Draft Study Material

WAREHOUSE ASSOCIATE

(QUALIFICATION PACK: Ref. Id. LSC/Q0101)

(Logistics)

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
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Preface

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

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

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

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Date: 20 June 2024

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MODULE 1 INTRODUCTION TO WAREHOUSING

Module Overview

The logistics industry holds the second position as an industry and is the largest employer providing bright job opportunities in India. India ranks 44th in the Logistic Performance Index (LPI) released by the World Bank. The department of commerce logistic division for India was established on 7th July 2017. India's logistics sector consists of 37 export promotions councils, 20 government agencies, 40 Participating Government Agencies (PGA's), 10000 commodities and 500 certifications.

Logistics is the process of managing transportation from raw materials to consumer goods. In financial year 2021 the size of the Indian logistic market was around 250 billion and expected to reach 380 billion by 2025. Logistics industry plays a vital role in the process of supply chain. Delivery of goods from one place to other is a crucial part of any business. In addition to this, the logistics industry plays a vital role. It is responsible for receiving order, arranging items, invoices, shipping, and delivering at the customer's doorstep.

Recently, Government of India launched National Logistic Policy (NLP) 2022, aiming to achieve quick last-mile delivery, end transport related challenges. The policy focuses on re-engineering, digitalization and multi-modal, the need of which for NLP was felt when the logistic cost in India was higher as compared to other developed countries. PM Gati Shakti acts complementary with the launch of NLP.

The emergence of new age empowering technologies like artificial intelligence, internet of things and machine learning will disrupt the conventional workings of the country's logistic sector.

From securing important suppliers to the start of foreign trade, the district sector is always crucial. A better tomorrow will be ensured through the sector's expansion and strengthening. The trend that could change the logistic industry forever could be: cloud-based system and integration, atoms vehicle, 3D printing, real time analytics and tracking efficiency in last minute delivery, artificial intelligence, machine learning and block chain.

The logistic market is large and projected to grow sustainability in the next time years it will be digitalized but also agile multifunctional spread across geographic and truly open. Supply chain is the steps of any business to serve to customers. Managers are giving more emphasis to supply chain. Efficient supply chain improves the availability of the product followed by company's profit.

Companies must seek new ways to improve supply chain, like weight planning, way planning and network design.

Supply chain helps to stock different categories. If managed in an effective and efficient manner supply chain can help companies to remain profitable.

Logistics operations have its own significance. It is important for the product to be easily and widely made available in markets because faster product availability is basic to growing sales. For example, two products with the same specification launched at the similar time by two different companies. After one or two months, if the shortage of one product arises in the market, then there will be a substantial profit advantage for that extra time to the other company which is in the market. Resulting in the customers' demand slowly shifting to other company's product, therefore the company will get more orders and more market share. Thus, the ability of the products can break a sale which ultimately depends on supply chain.

This unit will focus on various aspects of Warehouse. The first session covers the basics of logistics and supply chain, the second session deals with the fundamentals of warehouses with its function and its types, the third session describes about the layout of the warehousing, and the fourth session discusses about the usefulness of PPEs and MHEs in Warehouse.

Learning Outcomes

After completing this module, you will be able to:

- Understand key principles of logistics and supply chain management.
- Learn essential concepts and practices in warehousing operations.
- Design effective warehouse layouts to enhance space and workflow efficiency.
- Properly use PPE and MHE to ensure safety and efficiency in warehousing.

Module Structure

Session1: Basics of Logistics and Supply Chain

Session2: Fundamentals of Warehousing

Session3: Warehouse Layouts

Session4: PPEs and MHEs in Warehousing

Session 1: Basics of Logistic and Supply Chain

Logistics is the process of planning, implementing and controlling Procedure's for the efficient and effective transportation and storage of goods. It includes movement of services and related information from the point of origin to the point of consumption. Its goal is to successfully meet the customer's requirements. This process includes inbound, outbound, internal and external movements.

According to the Council of Logistics Management, logistics is the management process of planning, implementing, and controlling the physical and informational flow concerned with material and final goods from the point of origin to the point of usage. International logistics involves the management of these resources in a company's supply chain across at least one international border.

FUNCTIONS OF LOGISTICS

Logistics is the process of planning, implementing and controlling procedures for the efficient and effective transportation and storage of goods. The functions of logistics are given in the following chart (Fig. 1.1):

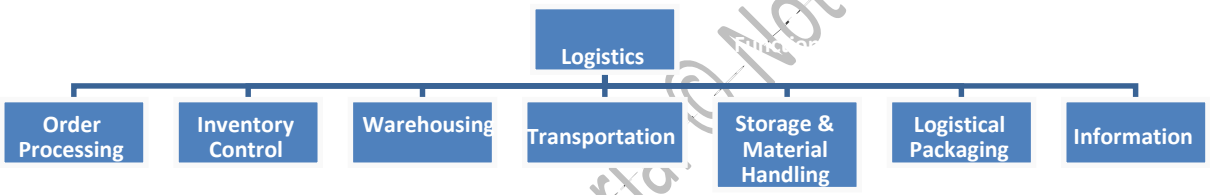


Fig. 1.1: Functions of Logistics

1. **Order processing:** It is a transaction between two parties, i.e., Purchase Order (PO) placed by a buyer to the seller. The process document holds its own importance because it has direct relation to the order. This order document indicates order date and delivery date to the customer.
2. **Inventory control:** Inventory control is the process of managing the inventory and striking a balance between the customer and the market.
3. **Warehousing**: Warehousing involves a place used for storage. The finished goods or raw materials are kept at this place. The features of warehousing are—

a) Locality of warehouses and facilities.

b) Number of warehouses.

c) Size, mass or area of the warehouse.

d) Warehouse layout.

e) Ownership of warehouse.

4. **Transportation:** The physical movement of goods from one place to another is known as transportation of goods.

5. **Storage and Material Management:** The arrangement of goods in a specified area is known as storage material management.
6. **Packaging:** Packaging is the function of protecting the goods in the physical distribution process. It extends the life of the product without any damage.
7. **Information:** Information is shared from one person to another by using information technology tools.

IMPORTANCE OF LOGISTICS

Despite the movement of commodities is at the heart of logistics, its impacts stretch much deeper. Success in logistics translates in business into higher efficiency, cheaper costs, higher production rates, better inventory control, more efficient use of warehouse space, higher customer and supplier satisfaction, and better customer experiences.

Each of these elements has a big impact on how successful a business is. Keep in mind that logistics also includes handling returns to maximize the profit from these goods.

CONCEPT OF SUPPLY CHAIN

A supply chain is the network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product. A supply chain encompasses everything from the delivery of source materials from the supplier to the manufacturer through its eventual delivery to the end user. The success of the business often depends on the success of the supply chain. Supply chain management deals with—

a) Material flow

b) Information flow

c) Financial flow

a) Material Flow: This is a physical flow of products from the supplier/seller/buyer to the customer is one directional or unidirectional (fig. 1.2).

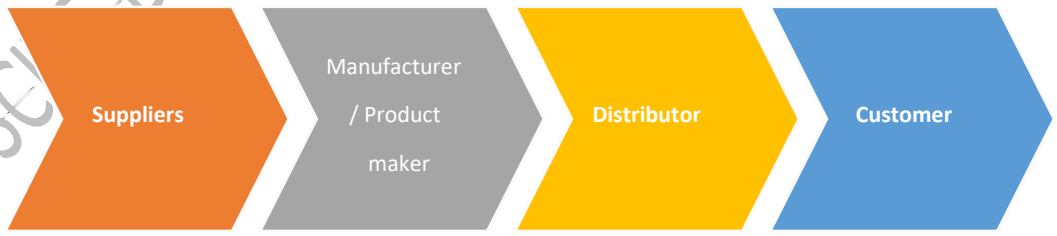


Fig. 1.2: Material Flow in Supply Chain

b) Information Flow: In this the information flows from supplier/seller to customer/buyer and then customer to supplier (fig. 1.3).

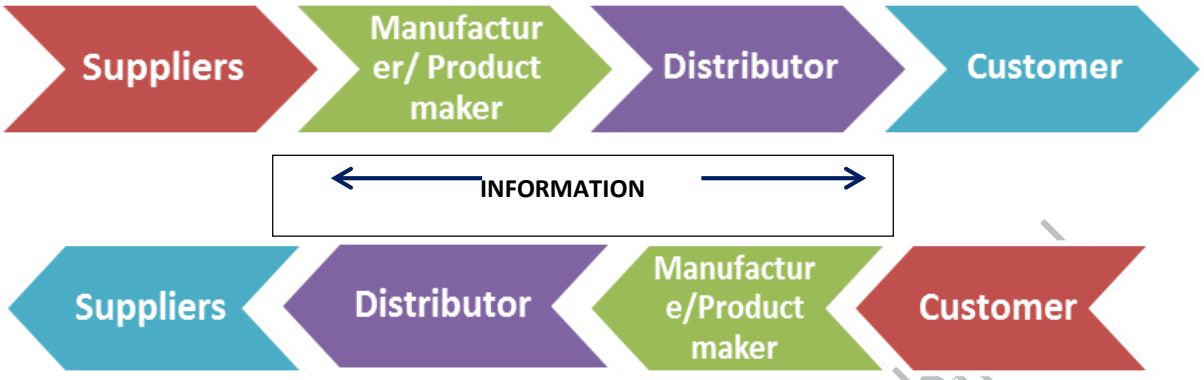


Fig. 1.3: Information Flow in Supply Chain

c) Financial Flow: In this the money flows from customer to supplier, when customer accepts the product and confirms the payment of money which goes to the supplier (fig. 1.4).

Fig. 1.4: Financial Flow in Supply Chain

TYPES OF SUPPLY CHAIN

There are common models of supply chain viz.

1. Integrated make-to-stock model.
2. Build-to-order model.
3. Continuous replenishment model.
4. Channel assembly model.

Integrated make-to-stock model: This model is used to track client request in real time and production process, maintain finished goods inventory and storage of raw material.

Build-to-order model: In this the company assembles the components to produce finished goods immediately upon the receiving of the order.

Continuous replenishing model: In this model, the company works with intermediaries and suppliers to constantly replenish inventory. This is useful for the products with stable demand, for example- circulation of prescribed medicine.

Channel assembly model: This model is a modification of build-to-order model.

IMPORTANCE OF SUPPLY CHAIN

The Supply chain is important because it:

1. Helps to reduce inventory cost.

2. Helps to boost customer service and improve customer satisfaction.
3. Maintain better trust between partners.
4. Provides efficient manufacturing strategy.
5. Improves process integration.
6. Improves lowermost line.
7. Increases cash flow.
8. Reduces operating cost.
9. Improves financial position by decreasing fixed assets.
10. Improves quality and gives higher profit margin.
11. Protects traditional freedom and development.

LOGISTICS LINKAGE IN SUPPLY CHAIN MANAGEMENT

The subsectors of logistics are interrelated to each other. Each subsector is directly or indirectly interdependent. Logistics help to facilitate the goods movement from starting to the end.

RELATIONSHIP BETWEEN LOGISTICS WITH WAREHOUSING

Logistics is the process of scheduling, supervision, application of goods storage from starting to end. **Warehousing** is holding inventory in a specific location. The positive relation between Logistics & Warehousing is equalising point where things and ideas can be delivered from production point to users, whereas the difference lies only in aspect. Though these two aspects are of a similar function, which is the important part of the supply chain.

Activities

Activity 1: Prepare a chart showing basic functions and requirements of Supply Chain and Logistics.

Material Required: Note Book, Pen/Pencil

Procedure:

1. Visit the warehouse along with peers.
2. Meet the inventory executives and others, and greet them.
3. Take a tour of the warehouse and enquire from the manager about the following:
   a) Suppliers of various products and their locations.
   b) Storage of the products.
   c) Local distributors of these products and their locations.
   d) Potential customers.

e) Transportation facility used for the products.

f) Types of Supply chain.

g) Supply chain management process.

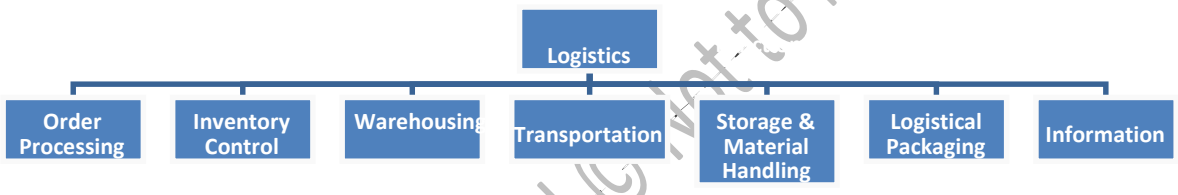
4. Discuss with the executive(s) about supply chain practices.
5. Show your notes to the executive and confirm.
6. Prepare a report and discuss with friends and show it to the teacher.
7. Discuss your report in the class.

Activity 2: Draw a flow chart showing functions of logistics.

Material required: Check-list, Notepad, pen/pencil, drawing sheet, color pencils.

Procedure:

1. Collect the materials required to draw the flow chart.
2. Draw a chart functions of logistics



3. Ensure about your work completion.
4. Discuss your work with the classmates in front of your teacher.
5. Display that chart in class.

Check Your Progress

A. Fill in the Blanks

1. Supply chain consists of suppliers, manufacturers, _____ and customers.
2. There are two types of logistics inbound and _____.
3. Warehouse is a part of_____.
4. Decision in regard to inventory and warehousing facilities is a part of _____ decision.
5. Flow of _____ in the supply chain is crucial.

B. Multiple Choice Questions

1. The purpose of Supply Chain Management is -
   a) Being responsible for customer satisfaction.
   b) Increasing product quality.
   c) Integrating demand and supply.

d) Increasing production.

2. Logistics is involved with the onward and opposite flow of
   a) Goods.
   b) Services.
   c) Cash.
   d) All of the above.
3. The main decision areas in Supply Chain Management -
   a) Planning, Production, Distribution, Inventory.
   b) Location, Production, Inventory, Distribution.
   c) Marketing, Location, Production, Distribution.
   d) Production, Scheduling, Inventory, Planning.
4. The process of logistics is -
   a) Planning.
   b) Implementing.
   c) Controlling.
   d) All of the above.
5. _____ is a critical component in the physical distribution of a product-
   a) Industrial Packaging.
   b) Logistical Packaging.
   c) Both.
   d) None of the Above

C. State whether the following statements are True or False

1. The information flows from seller to customer and then customer to supplier.
2. Supply chain is the support of a company which accomplishes the serious issues.
3. Outbound logistics is the movement of finished products from manufacturing unit to final user.
4. Warehouse cannot store goods.
5. SC & L are correlated with each other.

D. Short Answer Questions

1. Define supply chain.
2. What is flow of supply chain?
3. What is logistics?
4. What is a marine service?
5. Draw a flow chart containing supply chain process.

E. Long Answer Questions

1. Explain various types of supply chain.
2. Deliberate the importance of supply chain.
3. Explain briefly about sub-sectors of logistics.
4. State the relationship between logistics and supply chain management?

F. Check your Performance

1. Draw a flow chart of material flow and financial flow.
2. List the functions of supply chain management with an example.
3. Demonstrate the importance of supply chain with an example.
4. Draw a flow chart containing list of subsectors in logistics.
5. Difference between warehousing and logistics.

Session 2: Fundamentals of Warehousing

Any goods whether raw material or finished goods have to be stored during the course of production consumption or delivery. While going from a manufacturer to the final consumer, a product gets transferred at various levels and it has to be stored and transported from one level to another, as shown in (fig. 1.5).

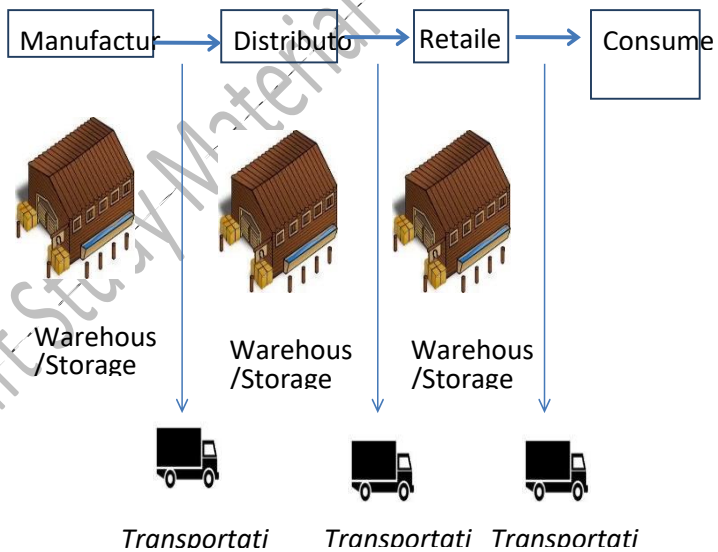


Fig. 1.5: Warehousing at Different Stages

This process of storage is termed as warehousing, and the place where the goods are stored is known as a 'warehouse'. So, we can say;

"*Warehouse is a planned commercial space for well-organised storage and management of products".*

"Warehousing is the process of storage, handling and management of goods in a warehouse."

Warehousing is an important function of logistics. Warehousing facility is availed by a trader, manufacturers, exporters, importers, transporters, agriculturists etc. Thus, it can be said that warehouse provides storage solutions for number of clients having extensive range of products. There are specialized warehouses for specialized kind of products.

A place where inventories are stored is called as warehouse. Warehousing means maintaining raw material of stock, spare parts, components, fuels, work in process, finished goods, etc., in a convenient location and from there, retrieving the stock when required. It is the sorting of finished goods until they are sold. It is a part of development of facility structures. It is an important component of logistics as it is linked to the firm's ability to deliver the services to customer.

According to ***Collins English Dictionary****,*

"The act or process of storing large quantities of goods so that they can be sold or used at a later date."

According to **R.E Murphy**,

"Warehousing is concerned with storing function in the channel of distribution of goods".

Need of Warehousing

Storage is an essential activity for many business houses. Goods are stored to avoid sudden shortage. In order to avoid the situation such as price rise or sudden surge in demand, warehousing of goods is a good scheme. Raw material also needs to be stored for production cycle during off seasons. Thus, warehousing is needed:

- To safeguard against the condition of loss of production.
- To achieve the fundamental of mass production to reduce overall cost.
- To acquire in bulk and store instead of buying in small batches and pay more.
- To provide sufficient stock during the uncontrollable situations such as sudden price rise or variations in demand and supply.
- To maintain the availability of spares and adequate service items.
- To provide a safe storage environment to the goods with a guard from damage, deterioration and un-authorization.
- To keep proper inventory record.
- To enhance company's goodwill with efficient warehouse handling systems.

Benefits of Warehousing

The benefits of warehousing are shown in (fig. 1.6).

1. **Location advantage** – it provides a central location for storing and distributing products. This location is generally on a reasonable distance to the supplier and the buyer.
2. **Storage benefits-** goods can be stored in a controlled and safe location. Even if the consumable goods are of seasonal use they can be produced during the whole year and can be stored for sale during the season of demand.

Fig. 1.6: Benefits of Warehousing

3. **Consolidation –** goods from number of suppliers can be received in one warehouse and can be transported as a single bulk consignment to the buyer.
4. **Value addition operation**- Value addition of the products such as packaging and labelling is also done in the warehouse to reduce the operational time.
5. **Economic Benefits**- Warehouses provide economies of scale (benefit of large-scale production) to the manufacturer and buyer. This reduces their cost of operations.
6. **Service benefits**- it provides a benefit of safety stocking.

