Check settings before use, and turn off after use.	

Equipment	Sub-Parts	Tool Usage	Safety Protocol	Image
	Steam Function	Releases steam for wrinkle removal.	Avoid skin contact, descale regularly, and drain water before storage.	
Overlock Machine	Loopers	Form overlock stitches to prevent fraying.	Ensure proper threading, clean regularly, cover machine after use.	
	Cutting Blades	Trims excess fabric while stitching.	Keep fingers away, sharpen regularly, and store securely.	
	Stitch Finger	Supports fabric for proper stitch alignment.	Position fabric correctly, clean lint, and store properly.	
	Differential Feed	Controls fabric movement for even stitches.	Adjust smoothly, clean regularly, and cover after use.	
Scissors & Fabric Cutters	Handles	Provide grip for control.	Check for cracks, clean, and store in a dry place.	
	Locking Mechanism	Secures blades when not in use.	Ensure proper function, lubricate, and store securely.	

Equipment	Sub-Parts	Tool Usage	Safety Protocol	Image
	Blade	Cuts fabric with precision.	Keep sharp, handle carefully, and store safely.	
Measuring Tape	Flexible Ruler	Measures fabric accurately.	Handle carefully, wipe clean, and roll up neatly.	
	Retracting Mechanism	Rolls up tape for easy storage.	Prevent tangling, ensure smooth operation, and store properly.	
Shears	Sharp Blades	Used for precise cutting.	Sharpen regularly, hold properly, and store safely.	
	Pivot Point	Joins blades for smooth cutting.	Keep screw tight, lubricate, and close after use.	
Marking Tools	Chalk/Fabric Pens	Makes temporary fabric markings.	Store dry, secure handling, use with care.	

Table 3.2.1: Apparel Industry Equipment and Safety Guidelines

For other miscellaneous equipment, the layerman can follow the same format of the checklist and collaborate with the respective departments in the organisation.

3.2.3 Maintaining Hazard-Free Work Areas

Workstation areas in the apparel industry include fabric inspection, cutting, sewing, ironing, and finishing zones. To prevent accidents, keeping them hazard-free requires regular cleaning, proper tool storage, and clear walkways. Workers should follow safety protocols like wearing protective gear, maintaining equipment, and ensuring proper ventilation. The checklist for maintaining hazard-free work areas is commonly called the "Workplace Safety and Housekeeping Checklist" or "Workstation Safety Inspection Checklist." It includes checks for cleanliness, proper tool storage, equipment maintenance, fire safety, ventilation, and personal protective equipment (PPE) compliance.

WORKPLACE INSPECTION CHECKLIST

Inspection Team:		Inspection Site:
Name	Position	Inspection Date:

Note: S = Satisfactory

Entrances and Exits	S	A

Walkways, Floors, and Stairs	S	A

Work Areas/Desks/Workstations	S	A

Fig. 3.2.9: Workplace safety inspection checklist

There are several workstation areas that a layerman has to work on. The table that follows shows how to maintain hazard-free work areas as per the stages of a workplace safety inspection checklist:

Workstation Areas	Description and Function	Maintaining Hazard-Free Areas
Fabric Inspection Station	Checks fabric quality, defects, and measurements.	Keep the area clean, remove defective fabric, and ensure proper lighting.
Spreading Table	Lays fabric accurately for cutting with minimal waste.	Keep surface dust-free, align fabric properly, and avoid overloading.
Marker Placement Area	Positions patterns efficiently for optimal fabric use.	Store markers safely, use templates properly, and avoid clutter.
Cutting Zone	Ensures fabric layers stay stable during cutting.	Keep blades sharp, secure fabric before cutting, and wear safety gloves.
Numbering & Bundling Station	Sorts and bundles fabric pieces for production.	Organise bundles neatly, use labels, and avoid stacking them too high.

Workstation Areas	Description and Function	Maintaining Hazard-Free Areas
Quality Control Desk	Inspects fabric alignment and shrinkage issues.	Maintain proper lighting, use accurate measuring tools, and store checked items separately.
Waste Management Area	Handles fabric scraps for disposal or recycling.	Dispose of waste regularly, separate reusable scraps, and keep the area tidy.

Table 3.2.2: Workstation safety and maintenance guidelines

For other miscellaneous equipment, the layerman can follow the same format of the checklist and collaborate with the respective departments in the organisation.

3.2.4 Ensuring Workflow and Production Targets

A production target is the set quantity of goods that must be manufactured within a specific time to meet demand and business goals. Ensuring workflow means organising tasks efficiently so that each process runs smoothly without delays. Meeting production targets requires proper planning, resource allocation, and timely execution of tasks. Clear communication, skilled workforce management, and regular monitoring help maintain productivity and quality standards. The Production Workflow and Efficiency Checklist helps track scheduling, worker efficiency, machine maintenance, and quality control to maintain smooth operations.

Questionnaire	Compliant	Non-compliant	N/A
General			
Verify that the scheduled operations can take place according to the planned schedules	✓		
Verify that the interlocks are functioning properly		✓	
Add text here	✓		
Control systems			
Verify the specified interlocking between various control systems			✓
Verify for the correct sequencing control	✓		
Add text here	✓		
Function			
Verify the lamp test facility		✓	
Verify if correct labelling has been provided	✓		
Add text here	✓		
Add text here	✓		
Add text here	✓		

Fig. 3.2.10: Production workflow and efficiency checklist template

There are several workstation areas that a layerman has to work on. The table that follows shows how to ensure workflow and production targets in several workstations:

Workstation Areas	Production Target & Definition	Workflow Required & Definition	Ensuring Workflow & Production Targets
Fabric Inspection Station	Quality Target – Ensure defect-free fabric.	Sequential Workflow – Step-by-step inspection.	Use checklists, proper lighting, trained inspectors.
Spreading Table	Accuracy Target – Align fabric layers precisely.	Structured Workflow – Systematic fabric spreading.	Maintain equipment, precise handling, and accurate tools.
Marker Placement Area	Optimisation Target – Maximise fabric usage.	Planned Workflow – Reduce fabric waste.	Use CAD software, trained staff, and accurate markings.
Cutting Zone	Precision Target – Match pattern dimensions.	Controlled Workflow – Consistent, accurate cutting.	Sharp tools, secure fabric, automated cutting.
Numbering & Bundling Station	Sorting Target – Label and bundle correctly.	Organised Workflow – Systematic grouping.	Proper labelling, order maintenance, and systematic storage.
Quality Control Desk	Defect-Free Target – Meet quality standards.	Inspection Workflow – Check against benchmarks.	Use checklists, trained inspectors, and regular audits.
Waste Management Area	Efficiency Target – Reduce and recycle waste.	Sustainable Workflow – Sort, store, and dispose properly.	Segregate waste, encourage recycling, and track levels.

Table 3.2.3: Ensuring workflow and production targets

For other miscellaneous equipment, the layerman can follow the same format of the checklist and collaborate with the respective departments in the organisation.

3.2.5 Conducting Visual Product Inspections

Visual product inspection ensures quality by identifying defects, inconsistencies, and deviations before production moves forward. The Visual Inspection and Quality Control Checklist helps achieve this by outlining key checkpoints like fabric defects, stitching accuracy, colour consistency, and overall finishing. Using this checklist ensures systematic inspection, minimising errors and maintaining high product standards.

[illegible]

Fig. 3.2.11: Visual Inspection and Quality Control Checklist Template

Visual Products	Definition & Uses	Inspection Process
Fabric	Textile material ensures quality, colour, and texture consistency.	Ensure good lighting, clean workspace, and tools.
Stitching	Seam lines ensure durability, accuracy, and strength.	Surface Check: Examine fabric for stains, defects, and damages.
Trims & Accessories	Additional components ensure proper attachment and function.	Structural Inspection: Check stitching, trims, and accessories for accuracy.
Prints & Embroidery	Decorative patterns ensure alignment, colour accuracy, and finish.	Detail Verification: Inspect prints, embroidery, labels, and tags.
Labels & Tags	Identification details ensure correct info and attachment.	Final Approval: Record findings, separate defects, and approve quality pieces.

Table 3.2.4: Visual Inspection Checklist for Quality Assurance of Visual Products

For other miscellaneous equipment, the layerman can follow the same format of the checklist and collaborate with the respective departments in the organisation.

3.2.6 Reporting Defective Tools and Machines

Timely reporting of defective tools and machines prevents accidents, maintains efficiency, and ensures product quality. The defective equipment reporting checklist helps identify faulty parts, document issues, and escalate problems for quick resolution. A structured reporting process ensures prompt repairs, minimises downtime and enhances workplace safety.

Equipment ID	Item Name	Issue Date	Age of Item	Assigned To

Fig. 3.2.12: Defective equipment reporting checklist template

The table that follows shows the method of reporting defective tools and machines as per the protocols of the company's defective equipment reporting checklist:

Equipment	Sub-Parts	Reporting Method
Sewing Machine	Needle	Report bent or broken needles immediately for replacement.
	Presser Foot	Inform the supervisor if the presser foot is loose or damaged.
	Bobbin & Case	Report missing or misaligned bobbin cases for correction.
	Feed Dogs	Notify maintenance if the feed dogs are not moving the fabric smoothly.
	Tension Control	Report erratic tension issues for machine servicing.
Cutting Machine	Cutting Blade	Inform if the cutting blade is dull or chipped, request sharpening or replacement.
	Motor	Report overheating or malfunctioning motors for inspection.
	Safety Guard	Escalate missing or broken safety guards for immediate repair.
	Handle	Notify cracks or loose grips on handles for prompt replacement.
Ironing Press	Heating Plate	Report uneven heating or burnt marks on the heating plate for maintenance.
	Pressure Lever	Inform if the pressure lever is stuck or loose for servicing.
	Temperature Control	Report faulty temperature adjustments immediately.
	Steam Function	Notify water leakage or blocked steam vents for cleaning.

Equipment	Sub-Parts	Reporting Method
Overlock Machine	Loopers	Report improper stitching due to looper misalignment.
	Cutting Blades	Inform about dull or broken cutting blades for sharpening.
	Stitch Finger	Report misaligned or missing stitch fingers for repair.
	Differential Feed	Notify irregular fabric movement in the differential feed for machine adjustment.
Scissors & Fabric Cutters	Handles	Report loose or cracked handles for replacement.
	Locking Mechanism	Inform us if the locking mechanism fails to secure the blades.
	Blade	Report dull or chipped blades for sharpening.
Measuring Tape	Flexible Ruler	Notify if the flexible ruler is faded or stretched for replacement.
	Retracting Mechanism	Report stuck or broken retracting mechanisms for repair.
Shears	Sharp Blades	Inform about dull shears for re-sharpening.
	Pivot Point	Report loose screws or stiffness in the pivot point for maintenance.
Marking Tools	Chalk/Fabric Pens	Notify about dried or broken fabric marking tools for replacement.

Table 3.2.5: Defective equipment reporting methods

For other miscellaneous equipment, the layerman can follow the same format of the checklist and collaborate with the respective departments in the organisation.

3.2.7 Storing Materials as per Guidelines

A layerman in the apparel industry handles and stores various materials to ensure smooth fabric cutting and production. Proper storage of materials maintains quality, prevents damage, and ensures a smooth workflow in apparel production. The material storage compliance checklist helps categorise and store materials systematically and follow safety protocols. Adhering to storage guidelines minimises waste, improves accessibility, and enhances overall efficiency.

Type	YY/MM/DD													
Order	Item	Type	Unit	Amount	Unit price	Amount								Note
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
Total Amount														
Keeper:					Deliver:					Accountant:				

Fig. 3.2.12: Material storage compliance checklist blank template

The table that follows shows a list of materials whose storage and care forms the utmost responsibility of the layerman with the correct usage and protocols:

Materials	Storage Protocols	Storage Compliance
Fabric Rolls	Store upright on racks, away from moisture.	Follow FIFO (First In, First Out) method.
Markers and Patterns	Keep flat in labelled folders or drawers.	Ensure easy accessibility and prevent damage.
Numbering Stickers or Tags	Store in sealed containers to avoid loss.	Maintain proper labelling for tracking.
Fusible Interlining	Store in dry, dust-free cabinets.	Protect from humidity to prevent adhesion loss.
Thread Cones and Bobbins	Keep in designated thread organisers.	Separate by colour and type for efficiency.
Cutting Tools and Blades	Store in locked cabinets after use.	Ensure safety measures to prevent injuries.
Measurement Tools	Keep in labelled storage boxes.	Regularly calibrate for accurate measurements.
Adhesives and Tapes	Store in a cool, dry place.	Seal properly to avoid drying out.