Aims of Warehousing

1. Storage—keeping goods in a safe and secured environment.
2. Safety—to ensure damage free and error free storage environment.
3. Utilisation of resources—for effective distribution of stored material.
4. Facing unprecedented conditions— For overcoming the situations, such as, sudden shortage of raw material.

Classification of Warehouses

There are number of ways in which warehouses can be classified. The selection of warehouse is based on consideration of several factors such as type of product, location, structure etc., (fig. 1.7).

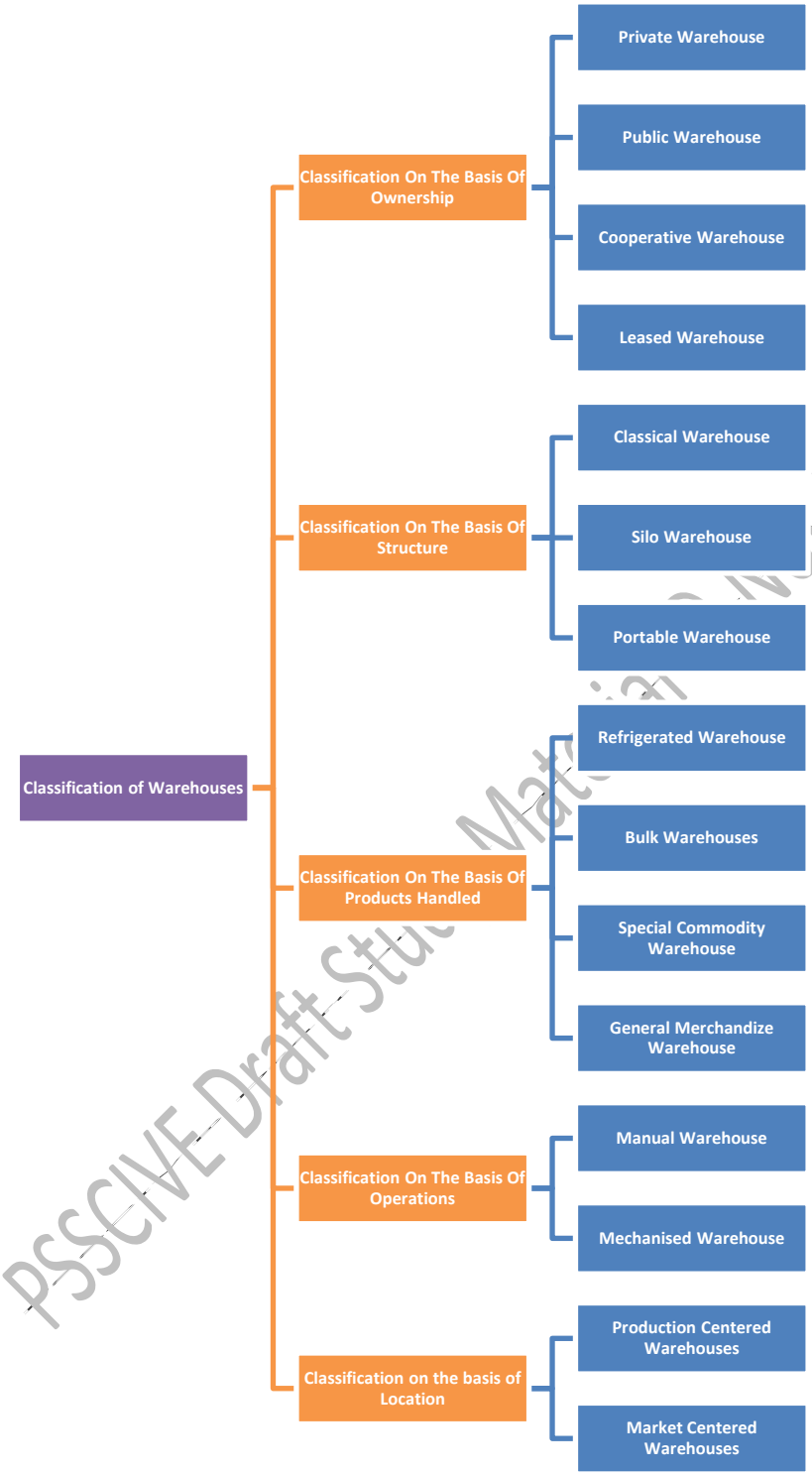


Fig. 1.7: Classification of a Warehouse

CLASSIFICATION ON THE BASIS OF OWNERSHIP

a) **Private Warehouse:** This is a warehouse which is owned by a firm or a company. Large scale companies with large scale operations setup their own warehouse.

b) **Public Warehouse:** These are government owned warehouses. Storage space is booked by any company or business entity and due fee is paid to the warehouse. Central Warehousing Corporation is example of such warehouses in India. These are best warehousing agency in India, it operates 438 warehouses across the country.

c) **Cooperative Warehouse:** These are owned, controlled and managed by cooperative societies. These provide storage space to members on a nominal fee.

d) **Leased Warehouse:** Leased warehouse is a warehouse which can be hired (whole premises) on lease or rent as and when required.

CLASSIFICATION ON THE BASIS OF STRUCTURE

a) **Classical Warehouse:** It is a single building divided in rooms/sections through concrete walls. It is a common form of warehouse.

b) **Silo Warehouse:** These are vertical units with options to store bulk items. Use of mechanical devices is highly prevalent. These are used for bulk storage of grain, cement, carbon black, coal, woodchips, food products and sawdust (fig. 1.8).

Fig. 1.8: Modern Silo Warehouse

c) **Portable Warehouse:** It is a type of temporary warehouse which can be built or transferred easily. Generally, it is a fabricated structure or shipping containers used for temporary storage of goods (fig. 1.9).

Fig. 1.9: A Portable Warehouse

CLASSIFICATION ON THE BASIS OF PRODUCTS HANDLED

a) **Refrigerated Warehouse:** It is a temperature-controlled warehouse specifically set up to store for perishable items. Generally processed foods, agricultural commodities, pharmaceutical products and cut flowers are stored in this type of warehouse(fig.1.10).

Fig. 1.10: Refrigerated Warehouse Storing cut Flowers

b) Bulk Warehouses: These are used to store bulk items, which are generally not packed such as wooden logs, scrap, sand, coal, grains etc., (fig. 1.11a & 11b).

Fig. 1.11(a): Bulk Warehouse.

Fig. 1.11(b): Bulk Warehouse.

c) Special Commodity Warehouse: These are used to store specialized goods such as tobacco, cotton, wool, wheat etc. These may be temperature and pressure controlled, depending upon the requirement (fig. 1.12).

Fig. 1.12: Specialised Tanks for Storing Natural Gas

d) General Merchandize Warehouse: Goods which do not require any special storage facilities are stored in these warehouses. For example: - tires, rubber mats, etc., it has racks or shelves for stacking items or it can have a big hall for storing goods (fig. 1.13).

Fig. 1.13: General Merchandise Warehouse

CLASSIFICATION ON THE BASIS OF OPERATIONS

a) **Manual Warehouse:** This warehouse uses manual handling of goods. Manpower rather than machines is used in this warehouse. Thus, the time and cost of operations is high.

b) **Mechanised Warehouse:** This warehouse uses machines for handling and storage operations. Cranes, forklift trucks conveyer belts and mechanical movers are used in place of man power (fig. 1.14).

Fig. 1.14: Production Cantered Warehouse

Classification on the basis of Location

(a) Production Centered Warehouses: These are positioned near the production facility. These are usually used to store raw materials, spares and intermediate supplies (fig. 1.15).

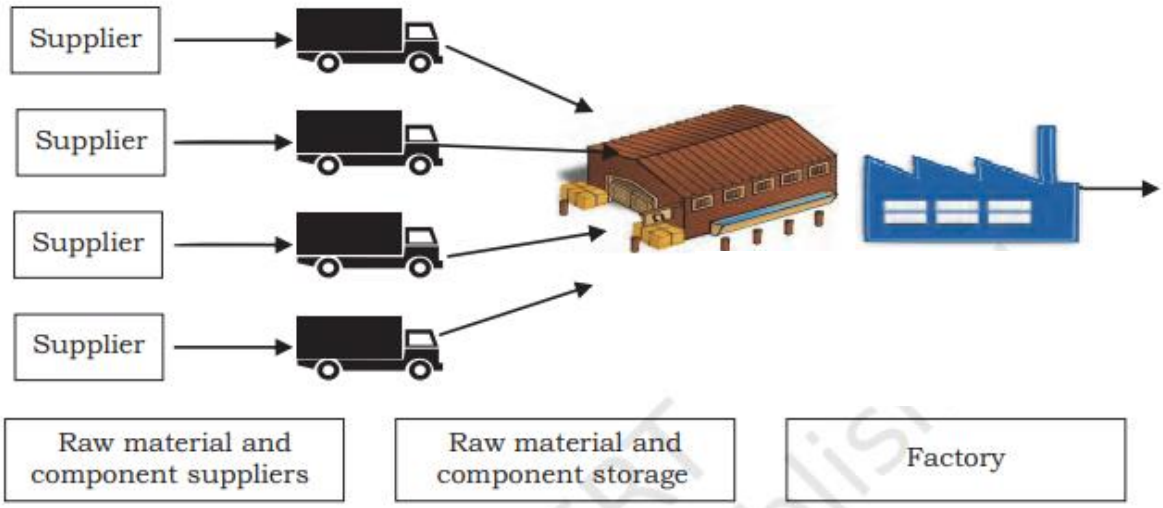


Fig. 1.15: Production Centered Warehouse

(b) Market Centered Warehouses: These are located near to the market area or distribution centers. These are generally used to store final products and spares for after sales service (fig. 1.16).

Fig. 1.16: Market Centered Warehouse

Features:

1. Processing, packaging and shipping orders accurately.
2. Inspecting products related to defects and damages.
3. Examining incoming and outgoing shipments.
4. Organising and maintaining inventory.
5. Organising warehouse space.
6. Receiving, unloading and place incoming inventory items appropriately.
7. Checking, verifying and filling customer invoices.
8. Abiding by all company safety and hygiene regulations.
9. Contributing ideas on ways to improve or optimise warehousing procedures.
10. Keeping warehouse clean and organised daily.

Warehousing Operation

Warehouse operations consist of receiving of goods, storing, order picking, shipping and delivery of goods (Fig. 1.17). There are other activities which the warehouse associate has to perform, those are: putting items away, moving items inside or between warehouses, and picking items for assembly, production, or shipment.

1. **Receiving:** tasks that involve assigning vehicles to docks and planning and carrying out unloading procedures.
2. **Storing:** material's movement from unloading area to its designated place in inventory.
3. **Order Picking:** the process of obtaining the right amount of the right products for a set of customer orders. This is a labor- intensive activity of warehouses.
4. **Shipping:** executing, truck's loading after picking and involve assignment of trucks to docks.
5. **Delivery**: it is the time taken by the transporter from warehouse to customer.

Fig. 1.17: Warehousing Operation Warehouse Activities

Functions of Warehousing

Storage is not only the purpose of setting up a warehouse. But there are various other activities that take place in a warehouse such as security, processing, value addition like packaging etc., so, in broad terms these functions are also included in warehousing. It is very important to understand the various functions performed in the warehouse. Following are the three **primary functions** performed in a warehouse: The secondary functions (fig. 1.18) of warehouse are as follows:

Storage Function	Movement Function	Information Management
• Stock of products at the warehouse • Order/Consignment • Shipping • Receiving • Put-away	• Location at selected place • Rearranging goods • Relocating using transport vehicle • Receipt of goods from production place • Shifting to the warehouse	• Record keeping • Documentation • Application of information technology and software for information management.

Fig. 1.18: Secondary functions of a warehouse

1. **Protection of goods**- Protection of goods provides protection to goods against loss and damage arising due to theft, fire or mishandling.
2. **Responsibility/liability sharing –** The responsibility of goods (damage and security of goods) is taken up by the warehouse, once the goods enter into the premises.
3. **Processing-** Warehouse also provides processing option to the manufacturers. Certain goods have to be worked upon before final consumption such as Paddy is polished, processed foods are labeled, etc.
4. **Checking and damage control-** Many times goods are checked for damages or maintenance in warehouse. Preventative and corrective measures are implemented accordingly on the products. Example – Anti-termite treatment on wooden products, Pest control treatment on agro-based products, and antirust coating on iron/metallic products.
5. **Breaking the Bulk-**Goods are generally received in bulk inside a warehouse. These are distributed in small batches as and when required by the distributor. The breaking of the bulk lot into small batches is termed as 'breaking the bulk'.
6. **Consolidation-** Small lots of goods are combined to form single big lot. Warehouses often act as a consolidation point where supplies from various suppliers are collected and combined into single lot for further transportation to a single buyer.
7. **Identifying-**Warehouse receives goods and identify them to store at a particular location and space suitable for inventory.
8. **Holding:** Holding of goods is a major function of warehouse. Goods received in warehouse for further transportation after some time. But sometimes due to different reasons, goods remain idle in the warehouse.
9. **Assembling:** Warehouses often act as an assembly point where supplies from various suppliers are collected and combined into single lot for further transportation to a single buyer.

Functions of the Warehouse:

1. In receipt of goods from upstream suppliers.
2. Identifying the merchandises, matching them to orders to finding their use.
3. Unloading materials from delivery vehicle.
4. Doing necessary checks on quality, quantity and condition.
5. Labelling materials so that they can be identified easily. Usually this can be completed through bar codes.
6. Sorting the goods as needed.

7. Moving goods to bulk storage area.
8. Holding them in stock until needed.
9. When necessary moving goods from bulk storage area to a smaller picking store.
10. Picking materials from this store to meet orders.

Warehouse People Management

Warehouse demands both a mind-set and unique skillset, as it involves a team of people who must work together for a common purpose. This requires especially trained staff members who can fulfill shipping and complex inventory requirements as well as can handle equipment and machinery safely and efficiently. For managing a safe and productive warehouse following points must be kept in mind (fig.1.19).

- Earn their trust
- Communicate
- Manage Wisely
- Provide Regular Training

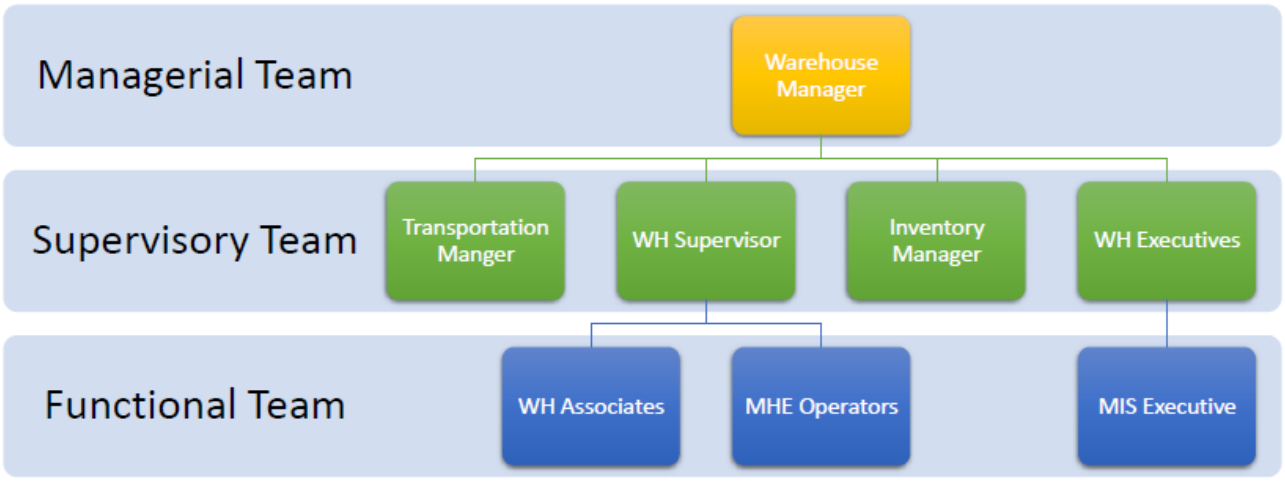


Fig.1.19: Organisation Chart of a Warehouse

Meaning of Warehouse Associate

A Warehouse Associate is a professional person who fulfils the logistics behind processing, receiving and storing inventory according to purchase orders and store policy.

Warehouse associates are employees who perform any task required at the firm's warehouse. They handle inventory, accept deliveries, scan on their computers, maintain the general cleanliness of the warehouses, and inspect products to look for faults or defects. Warehouse Associate assembles packed products related to orders, ensure proper shipment of goods and receives purchase orders.

Role of a Warehouse Associate and its interface with other job roles

Warehouse Associates support company's warehouse operations. They sort, receive, load and unload products and abler to perform various warehouse activities.

Duties and Responsibilities as Warehouse Associate

- Processing, packing and shipping orders accurately.
- Identifying the defective items and reporting to concerned authority.
- Maintaining inventory of order.
- Sorting, storing and receiving items.
- Preparing items for shipping.
- Maintaining Warehouse procedures and safety measure.
- Creating invoices for dispatching of goods.

Activities

Activity 1: Field Visit on exposure of warehouse

Materials Required: Notebook, Pen Pencil, Questionnaire (if required),

Procedure:

1. Make a group of 4-5 students.
2. Ask them to visit a warehouse nearby their residence or school.
3. Ask the warehouse manager about the types of warehouses.
4. Also discuss the functions of the warehouse.
   a) Unloading materials from delivery vehicle.
   b) Doing necessary checks on quality, quantity and condition.
   c) Labelling materials so that they can be identified easily. Usually this can be completed through bar codes.
   d) Sorting the goods as needed.
   e) Moving goods to bulk storage area.
   f) Holding them in stock until needed.
5. Write down the questions and answers in your notebook.
6. Present the
7. report in the class and discuss the outcomes of the visit.

Activity 2: Field Visit for getting idea on the types of warehouses and prepare a report on the types of warehouses and its respective goods.

Materials Required: Notebook, Pen Pencil, Questionnaire (if required),

Procedure:

1. Make a group of 4-5 students.

2. Ask them to visit at least three warehouses nearby their residence or school.
3. Ask the warehouse manager about the types of warehouses
   a) type of product
   b) location
   c) structure
4. Prepare a report of all three types of warehouses and also discuss the features of warehouses on the basis of observation.
5. Prepare a report on the visit and submit to the subject teacher
6. Present the report in the class and discuss the outcomes of the visit.

Activity 3: Field Visit for getting idea on the duties and responsibilities of Warehouse associate.

Materials Required: Notebook, Pen Pencil, Questionnaire (if required),

Procedure:

1. Make a group of 4-5 students.
2. Ask them to visit at least three warehouses nearby their residence or school.
3. Ask the warehouse manager about the duties and responsibilities of Warehouse associate.
   a) Processing, packing and shipping orders accurately.
   b) Identifying the defective items and reporting to concerned authority.
   c) Maintaining inventory of order.
   d) Sorting, storing and receiving items.
   e) Preparing items for shipping.
   f) Maintaining Warehouse procedures and safety measure.
   g) Creating invoices for dispatching of goods.
4. Prepare a report on the visit and submit to the subject teacher.
5. Present the report in the class and discuss the outcomes of the visit.

Activity 4: Draw a chart mentioning benefits of Warehouse

Materials Required: Notebook, Pen Pencil, Chart.

Procedure:

1. Make a group of 4-5 students.
2. Ask them to visit at least three warehouses nearby their residence or school.
3. Ask the warehouse manager about benefits of warehouse.
   a) Location advantage
   b) Storage benefits
   c) Value addition operation
   d) Economic Benefits

4. Prepare a chart showing benefits of Warehouse and submit to the subject teacher.
5. Present the chart in the class and discuss the outcomes of the visit.

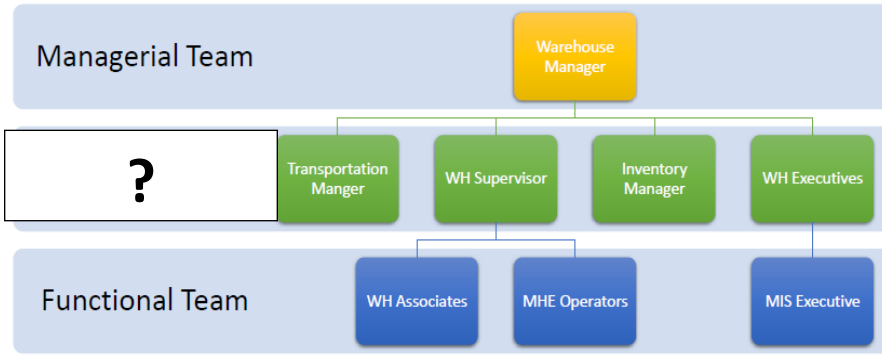
Check Your Progress

A. Fill in the Blanks

1. The process of storage is termed as _____ and the place where the goods are stored is called as _____.
2. There are _____ warehouses for specialised kind of products.
3. Goods from number of suppliers can be received in one warehouse and can be transported as a single bulk consignment to the buyer. This is called as _____.
4. The time between receipt of order and delivery of order is called as _____.
5. Warehouse is an important activity of _____ function.

B. Multiple Choice Questions

1. Identify missing step in organisation chart



a) Managerial Team
b) Supervisory Team
c) Functional Team
d) None of the above

2. Which of the following is the Primary function of warehouse?
   a) Storage Function
   b) Movement Function
   c) Information Management
   d) All of the above
3. Which of the following does not include benefits of warehouse?
   a) Economic Benefits

b) Value addition operation
c) Consolidation
d) Money

4. The breaking of the bulk lot into small batches is termed as
a) breaking the bulk
b) breaking of hut
c) both
d) None of the above

C. State whether the following statements are True or False

1. Warehouse provides storage solutions for number of clients.
2. Packing is not a function of warehouse.
3. Warehousing is an integral part of logistics.
4. Warehousing works as a system.
5. Effective resource utilisation is not an aim of warehousing.
6. Warehouses are only for storage activity.

C. Short Answer Questions:

1. What is warehousing?
2. Discuss the aim of warehousing.
3. What are the various benefits attached to the warehousing process?
4. Confer about the needs of warehousing.
5. Discuss in brief the functions performed in the warehouse?
6. What is 'breaking the bulk'? Discuss in short.

D. Long Answer Questions

1. What is consolidation process? How does warehousing takes care of this function?
2. Discuss in brief the classification of warehouses based on the nature of products they store.
3. What is the difference between public, private and leased warehouse?
4. How would you discriminate between market cantered and production cantered warehouse?
5. What are the characteristics of a good warehouse?
6. Special commodities like cut flowers are stored in which type of warehouse and why?

E. Check your Performance

1. Draw a chart showing benefits of Warehouse.

Prepare PPT showing primary and secondary functions of Warehouse

Session 3: Warehouse Layouts

The basic aim of warehouse is to store maximum possible level of products in the given space. To ensure optimum storage levels, the warehouse should be designed such that less space is wasted and maximum space is utilized for operations. This planning of space in a warehouse is called as warehouse layout.

A warehouse is try-pictorially divided into different areas/compartments to ensure smooth functioning of all the processes. It is the physical arrangement of storage racks, loading and unloading areas, equipment, and all other facilities. The warehouse layout is important as:

1. It has a significant impact on the speed of operation in the warehouse.
2. It will be directly affecting the total cost of operation in the warehouse.
3. Layout is long term or rather permanent and cannot be changed easily.

Principles of Warehousing Layout

General principles of warehouse layout designing are:

1. Making best use of space.
2. Minimizing movement of goods inside the warehouse.
3. Keeping the operational cost low.
4. Ensuring proper handling of equipment.
5. Minimising aisle space.
6. Maximising the use of labor.
7. Providing safe and secure environment to the goods.

General Warehouse Layout

Warehouse layout like an architectural blueprint—where each section is clearly defined. A general lay out (fig. 1.20) will be as follows:

1. An arrival bay or doc- where goods are received, checked and sorted out.
2. A storage area- where goods are stocked.
3. A departure bay or stock - where customers' orders are assembled and sorted out.
4. A material handling system for moving goods around.
5. An information system, which records the location of all goods, arrivals from suppliers, departures to consumers, and other relevant information.

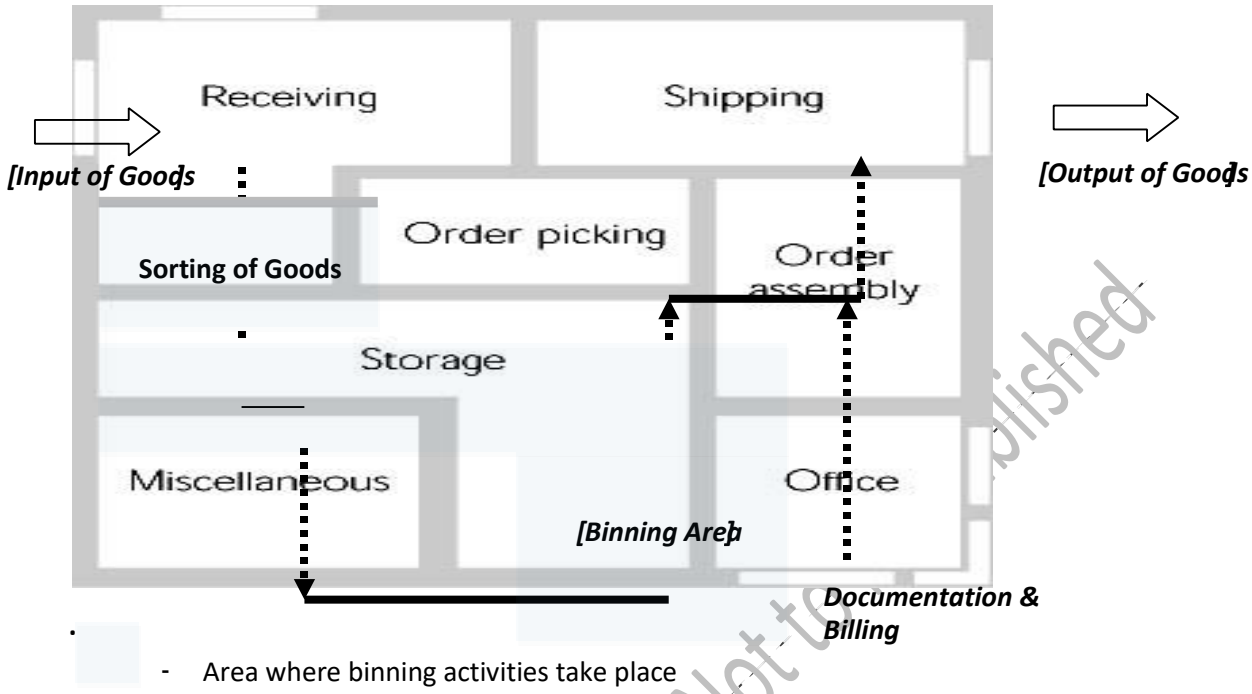


Fig. 1.20: General Layout of a Warehouse

To Creating a pictorial layout of an e-commerce company warehouse requires understanding the various sections and zones typically found in such facilities. Here's a basic layout (fig.1.21):

Fig. 1.21: Pictorial layout of an E-Commerce Company Warehouse.

Source: http://www.trans-cosmos.co.id/service/ec/

This layout can be depicted visually as a schematic diagram or blueprint, with each section labelled and connected by arrows indicating the flow of goods and personnel. Depending on the size and complexity of the warehouse, additional features such as mezzanine levels, automated guided vehicles (AGVs), or specialized zones for specific product categories may be included. Operations start from Merchandise Receipt to Picking, Shipping, Returns and Wrapping for delivery.

A. Objectives of Warehouse Layout and Design

The objectives of warehouse layout and design are discussed in (refer fig. 1.22).

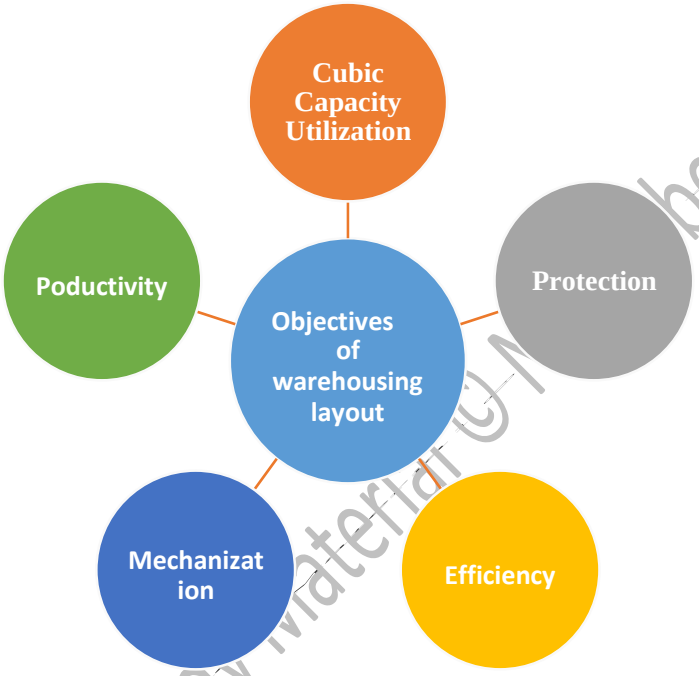


Fig. 1.22: Principles of warehouse layout and design

1. **Cubic capacity utilization:** Cubic capacity is a measure of net storage space available in a warehouse. Main aim of layout is to completely utilize the cubic capacity of the warehouse. In simple terms, it is complete utilization of the space.
2. **Protection:** The layout should be planned such that maximum security of products is ensured. Minimum movement and handling of goods within the warehouse should be determined.
3. **Efficiency:** Efficiency of a warehouse implies reduced cycle time and faster processing of orders. Layout should be designed keeping in mind the fact that the time required for receipt of goods, storage, sorting and dispatch should be least. An error-free working environment should be developed.

4. **Mechanisation:** Optimum utilisation of mechanical equipment is a major objective of warehouse layout.
5. **Productivity:** The layout should ensure improved overall productivity of the warehousing system. Improved productivity means lesser time, lesser cost, more stock turn around and an error-free system.

The efficient input-output process of goods inside the warehouse depends upon the layout of the warehouse. An effectively planned warehouse leads to speedy and error free flow of warehousing system. Thus, understanding the layout of the warehouse is an important aspect to understand the handling sequence of the warehouse. Layout helps the workers to understand which path they have to follow to complete their operations. After understanding the types, functions and layout of the warehouse, a student is ready to understand his/her individual function in the warehouse.

Activities

Activity 1: Field Visit for study of warehouse layout and prepare report.

Materials Required: Notebook, Pen Pencil, Questionnaire (if required),

Procedure:

1. Make a group of 4-5 students.
2. Ask them to visit at least three warehouses nearby their residence or school.
3. Ask the warehouse manager about the layouts of warehouse.
4. Make comparisons of different layouts of warehouse with its information system, which records
   a) the location of all goods
   b) arrivals from suppliers
   c) departures to consumers
   d) other relevant information.
5. Discuss the utility of layout of warehouses on the basis of the observation.
6. Prepare a report on the visit and submit to the subject teacher.
7. Present the report in the class and discuss the outcomes of the visit.

Activity 2: Prepare Chart on layout of the warehouse

Materials Required: Notebook, Pen, Pencil, eraser and drawing sheet.

Procedure:

1. Make a group of 4-5 students.
2. Ask them to draw a chart on the layout of the warehouse.
3. Also give the reason of arrangements of machines and equipment on the basis of the discussion with the warehouse managers/supervisor.
   a) A storage area- where goods are stocked.

b) A departure bay or stock - where customers' orders are assembled and sorted out.
c) A material handling system for moving goods around.
d) An information system, which records the location of all goods
e) An arrival bay or doc- where goods are received, checked and sorted out.

4. Prepare a chart on the visit and submit to the subject teacher.
5. Display the chart in the class and discuss the outcomes of the visit.

Activity 3: Sketch the warehouse layout and design with suitable equipment.

Materials Required: Notebook, Pen, Pencil, eraser, drawing sheet.

Procedure:

1. Make a group of 4-5 students.
2. Ask them to draw a Sketch of the warehouse layout and design it with suitable equipment.
   a) **U-flow layout**
   b) **T-flow warehouse design**
   c) **Straight-line flow layout**
3. Also give the reason of arrangements of machines and equipment on the basis of the discussion with the warehouse managers/supervisor.
4. Prepare a chart on the visit and submit to the subject teacher.
5. Display the chart in the class and discuss the outcomes of the visit.

Check Your Progress

A. Fill in the Blanks

1. Grains are stored in _____warehouse.
2. _____ is the measure of net storage space available in a warehouse.
3. _____ & _____ operations take place in the office area of a warehouse.
4. _____ movement and handling of goods within the warehouse should be determined.
5. Warehouse layout is a _____ of the warehouse.

B. Multiple Choice Questions

1. Warehouse layout is different in different warehouses:
   a) Varies according to the types of operations performed in the warehouse
   b) Varies according to the type of commodity handled in the warehouse
   c) It is always same
   d) (a)&(b)
2. Warehouse layout objectives are:
   a) Storage

b) Cubic capacity utilization
c) Protection
d) (b) and (c)

3. Following is not a part of warehousing layout:
   a) Arrival bay
   b) Manufacturing bay
   c) Storage bay
   d) Shipping/departure bay
   e) Office
4. Natural gas is stored in
   a) Silo
   b) Specialty warehouse
   c) Bulk warehouse
   d) Refrigerated warehouse
5. Major function of warehouse is
   a) Storage
   b) Protection
   c) Value addition
   d) All the above

C. State whether the following statements are True or False

1. Cubic capacity is a measure of net storage space available in a warehouse.
2. The basic aim of warehouse is to store maximum possible level of products in the given space.
3. Optimum utilisation of mechanical equipment is a major objective of warehouse layout.
4. Cubic capacity is a measure of net storage space available in a warehouse.
5. The efficient input-output process of goods inside the warehouse depends upon the layout of the warehouse.

D. Short Answer Questions

1. State the meaning of Warehouse Layout.
2. What are the principles of Warehousing layout?
3. State the Objectives of Warehouse Layout and Design.

E. Long Answer Questions

1. Discuss in class about the layout of the warehouse.

2. Which area in the warehouse layout denotes quality check area? Based on the layout what roles of a warehouse quality checker can you point out?
3. Based on what principles the warehouse layout should be designed?

F. Check your Performance

1. Prepare PPT showing principles of Warehouse.
2. Sketch the warehouse layout.
3. Design suitable warehouse equipment.

Session 4: Peps and Mses in Warehousing

Personal Protective Equipment (PPE) is specialised equipment or clothing worn by an employee for protection against infectious materials. Personal protective equipment may include items like gloves, safety glasses, shoes, earplugs, etc. It is used to prevent exposure to infectious material. It acts as barrier to stop the spread of germs.

PPE is an equipment that protects the person from health or safety risks at workplace. To reduce risk PPE is needed.

1. **Face PPE:** To protect face from flying objects, sparks, chemical splash, etc.

Face PPE

- While handling chemicals.
- Working with electrical energy for protection against arc flash.
- Working at construction site.
- While welding, cutting, grinding.
- Working with metals.

2. **Head PPE:** To protect head against flying objects, falling objects, fall apart, stuck with, etc.

Head PPE

- On construction site.
- Material handling (Manual or mechanical).

3. **Eye PPE:** To protect eyes from various chemicals.

Eye PPE

- Welding.
- Cutting
- Grinding.
- Working with metals.
- Chemical handling.

4. **Ear PPE:** To protect against unpleasant noise

Ear PPE

- On construction site.
- Material handling (Manual or mechanical).

5. **Hand & Arm PPE:** To protect against pinch, sparks, hot surface, Vibration, etc.

Hand & Arm PPE

- Welding.
- Cutting.
- Grinding.
- Working with metals.
- Working with Electricity.
- Doing construction activity.
- Material handling.
- Working with chemicals.

6. **Body PPE:** To protect against hot and cold surface.

Body PPE

- Welding.
- Cutting.
- Grinding.
- Working with metals.
- Working with Electricity.
- Material handling.
- Chemical handling.
- Hot and cold workplaces.

7. **Safety Belt and Harness PPE:** To protect while working at height

Safety Belt and Harness PPE

- While working at Height

8. **Foot and Leg PPE:** To protect legs and feet from shocks, jerk, etc.

Foot and Leg PPE

- Welding.
- Cutting.
- Grinding.
- Working with metals.
- Working with Electricity.
- Material handling.
- Chemical handling.
- Working at height.

9. **Respiratory PPE:** To protect workers from breathing problem.

Respiratory PPE

- Welding.
- Cutting.
- Grinding.
- Material Handling.
- Chemical Handling.
- Dusty Workplace.
- Firefighting.

The PPE products shown in the following (fig.1.23).

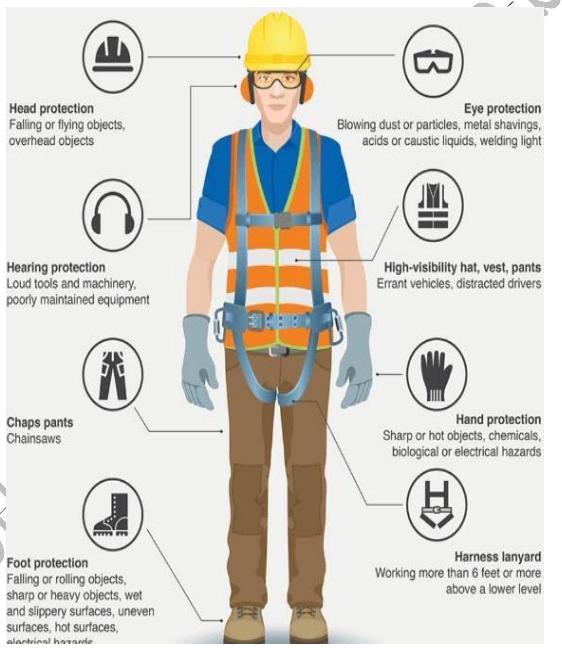


Fig. 1.23: PPE

Source :PPE_person.jpg (1024×976) (umn.edu)

Gloves-while handling dirty items we need to protect our hands. To cover hands and wrists, protecting the skin from contact with droplet exposure.

Gowns-are worn over our clothes to protect us from body fluids and dirty items.

Safety-to protect our eyes and feet, glasses and shoes are used.

Face Shield-to cover face with a clear plastic screen.

Earplugs or Muffs-to protect ears from unpleasant sound.

Hard Hats-to protect head from injury, hard hats or helmets are used.

Respirators or Coveralls-to protect the wearer from inhaling airborne contaminants like dust, vapours, small and large particles.