Materials	Storage Protocols	Storage Compliance
Plastic and Paper Sheets	Keep in a dedicated area, rolled or flat.	Avoid exposure to heat and moisture.
Fabric Waste Bins	Place near workstations for easy disposal.	Follow waste segregation guidelines.

Table 3.2.6: Material storage guidelines in apparel industry

For other miscellaneous equipment, the layerman can follow the same format of the checklist and collaborate with the respective departments in the organisation.

UNIT 3.3: Waste Management, Hygiene and Health Awareness

Unit Objectives

By the end of this unit, the participants will be able to:

1. Describe the effects of contamination on product quality in the apparel industry.
2. Outline effective ways to minimise wastage during the garment manufacturing process.
3. Elucidate the importance of following environmental management procedures in the workplace.
4. Illustrate the key elements of a proper waste disposal system.
5. Discuss methods for minimising and safely disposing of waste materials.
6. Describe the importance of maintaining health and hygiene in the work environment.
7. Elaborate on the ill effects of harmful substances on workers and the environment.
8. Discuss the importance of maintaining a healthy lifestyle for occupational well-being.

3.3.1 Effects of Contamination on Products

Contamination in apparel products affects their durability, appearance, and safety, leading to defects and customer dissatisfaction. The product contamination prevention checklist helps identify contamination risks, enforce hygiene measures, and ensure proper handling during production. Preventing contamination maintains product quality, reduces rejections, and enhances brand reputation.

Regulatory Claims			
Claim	Status	Claim	Status
Physical Specifications		Chemical Specifications	
Shelf life		Suggestive Storage	
Allergens		Package Content	
Microbiological Specification			
Version No.		Issue Date	

Fig. 3.3.1: Product Contamination Prevention Checklist

The table that follows shows the effects of contamination and how they can be prevented:

Types of Finished Products	Contamination They Get	Effect of Contamination
Clothing & Garments	Dust, stains, fabric defects	Reduces fabric quality and appearance
Sportswear & Active wear	Sweat, bacteria, colour fading	Causes odour and weakens fabric
Innerwear & Loungewear	Dirt, fabric pilling, moisture	Affects comfort and hygiene
Workwear & Uniforms	Grease, chemicals, rough handling	Weakens fabric and reduces durability
Accessories	Dirt, moisture, colour fading	Reduces durability and appearance
Home Textiles	Dust, stains, mould	Affects hygiene and fabric longevity
Specialised Garments	Chemical spills, heat exposure	Reduces protective function
Industrial Textiles	Oil, grease, dust	Weakens material strength

Table 3.3.1: Contamination and prevention in apparel products

3.3.2 Ways to Minimise Wastage

Minimising wastage is crucial for cost-saving, environmental protection, and overall efficiency in any industry. Businesses can significantly reduce waste by optimising resources, reducing errors, and implementing sustainable practices. In the apparel industry, managing fabric, trims, and production materials efficiently helps reduce costs and maintain quality standards.

- **Waste Segregation**

Waste segregation means separating different types of waste for proper disposal and recycling. It helps reduce pollution, manage waste efficiently, and clean the workplace. Using colour-coded bins ensures that fabric, plastic, metal, paper, and hazardous waste are disposed of correctly.

Bin Colour	Bin Type	Waste Collected	Purpose	Image
Blue	Fabric Waste Bin	Fabric scraps, cuttings	Collects reusable or recyclable fabric waste.	
Green	Paper & Cardboard Bin	Patterns, packaging materials	Ensures paper-based waste is properly recycled.	

Bin Colour	Bin Type	Waste Collected	Purpose	Image
Red	Plastic Waste Bin	Plastic wraps, thread cones	Collects plastic waste for recycling or disposal.	
Yellow	Metal Waste Bin	Broken needles, machine parts	Safely disposes of sharp or damaged metal parts.	
Black	Hazardous Waste Bin	Chemical containers, adhesives	Separates harmful substances for safe disposal.	

Table 3.3.2: Waste segregation

- **Efficient Resource Planning (Reduces Material Waste)**

Planning raw material usage prevents overstocking and excess waste. For example, in garment production, fabric consumption is calculated based on order quantity, reducing leftover fabric. Advanced inventory management systems help track usage and avoid unnecessary procurement.

- **Quality Control Measures (Prevents Defective Product Waste)**

Ensuring high-quality production at every stage reduces rework and defective outputs. In apparel manufacturing, pre-production fabric inspection helps avoid cutting defective materials and saves fabric and labour costs. Regular machine maintenance prevents stitching defects, reducing rejected garments.

- **Optimised Cutting and Pattern Layouts (Minimises Fabric Scraps)**

Using computerised pattern-making software and efficient cutting layouts maximises fabric utilisation. For example, auto-nesting software in apparel factories arranges patterns to use every inch of fabric efficiently, reducing leftover scraps. Precise cutting techniques ensure minimal off-cuts.

- **Recycling and Reusing Materials (Reduces Disposal Waste)**

Recycling fabric scraps, trims, and other materials reduces landfill waste. Apparel brands repurpose fabric leftovers into accessories like scrunchies, bags, or stuffing for cushions. Unused thread cones are often recycled for secondary production processes.

- **Proper Storage and Handling (Prevents Storage and Spoilage Waste)**

Storing materials correctly prevents damage, contamination, and spoilage. In the apparel industry, fabric rolls must be kept in dry, dust-free areas to prevent mould and staining. Proper handling of delicate trims and embellishments reduces breakage and loss.

- **Employee Training and Awareness (Reduces Operational Waste)**

Training workers on best practices ensures efficient resource usage and minimises mistakes. In garment stitching units, trained operators use precise techniques to avoid stitching errors that lead to fabric wastage. Awareness programs on sustainable production reduce unnecessary material usage.

- **Sustainable Production Techniques (Reduces Energy and Chemical Waste)**

Eco-friendly processes minimise waste generation and environmental damage. Apparel manufacturers adopt waterless dyeing techniques to save water and reduce chemical discharge. Using energy-efficient machinery lowers electricity consumption, reducing overall operational waste.

- **Proper Waste Disposal**

Proper disposal methods prevent pollution, maintain hygiene, and promote sustainability. In the apparel industry, segregating textile waste, recycling fabric scraps, and safely disposing of chemical waste help reduce environmental impact. Following waste disposal guidelines ensures compliance with regulations and improves workplace safety.

Minimising wastage helps lower costs, improve efficiency, and reduce environmental impact. Different types of waste, such as material, energy, and defective production, can be controlled through better planning and execution. The waste management and efficiency checklist helps industries track resource usage, reduce waste, and improve sustainability. Minimising wastage lowers costs, enhances efficiency, and reduces environmental impact by controlling material, energy, and defective production waste through better planning and execution.

[illegible]

Fig. 3.3.2: Waste management and efficiency checklist template

3.3.3 Following Environmental Management Procedures

Environmental management procedures help industries reduce their environmental impact, comply with regulations, and promote sustainability. In the apparel industry, following these procedures ensures responsible use of resources, proper waste disposal, and minimal pollution. The Environmental Management System (EMS) provides industry guidelines to monitor, control, and improve their environmental performance. The following make up the stages of environmental management protocols:

- **Compliance with Environmental Regulations**

Waste disposal guidelines in India are primarily regulated by the Central Pollution Control Board (CPC under the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India. The CPCB sets rules for waste management, including Solid Waste Management Rules, 2016, Hazardous Waste Management Rules, 2016, and E-Waste Management Rules, 2016, ensuring proper disposal and environmental protection.

- **Efficient Waste Management**

Proper segregation and disposal of textile waste prevent pollution. Industries must categorise waste into biodegradable, recyclable, hazardous, and non-hazardous and dispose of them in designated bins. Following the Solid Waste Management Rules, 2016, helps maintain cleanliness and reduce landfill waste.

- **Sustainable Resource Utilisation**

Industries should focus on reducing energy, water, and raw material consumption. Techniques such as rainwater harvesting, energy-efficient machinery, and sustainable fabric sourcing help in conserving resources. Adopting circular economy principles ensures materials are reused, recycled, or repurposed.

- **Pollution Prevention Measures**

Textile production can lead to air, water, and soil pollution if not controlled. Installing effluent treatment plants (ETPs) for wastewater treatment and using low-emission machinery help reduce pollution. Proper air filtration systems in factories control dust and airborne pollutants.

- **Employee Training and Awareness**

Educating workers on environmental policies, waste segregation, and energy conservation improves compliance. Regular training sessions on handling hazardous materials and eco-friendly practices ensure a sustainable work culture.

- **Monitoring and Continuous Improvement**

Regular audits and assessments help identify areas for improvement. Using environmental performance indicators (EPis) and conducting periodic environmental impact assessments (EIA) ensure continuous progress. Implementing ISO 14001 (Environmental Management System) certification helps maintain sustainability standards.

AUDIT CODE	CHECKLIST POINTS	RESPONSIBILITY	AUDITOR	SIGNATURE	
				AUDITEE	AUDITOR
1.	Construction Works / Layout Management / Project Planning				
2.	Construction Layout check points				
3.	Employee facility & Welfare				
4.	Supply of air in Rooms / Work stations / Colonies				
5.	Water management				
6.	Equipment planning				
7.	Electrical Works				
8.	Natural Fuel Resources / Fuel Resources				
9.	Machinery Planning				

10	Process equipment maintenance				
11	Solid waste / Liquid waste disposal				
12	Cleaning and sanitisation / house keeping works				
13	Manufacturing process / Manufacturing facilities / manufacturing process monitoring & controls				
14	Quality Assurance & Quality Control (In process / Finish Products)				
15	Prevention of cross contamination				
16	Packing / Packing Materials Controls				
17	Purchasing / Procurement Process & Controls				
18	R.M Purchasing / Consumable Purchasing Quality Management				
19	Processing, Handling and storage of products				
20	Material management				
21	Finished product storage & Finish goods transportation				
22	Health & Safety Management				
23	Environmental Controls				

Fig. 3.3.3: Environmental Management System Standard Template

3.3.4 Proper Waste Disposal System Elements

A structured waste disposal system prevents pollution, ensures compliance, and maintains workplace hygiene. Properly disposing fabric scraps, chemicals, and packaging materials in the apparel industry is crucial for sustainability. The Waste Disposal and Management Checklist helps industries segregate, handle, and dispose of waste safely.

- **Compliance with Regulations**

The Central Pollution Control Board (CPC under the Ministry of Environment, Forest and Climate Change (MoEF&CC) regulates waste disposal. Laws like the Solid Waste Management Rules, 2016, and Hazardous Waste Management Rules, 2016, mandate proper segregation, treatment, and disposal to prevent environmental damage.

- **Waste Segregation**

Industries must sort waste into biodegradable, non-biodegradable, recyclable, and hazardous categories. Colour-coded bins ensure proper disposal and prevent contamination. Fabric scraps, trims, and packaging materials should be recycled or repurposed whenever possible.

- **Safe Collection and Transport**

Waste must be stored in sealed, labelled bins and transported by authorised waste handlers. Hazardous waste, such as chemical residues, requires special handling to avoid environmental risks. Proper containment prevents leaks, spills, and contamination.

- **Sustainable Disposal and Recycling**

Industries should adopt recycling, reusing, composting, and energy recovery methods to minimise landfill waste. Fabric scraps can be repurposed, packaging materials reused, and organic waste composted. Waste-to-energy plants convert non-recyclable waste into usable power.



Fig. 3.3.4: Waste Disposal Cycle

- Hazardous Waste Handling**

Chemical waste from textile processes must be stored in leak-proof containers and disposed of at licensed hazardous waste treatment facilities. Installing Effluent Treatment Plants (ETPs) ensures wastewater is treated before disposal, reducing environmental harm.

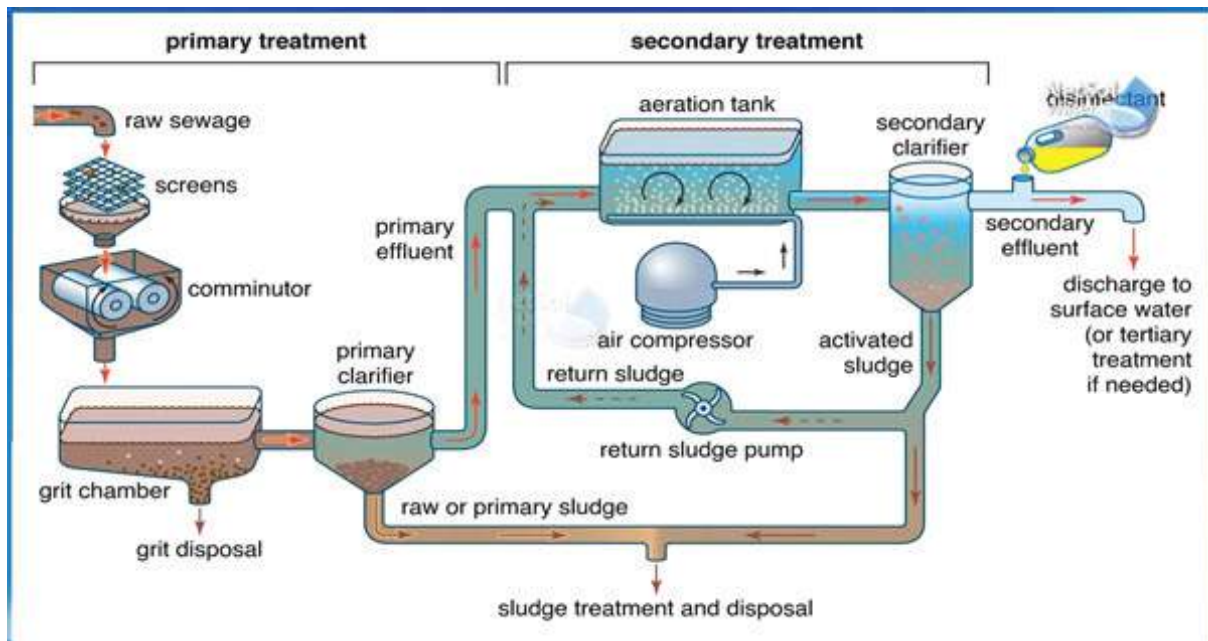


Fig. 3.3.5: Effluent Treatment Plant

- Employee Training**

Workers must be trained in waste segregation, hazardous material handling, and recycling best practices. Regular awareness programs improve compliance and create a culture of sustainability.

Audit checklist				Yes	No	Notes
Planning						
Determine methods and waste categories				✓		Add text here
Outline goals and state some predictions				✓		Add text here
Add text here					✓	Add text here
PPE and sorting equipment						
Puncture-resistant nitrile gloves				✓		Add text here
Eye protection and face masks				✓		Add text here
Waste Sorting						
Coordinate time and place with the sorting team				✓		Add text here
Tally up or weigh various waste streams and record				✓		Add text here
Add text here					✓	Add text here
Findings and follow-up						
Tally the data collected				✓		Add text here
Add text here						Add text here
Completion						
Provide recommendations and action plans				✓		Add text here
Add text here						Add text here

Fig. 3.3.6: Waste Management Mentoring and Audit Checklist

- Monitoring and Improvement**

Regular waste audits track disposal efficiency and compliance. The Waste Disposal and Management Checklist continuously monitors segregation, handling, and disposal methods. Periodic evaluations help industries adopt better waste management practices.

Physical Environment			
As a result of the Lean event, will there be:	Unk	Yes	No
Any Changes in the area ?		☒	
Any Changes in the Equipment or personnel ?			☒
Text Here			
Material/Chemical Use and Storage			
As a result of the Lean event, will there be:	Unk	Yes	No
Any Changes in the volume of synthetic compounds/materials put away?		☒	
Text Here			
Waste Management			
As a result of the Lean event, will there be:	Unk	Yes	No
Any Changes to the territory or no. of initial waste amassing Points?		☒	
Text Here			

Fig. 3.3.7: Waste Management Checklist

3.3.5 Minimising and Disposing Waste Safely

Reducing and properly disposing waste lowers costs, conserves resources, and prevents environmental damage. In the apparel industry, minimising fabric scraps, optimising resource usage, and ensuring safe chemical and textile waste disposal are essential. The Waste Reduction and Disposal Checklist helps industries implement effective waste management strategies. The following are the different stages and types of minimising and disposing off waste successfully:

- **Efficient Material Usage**

Maximising material efficiency reduces waste and lowers production costs. Techniques like fabric utilisation planning, marker optimisation, and digital pattern cutting ensure minimal fabric scraps. Using sustainable raw materials and alternative fibres further enhances efficiency while reducing environmental impact.

- **Process Optimisation**

Improving workflow efficiency minimises resource wastage and enhances productivity. Automation, lean manufacturing, and real-time monitoring help reduce energy consumption and material loss. Streamlining processes through standardised operations and quality control ensures consistent output with fewer defects.

- **Recycling Initiatives**

Recycling in the apparel industry involves repurposing fabric scraps, trims, and packaging materials. Waste textiles can be converted into new fabrics, insulation materials, or industrial rags instead of being discarded. Implementing closed-loop recycling systems reduces landfill waste and promotes sustainability.

- **Zero-Waste Design**

Zero-waste design eliminates fabric waste by creating patterns that use every inch of the material. Techniques like modular garment construction, draping, and fabric-first designing prevent scraps from being generated. This approach not only conserves raw materials but also reduces production costs and environmental impact.

- **Eco-Friendly Disposal Methods**

Sustainable disposal involves biodegrading, composting, and converting waste into energy instead of dumping it in landfills. Organic textile waste can be composted, while non-recyclable materials can be processed into biofuel. Partnering with certified waste management companies ensures proper disposal while minimising environmental harm.



Fig. 3.3.8: Standard waste generation reduction plan

3.3.6 Importance of Health and Hygiene

Maintaining proper health and hygiene is essential for personal well-being, workplace safety, and overall productivity. In industries like apparel manufacturing, ensuring clean work environments, proper sanitation, and personal hygiene practices prevent illnesses and improve efficiency. Implementing health policies and hygiene protocols promotes a safer and healthier workspace.

- **Workplace Hygiene Practices**

A clean workplace reduces the risk of infections and enhances employee well-being. Regularly cleaning workstations, proper waste disposal, and sanitised restrooms maintain hygiene standards. Access to handwashing stations, disinfectants, and protective gear ensures a healthier work environment.

- **Personal Hygiene Standards**

To prevent contamination, employees must follow basic hygiene practices like regular handwashing, wearing clean uniforms, and maintaining personal cleanliness. In textile sectors, avoiding open wounds near fabrics, using gloves, and keeping hair covered prevent product contamination. Proper personal hygiene minimises health risks and ensures a professional appearance.

- **Health and Safety Regulations**

Workplace health policies ensure compliance with safety regulations and protect employees from hazards. Measures like regular health check-ups, vaccination programs, and first-aid training help prevent occupational diseases. Adhering to safety protocols like wearing masks in dusty environments and maintaining ergonomic workstations improves overall well-being.

- **Impact on Productivity and Well-Being**

Good health and hygiene practices reduce absenteeism and improve focus and efficiency. A hygienic workspace promotes employee satisfaction, fewer sick days, and better morale, leading to higher productivity. Encouraging a culture of cleanliness and well-being creates a healthier and more engaged workforce.

Done	Food Storage and Dry Storage	Comments
	Food is kept at least 6" off the ground.	
	All food is labeled with name and delivery date.	
	The FIFO (First In, First Out) method of inventory is being practiced.	
	Containers are labeled with the food name and delivery date.	
	Chemicals and food are separated.	

Done	Employee Hygiene	Comments
	Fingernails are short, unpolished, and clean.	
	Employees take appropriate action when coughing or sneezing.	
	Hands are washed thoroughly using proper hand-washing procedures at critical point.	
	Smoking is observed only in designated areas away from preparation, service, storage, and ware-washing areas.	
	Jewelry is limited to simple earrings, plain rings, and watches.	

Done	Food Handling	Comments
	Food is handled with utensils, clean gloved hands, or clean hands.	
	Food is tasted using proper method.	
	Frozen food is thawed under refrigeration or in cold running water.	
	Food is heated to the correct temperature to remove all bacteria before being placed in the hot holding area.	
	Food is protected from cross-contamination.	

Fig. 3.3.9: General health inspection checklist

3.3.7 III Effects of Harmful Substances

Exposure to harmful substances can cause serious health issues, environmental damage, and workplace hazards. Industries like textiles, chemical dyes, adhesives, and synthetic fibres may lead to respiratory problems, skin disorders, and long-term health risks. Implementing safety guidelines and protective measures minimises exposure and ensures a safer work environment.

- **Health Hazards and Occupational Risks**

Toxic chemicals and pollutants can lead to breathing difficulties, allergic reactions, and chronic illnesses among workers. Continuous exposure to formaldehyde, heavy metals, and volatile organic compounds (VOCs) increases the risk of respiratory diseases and skin irritation. Protective gear, proper ventilation, and regular health screenings ensure worker safety.

- **Environmental Damage and Pollution**

Harmful substances pollute air, water, and soil, affecting ecosystems and communities. Improper disposal of chemical-laden wastewater, non-biodegradable materials, and toxic fumes degrades environmental quality. Using eco-friendly alternatives, waste treatment plants, and sustainable disposal methods reduces contamination.

- **Workplace Safety Measures**

Proper handling and storage of hazardous materials prevent accidents and exposure risks. Training employees in safe chemical usage, emergency response, and waste disposal protocols enhances workplace safety. Implementing Material Safety Data Sheets (MSDS) and hazardous substance labels ensures proper identification and risk management.

- **Preventive Measures and Regulations**

Following national and international safety regulations helps minimise the impact of harmful substances. Compliance with Occupational Safety and Health Administration (OSHA) standards, environmental laws, and chemical safety guidelines ensures legal and ethical operations. Regular safety audits, risk assessments, and worker education programs promote long-term well-being and sustainability.

- **III Effects of Alcohol, Tobacco, and Drugs**

Substance abuse negatively affects health, productivity, and workplace safety. Alcohol and drug consumption lead to impaired judgment, accidents, absenteeism, and reduced efficiency. Tobacco use increases the risk of lung diseases, heart problems, and second-hand smoke exposure for co-workers. Employers must enforce strict workplace policies, conduct awareness programs, and provide counselling support to prevent substance abuse.

The table that follows shows a list of checklists that help to understand the ill effects of different hazardous and harmful substances:

Checklist Category	Description
Identification of Hazardous Substances	Label chemicals, maintain Material Safety Data Sheets (MSDS), and track usage.
Workplace Safety Measures	Ensure proper ventilation, use protective gear, implement emergency response plans, and conduct worker training.
Environmental Protection Guidelines	Dispose of toxic waste properly, treat wastewater, and reduce emissions to minimise environmental impact.
Health Monitoring and Risk Assessment	Conduct regular medical check-ups, monitor air quality, and track exposure to harmful substances.
Substance Abuse Prevention	Enforce strict policies on alcohol, tobacco, and drugs, provide awareness programs, and offer counselling support.
Regulatory Compliance	Follow OSHA standards, adhere to environmental laws, and implement workplace safety protocols.

Table 3.3.3: Hazardous substance safety and workplace wellness checklist types

3.3.8 Maintaining a Healthy Lifestyle

A healthy lifestyle improves overall well-being, boosts energy levels, and enhances productivity. Maintaining good health ensures better focus, reduced absenteeism, and increased efficiency in the workplace. A structured approach to healthy living includes balanced nutrition, regular exercise, mental well-being, and proper rest.

- **Balanced Nutrition**

Eating a well-balanced diet provides essential nutrients for the body's proper functioning. Consuming fresh fruits, vegetables, whole grains, and lean proteins helps maintain energy levels and strengthens the immune system. Avoiding processed foods, excessive sugar, and unhealthy fats prevents lifestyle diseases like obesity and diabetes.