Vests and Full Body Suits- to give your arms freedom of movement and keep your core warm, vests are worn. Skin tight garment that covers our entire body is called as full body suits.

Meaning of MHE

Material Handling Equipment (MHE) plays a vital role in warehouse. It is the movement that needs care while lifting, removing pallets from racking. It is used for the movement, control, storage, and protecting materials, products and goods throughout the process of distribution, manufacturing, consumption and disposal of goods(fig. 1.24).

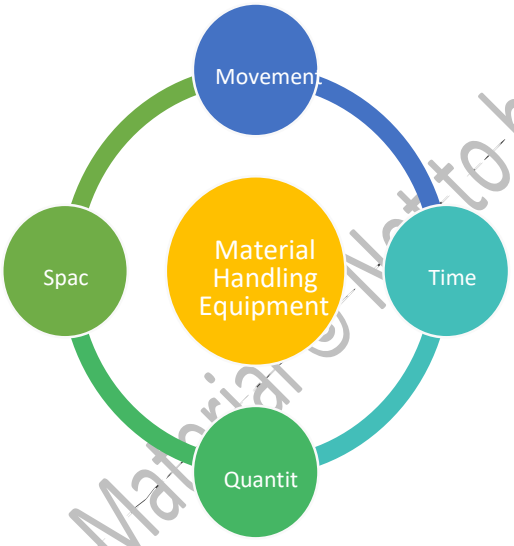


Fig. 1.24: Material Handling Equipment

There are four types of MHE:

1. **Storage Equipment-**mezzanine floors and warehouse racking, to non-automated equipment such as trolleys and other MHE for their efficient storage solutions. It makes space for more stock and improve order fulfilment time.
2. **Engineered systems-** equipment that provides automation that speed up the processes, including automated guided vehicles, conveyor systems, automated storage and retrieval systems.
3. **Bulk Material Handling Equipment-**to handle bulky material, dry material such as sand and minerals are often used by transporter.
4. **Industrial Trucks-** comprises of forklift truck, pallet truck is used by various industries for shifting goods from one place to another.

Functions of PPE and MHE

Personal Protective Equipment, commonly referred to as "PPE", is worn to minimise the exposure to hazardous workplace injuries and illnesses. These injuries and

illnesses occur when a person comes in contact with chemical, physical, radiological, electrical, mechanical or other workplace hazards.

The warehouse associate needs to ensure that the Material Handling Equipment (MHE) supervisor & amp technician have sufficient material handling equipment to carry out the day's load (day's work). There might be problems in MHE maintenance, equipment breaks down, in-sufficient material handling equipment etc. In such cases the warehouse associate needs to coordinate with the MHE supervisor for proper co-ordination and proper utilisation of MHE. The associate needs to have a backup plan in case of any challenges.

Importance of PPE

1. PPE is worn to minimise the risks and hazards associated with the working conditions.
2. Without proper PPE, workers are exposed to risks of injury or illness.
3. PPE protects employees from effects of the nature of their work.
4. To perform a Safety & PPE assessment and training in the workplace.

Importance of MHE

1. Efficient material handling.
2. Reduces the cost of warehouse operations.
3. Prevents workplace accidents and material damage.
4. Enhances the accuracy of supply chain management.

Usefulness of PPE and MHE

Use of Personal Protective Equipment (PPE). Appropriate use of PPE is a very good practice. PPE will protect the user against health and safety risks at work. PPE includes various items like helmets, gloves, eye protection, clothing and safety footwear. It also includes Respiratory Protective Equipment (RPE).

Usefulness of PPE

1. PPE should generally be available in a range of sizes, as one size or type seldom fits all.
2. Comfort and acceptability to the wearer are important, as the equipment may need to be worked for longer periods.
3. A particular PPE that is necessary should be determined by an assessment of the hazards involved.
4. Managers and supervisors should ensure that appropriate PPE is used by all port workers in accordance with instructions.
5. Managers should give a clear lead by using the equipment when it is required.

6. All persons in cargo-handling areas should wear high visibility overalls or other high visibility outer clothing.
7. Loose clothing should never be worn by workers when working near open conveyors or other moving machinery. One-piece overalls are suitable.

Usefulness of MHE

1. Choose the right MHE.
2. Plan MHE acquisition strategy.
3. Analyse MHE data and maximise its operations.
4. Maintenance and replacement of MHE.
5. Scrutinise automation needs and prefer efficiency over technology.

Different MHE and PPE equipment used in Warehouse

The following are the specific types of MHE which are used in various industries (fig. 1.25, 1.26, 1.27, 1.28, 1.29 & 1.30):

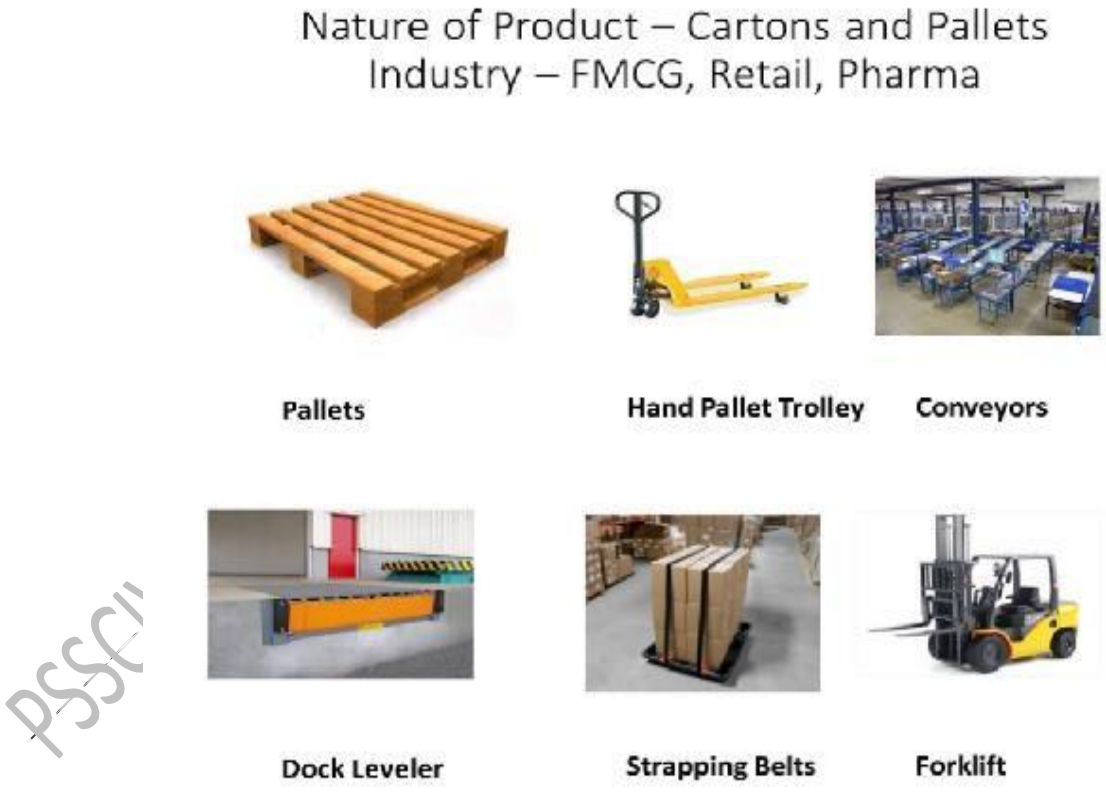


Fig. 1.25: MHE used in FMCG

Fig. 1.26: MHE used in Consumer Durables

Fig. 1.27: MHE used in Chemical Industry

Fig. 1.28: MHE for Garments

Fig. 1.29: MHE for Automobiles

Fig. 1.30: MHE for Bulk Goods

The following are the specific types of PPE which are used(fig 1.31 & 1.32)

Fig. 1.31: PPE for different uses

Fig. 1.32: Different types of PPE

Activity

Activity 1: Field Visit to identify and enlist functions of Personal Protective Equipment (PPE)& and Material Handling Equipment(MHE).

Materials Required: Notebook, Pen Pencil, Questionnaire (if required).

Procedure:

1. Make a group of 4-5 students.
2. Ask them to visit at least three warehouses nearby their residence or school.
3. Ask the warehouse manager about the Usefulness of PPE in warehouse.
   a) PPE should generally be available in a range of sizes, as one size or type seldom fits all.
   b) Comfort and acceptability to the wearer are important, as the equipment may need to be worked for longer periods.
   c) A particular PPE that is necessary should be determined by an assessment of the hazards involved.
   d) Managers and supervisors should ensure that appropriate PPE is used by all port workers in accordance with instructions.
   e) Managers should give a clear lead by using the equipment when it is required.
   f) All persons in cargo-handling areas should wear high visibility overalls or other high visibility outer clothing.
   g) Loose clothing should never be worn by workers when working near open conveyors or other moving machinery. One-piece overalls are suitable.
4. Ask the warehouse manager about the Usefulness of MHE in warehouse.
   a) Choose the right MHE.
   b) Plan MHE acquisition strategy.
   c) Analyse MHE data and maximise its operations.
   d) Maintenance and replacement of MHE.
   e) Scrutinise automation needs and prefer efficiency over technology.
5. Discuss the utility of PPE and MHE in warehouses on the basis of the observation.
6. Prepare a report on the visit and submit to the subject teacher.
7. Teacher should discuss the outcomes of the visit.

Activity 2: Prepare a Chart showing Working process of PPE & MHE of the warehouse.

Materials Required: Notebook, Pen, Pencil, Eraser, Drawing Sheet

Procedure:

1. Divide the class in a group of 4-5 students.
2. Collect or draw images that represent each type of PPE and MHE.

3. Sketch a rough layout in your notebook, indicating where each element (text, images, titles) will be placed.
4. Clearly label each section with titles (e.g., "Personal Protective Equipment (PPE)" and "Material Handling Equipment (MHE)").
5. In the PPE section, draw or paste images of various types of PPE (such as gloves, helmets, safety vests, goggles).
6. In the MHE section, draw or paste images of different types of MHE (such as forklifts, pallet jacks, conveyors).
7. Outline the steps for operating, maintaining, and inspecting MHE. Include any relevant safety procedures and maintenance tasks.
8. Use color to differentiate between different elements and to make the chart more visually appealing.
9. Teacher should display that chart in class.

Check your progress

A. Fill in the Blanks

1. PPE stands for _____.
2. MHE stands for _____.
3. To protect head against flying objects, falling objects, fall apart, stuck with, etc. _____PPE is used.
4. _____comprises of forklift truck, pallet truck is used by various industries for shifting goods from one place to another.
5. A particular PPE that is necessary should be determined by an assessment of the _____ involved.

B. Multiple Choice Questions

1. Identify the Picture-

a) Safety Glasses
b) Helmets
c) Trolley
d) Pallet

2. Identify the Picture-

a) Safety Glasses
b) Helmets
c) Trolley
d) Pallet

3. Identify the Picture-

a) Platform Trolley
b) Tuck
c) Shoes
d) Safety belts

4. What is the primary purpose of Material Handling Equipment (MHE) in a warehouse?
   a) To enhance employee safety
   b) To improve communication between warehouse staff
   c) To control, move, store, and protect materials throughout the distribution, manufacturing, consumption, and disposal processes
   d) To minimize exposure to hazardous workplace injuries and illnesses

5. Which type of Material Handling Equipment (MHE) is used to handle bulky and dry materials such as sand and minerals?
   a) Storage Equipment
   b) Engineered Systems
   c) Bulk Material Handling Equipment
   d) Industrial Trucks

C. State whether the following statements are True or False

1. Material Handling Equipment (MHE) plays a vital role in warehouse.
2. PPE is worn to minimise the exposure to hazardous workplace, injuries and illnesses.

3. Face Shield is used to cover face with a clear plastic screen.
4. Skin tight garment that covers our entire body is called as full body suits.
5. Respirators or Coveralls is not used to protect the wearer from inhaling airborne contaminants like dust, vapors, small and large particles.

D. Short Answer Questions

1. State the meaning of PPE and MHE.
2. Explain the importance of PPE and MHE.
3. Illustrate different types of PPE.

E. Long Answer Questions

1. List the key MHE used in warehousing processes?
2. Detail the types of MHE to be used for various types of products?
3. Describe the application of Personal Protection Equipment (PPE)?

F. Check your Performance

1. Draw any five types of PPE.
2. Role-play showing the difference between PPE and MHE.

MODULE 2	PICKING, PACKING, KITTING, LABELLING AND BINNING

Module Overview

The associate has to count the picked goods in the staging area and verify with the given pick-list to ensure that the correct number of items are sent out. After verifying the picked goods, he/she needs to sign-off on goods in the staging area so that they can be moved into the outbound area for shipping. The utility of perishable items is determined by their shelf lives. Limited life time of such perishable products increases the complexity of the inventory management. The inventory management system that is used for non-perishable goods cannot be used for perishable because such goods lose their value over time. Warehouse Kitting involves warehouse associate picking several products and bringing them to an area where they are packed together and shipped. It is a way of filling the orders by pre-assembling separate articles into ready-to-ship kits, in place of picking and packing those items when orders are received. There are different areas dedicated for different types of material. Deep freezer to store refrigerated material, vegetable basket to store vegetables, egg plates to store egg, door shelves to store water bottle, and inner shelves to store dairy products. Same is the concept of bins in warehouse.

The basics of picking, packing, kitting, labelling and binning of warehouse products is discussed at the ground level and the importance of logistics linkage in managing an efficient supply chain. picking, packing, kitting, labelling and binning of warehouse products is clearly explained in this unit. To understand the main roles of the individual as a warehouse associate with the set targets, this unit also discusses the necessity of a warehouse and different activities carried inside the warehouse.

To be a successful Warehouse Associate one must carry achievement motivation and be keen to learn. People must be trained enough to know how to handle warehouse products. Do not hesitate to ask for help and do not be afraid to make mistakes. Warehouse Associates do not limit themselves for working hours during the learning phase.

This unit will focus on various aspect of picking, packing, kitting, labelling and binning of warehouse products. The first session covers picking of warehouse products, the second session deals with packing and labelling of warehouse products, the third session describes about the kitting of warehouse products, and the fourth session explains about the binning of warehouse products.

Learning Outcomes

After completing this module, you will be able to:

- Understand Efficiently and accurately pick warehouse products according to order requirements and inventory management systems.
- Properly pack and label warehouse products to ensure safe transport and accurate identification.
- Assemble and prepare kits of warehouse products according to specifications and order needs.
- Organize and store warehouse products in bins systematically to optimize space and improve retrieval efficiency.

Module Structure

Session1: Picking of Warehouse Products

Session2: Packing and Labelling of Warehouse Products

Session3: Kitting of Warehouse Products

Session 4: Binning of Warehouse Products

Session 1: Picking of Warehouse Products

As studied in the previous unit, warehouse is a place of storage of goods. Goods are received at the warehouse, stored and finally dispatched. The fundamental three processes in the warehouse are receipt, storage and dispatch process(fig. 2.1).

Fig. 2.1: Process of Warehousing

The Receipt Process

The warehouse activity flow starts with receipt of the goods. Conducting the first step right ensures that mistakes are not carried forward to subsequent steps. Receipt process starts with checking on the incoming shipment. Whether the shipment is

destined for this warehouse or not. Unloading of the material to ensure zero breakages, during the process. Doing physical and quality check of the incoming material and finally put away of the material at the right location and updating the system on the quantities received. The following flow chart indicates the various steps in receipt process (fig. 2.2):

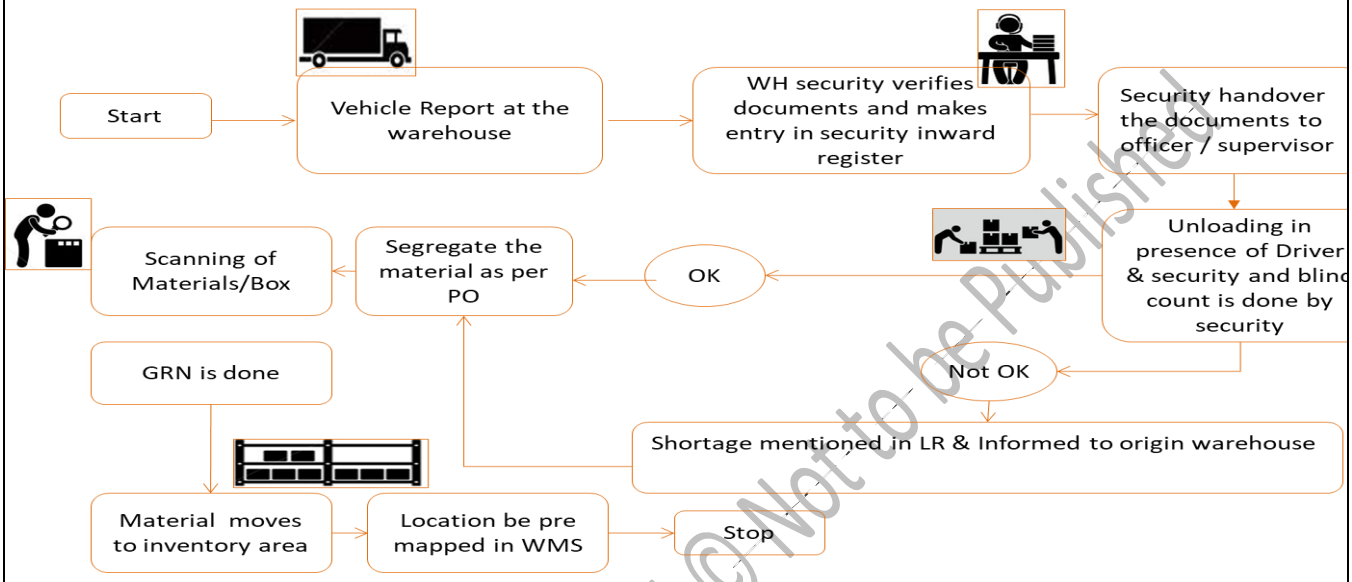


Fig. 2.2: Receipt Process

The Storage Process

Storage process involves the management of Inventory and how to handle the same in the warehouse. In recent days, warehousing is used as switching facility rather than long term storage house.

The Dispatch Process

Dispatch process is the critical process in the warehouse, as it meets the needs of the customer whose order must be processed or of the factory whose production must happen. Dispatch process starts with the generation of the pick list as per the order. Conducting the picking as per the pick list, packing the picked material, labeling the goods, arranging for the transporter to pick up the material, completing the documentation in terms of Invoicing, Lorry Receipt (LR), and other transit documents (fig. 2.3).