Natural Whole foods



Required Body Nutrients

Fig. 3.3.10: Balanced Nutrition Components

- **Regular Physical Activity**

Daily physical activity improves cardiovascular health, strengthens muscles, and enhances stamina. Simple exercises like walking, stretching, or yoga can be integrated into daily routines, even in the workplace. Staying active reduces stress, boosts mood, and promotes long-term health.



Fig. 3.3.11: Physical Activities and Exercise

- **Mental Well-Being**

Managing stress and maintaining a positive mindset contribute to overall wellness. Practising mindfulness, meditation, or relaxation techniques helps reduce anxiety and improve focus. Creating a healthy work-life balance and seeking support prevent burnout and mental exhaustion.

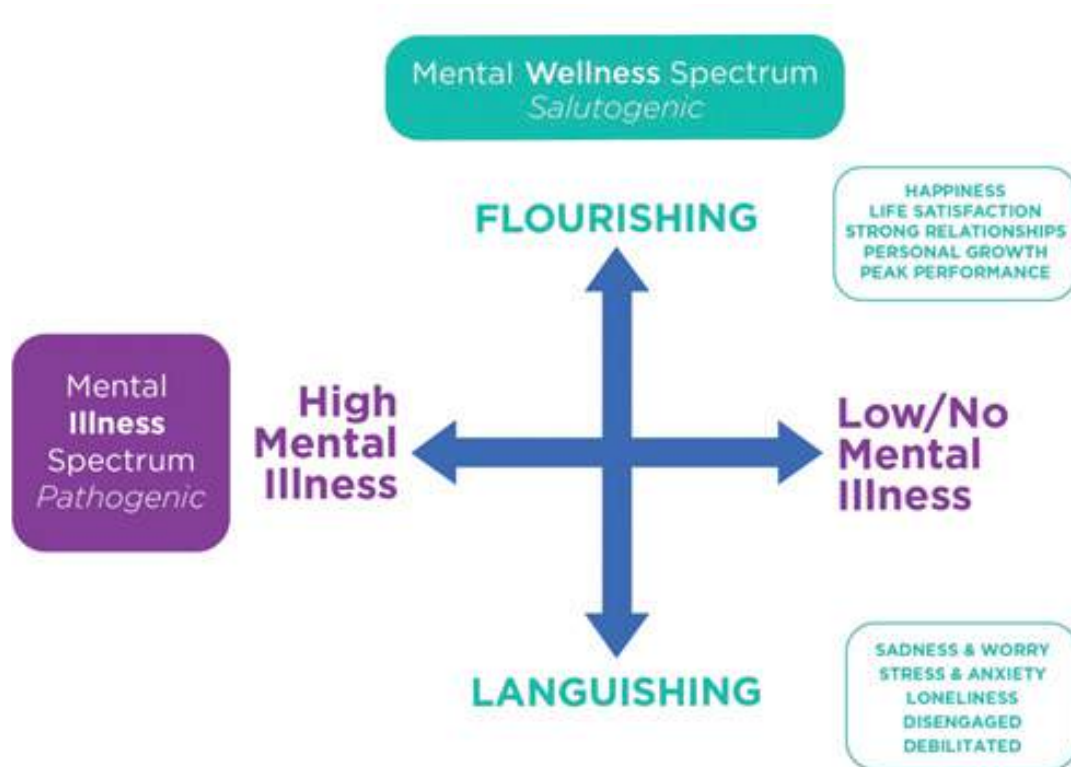


Fig. 3.3.12: Mental health milestones

- **Proper Hydration**

Drinking sufficient water throughout the day keeps the body hydrated, improves digestion, and boosts energy levels.

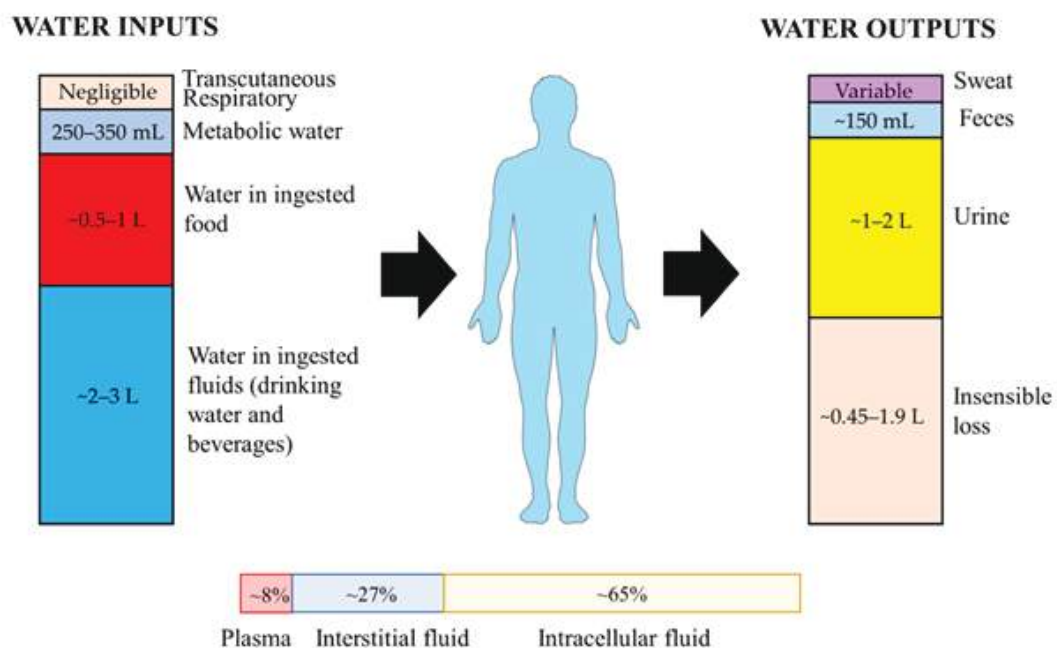


Fig. 3.3.13: Proper hydration

- **Proper Rest**

Adequate sleep is essential for physical and mental recovery. Maintaining a regular sleep schedule improves concentration, memory, and decision-making abilities.



Fig. 3.3.14: Proper sleep scheduling

- **Avoiding Harmful Habits**

Limiting the consumption of alcohol, tobacco, and drugs helps maintain a healthy body and mind. These substances negatively affect organ function, reduce work efficiency, and increase health risks. Adopting healthy alternatives like herbal drinks, deep breathing, or engaging in hobbies promotes long-term well-being.



Fig. 3.3.15: Tobacco and alcohol quitting steps

UNIT 3.4: Inclusion and Accessibility for Persons with Disabilities (PwD)

Unit Objectives

By the end of this unit, the participants will be able to:

1. Demonstrate accessibility walk-through procedures.
2. Outline how to seek clarity on workplace hazards.
3. Illustrate accessible workspace design.
4. Describe workplace inclusion policy adherence.
5. Explain how to report safety barriers.
6. Demonstrate emergency evacuation assistance.
7. Discuss workplace inclusivity promotion.

3.4.1 Conducting Walk-Throughs for Accessibility

The Ministry of Social Justice and Empowerment (MSJE) is responsible for formulating policies and implementing programs that safeguard the rights and welfare of persons with disabilities in India. It administers key legislation like the Rights of Persons with Disabilities Act, 2016, (PwD) ensuring accessibility, equal opportunities, and non-discrimination across various sectors. The ministry also collaborates with state governments and NGOs to remove physical and societal barriers, empowering persons with disabilities to lead independent and dignified lives.



Ministry of Social Justice and Empowerment
Department of Social Justice and Empowerment
Government of India

Fig. 3.4.1: MSJE official logo

Conducting walk-throughs for accessibility involves systematic inspections of the workplace to identify physical, sensory, and cognitive barriers. This process includes gathering feedback from employees, particularly persons with disabilities, to ensure that all potential issues are recognised and addressed. The findings guide targeted improvements and strategic planning to create a safer and more inclusive environment for everyone.

- **Assessment:** Regular walk-throughs allow teams to systematically assess the workplace environment for physical, sensory, and cognitive barriers.
- **Engagement:** These inspections involve feedback from PwD and other employees to identify areas for improvement.
- **Action Plan:** Findings are documented and used to inform targeted interventions to enhance accessibility.

3.4.2 Seeking Clarifications on Workplace Risks

Seeking clarifications on workplace risks ensures that all employees, including persons with disabilities, fully understand potential hazards. In India, this process is supported by guidelines under the Rights of Persons with Disabilities Act, 2016, and the Ministry of Labour and Employment oversight. Open dialogue on safety concerns allows organisations to implement preventive measures in accordance with these regulations. The following are the methods for identifying and understanding risks for PwDs:

- **Risk Identification:** Employees are encouraged to ask questions about potential hazards that might not be immediately apparent, ensuring clarity on risks that affect PwD.
- **Communication Channels:** Open lines of communication between staff and management facilitate discussions about unclear or complex safety protocols.
- **Continuous Improvement:** Seeking clarifications leads to informed decision-making and continuous refinement of safety procedures.

Workplace Risks/ Barriers	Description Table: workplace risks and barriers for PwDs	Examples/Impact
Physical Barriers	Architectural and infrastructural obstacles that hinder mobility and access.	Inaccessible doorways, absence of ramps/elevators, narrow corridors, and uneven surfaces that impede wheelchair access.
Sensory Barriers	Environmental factors that affect individuals with sensory impairments.	Poor lighting for visually impaired individuals, excessive noise affecting those with hearing issues, and inadequate signage.
Cognitive Barriers	Challenges arise from complex information or processes that are hard to understand.	Overly complicated instructions, unstructured communication, or lack of visual aids affect comprehension and decision-making.
Technological Barriers	Lack of or non-adaptive technology that prevents effective work participation.	Inaccessible software interfaces, absence of screen readers or assistive devices, and non-adjustable workstations.
Policy/Procedural Barriers	Inadequate or unclear policies that fail to address the specific needs of persons with disabilities.	Lack of defined accommodation procedures, unclear emergency protocols, and insufficient workplace support systems.
Social/Attitudinal Barriers	Negative perceptions, stereotypes, and discrimination that affect workplace inclusion.	Stigma, bias in hiring or promotions, and lack of awareness among colleagues leading to isolation or exclusion.

Table 3.4.1: workplace risks and barriers for PwDs

3.4.3 Designing Accessible and Inclusive Workspaces

Designing accessible and inclusive workspaces involves incorporating universal design principles to remove physical, sensory, and cognitive barriers. In India, designers refer to the National Building Code 2016 and the Rights of Persons with Disabilities Act, 2016, with guidance from the Ministry of Social Justice and Empowerment. This approach complies with legal requirements and fosters an environment where every employee can thrive. The following are the stages of Strategic Design Principles for PwDs:

- **Universal Design:** Workspaces are planned to accommodate diverse needs through flexible layouts, adjustable furniture, and assistive technologies.
- **Inclusive Aesthetics:** Design elements are chosen for functionality and creating an inviting environment that respects and celebrates diversity.
- **Employee Input:** The design process incorporates feedback from PwD to ensure that the workspace effectively meets their needs.

The Rights of Persons with Disabilities Act, 2016, along with the National Building Code (NBC) 2016, identified by the Bureau of Indian Standards (BIS) provides guidelines for inclusive workplace design in India.



Fig. 3.4.2: BIS BC home page

3.4.4 Following Inclusivity and Accommodation Policies

Following inclusivity and accommodation policies means adhering to established guidelines that ensure equal opportunities for persons with disabilities. In India, these policies are guided by the Rights of Persons with Disabilities Act, 2016, and supported by directives from the Ministry of Social Justice and Empowerment. Consistent application of these policies guarantees that necessary accommodations are provided, promoting a fair and inclusive workplace. The following are the pillars of adherence to standards for dealing with PwDs:

- **Barrier-Free Access:** Specifications for ramps, lifts, and wide doorways facilitate smooth entry and movement for wheelchair users.
- **Circulation and Connectivity:** Designed corridors, passageways, and staircases with appropriate dimensions and tactile indicators enhance connectivity for individuals with visual impairments.
- **Accessible Sanitary and Service Areas:** Standards for toilets, washrooms, and service areas ensure they effectively accommodate the needs of persons with disabilities.
- **Signage and Emergency Egress:** Clear, visible signage and well-marked emergency evacuation routes guarantee the safety of all occupants, including those with disabilities.

Fig. 3.4.3: NBC rules for buildings and workplace design for PwD inclusivity

3.4.5 Reporting Barriers Affecting PwD Safety

Reporting barriers affecting the safety of persons with disabilities is essential for promptly addressing accessibility issues. Indian laws, including the Rights of Persons with Disabilities Act, 2016, mandate that organisations set up clear reporting mechanisms, with oversight often provided by the Ministry of Labour and Employment. Timely reporting leads to corrective actions that improve workplace safety and accessibility. The following are the effective reporting mechanisms for barriers related to PwDs:

Workplace Risks/Barriers	Methods of Reporting Barriers
Physical Barriers	Report via internal maintenance requests, facility audits, suggestion boxes, or direct communication with the accessibility committee or HR.
Sensory Barriers	Use dedicated feedback forms, accessibility hotlines, or direct reporting to facility management and HR.
Cognitive Barriers	Report through structured feedback systems, direct communication with supervisors, or designated HR channels.
Technological Barriers	Submit issues via IT support tickets, accessibility feedback channels, or assistive technology user groups.
Policy/Procedural Barriers	Report concerns through HR grievance channels, policy feedback forms, or meetings with management.
Social/Attitudinal Barriers	Use anonymous feedback systems, report to diversity and inclusion committees, or file formal complaints with HR.

Table 3.4.2: Methods to Report Barriers

3.4.6 Assisting PwD during Emergency Evacuations

Assisting persons with disabilities during emergency evacuations is critical to workplace safety planning. In India, organisations follow emergency protocols outlined in the National Building Code 2016 and the Rights of Persons with Disabilities Act, 2016, with guidance from the Ministry of Labour and Employment. Tailored evacuation procedures ensure that everyone can evacuate safely during emergencies. The following are the stages to provide emergency preparedness and support to PwDs:

- **Tailored Plans:** Emergency evacuation plans are specifically designed to address the unique needs of PwD, ensuring that everyone can evacuate safely.

- **Training and Drills:** Regular drills and specialised training for staff and emergency responders help prepare the team for real-life scenarios.
- **Assigned Assistance:** Designating support personnel to assist PwD during emergencies minimises confusion and speeds up evacuation processes.

The National Disaster Management Authority (NDMA) is the key agency responsible for developing and overseeing inclusive emergency evacuation plans that ensure the safety of persons with disabilities during disasters in India.



Fig. 3.4.3: NDMA official logo

3.4.7 Promoting Awareness of Workplace Inclusivity

Promoting awareness of workplace inclusivity involves continuous education and communication efforts that highlight the importance of accessibility and diversity. In India, training programs and campaigns are developed in line with the Rights of Persons with Disabilities Act, 2016, and often receive support from the Ministry of Social Justice and Empowerment. These initiatives foster a culture of inclusion where all employees understand and contribute to a respectful and accessible work environment. The following are the methods of raising consciousness and driving change to promote PwD inclusivity:

- Training sessions enhance understanding of diversity and inclusion in the workplace.
- Communication campaigns, such as newsletters and posters, raise awareness of the benefits of an inclusive environment.
- Leadership initiatives play a crucial role in modelling inclusive behaviour.
- Workshops help employees understand and implement policies for a more accessible workplace.
- Engaging all employees in discussions on inclusivity fosters a culture of respect and support.

PwD Awareness Day in India is observed on December 3rd, aligning with the International Day of Persons with Disabilities.



Fig. 3.4.4: PwD awareness day official logo

Summary



- Safe working practices prevent accidents during equipment cleaning and maintenance.
- Contamination from dirt and oil can affect product quality and durability.
- Reducing workplace waste improves efficiency and lowers costs.
- Health and safety measures protect workers from potential hazards.
- Environmental management procedures help in maintaining sustainability.
- Identifying hazards and risks ensures a safer work environment.
- Proper accident response minimises injuries and damages.
- Regular inspections help maintain a hazard-free workspace.
- Seeking guidance from supervisors improves workplace safety.
- Following organisational procedures ensures safe machine and equipment handling.
- Correct waste disposal prevents environmental harm.
- Mock drills and evacuation exercises prepare employees for emergencies.

Exercise

Multiple-choice Question:

1. What is the main purpose of safe equipment maintenance?
 - a. To increase production costs
 - b. To prevent workplace accidents and ensure efficiency
 - c. To make equipment harder to operate
 - d. To avoid following workplace rules

2. How can contamination affect product quality?
 - a. It improves durability
 - b. It causes defects and reduces quality
 - c. It makes products more attractive
 - d. It has no impact on production

3. What is one way to minimise wastage in the workplace?
 - a. Ignoring workplace procedures
 - b. Using materials efficiently and reducing defects
 - c. Increasing production speed without quality checks
 - d. Disposing of all materials without sorting

4. Why are health and hygiene important in the workplace?
 - a. To make workers uncomfortable
 - b. To reduce workplace safety measures
 - c. To prevent illness and ensure a safe environment
 - d. To increase production waste

5. What should employees do in case of a fire emergency?
 - a. Wait for instructions without taking action
 - b. Panic and leave their workstations unattended
 - c. Follow emergency response procedures and evacuate safely
 - d. Continue working as usual

Descriptive Questions:

1. How do safe working practices help in equipment cleaning and maintenance?
2. What are the effects of contamination on product quality in the apparel industry?
3. Why is it important to minimise wastage during garment production?
4. What are the key elements of a proper waste disposal system?
5. How do environmental management procedures contribute to workplace safety?

Notes

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Scan the QR codes or click on the link to watch the related videos



<https://youtu.be/-6BhWN7Zx4g>

Workplace Hazards, Risks, and Threats



https://youtu.be/ZAB1Qf_Ef5M

Understanding Task Management



https://youtu.be/Apq2WN3_Jng

Waste Reduction Principles



<https://youtu.be/ge5k0Zp0P7U>

Workplace Inclusivity

4. Comply with Industry, Regulatory, Organisational Requirements and Greening of Job Roles



- Unit 4.1 - Governance, Compliance, and Ethical Practices
- Unit 4.2 - Operational Efficiency, Safety, and Maintenance



Key Learning Outcomes

By the end of this module, the participants will be able to:

1. Elaborate on the importance of ethical, value-based governance.
2. Elucidate the benefits to self and organisation from practicing values and ethics.
3. Describe the significance of punctuality and attendance for workplace efficiency.
4. Discuss customer-specific requirements mandated in work processes.
5. Explain the importance of complying with country- and customer-specific regulations in the apparel sector.
6. Illustrate the organisation's reporting procedures for addressing deviations.
7. Demonstrate understanding of personal responsibility limits within the organisation.
8. Explain the process for promptly reporting regulatory deviations.
9. Clarify how to address doubts regarding policies by consulting supervisors.
10. Describe the necessity of following organisational policies and supporting sustainable practices.

UNIT 4.1: Governance, Compliance, and Ethical Practices

Unit Objectives

By the end of this unit, the participants will be able to:

1. Elaborate on the fundamental ethical principles guiding professional conduct.
2. Outline the essential workplace standards and regulatory requirements.
3. Discuss the established procedures for reporting incidents and ensuring accountability.
4. Demonstrate effective communication and support strategies in professional interactions.
5. Explain the processes involved in interpreting and applying organisational procedures.

4.1.1 Ethical Foundations and Principles

An ethical and value-based approach to governance is important because it ensures fairness, transparency, and accountability in decision-making, fostering trust among employees, customers, and stakeholders. When individuals practice values and ethics, they gain self-respect, integrity, and stronger professional relationships, leading to personal growth and credibility. For organisations, ethical practices enhance reputation, improve efficiency, reduce risks, and create a positive work culture, ultimately leading to long-term success and sustainability.

- **Ethical Governance Principles**

Ethical governance ensures that decisions are made with honesty, fairness, and accountability, which builds trust among employees and stakeholders. An ethical and value-based approach to governance is important because it promotes transparency and integrity in an organisation's operations. By following ethical principles, individuals and organisations gain long-term respect, credibility, and sustainable growth.

- **All-Inclusive Ethical Benefits**

Ethics in governance create a positive work environment where all individuals feel valued and respected, leading to increased morale and productivity. When individuals practice values and ethics, they gain self-respect, confidence, and better professional relationships, while organisations benefit from improved reputation, reduced risks, and higher efficiency. Ethical practices also help attract talent, retain employees, and ensure compliance with laws, leading to overall organisational success.

Law	Key Provisions
The Companies Act, 2013	Mandates corporate social responsibility (CSR), independent directors, and transparency in financial reporting to ensure accountability and integrity.
The Prevention of Corruption Act, 1988	Addresses corruption by criminalising bribery and unethical practices in public and private sectors.
The Whistle Blowers Protection Act, 2014	Provides protection to individuals who report unethical practices and corruption within organisations.

Table 4.1.1: Laws promoting ethical governance in India

4.1.2 Workplace Standards & Regulations

A well-regulated workplace ensures discipline, efficiency, and compliance, leading to higher stakeholder productivity and trust. Adhering to standards like punctuality, customer requirements, and apparel regulations benefits both employees and organisations. Compliance enhances reputation, ensures smooth operations, and supports long-term growth.

- **Significance of Punctuality**

Punctuality and attendance reflect commitment, improve efficiency and foster teamwork. State the importance of punctuality and attendance, as they reduce workflow disruptions and enhance productivity. Organisations benefit from reliable employees, leading to better service and customer satisfaction.

- **Mandatory Customer-Specific Requirements**

Industries must follow customer-set guidelines to ensure quality and consistency. State customer-specific requirements are mandated as a part of the work process, as they build trust and ensure compliance. Meeting these standards enhances reputation, customer retention, and operational efficiency.

- **Significant apparel Regulations**

The apparel sector must follow country-specific and customer-driven quality, safety, and compliance regulations. One needs to state the country/customer-specific regulations for the apparel sector and their importance, as they prevent legal issues and promote ethical practices. Adhering to these standards improves market access and strengthens consumer confidence.

Law	Key Provisions
The Factories Act, 1948	Regulates working conditions, worker safety, and health standards in manufacturing units, including textile and apparel factories.
The Minimum Wages Act, 1948	Ensures fair wages for workers in the apparel sector by setting minimum wage standards.
The Employees' Provident Funds and Miscellaneous Provisions Act, 1952	Mandates social security benefits like provident fund contributions for apparel industry workers.
The Contract Labour (Regulation and Abolition) Act, 1970	Regulates the employment of contract labour in the textile and apparel sector to ensure fair wages and working conditions.
The Environment Protection Act, 1986	Governs pollution control and sustainability practices in apparel manufacturing, ensuring eco-friendly production.

Table 4.1.2: Laws regulating the apparel sector in India

4.1.3 Reporting and Accountability

A structured reporting and accountability system ensures an organisation's compliance, transparency, and ethical decision-making. Employees must understand their personal responsibilities, reporting procedures, and how to handle deviations from regulatory requirements. Adhering to these processes helps maintain operational integrity, prevents legal risks, and supports a culture of accountability.

- **Limits of Personal Responsibility**

Employees are responsible for performing their duties ethically, following company policies, and adhering to industry regulations. One needs to state the limits of personal responsibility, as individuals must act within their assigned roles and escalate issues beyond their control to appropriate authorities. Recognising these boundaries prevents errors, ensures proper decision-making, and maintains workplace efficiency.

- **Deviation Reporting Procedures against Regulatory Requirements**

Organisations must have clear protocols for reporting non-compliance or deviations from industry regulations. One needs to state the organisation's reporting procedure in case of deviations, ensuring employees know how to document and escalate issues promptly. Report any possible deviation to regulatory requirements, as timely reporting prevents legal consequences, maintains safety standards, and protects the organisation's reputation.