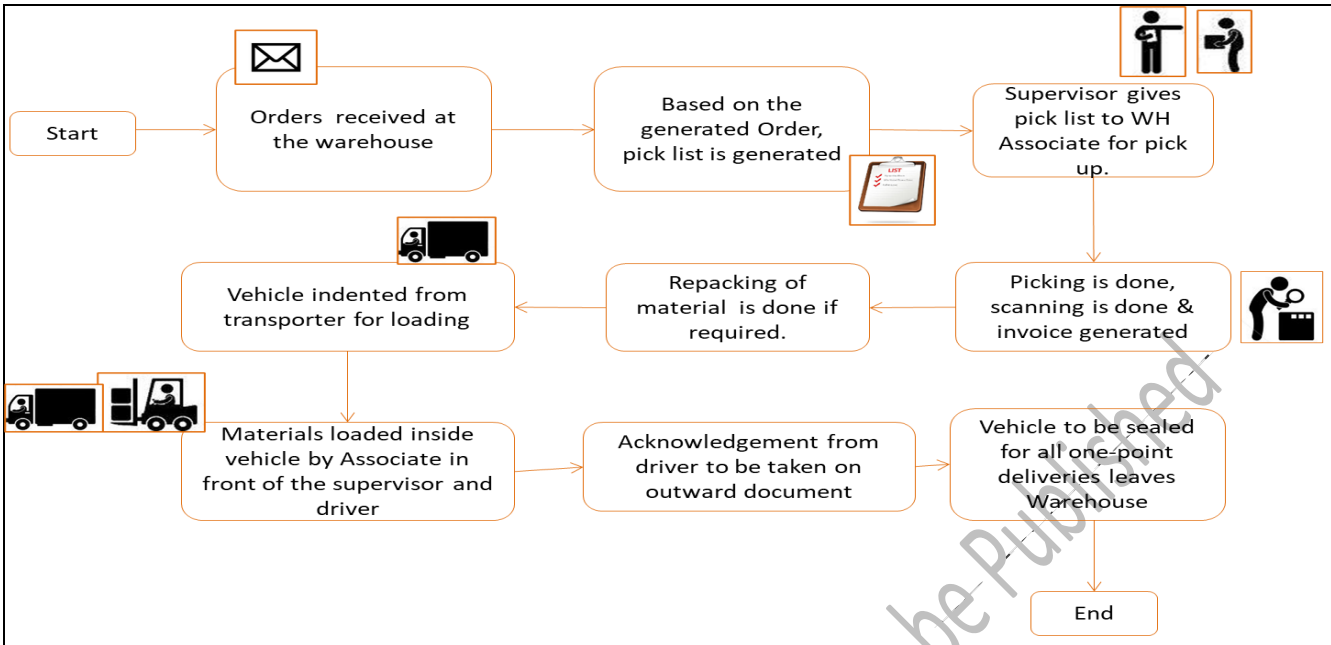


Fig. 2.3: Dispatch Process

Picklist and its Components

As seen in the previous section, dispatch is a fundamental process in the warehouse which affects the customer service and effectiveness of the warehouse.

Meaning of Pick List

The dispatch process starts with the receipt of order from the customer. The order is converted into a pick list. Pick list is the list of various items which are there in the order, the quantities and their location inside the warehouse.

Picking Process

The picking process starts with an order or command; a warehouse associate receives from his/her supervisor. The warehouse supervisor provides a detailed list of items or products to be picked by the associate. The pick list or an order list might be a computer-generated list given by a supervisor or an automated instruction received in a hand-held device. (refer Table1)

A typical pick list will carry the following information:

1. **Product Code:** Every product in the warehouse has a code number for easy identification of goods. This also helps in the easy picking, storage and delivery of cargo. Every pick list clearly mentions this product code.
2. **Product Description:** A pick list may even have product description which helps the associate to reconfirm that they are handling the right cargo. This is in addition to the code number.
3. **Part Number:** A product can be further classified into parts. So, the part numbers help in identifying the exact part of the product.

4. **Units of Measurement:** This basically clarifies how each cargo is measured. In some cases, it will be generalized as one pack. But in some other cases, it can be specific as kilograms, cm or any such measurements. This ensures that only the right quantity of the cargo is picked up by the team.
5. **Storage Location:** This clearly denotes where exactly the cargo is stored in the warehouse. This enables smooth pickup and delivery of cargo. It also ensures that the right material is picked up.
6. **Required Quantity:** Pick list specifies the quantity to be picked up. Since goods are stored in bulk, this information is vital.
7. **Picked Quantity:** There might be situations, where there is a mismatch between the required quantity and the quantity available. This is solved by mentioning the picked quantity in the Pick list. It also helps in keeping inventory intact.

Pick List

Warehouse		_____			Date	_____	
Order No.		_____			Time	_____	
S. No.	Item Code	Item Description	UOM	Required Quantity	In Hand	Location	Picked Quantity
1	ABCD01234	Plastic Pots	No.	7	84	BIN 365	
2	XYZ78910	Compost	Kgs	10	95	BIN 789	

Table 1: Pick List

The associate has to count the picked goods in the staging area and verify with the given pick list to ensure that the correct number of items are sent out. After verifying the picked goods, She/he needs to sign off on goods in the staging area so, that they can be moved into the outbound area for shipping.

Different forms of Pick List

A. Computer Generated Pick List: This is the most common type of a pick list generated using a computer (fig. 2.4). A copy is handed over to the associate to perform a picking activity. Below mentioned is a sample form of such pick list.

Bryan - MFG DB PICKLIST
Sales Order Number 1434
Ordered By: 4002

Warehouse	Location	Item Code	Quantity
1	LOC1	PICK001	10
	LOC2	PICK001	20
	LOC3	PICK001	20
2	LOC1	PICK001	10
	LOC2	PICK001	20

Fig. 2.4: Computer Generated Pick List

B. Automated Pick List: The information regarding picking and the details of items to be picked will be communicated to an associate through a "Handheld Device". The screen in the device will display the details of the pick list (fig. 2.5). The device and the computer will be connected through Wi-Fi connectivity (wireless). Below mentioned sample figure depicts an automated pick list using a handheld device.

Fig. 2.5: Automated Pick List

Picking and dispatch are key processes in warehouse management. It deals with client satisfaction by fulfilling their demands and requirement.

Order picking deals with pick up of the goods as per customers' order. Picking of the order is the costliest activity with in today's warehouses as it is labour intensive and automation of process is required, which leads to upgradation of technology. Order picking is a difficult process to plan. Order picking has direct impact on the customer service.

Traditional Put-away & Picking Process

The picking operation has changed significantly over the past two decades. Previously traditional methods like pallet picking, full cases were used but now with online shopping being popular, just in time and smaller orders have made the deliveries more frequent.

Picking is of different types namely, pick to order, cluster picking, batch picking, wave picking, etc. A company can deploy one or more methods for the picking process.

The picking strategies are of three types which are as under:

1. **Picker to goods:** This is the most common strategy which is prevailing in most of the industries. It is a traditional style of picking. It is carried out by pickers who walk around the warehouse and take the goods. The most common methods used in this strategy are pick to order, batch, wave, cluster, piece and zone picking.
2. **Pick to order**: This is a practice in which the picker takes the order and prepares the order to dispatch. It is one-way handling movement i.e., beginning from customer order to dispatch. In this process, the picker takes the order from the customer and goes to the warehouse. It may be a part of the order or complete order. The picker picks the order either on foot or in trucks with forklifts and pallet jack from the warehouse.
3. **Goods to picker**: It is a goods to person approach as the name suggests, goods come to the picker for the completion of the order, goods reach the picker with the help of specialised devices such as conveyors where ingoodsaredumpedontheconveyorsandthepickercancollectthegoodsatpickupstations.

Mechanised Put-away & Picking Process

Mechanised systems are mainly used to increase productivity, accuracy and flexibility. These systems provide mentioned features by simplifying process and assisting in handling goods by reducing travel time or carry goods while travel.

When it comes to classification of mechanised systems for picking/put-away, we shall think of following two types of systems:

Process Assisting Systems

- Process Assisting Systems are those which help us to reduce efforts imparted on process and allow smooth execution.
- Some examples may be put/pick to light system, and voice picking system.
- When we choose any of the above systems, it navigates us to location and instruct about SKU and quantity. In this way dependency on put/pick list is reduced and efficiency along with accuracy is increased.

Hybrid Systems

- These systems are capable of both reducing burden on process and handling. These systems simplify process and reduce effort required in handling of goods and movement to/from location.
- Some examples may be Rack to Person (RTP), Tote to Person (TTP), Robot Assisting a Person (RAP)
- When we choose any of above systems, they support us in simplifying process as well as either reducing our travel time or assisting us picking more items at one time by allowing us freedom while they carry goods with them.

Automated Picking

In this technologically advanced world, automated picking is the most popular picking strategy. In automated picking, the picking process will be done with the help of different machines, software and technologies such as voice over machines, self-driven vehicles and robots (fig. 2.6). Depending on the order and inventory type, one or more strategies from the above can be used.

Fig. 2.6: Automated Picking

Picking is followed by dispatch. Dispatch implies send off to destination. In the context of order dispatch, it means sending off the picked-up orders to their respective destinations.

The dispatching process is preceded by picking of the order, once the order is picked, the dispatching process begins, where in the order is scanned and properly checked. After the scanning and checking is done, the product is properly packed and made ready to be loaded in to the shipment along with the address. Once the product is ready to be shipped, it is put into the respective delivery vehicles and are shipped to their respective locations, meanwhile

the documentation of the goods is done, and invoices are also generated. Shipment and documentation will be the end of dispatching process.

Put/Pick to Light

Put/pick to light is mainly used for order fulfilment when there is mass of order, supposed to be fulfilled by small number of SKUs. In this system, travel time for item picking/put-away is reduced as fulfilment is done through dense storage system on replenishment model.

For put-away, first we have to scan SKU barcode and then all lights will glow with quantity on screen. Then the operator puts respective quantity on those locations and simply press button to confirm put-away.

For picking, first the operator must scan order ID and then all respective location's light will glow (which contains those SKUs) with respective quantity to be picked. After item picking from location, operator must press button to confirm picking as per sample shown in below picture (fig. 2.7).

Fig. 2.7: Put/Pick to Light

Put/Pick to Voice

Functionally, put/pick to voice is like put/pick to light. In this system put/pick list is fed in software only and instructions are passed through headphone. In Put/pick to voice, use of scanning device is mandatory as it is the only data input medium. In the below image, a sample put/pick-to -voice system is shown where we can see how headphone and ring scanner shall be used.

Goods to Person (GTP) & Totes to Person (TTP) System

Functionality of GTP and TTP is similar, and both have one intelligent robot and storage shelf. In GTP, robot moves shelf to operator at designated location while in TTP robot pulls totes from shelf and bring only required totes to operator at designated location. A sample GTP and TTP is shown in the below image. GTP and TTP are very intelligent systems, these systems optimise storage locations basis order profile and brings those racks/totes to operator which have maximum picks from rack/shelf. Picking and put-away in these systems are scanning driven and it is the only data input method which enhances productivity. Manual data input is also available with these systems, but it will be a tedious task and hamper productivity (fig. 2.8).

Fig. 2.8: GTP&TTP

Material Handling Meaning

Material handling is nothing but moving, packing and storing of the materials, goods and inventories. It also includes the preparation, placing and positioning material to facilitate the movement of goods.

International Material Management Society has defined the Materials Handling as- "Materials handling is an art and science involving the movements, packaging and storing of substances in any form".

Material Handling Equipment (MHE)

Equipment commonly referred as tool or set of tools that are used for the movement, storing, controlling and to protect the materials, goods and products throughout the process of manufacturing, distribution and consumption by end customers. Unlike olden days, due to technological advancements lot of equipment are in use for effective material handling.

Importance

Many years ago human labours were used to move or transport raw materials, semi–fully finished goods from one place to another place. People used to carry the items by hand or some types of mobile devices to shift them from one end to other. This posed for numerous risks such as mishandling, quality issues due to dropping the item or improper holding, involvement of physical labour, accidents. But with the use of these equipment, occurrence of aforesaid issues is reduced and transportation of goods in warehouse became much easier, faster and economical. Such equipment is designed mainly for safety, speed and accuracy of transportation of goods to manage the inventory effectively and efficiently (refer fig. 2.9).

Fig. 2.9: Risk

Various types of Material Handling Equipment

Warehouses stores wide range of goods from food to clothing, furniture to electronics and so on. They are diverse and can range from a small storage to a few or multi-thousand square foot area. Because of the size and the functionality differences in warehouse buildings, the types of equipment needed for a smooth operation will also differ. However, some equipment is essential for warehouse operation irrespective of the size and function. Let us see few of the common equipment used in warehouse for better and efficient material handling purpose.

a. Transport Equipment
b. Positioning Equipment
c. Loading /Unloading Equipment
d. Storage Equipment

1. Transport Equipment

Transport Equipment is needed to transport or move stored goods and inventories from one location to another. Few of the widely used transport equipment are as below:

Conveyors: A continuously moving band that is used for transporting goods from one part of the warehouse to the other through a fixed path. Goods are moved

between some specific points are called as Conveyors. Conveyor can be on-floor or overhead.(fig. 2.10 & 2.11)

Fig 2.10: Overhead Conveyor

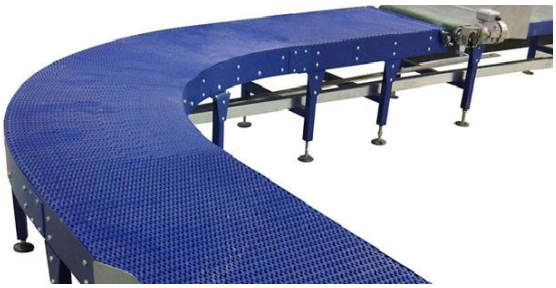


Fig 2.11: On Floor Conveyor

Electric Tugs: One of the most commonly used tools to move heavy loads on wheels. It is battery powered and pedestrian operated machine. Towing tugs, battery powered tugs & pedestrian operated tugs are few of the other names of electric tugs (fig. 2.12). This tool does not lift goods or load on ground. The load must have wheels or it should be kept in a platform with wheels to tug and move it.

Fig 2.12: Electric Tugs Moving Heavy Goods

Cranes: Heavy and powerful machine that is used for lifting, lowering, pulling, tugging, moving heavy objects, machines, goods etc., with the help of ropes, cables and pulleys are known as Cranes (fig. 2.13). Crane can be used in any sector that demands transportation of heavy items. In the current world, it is highly impossible to undertake any of the aforesaid activities without cranes.

Fig. 2.13: Crane

Industrial Trucks: Wheeled tool or vehicle, also equipped with motor, designed to pull, carry, convey and transport goods and materials from one place to other are called trucks. They are most flexible in use than Conveyor because these are not permanently fixed or installed at one point. It is very helpful to handle goods and materials of various sizes. Industrial trucks are not licensed to be operated on public roads.

Hand Powered Trucks: Hand Powered trucks are non-motor equipped tools mainly used to tilt, move goods and materials in the warehouse (fig.2.14). This kind of trucks are made out of different types of materials such as steel, aluminium, steel tube. This is not only used in warehouse but also commonly used as baggage carts in airports and railway stations.

Fig. 2.14: Hand Powered Trucks

Fork Lift: Powered industrial tool or truck used to transport goods in warehouse for short distances (fig. 2.15). Fork lift is one of the tools which is in use since World War II. Fork lifts have become an inevitable equipment not only in warehouse but also in all other major industries wherever transportation of goods is involved.

Fig. 2.15: Fork Lift

Pallet Jacks: A tool which is used to lift and move pallets. These are the basic form of forklift and are used to move pallets within warehouse premises (fig. 2.16). Pallet Jack can be manual and it can be powered too.

Fig. 2.16: Pallet Jacks

Positioning Equipment: As the name indicates, (fig. 2.17 & 2.18) positioning equipment is used to keep goods and things in proper position. It is widely used to position the materials and goods in the appropriate/correct position for further

handling – such as machining, transporting or to keep it in the storage. Unlike transport equipment, positioning equipment is usually used in single workplace. Few of the widely used positioning equipment are listed below.

- Tilt, turn tables – Used to keep the goods into a sloping position.
- Hoists – Used to lift or lower goods and materials using a rope or a chain wrap.

Fig. 2.17: HOIST

Fig 2.18: TILT – TURN TABLE

Loading Equipment: Whether the load is huge or too many, we need to have some type of loading equipment available in the warehouse to smoothen the loading process. This is also needed to ensure the workers are not straining their bodies and increasing the risk of getting hurt. Loading equipment comes in a variety of options. Which type of equipment to be used is decided based on the type & size of goods and material that are to be loaded.

Pallets: Flat structured tool with a bottom deck, which supports to load, unload, move or store the goods in a stable position are called as Pallets (refer fig. 2.19). It can be lifted by a Pallet Jack, Forklift, Jacking devices and Jerks.

Fig. 2.19: Pallets

Skid: A skid is a single deck loading platform which doesn't have a bottom deck. Skids are mainly used as a strong foundation for the goods or for moving large amount of supplies.

STORAGE EQUIPMENT

Storage Equipment are used for storing, saving the goods, excess goods in warehouse for a certain period of time. It is important to have a very good storage equipment system in warehouse inventory management.

- Bins
- Baskets
- Cartons
- Bags

Types of Goods Stored in Warehouse

Inventory Management plays a vital role in the entire supply chain management. Deciding the type of inventory storage to be used is also equally important in the whole process. Finalising the type of inventory storage is usually determined by the nature of the goods, raw materials and products. Various kinds of goods stored in warehouse that can be classified as below.

1. Perishable goods
2. FMCG – Fast moving consumer goods
3. Automotive goods
4. Dry Bulk Cargo

Perishable goods

There are goods which are perishable or highly perishable in nature when not stored properly (fig. 2.20). The utility of perishable items is determined by their shelf lives. Limited life time of such perishable products increases the complexity of the inventory management. The inventory management system that is used for non-perishable goods cannot be used for perishable goods, because such goods lose their value over time.

In simple terms, the nature of the products which is highly perishable will have an expiration date and to be consumed within a stipulated time frame. Such as milk, meat, flower, a bouquet of flowers, chemicals, composite materials and pharmaceuticals. For example, Cakes and eatable items like Samosa have a very short shelf life, maybe a day or two.

Fig. 2.20: Perishable Goods

FMCG - Fast Moving Consumer Goods

Fast moving consumer goods which is generally abbreviated as FMCG which are non-durable and are aimed to sell quickly (fig. 2.21). It is also known as Consumer-Packaged Goods (CPG).

From the perspective of consumers, FMCG is: frequently purchased (once or more a month), easily purchased i.e. not much thinking/comparison between products carried out before purchase, and low investment required for purchasing these items.

Typical purchase points for FMCG include local kirana stores, grocery stores, supermarkets and hypermarkets.

From a retailer's perspective, FMCG have low margins, high shelf turnover and high-volume sales items. Since levels of involvement are low for the purchase decision firms rely heavily on advertising and promotion to increase sales.

Some of the key players in the international market include – Unilever, Procter& Gamble, Colgate-Palmolive, and Nestle.

Prominent FMCG companies of Indian origin include – ITC, Dabur, Marico, Parle, Cavin Kare, Britannia, Tata Global Beverages etc.

Fig. 2.21: FMCG - Fast Moving Consumer Goods

Automotive Goods

Automotive goods are the goods, raw materials, spare parts and other components which are involved in the process of manufacturing automobiles, ranging from motorcycles, two wheelers (fig. 2.22), three wheelers, cars, vans, other utility vehicles, truck, bus, etc.

Fig. 2.22: Automotive Goods

Dry Bulk Cargo

Dry bulk goods are those which are unprocessed raw materials or pre-production materials that are stored in large quantity and would be used in the manufacturing, production process. The storage of products which do not require a climate-controlled environment alike perishable goods. The storage and transport of dry bulk commodities is highly regulated because of the sensitivity and hazards involved during its transportation.

Dry bulk goods are usually unpacked goods and it can be categorised into two

1. Major bulks - Some examples of major dry bulk commodities are coal, grain and iron ore.
2. Minor bulks - includes steel products, sugar, cement, etc.

Activities

Activity-1 Identifying and listing the uses of MHE in Picking process

Material Required: List of MHE used in Picking, Pen/Pencil, Notebook

Procedure:

Identify the below pictures and write its feature and uses

1. 