Regulatory Requirement	Reporting Process and Accountability
The Factories Act, 1948	Report unsafe working conditions or labour law violations to the factory inspector or labour department.
The Minimum Wages Act, 1948	Any underpayment must be reported to the labour commissioner or relevant authority.
The Employees' Provident Funds and Miscellaneous Provisions Act, 1952	Any delay or non-payment of provident fund contributions should be reported to the Employees' Provident Fund Organisation (EPFO).
The Contract Labour (Regulation and Abolition) Act, 1970	Violations in contract labour terms must be escalated to the labour commissioner for corrective action.
The Environment Protection Act, 1986	Any pollution or environmental violations should be reported to the State Pollution Control Board.

Table 4.1.3: Regulatory Requirements and Reporting Process in the Apparel Industry

4.1.4 Communication & Support

Effective communication and support in the workplace ensure clarity, efficiency, and alignment with organisational values. Employees must seek guidance when in doubt, adhere to policies within their role, and assist supervisors in maintaining ethical standards. This approach fosters teamwork, accountability, and a well-structured work environment.

- **Clarification of Policy Doubts from Supervisors**

Employees should seek clarification on workplace policies and procedures from their supervisors or authorised personnel to avoid misunderstandings. Clarify doubts about policies and procedures from the supervisor or other authorised personnel, ensuring compliance and effective decision-making. Open communication helps prevent errors and ensures smooth operations.

- **Following Policies within Personal Authority**

Every employee has a defined role and responsibility in enforcing company policies. Follow the organisational policies and procedures within limits of self-authority to ensure tasks are carried out correctly and efficiently. Adhering to policies within one's scope helps maintain order and accountability.

- **Supporting Supervisors on Organisational Values**

Supervisors play a key role in upholding organisational values, and employees must assist them in this responsibility. Provide support to the supervisor and team members in enforcing organisational considerations and reinforcing a strong ethical culture. This collective effort promotes integrity and consistency across the organisation.

INTERNAL AND EXTERNAL COMMUNICATION PLAN					
STAKEHOLDER	POWER/INTEREST	KEY INTEREST & ISSUES	COMMUNICATION VEHICLE	FREQUENCY	COMMENTS

Fig. 4.1.1: Organisational communication Template

4.1.5 Procedures and Interpretation

Understanding and following proper procedures are essential to maintaining compliance with legal, regulatory, and ethical standards. Employees must identify appropriate actions when unmet requirements and accurately interpret ethical obligations in the apparel sector. A structured approach ensures adherence to industry best practices and protects the organisation from non-compliance risks.

- **Identification of Procedures for Unmet Requirements**

In cases where legal, regulatory, or ethical obligations are not met, employees must take appropriate action. Identify procedures to follow if the organisation's legal, regulatory, and ethical requirements are not met, ensuring corrective measures are implemented. Reporting such issues promptly prevents potential risks and maintains compliance.

- **Interpreting Apparel Industry Ethical Requirements**

The apparel industry follows ethical guidelines for fair labour, sustainability, and compliance. Interpret legal, regulatory, and ethical requirements specific to the apparel industry to ensure responsible business practices. Proper understanding of these requirements helps organisations meet industry standards and maintain their reputation.

S/No	Name	WP/IC/EP	Briefing Date	Signature of person briefed	Briefed By	Signature of briefing person	Remarks

Fig. 4.1.2: Company policy communication template

UNIT 4.2: Operational Efficiency, Safety, and Maintenance

Unit Objectives

By the end of this unit, the participants will be able to:

1. Outline sustainable policy and maintenance safety.
2. Discuss reporting and demonstrate safe maintenance.

4.2.1 Sustainable and Policy Practices

Sustainability in the workplace ensures responsible resource use, environmental protection, and long-term business efficiency. Employees must perform tasks according to sustainable standards, integrate eco-friendly policies into daily work, and contribute to continuous improvement in green practices. These efforts help organisations reduce waste, conserve resources, and enhance environmental responsibility.

- **Task Demonstration as per Sustainable Standards**

Work tasks should be performed per organisational sustainability policies and industry standards. Carry out work functions in accordance with organisational standards, greening solutions, procedures, policies, legislation, and regulations to ensure compliance and minimise environmental impact. Adopting sustainable work practices reduces waste and promotes efficiency.

- **Apply Policies with Sustainable Practices**

Sustainable policies must be implemented in daily tasks to align with company goals and environmental regulations. Apply and follow these policies and procedures within your work practices and inculcate sustainable consumption practices to ensure the responsible use of materials and energy. This approach helps maintain workplace efficiency while reducing environmental harm.

- **Performance Enhancement through Eco-Friendly Adaptation**

Organisations benefit from employees actively participating in sustainability efforts and process improvements. Actively get involved in improving the organisation's performance in line with your role and responsibilities and support adaptation to more environmentally friendly processes to reduce waste and improve operational efficiency. Embracing eco-friendly changes ensures long-term sustainability and business growth.

The Ministry of Textiles oversees sustainable task demonstration in the apparel industry, ensuring eco-friendly production. The Ministry of Environment, Forest and Climate Change (MoEFCC) sets environmental regulations and promotes green practices. Both work together to enhance sustainability in textiles.

Ministries	Task Demonstration and Sustainable Standards	Image/Logo
Ministry of Textiles	Oversees sustainable production in textiles and apparel, promoting eco-friendly practices and resource efficiency.	

Ministries	Task Demonstration and Sustainable Standards	Image/Logo
Ministry of Environment, Forest and Climate Change (MoEFCC)	Regulates environmental policies, waste management, and pollution control in textile and apparel manufacturing.	

Table 4.2.1: Ministries overseeing sustainable standards in the apparel industry

4.2.2 Maintenance, Safety, and Reporting

A clean and safe work environment improves efficiency, reduces hazards, and ensures compliance with workplace safety regulations. Employees must maintain their workspace, conduct scheduled cleaning and maintenance, and report any safety concerns or faulty equipment. These actions help prevent workplace accidents and ensure a hazard-free environment.

- **Maintain a safe, clean work area**

A well-maintained workspace promotes safety, efficiency, and sustainability. Handle materials, equipment, computers, and software safely and correctly to maintain a clean and hazard-free working area and support adaptation to more environmentally friendly processes to ensure a productive and risk-free workplace. Regular cleaning and proper handling of resources help in maintaining order and hygiene.

- **Conduct scheduled maintenance and cleaning**

Routine maintenance and cleaning prevent equipment failure and workplace hazards. Carry out running maintenance and/or cleaning within one's responsibility and agreed schedules and deal with work interruptions effectively to ensure smooth operations and prevent potential risks. Keeping work areas organised reduces accidents and enhances productivity.

- **Report unsafe equipment and incidents**

Employees must promptly report any safety hazards, defective equipment, or accidents to maintain a secure workplace. Identify and report any unsafe equipment or incidents to the relevant authority to ensure immediate corrective actions and prevent risks. Proactive safety reporting minimises workplace injuries and ensures compliance with safety regulations.

Format no.:

Inspection Location / Area	Date
Inspection Team:	Signature

Checklist	C	NC	Observation
Production office Safety			
Production office 5S			
Production Area Environment			
Fire Safety & Safety Equipments			
Emergency Procedures			
Electrical Safety			
Production – Machinery Safety			
Personal Protective Equipments			

Fig 4.2.1: Maintenance and safety inspection checklist

Summary

- Ethical and value-based governance ensures trust and professionalism in the workplace.
- Practising ethics and values benefits both employees and the organisation.
- Punctuality and regular attendance improve workplace efficiency and discipline.
- Customer-specific requirements must be followed for quality service and compliance.
- Adhering to country- and customer-specific regulations ensures legal and operational integrity.
- Organisations have defined procedures for reporting workplace deviations.
- Employees must understand their limits of responsibility within the company.
- Prompt reporting of regulatory deviations helps in maintaining compliance.
- Supervisors should be consulted to clarify doubts regarding policies.
- Following organisational policies supports smooth operations and sustainability.
- Sustainable practices in the workplace contribute to environmental responsibility.
- Maintenance and safety policies must be strictly followed for workplace security.

Exercise

Multiple-choice Question:

1. Why is ethical governance important in the workplace?
 - a. It increases profits only
 - b. It ensures trust, fairness, and professionalism
 - c. It helps in avoiding work responsibilities
 - d. It reduces accountability in decision-making
2. What is the benefit of following ethical workplace practices?
 - a. Employees face more challenges
 - b. It improves reputation and employee satisfaction
 - c. It decreases productivity
 - d. It has no impact on an organisation
3. Why is it necessary to follow customer-specific regulations?
 - a. To make extra profits
 - b. To ensure compliance and product quality
 - c. To avoid customer satisfaction
 - d. To increase workplace conflicts
4. What should an employee do if they notice a regulatory deviation?
 - a. Ignore it and continue working
 - b. Report it immediately as per company procedures
 - c. Inform only their colleagues
 - d. Hide it to avoid penalties
5. How can employees clarify doubts about workplace policies?
 - a. Make assumptions without asking
 - b. Consult their supervisors for guidance
 - c. Ignore policies and continue working
 - d. Follow what other colleagues are doing

Descriptive Questions:

1. Why is ethical and value-based governance important in an organisation?
2. How does practising workplace ethics benefit both employees and the organisation?
3. Why are punctuality and attendance crucial for workplace efficiency?
4. What are the steps involved in reporting deviations from organisational policies?
5. How do country- and customer-specific regulations impact the apparel industry?

Notes

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Scan the QR codes or click on the link to watch the related videos



<https://youtu.be/IThZh8Hv5KI>

Ethical Foundations and Principles



<https://youtu.be/DOWj43gDZwE>

Workplace Incident Reporting





5. Maintain Work Area and Tools

Unit 5.1 - Workplace Compliance and Efficiency

Unit 5.2 - Workplace Maintenance and Safety

Unit 5.3 - Workplace Problem-Solving and Responsibility



Key Learning Outcomes

By the end of this module, the participants will be able to:

1. Elaborate on safe working practices and organisational procedures to ensure a secure work environment.
2. Describe the entire production process and the specific work activities that contribute to it.
3. Explain the lines of communication, authority, and reporting procedures within the organisation.
4. State the limits of personal responsibility in the workplace.
5. Explain the importance of taking prompt action when problems are identified.
6. Describe effective methods for resolving problems within the work area.
7. Illustrate the company's quality standards and their relevance to daily operations.
8. Demonstrate the proper maintenance and handling of tools and equipment.
9. Describe work instructions and specifications and interpret them accurately.
10. Explain how to utilise the detailed information in specifications and instructions effectively.
11. Describe the relationship between individual work roles and the overall manufacturing process.
12. Explain the significance of regular maintenance and cleaning for operational efficiency.
13. Illustrate standard maintenance procedures and ways to minimise waste during operations.
14. Discuss hazards likely to be encountered during routine maintenance and how to address them.
15. Demonstrate the correct use of cleaning equipment and substances appropriate for the task.
16. Explain the importance of maintaining a clean and hazard-free working area.
17. Describe the organisation's rules, codes, and guidelines, including timekeeping and proper posture.
18. Discuss the procedures for reporting unsafe equipment, dangerous occurrences, and common equipment faults along with their rectification methods.

UNIT 5.1: Workplace Compliance and Efficiency

Unit Objectives

By the end of this unit, the participants will be able to:

1. Elaborate on workplace safety, rules, and adherence to instructions for a secure work environment.
2. Outline production processes, work activities, and manufacturing roles for better efficiency.
3. Explain quality standards, work instructions, and specification used for consistency.
4. Describe equipment handling and manufacturer instructions for safe operation.

5.1.1 Workplace Safety and Procedures

A safe work environment reduces risks, enhances productivity, and ensures compliance with organisational safety standards. Employees must follow workplace safety practices, adhere to company rules, and comply with written instructions to maintain a secure and efficient workspace. These measures help prevent accidents, improve discipline, and create a structured work environment.

- **Safe Work Practices and Procedures**

Safe practices at the workplace help prevent accidents and ensure smooth operations. Work activities must align with safety guidelines, proper equipment handling, and risk prevention strategies to maintain a hazard-free environment. Following established safety protocols enhances efficiency and reduces workplace incidents.

- **Organisational Rules, Codes, and Guidelines**

Company rules and codes provide structure, improve discipline, and promote a professional work culture. Timekeeping, workplace conduct, and regulatory compliance are essential to ensure a smooth workflow and maintain order within the organisation. Employees must understand and follow these rules to support organisational goals and maintain workplace harmony.

- **Adherence to Written Instruction Compliance**

Compliance with written instructions ensures work process accuracy, efficiency, and consistency. Following documented guidelines helps employees perform tasks correctly, minimise errors, and meet organisational standards. Adhering to these instructions reduces confusion and improves overall productivity.

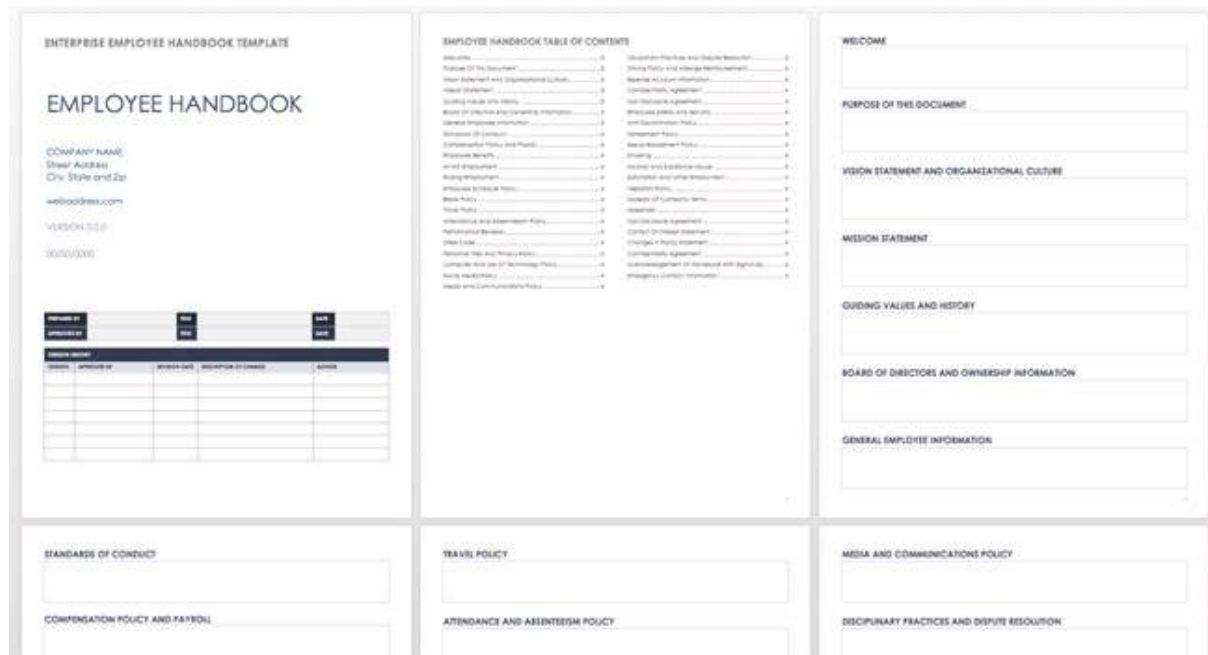


Fig. 5.1.1: Sample organisational rulebook template

5.1.2 Production Process and Responsibilities

An efficient production process ensures smooth workflow, minimises errors and improves productivity. Employees must follow established procedures, operate equipment correctly, and adhere to assigned roles to maintain quality and efficiency. These practices help streamline operations, reduce delays, and enhance overall manufacturing output.

- Production Process and Work Activities**

A well-defined production process ensures consistency, efficiency, and high-quality output. Work activities must align with production requirements, including material handling, equipment operation, and task sequencing, to maintain a smooth workflow. Following structured production steps enhances efficiency and reduces wastage.

- Work Roles in the Manufacturing Process**

Clear role definitions improve teamwork, accountability, and operational efficiency. Employees must perform their designated tasks, coordinate with team members, and follow assigned responsibilities to support smooth production flow. Understanding work roles ensures accuracy, reduces errors, and maintains production standards.

Formal No. _____

Customer Name: _____

Part No.: _____

Sr. No.	Description	Revisions & Date					
		1 - Rev. & Date	2 - Rev. & Date	3 - Rev. & Date	4 - Rev. & Date	5 - Rev. & Date	6 - Rev. & Date
01	Drawings						
02	Process Flow Diagram						
03	Process FMEA						
04	Control Plan						
05	Work Instruction						

Prepared By: _____

Verified & Approved By: _____

Fig. 5.1.2: Sample production process handbook

5.1.3 Quality Standards and Compliance

Maintaining quality standards ensures product consistency, customer satisfaction, and compliance with industry regulations. Employees must follow company guidelines, accurately interpret work instructions, and use specification information effectively to meet production standards. These practices help minimise errors, enhance efficiency, and uphold product quality.

- **Company Quality Standards and Guidelines**

Adhering to quality standards ensures consistency, efficiency, and compliance with industry requirements. To maintain high-quality output, employees must follow company guidelines for material usage, production processes, and final inspections. Strict adherence to quality protocols enhances customer satisfaction and reduces product defects.

- **Accurate Interpretation of Work Instructions**

Understanding work instructions ensures accuracy, efficiency, and smooth operations. Employees must read, interpret, and follow provided guidelines carefully to perform tasks correctly and avoid errors. Proper interpretation of instructions helps maintain workflow consistency and product quality.

- **Effective Utilisation of Specification Information**

Using specification details correctly improves precision and productivity. Employees must refer to technical data, measurements, and material guidelines to ensure product compliance with design and quality requirements. Efficient use of specifications minimises errors and enhances production efficiency.

WORK TASK									
01									
START DATE	END DATE	COMMUNICATION	PROCESS / PROCEDURE	METHOD	RESPONSIBILITY	PRODUCT IMPACTS	MATERIAL / RESOURCES	MONITORING & CONTROLS	STAGES

WORK TASK									
02									
START DATE	END DATE	COMMUNICATION	PROCESS / PROCEDURE	METHOD	RESPONSIBILITY	PRODUCT IMPACTS	MATERIAL / RESOURCES	MONITORING & CONTROLS	STAGES

Fig. 5.1.3: Company quality and compliance sheet template

5.1.4 Equipment Handling and Instructions

Proper equipment handling ensures workplace safety, efficiency, and compliance with operational standards. Employees must follow manufacturer instructions, adhere to operating procedures, and report any issues to prevent malfunctions or accidents. Safe and correct usage of equipment enhances productivity and reduces risks.

- **Equipment Operating Procedures**

Operating equipment as per guidelines ensures efficiency and prevents damage. Employees must follow the recommended procedures for setup, operation, and shutdown of machinery to maintain smooth workflow and avoid technical failures. Adhering to safety measures while handling equipment reduces operational risks.

- **Manufacturer Instructions Compliance**

Following manufacturer instructions enhances equipment lifespan and performance. Employees must carefully read and apply usage guidelines, maintenance schedules, and troubleshooting steps to ensure proper functioning. Understanding and implementing these instructions prevent breakdowns and improve overall productivity.

Section	Description
1. Introduction	Overview of the equipment, purpose, applications, key features, and benefits.
2. Safety Guidelines	General safety precautions, PPE requirements, hazard identification, and emergency shutdown procedures.
3. Equipment Specifications	Technical details such as model, capacity, power requirements, material compatibility, and dimensions.
4. Installation and Setup	Step-by-step installation guide, environmental requirements, and power/connectivity setup.

Section	Description
5. Operating Procedures	Startup and shutdown steps, standard operating methods, and safe usage guidelines.
6. Maintenance and Cleaning	Regular maintenance schedules, cleaning procedures, and preventive maintenance guidelines.
7. Troubleshooting and Problem Resolution	Common issues, troubleshooting methods, and when to seek professional assistance.
8. Emergency Procedures	Steps to handle equipment failures, fire hazards, electrical risks, and first aid measures.
9. Storage and Handling	Proper storage, safe handling, transportation guidelines, and long-term preservation tips.
10. Manufacturer Support and Warranty	Contact details for technical support, warranty terms, and replacement/service options.

Table 5.1.1: Equipment Usage Manual Contents

UNIT 5.2: Workplace Maintenance and Safety

Unit Objectives

By the end of this unit, the participants will be able to:

1. Elaborate on effective equipment maintenance practices that enhance reliability.
2. Outline standardised cleaning procedures to ensure optimal workplace hygiene.
3. Describe key measures for ensuring workplace safety and ergonomics and preventing hazards

5.2.1 Equipment Maintenance & Reliability

A well-maintained workplace ensures operational efficiency, reduces equipment failures, and enhances safety. Proper maintenance of tools and equipment prevents unexpected breakdowns and ensures long-term reliability.

- **Maintain tools and equipment**

Proper maintenance of tools and equipment ensures their longevity and safe operation. Regular inspections, timely repairs, and adherence to manufacturer guidelines help prevent breakdowns and costly repairs.

- **Follow standard maintenance procedures**

Standard maintenance includes scheduled inspections, lubrication, calibration, and timely repairs. Adhering to these procedures ensures smooth operations and minimises downtime.

- **Identify and rectify common equipment faults**

Identifying overheating, leaks, or power failures helps prevent major breakdowns. Regular troubleshooting and rectification reduce operational disruptions.

- **Conduct scheduled running maintenance activities**

Routine maintenance activities prevent equipment failures, improve reliability, and ensure uninterrupted operations. Adhering to maintenance schedules enhances performance and productivity.

DATE	EQUIPMENT NAME	SERIAL NO.	FREQUENCY	SERVICE ENGINEER NAME	STATUS

Fig. 5.2.1: Equipment maintenance checklist

5.2.2 Cleaning Procedures & Hygiene

A clean workspace prevents contamination, enhances efficiency, and maintains health and safety standards. Using appropriate cleaning equipment and following safe cleaning methods ensure effective hygiene maintenance.

- **Use appropriate cleaning equipment and substances**

Cleaning tools such as mops, vacuum cleaners, and pressure washers should be used based on surface type and contamination level. Using correct substances ensures effective cleaning and prevents damage.

- **Follow safe cleaning practices and methods**

Safe cleaning practices include using protective gear, following proper cleaning sequences, and handling chemicals responsibly to prevent injuries and contamination.

- **Use appropriate cleaning equipment and methods**

Selecting the right equipment and techniques ensures thorough cleaning and prevents damage to surfaces and machinery.

- **Carry out cleaning according to assigned schedules**

Following scheduled cleaning routines prevents dirt build-up, ensures hygiene, and maintains a safe work environment.

○	Use a damp clean cloth or wet mop (do not dust or dry wipe down).
○	Follow the manufacturer's instructions for safe use.
○	Appropriate contact time with the surface to kill germs (as directed by the product used).

High touch surfaces must be frequently disinfected (as applicable):

○	Door knobs	Other high-touch surfaces:	
○	Countertops	○	
○	Electronics (Debit machines, remote controls)	○	
○	Tables	○	
○	Handrails	○	
○	Elevator buttons (or other high-touch buttons)	○	
○	Light switches	○	
○	Handles (faucet, toilet, cabinets, etc.)	○	
○	High touch equipment	○	
○	Personal Protective Equipment (i.e., Face shield)	○	

Once used/contaminated:

○	Disposable cloths or cleaning items are put in garbage bags and disposed of.
○	Re-usable cloths or cleaning items are washed in hot water (60-90 degrees) with regular laundry soap.
○	Wash hands with soap and water or use alcohol-based hand sanitizer after cleaning.

Supporting hand hygiene:

☐	Liquid hand soap and paper towels are stocked and available at all sinks.
☐	Alcohol-based hand sanitizer (70% alcohol) is available and accessible to staff and clients.
☐	Alcohol-based hand sanitizer is available at the point of care (if applicable).
☐	Alcohol-based hand sanitizer containers are full.

Date: _____ Time of cleaning: _____ Employee initials: _____

Fig. 5.2.1: Standard equipment cleaning checklist

5.2.3 Workplace Safety & Hazard Prevention

Ensuring workplace safety involves identifying hazards, handling tools correctly, and maintaining cleanliness to prevent accidents.

- **Identify hazards in routine maintenance**

Hazards such as electrical risks, mechanical failures, and chemical exposure should be identified and mitigated to ensure safety.