2. 

3. 

4. 

Activity2: Perform Picking Process in Warehouse

Material Required: MHE and PPE used in Picking, Pen/Pencil, Notebook

Procedure:

1. Check the product to be picked with respect to the order.

2. Arrange necessary material handling equipment, tools, tackles, chains, and ropes for material picking.
3. Wear the appropriate PPE required for operations.
4. Operate MHE to pick the items from the storage location as required.
5. Deliver the picked material to the concerned person.
6. e specified location as per the instructions.
7. Report any breakages, spillages, shortage of picked material.
8. Move damaged goods to the quarantine area.
9. Park the MHE at the designated parking location.
10. Report to supervisor, in case of discrepancies.

SN	Activity	Yes	No	Reasons
1	Looking at the records, are the MHE used appropriate for different goods received at the warehouse?			
2	Do they maintain record for process of picking?			
3	Is the location of the storage clean and tidy?			
4	Are the storage bins made as per the inventory list?			
5	Is the inventory data recorded and maintained systematically?			
6	Is there any efficiency report maintained in use of materials and labour?			

Activity 3: Study of picking and preparing the pick list at a warehouse

Material Required: Check-list to visit notes, notebook and pen/pencils.

Procedure:

1. Visit a warehouse and see the different types of goods and their item code and descriptions.
2. List the details in Pick list.

Pick List							
Warehouse		_____ _			Date	_____	

Order No.		_____ _			Time	_____	
S. No.	Item Code	Item Description	UOM	Required Quantity	in Hand	Location	Picked Quantity

Check Your Progress

A. Fill in the Blanks

1. _____ process involves the management of Inventory and how to handle the same in the warehouse.
2. _____ goods are those which are unprocessed raw materials or pre-production materials that are stored in large.
3. The storage of products which do not require a climate-controlled environment alike _____ goods.
4. _____ plays a vital role in the entire supply chain management.
5. _____ which is generally abbreviated as FMCG which are non-durable and are aimed to sell quickly

B. Multiple Choice Questions

1. Pallets are important _____ equipment.

a) Warehousing
b) Storing
c) Warehousing and Transporting
d) Transporting

2. Pallets came into existence in the _____ century.
   a) 18th
   b) 19th
   c) 20th
   d) 21st

3. Major bulks
   a) coal
   b) grain
   c) iron ore
   d) All of the above

4. Which picking strategy involves the picker taking the order directly to the warehouse and preparing it for dispatch?
   a) Picker to goods
   b) Goods to picker
   c) Pick to order
   d) Batch picking

5. What is the primary benefit of mechanized systems in the put-away and picking process?
   a) Reducing the number of employees needed
   b) Increasing productivity, accuracy, and flexibility by simplifying the process and reducing travel time
   c) Ensuring the highest level of customer satisfaction
   d) Automating the entire warehouse management process

C. State whether the following statements are True or False

1. Warehouses stores wide range of goods from food to clothing, furniture to electronics and so on.
2. Mechanised systems are mainly used to increase productivity, accuracy and flexibility.
3. Flat structured tool with a bottom deck, which supports to load, unload, move or store the goods in a stable position are called as Pallets.
4. There are goods which are perishable or highly perishable in nature when not stored properly.

5. The utility of perishable items is determined by their shelf lives.

D. Short Answer Questions

1. Define picklist.
2. State types of packaging.
3. Write any three terminologies associated with packaging.
4. Explain the concept of PPE.
5. Define BOM and Bar Code.

E. Long Answer Questions

1. Explain the picking process.
2. Illustrate binning and its process.
3. State the importance of clean area after packing.
4. Explain different types of Material Handling Equipment(MHEs) and types of goods.

F. Check your Performance

1. Prepare a flow chart by showing the process of Warehousing.
2. Draw a chart showing Receipt process.
3. Draw a chart showing Dispatch process.

Session 2: Packing and Labelling of Warehouse Products

Once picked, the goods must be packed before delivery to the final customer. This is because of two reasons -

- In warehouses, most of the products are stored in bulk cartons or boxes to occupy the warehouse space.
- The customer requires the products in various small quantities as per the demand flow - where breaking the bulk is required.
- If packages are poorly packed, the possibility of damage increases greatly. The shipping carton should be of such strength that it cannot be bent or crushed easily, and it should be packed so that the products do not shift during transit.

Meaning of Packaging

Packaging is a harmonised system of preserving goods from various disturbances. The various types of packaging are —

1. Transport or distribution package.
2. Consumer package.
3. Medical device packaging.

4. Bulk chemical packaging.
5. Drug packaging.
6. Food packaging.
7. Military packaging.
8. Pharmaceutical packaging.

LEVELS OF PACKAGING

There are three levels of packaging, such as, primary, secondary and tertiary, which are detailed below:

Primary Packaging: The packaging that most closely touches a product is often referred to as retail packaging. Its main objectives are to protect the product and inform or attract a customer. For instance, a soap packed with the cover, which contains the product information like product features, ingredients used, manufacturing date, expiry date, etc., is called primary level of packaging.

Secondary Packaging: The wrapping used to transport products previously placed in primary packaging. Its foremost goals are to safeguard products and provide labelling during transportation of products. It's also used as display packs in retail sites, such as, retail grocery stores. Example of secondary packaging comprise 12 soaps put in one plastic cover for safe transit.

Tertiary or Transit Packaging: The packaging used mostly by warehouses before shipping the secondary packaging products. Its main objective is to appropriately protect consignments during their period in transit. Consumers typically do not see tertiary packaging. Examples are the pallets that majority shipments are retained on, corrugated cushions used to distinct layers of boxes and stretch wrap used to protect stacks of cartons.

TYPES OF PACAKAGING MATERIAL AND EQUIPMENT

Packing Material

Packing material" typically refers to materials used to protect and cushion goods during shipping, handling, and storage. The choice of packing material depends on the type of item being shipped, its fragility, and the mode of transportation (fig. 2.23).

Plastic- The most common packaging material is plastic and its various forms. Though it is the easiest and most effective material, it is also difficult to dispose of.

Wood- Mostly used for pallets and crates (heavy duty products).

Paper & Board- Paper is widely used because it is low cost, holds its shape, and is easily decorated.

Cardboard- This is the most commonly used and cost-effective way of packing. However, cardboard packing will not be strong and are exposed to getting wet in rainy seasons.

Metal- Metal is used mainly for packing food materials or high value products. Amongst all, aluminium is the most attractive.

Foam and **Bubble wrap** are other items used for packing which are quite common. It is mainly used for furniture and items which are more fragile.

Fig. 2.23: Different types of Packing Material

Apart from these, warehouses should have items namely:

Tape Machines: Most of the cargo is taped. This machine helps to tape the cartons efficiently and effectively (fig. 2.24).

Fig. 2.24: Tape Machines

Shrink Wrap: In this case the whole cargo is covered by plastic sheets and a machine is required to wrap using this (fig. 2.25).

Fig. 2.25: Shrink Wrap

Strapping Machines: Few cargoes only require strapping. In such cases strapping machines are used (fig. 2.26)

Fig. 2.26: Strapping Machines

Labelling symbols of packages-

The symbols used to label packages are:(refer fig. 2.27,2.28,2.29)

Fig. 2.27: Flammable Liquids

Fig. 2.28: Fragile

Fig. 2.29: Explosive

Labels in a Warehouse

In a warehouse there are two categories of labels used - One is warehouse labels, and another is product labels. Warehouse labels enables the picker to pick the items accurately and at a greater speed.

Product label is displayed in paper, plastic film, cloth, or relevant material affixed to a container or product, on which is- written data or symbols about the product or item. Information printed directly on a container or article can also be considered as labelling.

Product labels affixed on the items to give standard instructions about handling goods. The barcode label gives information about the serial number and pricing of the product.

After picking and selecting suitable packaging requirements, the items are handed over for suitable tagging and labelling (fig. 2.30)

Fig. 2.30: Label Specimen

There are two main categories of labels applied after picking and packaging:

a) Shipping Labels
b) Safety and Handling Labels

a) Shipping Labels: Shipping labels exhibits the key information for a carrier to transport a package warehouse to its end destination (the customer's hands).

Shipping labels may include the following (fig. 2.31)**:**

The consignee's name and address, the consignor's name and address (including postal code), date of shipment, package quantity, weight, description of material inside, and number of pieces. At times, a packing list of the products may also be pasted.

Labels also include information relating to the shipping method (e.g., express, standard, etc.) for the carrier to ensure the service that was paid for is provided.

Fig. 2.31: Shipping Label

b) Safety and Handling Labels: Safety and Handling labels contain headers, graphics, and messages that enable clear communication about hazards and handling instructions for the product being packed (fig. 2.32). Safety labels for consumer durables and machines are common.

These labels also convey a lot of information about handling of the cargo; what is the stacking level possible, if it is fragile and needs to be handled with care, what handling equipment can and cannot be used.

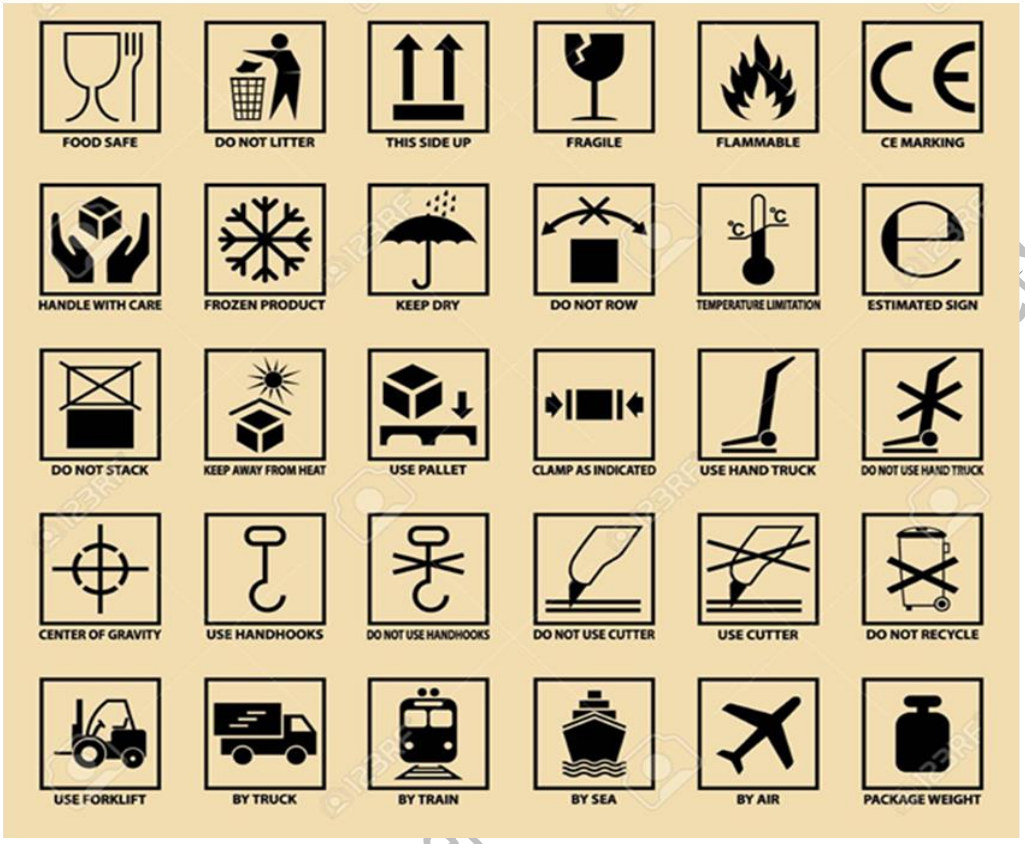


Fig. 2.32: Safety Label

PACKAGING AND LABELING PROCESS

Packaging is a science, art and technology of enclosing or protecting products for distribution, storage, sale and use. It includes proper labelling of handing instructions, order details and delivery instructions.

Different types of packing are: -

Product - Carton - Master Carton - Pallet Packing

This packaging is the most commonly used packing in warehouses. Depending on the nature of products, it may end at carton or master carton level(fig. 2.33)

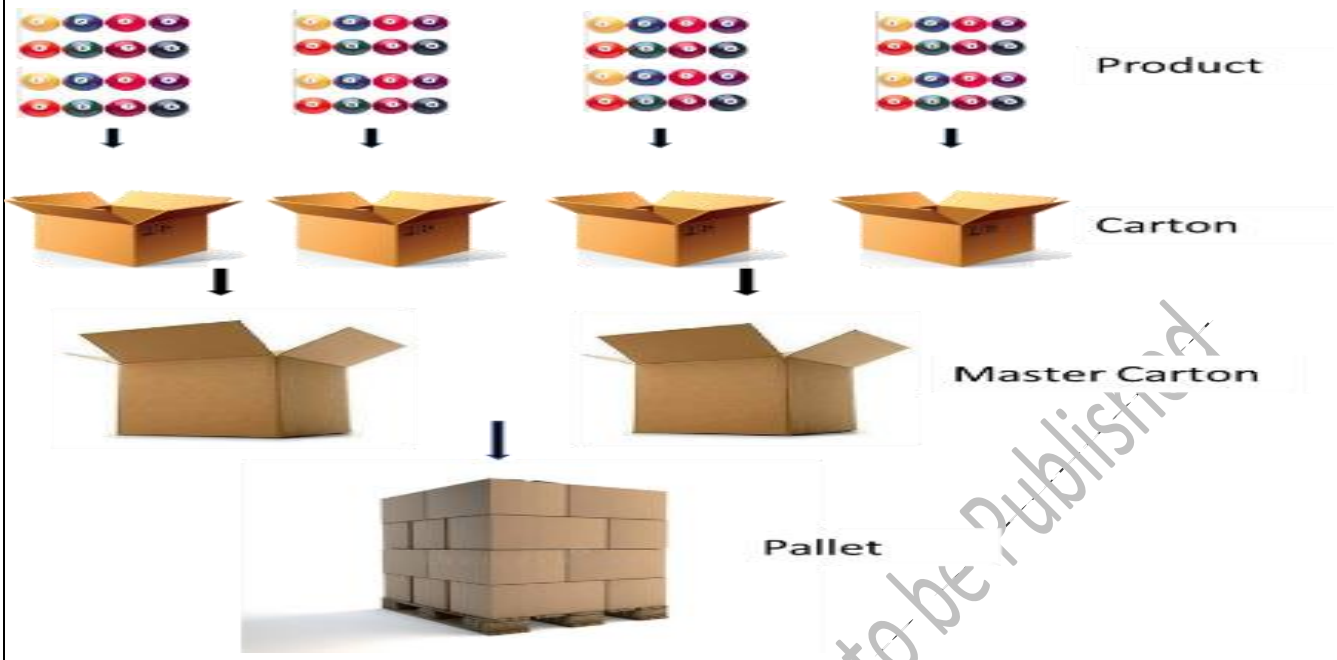


Fig 2.33: Carton Packing

Wooden Boxes and Crates Packing

Wooden boxes have been used from time immemorial for packaging. Wooden boxes and crates are generally used for food items, fragile items, machinery etc., for safe transportation of material. Wooden packaging also allows the products to be stored on long term basis (fig. 2.34)

Fig. 2.34: Wooden boxes and Crates Packing

Bubble Wrap and Shrink Wrap Packaging

These packing are also commonly used in warehouse these days, to protect the contents(fig. 2.35)

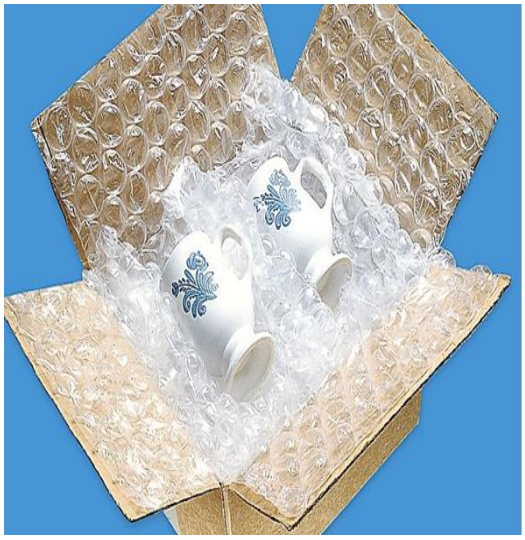


Fig. 2.35: Bubble Wrap and Shrink Packing

Labelling

Once the products are packed, they need to be appropriately labelled. Labels can be manually created or printed from the computer. These days, most of the labels are self-adhesive and printed through computer.

There are two main options for printing shipping-labels: a standard inkjet/laser printer, or a thermal label printer that does not require ink.

Packages could be exposed to heat, rain, rubbing and multiple handling. This means normal printing paper could become damaged, making the label unreadable. To protect the label by making it waterproof and safely secured, use clear tape on top of the label or attach the label in a plastic wallet. Make sure everything is clear and readable by both people and scanning machines.

Where to put Labels on the box?

The labels should be of correct size and correctly located. They should be either on the sidewalls of the box or top of the box, never at the bottom. They should be visible to the associate, handling it or machine gun reading. The label should not be folded at the edges. The labels should be applied such that no amount of handling should mutilate them.

Importance of clean area after Packing

Some products require additional precautions to ensure they are handled properly and the package contents are not compromised. Some products need to be packaged in an isolated area within a facility known as a “clean room.”

The main operations in the food industry range from processing and transforming raw materials from the primary sector—i.e. agriculture—to the packaging of semi-finished products that will ultimately be consumed.

High standards of cleanliness are required for all these operations to avoid compromising the end product's safety.

Another important element in the packaging in a clean environment is using appropriate equipment and furniture to ensure they do not generate micros or dust. Stainless steel tables are often required so that regular cleaning can occur without fearing metal oxidation. Floors must not have deteriorated, and ceilings must be able to handle water for complete wash-downs as dictated by certain projects. Light fixtures must also be special and be waterproof and shatterproof.

Activities

Activity 1- Study the packaging at a warehouse.

Material Required- notebook and pen/pencils.

Procedure:

1. Visit a warehouse and see the types of packing and symbols used.
2. Mention the appropriate option (Yes, No and give reasons).

SN	Activity	Yes	No	Reasons
	Did you understand the purposes of packing?			
	Are you able to identify types of packing?			
	Are you able to identify the symbols used for packing?			

Activity 2: Conduct a group discussion on Grouping of goods and using items for packing and labelling

Material Required: notebook and pen/pencils

Procedure:

1. Plan a visit to the warehouse.
2. Greet the warehouse managers and executives including all who are present there.
3. Note down the activities of warehouse.
4. Understand the goods handling in warehouse with the help of warehousing people.
5. Identify packaging materials used for different goods.
6. Place relevant Labels for different goods and descriptions, if required.

7. Note the activities in a note book, review with classmates and finalize in consultation with the executives.
8. Ask your teacher to comment on the discussion.
9. Teacher will conclude the discussion.

Activity 3: Visit to nearby Warehouses.

Material Required: Notebook and pen/pencils.

Procedure:

1. Visit at least three different types of warehouses.
2. Greet the warehouse managers and executives including all who are present there.
3. Request people:
   a) to explain the needs and types of packing materials used for packaging.
   b) how to collect packing material, non-production material, identify damages of product, Segregate and pack items.
   c) Handover packed items to Associate.
   d) Cleaning area after packing operations.
4. Ask your teacher to comment on the discussion.
5. Teacher will conclude the discussion.