- **Handle tools and materials safely**

Proper handling techniques prevent accidents and equipment damage. Following safety guidelines enhances workplace efficiency and security.

- **Maintain a clean work area**

A well-organised workspace prevents accidents, improves productivity, and ensures a safe working environment.

- **Store cleaning equipment safely**

Proper cleaning tools and chemicals storage prevents contamination, damage, and workplace hazards.

Date: _____
 Prepared By: _____
 Approved By: _____

No.	Equipment Description	Date Checked	Action Required	Action Completed	Person responsible for checking	Signature	Due Date for Next Check

Fig. 5.2.2: Routine check-up checklist for hazard prevention

- **Regular Maintenance and Cleaning Importance**

Routine upkeep reduces the risk of equipment failure, maintains hygiene, and ensures smooth operations. It also protects from contaminants like dirt, dust, and machine oil affect product quality, leading to defects, health risks, and financial losses. Following safety procedures and work instructions ensures effective task execution and prevents hazards.

- **Correct Posture and Work Comfort**

Ergonomic practices, such as maintaining good posture and using appropriate tools, reduce fatigue, prevent strain injuries, and enhance efficiency.

UNIT 5.3: Workplace Problem-Solving and Responsibility

Unit Objectives

By the end of this unit, the participants will be able to:

1. Elaborate on communication authority and reporting lines within the organisation.
2. Describe the importance of taking prompt action when problems are identified.
3. Explain effective methods for resolving workplace problems.
4. Demonstrate effective communication techniques with colleagues.

5.3.1 Communication Authority and Reporting Lines

- Clear and well-defined communication authority and reporting lines form the backbone of efficient organisational operations. They ensure that information flows smoothly, the appropriate individuals make decisions, and accountability is maintained. Establishing these structures prevents confusion and promotes timely responses to issues.
- Clear reporting lines and communication authority are essential for efficient problem-solving. This involves defining who reports to whom and the designated channels for communication.
- For example, if a machine malfunctions in a manufacturing plant, the operator reports to the shift supervisor, who then informs the maintenance team. A junior developer reports to a team lead in software development, who escalates bugs to the project manager.
- Protocols should clearly outline the chain of command, ensuring that information flows smoothly and the appropriate personnel makes decisions.

5.3.2 Taking Action on Identified Problems

- Prompt and decisive action on identified problems minimises disruptions and maintains operational efficiency. A proactive approach to problem-solving demonstrates a commitment to quality and continuous improvement, fostering a culture of accountability.
- However, one must adhere to the limit of responsibility. The limit of responsibility defines the boundaries of an individual or entity's obligations and accountability within a specific context. It clarifies what tasks, decisions, or outcomes fall within their purview and what lies outside their control or influence. Establishing these limits prevents overreach, ensures clarity in roles, and avoids the diffusion of responsibility, ultimately promoting efficiency and accountability. Clear delineation of responsibility is essential for effective collaboration and risk management.
- Once a problem is identified, prompt and decisive action is crucial to minimise its impact. This involves assessing the severity of the issue, determining the necessary steps, and assigning responsibility for resolution.
- For instance, if a customer complains about a defective product, the customer service representative logs the complaint, notifies the quality control department, and initiates a replacement or refund process. In a restaurant, if a customer finds a foreign object in their food, the server informs the manager, who then addresses the customer's concerns and investigates the source of the contamination.
- Protocols should include guidelines for documenting problems, tracking progress, and verifying the effectiveness of corrective actions.

5.3.3 Methods for Resolving Workplace Problems

- Workplace problems are inevitable, but their impact can be mitigated by applying appropriate resolution methods. Selecting the right approach through direct communication, mediation, or formal procedures ensures fairness and promotes a harmonious work environment.
- Various methods can be employed to resolve workplace problems, depending on their nature and complexity. These include direct communication, mediation, negotiation, and formal dispute-resolution procedures.
- For example, a conflict between two colleagues might be resolved through a facilitated discussion or mediation by a neutral third party. A safety hazard might require immediate corrective action, followed by an investigation and implementation of preventive measures. If a worker has an issue with their pay, they could use the formal grievance procedure outlined by the HR department.
- Protocols should specify the appropriate methods for different problems, ensuring fairness and consistency in the resolution process.

5.3.4 Effective Communication with Colleagues

- Effective communication with colleagues is the cornerstone of a collaborative and productive workplace. Clear, respectful, and timely communication fosters understanding, minimises misunderstandings, and strengthens team cohesion, contributing to overall success.
- Effective communication with colleagues is vital for maintaining a positive and productive work environment. This involves clear, concise, and respectful verbal and written communication.
- For example, managers should provide clear instructions and expectations when delegating tasks. When providing feedback, colleagues should focus on specific behaviours and offer constructive suggestions. All participants should listen actively in a project meeting and contribute relevant information.
- Protocols or company guidelines should emphasize the importance of active listening, clear articulation, and respectful dialogue, promoting collaboration and teamwork.

Category	Checklist Items
Identifying and Assessing Problems	• Recognise workplace challenges (e.g., equipment failure, workflow inefficiencies). • Gather relevant information about the problem (causes, impact, and urgency). • Analyse the issue logically before taking action.
Taking Responsibility for Solutions	• Understand job role and personal responsibility in problem-solving. • Take initiative to resolve minor issues within authority limits. • Seek guidance for complex problems that need higher-level intervention.
Implementing Solutions Effectively	• Apply workplace procedures and guidelines when solving problems. • Use logical reasoning and teamwork to address the issue. • Ensure solutions align with safety and company policies.

Category	Checklist Items
Reporting and Escalating Issues	• Report unresolved problems to the right authority (e.g., supervisor, maintenance team). • Maintain clear, accurate documentation of the issue and actions taken. • Follow up to ensure the problem is fully resolved.
Ensuring Continuous Improvement	• Learn from past issues to prevent recurrence. • Adapt to feedback and implement best practices. • Share insights with colleagues to enhance workplace efficiency.

Table 5.3.4: Workplace problem-solving and responsibility

Summary

- Safe working practices help prevent accidents and ensure compliance with company policies.
- The production process includes multiple work activities that contribute to the final product output.
- Clear communication, authority, and reporting lines ensure smooth workflow and accountability.
- Personal responsibility is limited to assigned tasks, safety measures, and reporting concerns.
- Prompt action when identifying problems prevents delays, hazards, and operational inefficiencies.
- Effective problem-solving involves identifying issues, analysing causes, and applying solutions.
- Quality standards guide daily operations to maintain consistency and customer satisfaction.
- Proper maintenance and handling of tools and equipment extend their lifespan and ensure safety.
- Work instructions and specifications must be followed accurately for consistent product quality.
- Understanding specifications ensures correct material usage and minimises errors in work.
- Individual work roles contribute to the overall efficiency of the manufacturing process.
- Regular maintenance and cleaning improve productivity and create a safe work environment.

Exercise

Multiple-choice Question:

1. What is the primary purpose of workplace safety practices?
 - a. To increase production speed
 - b. To reduce workplace hazards and ensure compliance
 - c. To limit employee responsibilities
 - d. To avoid employee training
2. Why is it important to follow equipment manufacturer instructions?
 - a. To reduce electricity consumption
 - b. To ensure safe and correct operation
 - c. To increase personal workload
 - d. To ignore maintenance schedules
3. What should an employee do if they notice an unsafe piece of equipment?
 - a. Continue working and ignore it
 - b. Report it to the relevant authority immediately
 - c. Try to fix it without training
 - d. Use the equipment as usual
4. How do quality standards affect daily operations?
 - a. They ensure consistency and product reliability
 - b. They increase workplace stress
 - c. They slow down production
 - d. They are optional for workers
5. What is the best way to resolve workplace problems?
 - a. Ignore the issue and continue working
 - b. Identify the cause, analyse solutions, and take action
 - c. Blame a colleague for the issue
 - d. Complain without seeking a solution

Descriptive Questions:

1. How do safe working practices contribute to a secure work environment?
2. What are the key steps involved in the production process and work activities?
3. Why is it important to take prompt action when a workplace problem is identified?
4. How do quality standards and work instructions help maintain consistency?
5. What are the correct methods for handling and maintaining workplace equipment?

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Scan the QR codes or click on the link to watch the related videos



<https://youtu.be/YgwWTDexCoU>

Safe Working Procedure (SWP)



<https://youtu.be/8EeuHhXXndk>

Workplace Hazard and Accident Prevention



<https://youtu.be/I3LcSMYPGsA>

Understanding Effective Communication





6. Employability Skills



Employability Skills is available at the following location



<https://www.skillindiadigital.gov.in/content/list>

Employability Skills

7. Annexure



Module No.	Unit No.	Topic Name	Page No	Link for QR Code (s)	QR code (s)
Module 1: Introduction	Unit 1.1: Indian Apparel Industry and Fabric Layering	1.1.1 Overview of the Apparel Industry in India	29	https://youtu.be/5dLX8mRAE88	 Apparel Industry in India
	Unit 2.1 Fabric Handling and Inspection	2.1.5 Procedure of Fabric Laying	119	https://youtu.be/U1w1GRcqr38	 Understanding Fabric Layering Process
Module 2: Carry Out Fabric Laying Operation	Unit 2.2 Work Planning and Waste Management	2.2.4 Metric System and its Applications in Fabric Handling	119	https://youtu.be/MwR23XkXQTM	 Metric Concepts in the Apparel Industry
	Unit 2.3: Equipment Handling and maintenance	2.3.6 Importance of Proper Fabric Handling	119	https://youtu.be/YtFjZwzAMLw	 Fabric Handling
	Unit 2.4: Workplace Safety and Organisation	2.4.1 Common Workplace Hazards Facing Layerman (Fabric)	119	https://youtu.be/POIQ27GQZp0	 Textile Apparel Hazard Management

Module No.	Unit No.	Topic Name	Page No	Link for QR Code (s)	QR code (s)
Module 3: Maintain health, safety and secure work place with Gender and PWD Sensitisation	Unit 3.1: Workplace Safety and Emergency Preparedness	3.1.3 Identifying Workplace Hazards, Risks, and Threats	172	https://youtu.be/-6BhWN7Zx4g	 Workplace Hazards, Risks, and Threats
	Unit 3.2: Equipment Handling and Workplace Efficiency	3.2.4 Ensuring Workflow and Production Targets	172	https://youtu.be/ZAB1Qf_Ef5M	 Understanding Task Management
	Unit 3.3: Waste Management, Hygiene and Health Awareness	3.3.2 Ways to Minimise Wastage	172	https://youtu.be/Apq2WN3_Jng	 Waste Reduction Principles
	Unit 3.4: Inclusion and Accessibility for Persons with Disabilities (PWD)	3.4.7 Promoting Awareness of Workplace Inclusivity	172	https://youtu.be/ge5k0Zp0P7U	 Workplace Inclusivity
Module 4: Comply with industry, regulatory, organisational requirements and Greening of Job Roles	Unit 4.1: Governance, Compliance, and Ethical Practices	4.1.1 Ethical Foundations and Principles	185	https://youtu.be/lThZh8Hv5KI	 Ethical Foundations and Principles

Module No.	Unit No.	Topic Name	Page No	Link for QR Code (s)	QR code (s)
	Unit 4.2: Operational Efficiency, Safety, and Maintenance	4.2.2 Maintenance, Safety, and Reporting	185	https://youtu.be/D0wj43gDZwE	 Workplace Incident Reporting
Module 5: Maintain work area and tools	Unit 5.1: Workplace Compliance and Efficiency	5.1.1 Workplace Safety and Procedures	203	https://youtu.be/YgwWTDexCoU	 Safe Working Procedure (SWP)
	Unit 5.2: Workplace Maintenance and Safety	5.2.3 Workplace Safety & Hazard Prevention	203	https://youtu.be/8EeuHhXXndk	 Workplace Hazard and Accident Prevention
	Unit 5.3: Production Planning and Process Optimization	5.3.4 Effective Communication with Colleagues	203	https://youtu.be/I3LcSMYPGsA	 Understanding Effective Communication





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सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP



**APPAREL MADE-UPS HOME FURNISHING
SECTOR SKILL COUNCIL**

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