Check Your Progress

A. Fill in the Blanks

1. There are two main options in printing shipping-labels: _____, or a_____.
2. Two main categories of labels applied after picking and packaging are _____.
3. _____wrapping is used to transport products previously placed in primary packaging.
4. The _____ should be of correct size and correctly located.
5. The label should not be folded at the _____.

B. Multiple Choice Questions

1. Packaging performs two functions- _____ and logistics.
   a) Distribution.
   b) Store keeping.
   c) Material handling.
   d) Marketing.

2. **Material handling consists of movement of material from**

   a) One machine to another.
   b) One shop to another shop.
   c) Stores to shop.
   d) All of the above.

3. Packaging group indicates _____.

   a) Probable Risk.
   b) Degree of Risk.
   c) Contaminant.
   d) Pollutant.

4. **What is the primary purpose of tertiary or transit packaging in a warehouse?**

   a) To attract customers and provide product information
   b) To appropriately protect consignments during their period in transit
   c) To transport products previously placed in primary packaging
   d) To store bulk chemicals safely

5. **Which type of packaging material is primarily used for packing food materials or high-value products?**

   a) Plastic
   b) Cardboard
   c) Metal
   d) Foam

C. State whether the following statements are True or False

1. The labels should be of correct size and correctly located.
2. Wooden boxes have been used from time immemorial for packaging.
3. In warehouses, most of the products are not stored in bulk cartons or boxes to occupy the warehouse space.
4. To protect the label by making it waterproof and safely secured, use clear tape on top of the label or attach the label in a plastic wallet.
5. Light fixtures must also be special and be waterproof and shatterproof.

D. Short Answer Questions

1. Define Labelling
2. Name the types of Packaging
3. What is bubble wrapping?

4. What is packing?
5. What is Barcode?

E. Long Answer Questions

1. Explain the process of Packing.
2. Name the terms used in packing.
3. Why it is important to clean area after Packing?

F. Check your Performance

1. Demonstrate the packing mechanism in the warehouse.
2. Spell out the advantages of warehouse packaging.
3. List the purpose of packaging and package labels.
4. Demonstrate the packaging types.

Session 3: Kitting of Warehouse Products

PPE is the equipment or set of equipment, an employee must use while they work to prevent any injury in the workplace due to uncertain events.

Safety is the major concern for the workers in the warehouse work environment. The purpose of PPE is to reduce the worker's exposure towards the occupational hazards in workplace such as plants, warehouse. PPE ensures it protects the workers from hazards due to unpredicted events. However, it does not stop or has any control over the event's occurrence.

Importance

PPE also tries to reduce the risk of such uncertain incidents that are well mitigated and to keep the employee safe. It is also important for the workers to use the PPE diligently otherwise they would risk their own lives (fig. 2.36).

Fig. 2.36: Caution

Types of PPE

Let us see some Common types of PPE designed to protect the user/wearer from any injury due to the uncertain events. Common types of PPE include clothing, helmets, goggles, shoes and other equipment(fig. 2.37)

Parts of the body and the relevant PPE

Fig. 2.37: PPE

Head PPE – Hard Hats

Purpose – To protect from head injury.

Requirement – Needed when employees have direct or indirect exposure towards flying or falling objects, chemical splash or drips. Some hard hats are designed with face shields or earmuffs to protect face and ears.

Types of Head protection PPE(fig. 2.38 & 2.39)

Fig. 2.38: Hard hat

Fig. 2.39: Hard hat with ear muff

Eye & Face PPE – Goggles & Full-face shields.

Purpose – To protect eyes & face from chemical or metal splash, dust, gas, vapour& radiation.

Requirement- Eye and face protection are essential as head safe-shield. Protection goggles, eyeglasses and full-face shields can be needed for eyes and face protection of the worker. This is needed mainly when the worker is exposed to chemical substances, dangerous liquids, flying objects, particles, dust, gas, hot solids, intense light, etc.,(fig. 2.40).

Categories of Eye protection PPE

General Safety Glasses

Fig. 2.40: Eye protection PPE

Hands & Arms PPE – Gloves

Purpose – To protect from hand injuries such as cuts, punctures, electric shock, radiation, temperature extremes, skin cancers, infections and keeping hands in water for longer.

Requirement - To protect the workers from occupational skin diseases such as contact dermatitis, open flames, hot liquids, chemical splash hazards, explosive compounds, toxic and hazardous material spills and exposure to potential cuts(fig. 2.41).

Fig. 2.41: Insulated Gloves

Feet PPE – Shoes

Purpose – To protect from hazards which has the potential to cause foot injury.

Requirement- To protect the workers from rolling – falling objects, sharp items, wet, hot or cold materials, hazardous liquids, electrostatic area, slippery walking work places (fig. 2.42).

Types

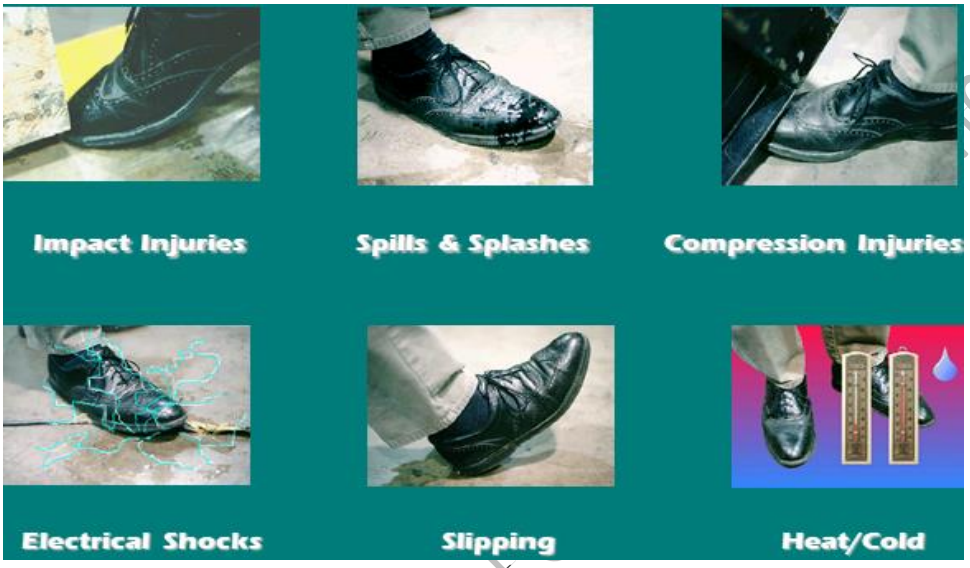


Fig. 2.42: PPE - Shoes

Body PPE – Coats, Apron, Overalls, Coveralls & body suits, Separates (jackets, trousers, etc.), which covers only a particular part of the body) Trousers, knee pads, high visibility water proof jacket and suits.

Requirement – When there is a potential direct or indirect exposure of the worker with chemicals, cuts, radiant heat hazards, wet and work during heavy rain(fig. 2.43).

Fig 2.43: PPE - Body

Ear PPE – Ear plugs, Ear muffs, Canal caps.

Requirement – When the worker is getting exposed to high noise level (refer fig. 2.44).

Fig. 2.44: PPE - Ear

Respiratory Protection PPE – Respirators, Breathing apparatus, Dust mask, Full mask.

Requirement – When the worker is exposed to inhalation hazards (fig. 2.45).

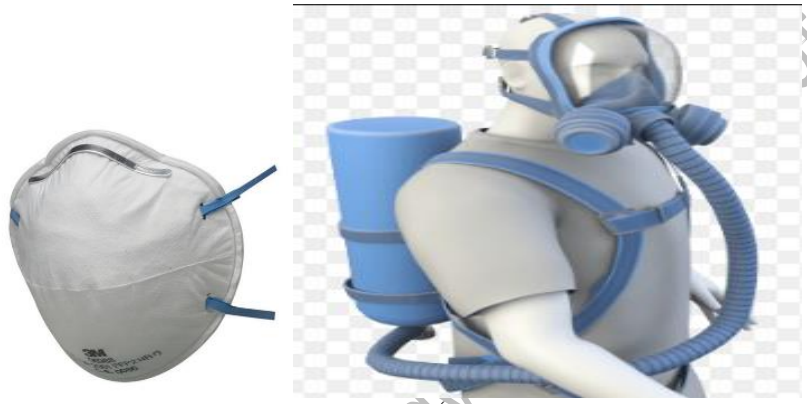


Fig 2.45: PPE-Respiratory Protection

PPE Maintenance: -

- The safety of the PPE is the next important factor.
- All PPEs are supposed to be maintained well.
- It is a joint responsibility of the employer and employee to ensure the PPE rules and regulations are adhered strictly.

KITTING

Kitting is the process of taking multiple Stock Keeping Units (SKUs) and combining them in a package to create a new one.

Warehouse at Kitting

This involves warehouse associate picking several products and bringing them to an area where they are packed together and shipped. It is a way of filling the orders by pre-assembling separate articles into ready-to-ship kits, in place of picking and packing those items when orders are received.

A good example is that while a customer orders a computer online, he may select accessories like memory card, drive, motherboard from several alternatives. The supplier, however, assembles these parts into a kit to be shipped as one unit. This method offers a high rate of savings in fulfilment costs. It helps reduce inventory on one hand and increases the response time, thus being more economical.

Kitting Process

Following is the example of kitting where the sim card, user manual and customer application form are brought inside an envelope and sealed at the warehouse(fig. 2.46)

Fig 2.46: Kitting Process

The following is the typical sequence of any kitting operations(fig. 2.47).

Step 1	Planning	Get the Kitting list/BOM from the Supervisor. Obtain the schedule for kitting.	
Step 2	Assembling	Start collecting all the parts of kit from the locations including the Packaging material and Labels. Inform Supervisor if any part is missing.	
Step 3	Organizing Assembly Line	Arrange for the kitting tables. Set up the sequence of operations. Ensuring each associate has similar activity time.	
Step 5	Quality Control	The Supervisor needs to do random sampling to ensure that kitting is happening as per BOM and SOP.	

Step 6	Packing and Labeling	After the kitting is completed, it has to be packed and labeled as per the SOP	
Step 7	5S of kitting area	Clean the kitting table and area for any leftovers and trash. Submit the final kitting report to the supervisor.	

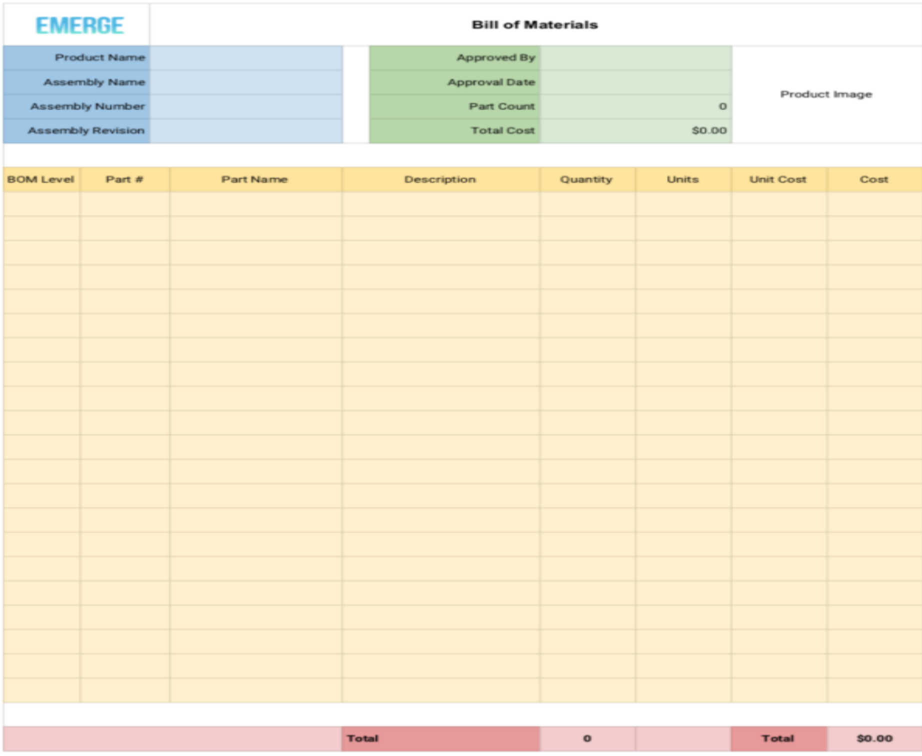
Fig. 2.47: Kitting Process

Bill of Material (BOM)

The key requirement for kitting is a bill of material. The bill of material consists of list of all products and the quantities required for kitting.

A bill of Material and kitting document should have following details:

1. **Product code:** The details of the product to be kitted. It should have the product code and number of each of the products.
2. **Product description:** A detailed product description should be mentioned. This helps the warehouse, pick up the right goods while kitting.
3. **Required quantity:** This is an important information, since the numbers can vary with each item. While the main product can be single, the accessories can be multiple.
4. **Packing requirement:** The document should mention the packing requirement of each item. Though it will be shipped as one unit, every individual item may require customised packing.
5. **Storage location:** Here the storage location of each item should be mentioned. This will make the picking and packing process much easier. It will also avoid wrong items being picked up and shipped.
6. **Units of measurement:** As kitting contains multiple SKUs, it is essential to know the exact quantity of each item to be shipped.
7. **Picked quantity:** This helps in maintaining a perfect inventory list. It will also highlight immediately if there is a mismatch while kitting the individual parts of the shipment.Following is a sample Bill of Material (fig. 2.48):



EMERGE — Bill of Materials

Product Name		Approved By		Product Image
Assembly Name		Approval Date		
Assembly Number		Part Count	0	
Assembly Revision		Total Cost	$0.00	

BOM Level	Part #	Part Name	Description	Quantity	Units	Unit Cost	Cost
			Total	0		Total	$0.00

Fig.2.48: Bill of Material Specimen

BAR CODES

The manufacturing or retail business must have heard of barcode types. It is a printed series with parallel lines consumed to enter data into a computer system which is called a barcode. Most of the items usually come with a label on their packaging. It contains lines and numbers used to gather information about the product.

These barcodes are read quickly at the counter, and the product's price and description are shown on the computer screen. However, various categories of barcodes are available, making it difficult to identify them (fig. 2.49)

Fig. 2.49: Bar Codes

What is the Standard Barcode Type?

The barcodes have a specific format to design. They come with particular characteristics depending on their creation. Each barcode differs in the following ways:

- Size
- Capacity
- Material used
- Segment
- Requirement of checking procedures

The barcode size mostly depends on its function and the machine applied. Barcode capacity refers to all the character combinations.

The area that can be scanned on the barcode states its linearity. Some barcode formats have a uniform portion to check whether the recovered information is correct. That is called checksum.

The number is at the right of the barcode. Scanners accomplish calculations on the numerals of the checksum to ensure the right results. When the numbers match there will be a beep from the scanner.

Different Combinations of Barcodes

It contains different lines with different widths to symbolise 12 or 13 digits.

1. Linear barcodes

These comprise of lines and spaces of several widths that generate specific patterns.

2. Matrix barcodes

On the other hand, Matrix barcodes are a two-dimensional way of representing data. They are similar to linear barcodes but can represent more data per unit area. They may be squares or rectangles that may contain numerous tiny dots.

Difference between Barcodes and QR Codes-

Barcodes	QR Codes
It is in a single line.	It is represented horizontally and vertically.
Limited Data positioned on stripes.	It has different dimension that can hold information.
Information limited to the product and its location.	Provides additional information.
Scanning 1D barcodes are not expensive.	It is an equipment for scanning 2D barcodes which is more expensive.

QR codes can quickly be scanned through mobile devices. There are package tracking and mail management apps which come with OCR expertise that resourcefully scans QR codes and helps users track their packages (fig. 2.50).

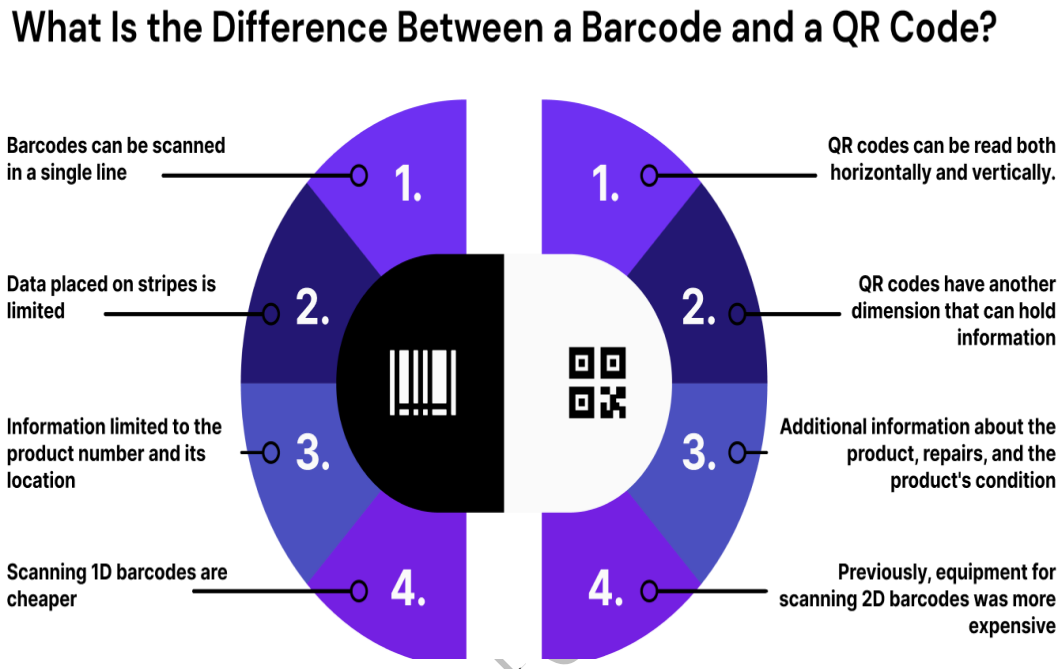


Fig. 2.50: Bar Codes and QR Codes

Kitting items for Damages and Errors

There are different challenges involved in kitting and which lead error. This includes issues with:

- Inappropriate apparatuses.
- Incomplete kits.
- Excessive numbers and incorrect inventory reporting.

Above mentioned are few reasons why accuracy needs to be a clear focus through kitting in warehousing.

Standard Operating Procedure (SOP)

Beside the BOM, most companies carry the Standard Operating Procedure (SOP) for the kitting operations. SOP will carry all the instructions about kitting such as:

- The sequence of operations.
- Packaging requirements of individual units if any.
- Number of workstations required.
- The activities to be done at each workstation.
- The standard time at each workstation.
- The packaging requirements for final kitted product.
- The labeling requirement for final kitted product.

- Any special handling instructions for the kitted product.

Benefits of Kitting

Kitting offers several benefits to industries, 3PL businesses, and customers.

1. **Reduced Inventory Costs**: By consolidating parts into kits, inventory management becomes simpler. This can lead to lower inventory carrying costs and less need for extensive storage space.
2. **Improved Quality Control**: Kitting allows for better quality control, as parts are checked and organized before they reach the assembly line. This reduces the chances of missing or defective parts being used in the final product.
3. **Simplified Training and Operations**: With kitted parts, workers can easily understand and follow assembly instructions, reducing the training time needed for new employees and minimizing errors during the assembly process.
4. **Enhanced Production Flexibility**: Kitting enables manufacturers to quickly adapt to changes in production schedules or custom orders. Kits can be customized and prepared in advance, allowing for more agile and responsive production processes.
5. **Cost Savings**: By improving efficiency, reducing inventory costs, and minimizing errors, kitting can lead to significant cost savings. These savings can be reinvested into other areas of the business, contributing to overall growth and profitability.
6. **Increased Efficiency**: Kitting helps streamline the production process by pre-assembling components, which reduces the time workers spend searching for individual parts. This leads to faster assembly and production times.

Picker or loader items for transport

Warehouse Forklift is often used in large warehouses to move high volumes of inventory. Side Dockers and balance forklifts are other types within this category (fig. 2.51).

Fig. 2.51: Warehouse Forklift

Pallet Jacki s used to transportation of palletised long distance loads.It Fits into tight spaces more certainly (fig. 2.52).

Fig 2.52: Pallet Jack

Walkie Stacker combines the firmness of a pallet jack with the reach of a forklift. Planned to transport lighter loads over short distances (fig. 2.53)

Fig. 2.53: Walkie Stacker

Order Picker It intended to carry one or two units rather than a whole pallet of items. In a platform that raises to the height of warehouse racks (fig. 2.54).

Fig. 2.54: Order Picker

Reach Forklift Truck become stable brace legs and forward-extending forks enhance reach. It is used to stack palletised goods in racking or pick palletised materials(fig. 2.55)

Fig. 2.55: Reach Forklift Truck

Activity

Activity 1: Study of PPE at a warehouse.

Material Required: Check-list to visit notes, notebook and pen/pencils.

Step by step Procedure:

1. Visit a warehouse and see the PPE used in packing, labelling and kitting.
2. Ask students to write down the essential PPE.
3. Ask them to prepare chart showing PPE explaining the significance of wearing PPE while doing the process of
   a) packing,
   b) labelling and
   c) kitting
4. Display that chart in class.
5. Teacher should award marks accordingly.

Activity 2: Role Play Note

Make group of five students from class and ask them to perform the following binning activities stepwise in the warehouse.

1. 1st student: Receipt of documents for kitting.
2. 2nd student: Sorting and checking.

3. 3th student: Kitting the products.
4. 4th student: Receiving outbound requirements for transport.
5. 5th student: Other additional activity.
6. Finally ask the fourth student to share their views before and after the activity.

Activity 3: Visit to warehouse and observe the Knitting Process

Material Required: Check-list to visit notes, notebook and pen/pencils.

Procedure:

1. Make a group of 4-5 students
2. Visit warehouse and enquire from warehouse associate about the following-
   a) how to obtain kitting list from supervisor and clean the area after kitting operation?
   b) appropriate PPE based on product and environment.
   c) how to collect and segregate Bill of Material(BOM) and kit the items as per Standard Operating Procedure: (SOP)?
   d) how to label tags and bar code?
3. Prepare PPT in group.
4. Present the PPT in class.

Check Your Progress

A. Fill up the Blanks

1. _____can be defined as picking and delivering all required components to assemble a given product.
2. BOM stands for _____.
3. Warehouse _____ are used in organisations nationwide to properly identify and track their assets and inventory.
4. The number is at the right of the _____.
5. _____ accomplish calculations on the numerals of the checksum to ensure the right results.

B. Multiple Choice Questions

1. Identify who is responsible for assessing the workplace to regulate whether perils are present, or to be present, necessitating using Personal Protective Equipment (PPE).
   a) Employer.

b) Employee.
c) Safety Manager.
d) Assessing the workplace is optional.

2. PPE related training must cover the following items except:
   a) When and what kind of PPE is necessary.
   b) How to properly don, doff, adjust, wear, preserve and dispose of PPE.
   c) The limitations of the PPE.
   d) The brand name of the PPE.
3. Which of the following can cause a severe eye injury if the proper shield is not carried?
   a) Flying metal chips.
   b) Nails.
   c) Chemicals.
   d) All of the above.
4. What is the primary purpose of PPE (Personal Protective Equipment) in the workplace?
   a) To completely prevent the occurrence of workplace hazards
   b) To reduce the worker's exposure to occupational hazards
   c) To increase the efficiency of workers
   d) To enhance the aesthetic appearance of workers
5. Which type of PPE is specifically used to protect workers from head injuries due to flying or falling objects?
   a) Goggles
   b) Hard Hats
   c) Gloves
   d) Respirators

C. State whether the following statements are True or False

1. SOP stands for Standard Operating Policy.
2. The barcodes have a specific format to design.
3. Intended to carry one or two units rather than a whole pallet of items.
4. The key requirement for kitting is a bill of material.
5. In a platform that raises to the height of warehouse racks.

D. Short Answer Questions

1. What is BOM?
2. What is Barcode?
3. Note on documents required for Kitting.
4. Name any PPE used in Warehouse.

E. Long Answer Questions

1. Explain the process of Kitting Process.

2. Why do we need different equipment for loading or picking for goods inside the warehouse?

F. Check your Performance

1. Prepare chart showing Knitting process.
2. Prepare Chart showing different PPE used in warehouse.

Session 4: Binning of Warehouse Products

Warehouses are part of supply chain management. Storage system is an engineered system with the function to store materials.

Bin is the smallest unit of space in a warehouse. It defines the place and position where the shipment is or can be stored. This is a main part of the supply chain controlling the movement and storage of goods and/or materials within a warehouse, while processing the associated transactions, including shipping, receiving, put away and picking.

Material Used for Binning

Bins are large containers or enclosed space for storing something in bulk, such as coal, grain, or wool. These bins are also used in various ways as;

1. Bread bin: A small container for bread.
2. Brewing bin: A storage place for bottled items, i.e., one particular bottling of syrup.
3. Dustbin or rubbish bin: A container for litter, rubbish, etc.

Concept of Binning

The concept of binning is like storing material in our home refrigerator. There are different areas dedicated for different types of material. Deep freezer to store refrigerated material. Vegetable basket to store vegetables. Egg plates to store eggs. Door shelves to store water bottles and inner shelves to store dairy products. Same is the concept of bins in warehouse.

BINNING FOR VARIOUS TYPES OF GOODS

Classification of goods for storage, including the activity of packing, labelling, and binning.

The classification of goods for storage in a warehouse depends on the following factors—

a) FMCG: Food category, non-food category, like bread, biscuits, chips, detergents, soaps, hair oil, shampoo, etc., are known as Fast Morning Consumer Goods (FMCG).

b) Consumer goods: Stationeries.

c) Semi durable goods: Mobiles, bags, belts, shoes, bulbs, tube lights, etc.

d) Durable goods: Washing machine, television, furniture, etc.

e) Industrial goods: Conductors, generators, machines, inverters, weighing machines, etc.

Further placing of goods for storage within the above categories is done on the following basis—

a. Perishable.

b. Non-perishable.

c. Identifying damaged goods at every stage.

d. Proper handling of goods with care in terms of reserve place, maintaining temperature for certain goods.

e. Weight and size.

f. Storing time.

g. Receiving (incoming).

h. Issuing (outgoing).

i. Safety and security.

j. Quality check before receiving, before issuing and during storage.

They are in different sizes and colours to store different category of material.

- Storage Bins Help to organise Warehouse Better.
- Storage Bins Allow Workers to easily access Items.

Overall, storage bins can be powerful tool to create an organisationally optimised warehouse, which saves time and efforts(fig. 2.56)

Fig. 2.56: Bin Racks

Bin Card

Bin card is the ledger of any SKU. It records all debits and credits or receipts and dispatches of any SKU. Bin card helps to find the current stock on hand in the warehouse for any item. As the material is added or pulled out, bin card is updated. The bin card may also carry information on reorder point, the level at which the fresh order needs to be placed. Unit price and order lot sizes are also indicated on bin cards(fig. 2.57).

BIN CARD

Store Location :
Item Name :
Item Code :

No	Date	In	Out	Balance	Notes	Sign

Fig 2.57: Bin Card Format

Creating Binning Location Names

1 – Dividing warehouse space into different zones

Dividing a warehouse space into zones. Apart from splitting only the storage area into zones, other areas like office, dispatching, packing etc., can be segregated into a separate zone (fig. 2.58).

Fig 2.58: Binning Locations

2 – Segregating zones into sections

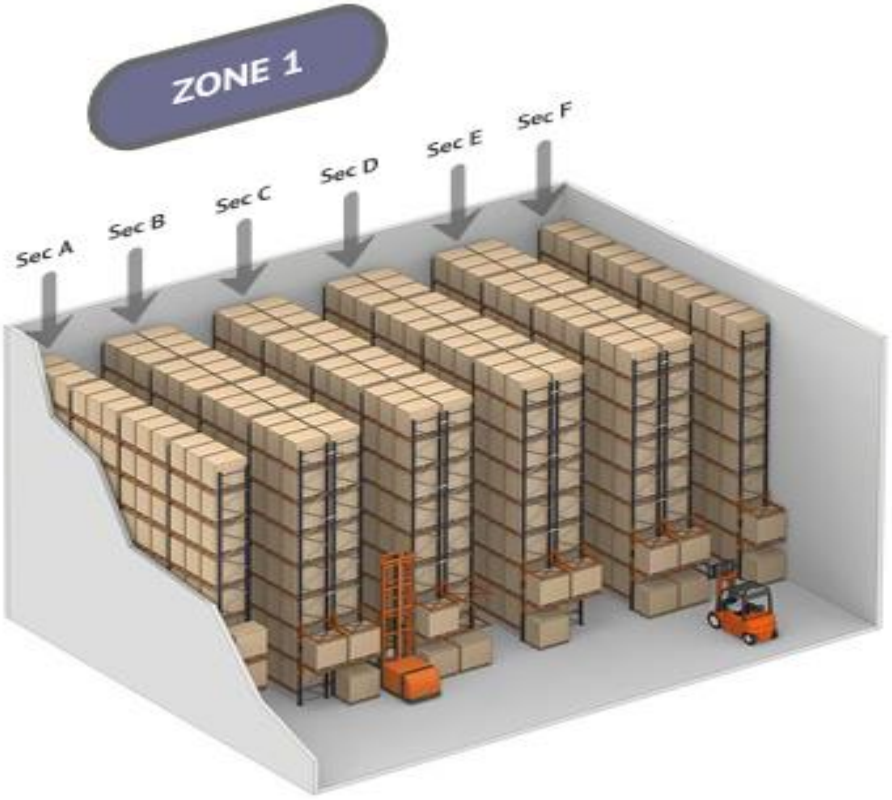


Fig.2.59: Segregation of Zones

The zones can be segregated into segments to ease in locating the bins (fig. 2.60)

3 – Drilling down to the last step, the 'exact Bin'

The 'exact bin location' of a product is a location in particular area within a section. The numbering of bin locations should be done in such a way that it starts with the top and ascends all the way till the end.

Look at the figure given below (refer fig. 2.60 & 2.61):

Fig. 2.60: Bin Exact Location

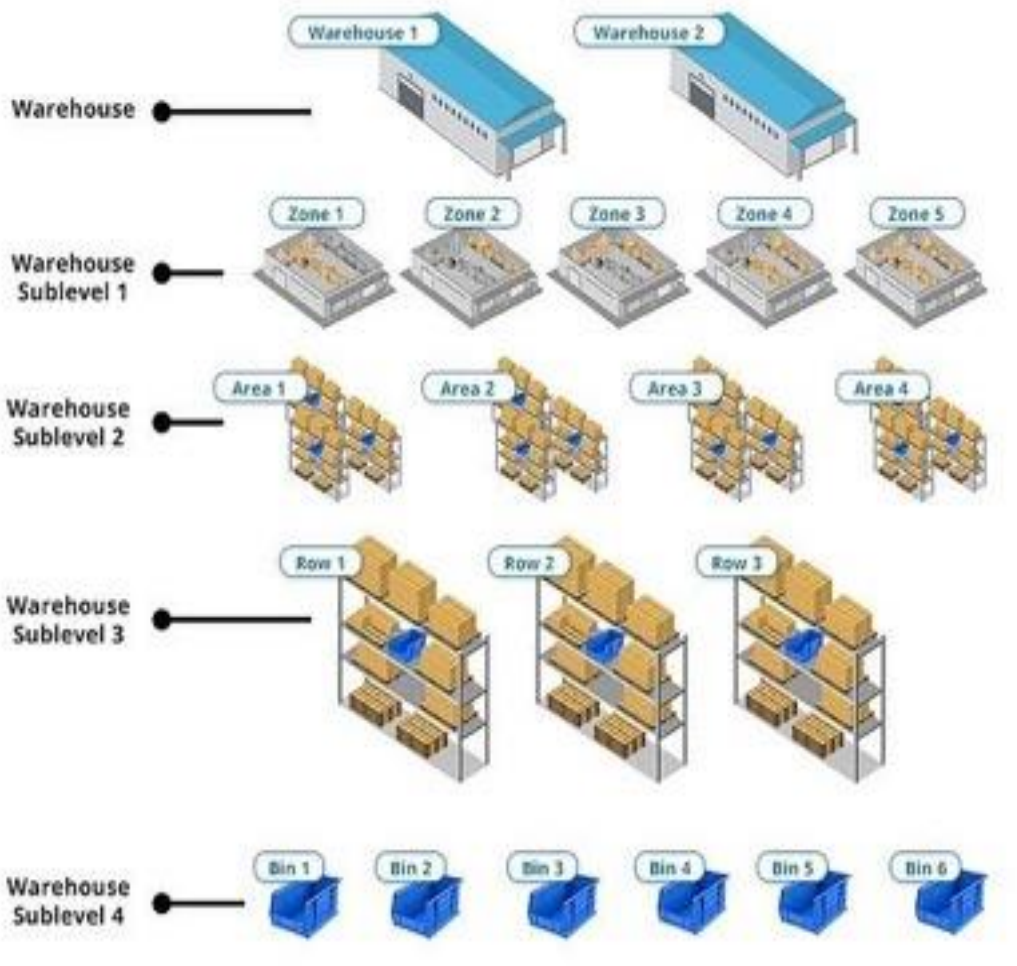


Fig. 2.61: Bin Location

Steps in Binning Process

There are seven-steps in the binning process (fig. 2.62):

Step 3	Receipt	Receive the material for binning. In case of any damaged parts, report to the supervisor.	
Step 4	Segregating	Segregate the products in various bins based on the binning locations. In case of ship quantities, Bin them into Bins based on geographical regions	
Step 5	Binning	Attach the bar codes and product codes and complete the Binning Process.	
Step 6	Dispatch	For shipping items hand it over to the transport supervisor for dispatch.	
Step 7	5S of kitting area	Clean the Binning area for any leftovers and trash. Submit the final Binning report to the supervisor.	

Fig. 2.62: Binning Process

Stationary Bin Shelving

Stationary Bin Shelving organisers come complete with bins. Bins are made of heavy duty polypropylene and are unaffected by water, grease and oil.

FUNCTIONS OF A BINNER

The functions of a binner are very important in a warehouse.

They are—

1. Receiving all packages and checking them for errors and pre-packing packages before storing into the bins according to an inventory list.
2. Preparing and performing binning, post binning exercises and carrying out housekeeping and post housekeeping activities.
3. Locating bay area and binning products from the pick list and storing them on shelves.
4. Classifying the goods received as per the defined categories.
5. Notifying the supervisor if the current location is full and obtaining an alternate location.
6. Checking the nature of products and determining method of binning.
7. Collecting the pallet trolley if required or requesting assistance of available MHE operator.
8. Applying the binning methods specified by the organisational Procedure: for the type of goods and sizes of orders using equipment required and covering all items on pick list.
9. Ensuring that the methods of packing, labelling Notes and coding for all category of goods are followed.
10. Checking binned items for errors and reporting the status of binned inventory to the supervisor complying with the safety, security and maintenance regulations.

Key competencies of a Binner include—

1. Knowledge of the types of goods and products being handled.
2. Binning and stock recording methods.
3. Working knowledge of technology and equipment used for scanning products and binning goods.
4. Understanding the methods, sequence and material for cleaning a variety of surfaces, equipment and machinery.
5. Identifying suitable equipment for the work area.

6. Acquiring in-depth knowledge of the PROCEDURES for disposing waste, disposing of storing equipment, reporting unidentified soiling, etc.

Activities

Activity1: Visit a warehouse in your area and interact with the owner regarding binning, and prepare a report in not more than 50 words.

Material Required: Check-list to visit notes, notebook and pen/pencils.

Procedure:

1. Arrange a visit to a warehouse nearby
2. Greet the people you meet at the warehouse.
3. Meet a warehouse binner if available.
4. Ask them to explain the basics of the binning process.
5. Write the process of binning in your notebook.
6. Draw a step chart of binning activity.
7. Ensure about your work completion.
8. Discuss with your classmates in front of the teacher.
9. Write the conclusion.

Activity 2: Understanding the binning process.

Material Required: Check-list to visit notes, notebook and pen/pencils.

Procedure:

1. Visit a warehouse near your location.
2. Take a note of their activities, functions and keenly observe the premises.

SN	Activity	Yes	No	Reason
1	Looking at the records, are the goods received regularly at the warehouse?			
2	Do they maintain format for the inward or outward of goods?			
3	Is the Procedure: of inward or outward clear with all the needed information?			
4	Is the location of the storage clean and tidy?			
5	Is the staff responsible at storage bins?			
6	Are the storage bins made as per the inventory list?			

7	Is the inventory data recorded and maintained systematically?			
8	Is there any professional development training given to the staff if needed?			
9	Is the work done at binner level properly recorded at managerial level?			
10	Is there any efficiency report maintained in use of materials and labour?			

3. Mention the appropriate option (Yes, No and give reasons/ remarks).

Activity3: Observations on Warehouse Activities

Procedures:

With prior permission from the warehouse head, visit the warehouse and practically involve the students in end-to-end binning process with the support and guidance by the warehouse staff.

Give responses to the points in the space provided.

a) Prior information of the goods about to be received at the warehouse.

_____

_____

b) b) Process the filling of needed inward documents and forwarding the same to the next level.

_____

_____

c) Counting the goods received and measures to be taken undertaking the goods' details.

_____

_____

d) Carrying the goods to the storage bins.

_____

_____

e) Consulting the person who is responsible for storage allocation if the stores or shelves are fully loaded.

_____

_____

f) Packing, labelling and coding differences, and colours, signs and symbols involved in the binning process while moving goods.

_____

_____

g) Taking the trolleys with bulky goods within the warehouse.
_____
_____

h) Safety measures, disposal of waste methods, etc.
_____
_____

i) Outward process of the goods to be sent to customers.
_____
_____ _____

j) Cleaning the storage location on daily basis, and measures to be taken for the same.
_____
_____

Check Your Progress

A. Fill in the Blanks

1. _____ are part of supply chain management.
2. _____system is an engineered system with the function to store materials.
3. _____ can be defined as picking and delivering all required components to assemble a given product.
4. _____ stands for Bill of Materials.
5. _____are used in organizations nationwide to properly identify and track their assets and inventory.

B. Multiple Choice Questions

1. _____location is the smallest unit of space internal a *warehouse* where merchants store their goods.
   a) Pallet.
   b) Rack.
   c) Table.
   d) *Bin.*
2. Identify the given picture:

   a) Pallet.
   b) Rack.
   c) Bin Exact Location.

d) Drilling down to the last step, the 'exact Bin'.

3. What is the primary function of a bin in a warehouse?

a) To transport goods to different locations
b) To define the place and position where the shipment is or can be stored
c) To label goods for shipping
d) To categorize goods by type

4. Which of the following is NOT a factor considered when classifying goods for storage in a warehouse?

a) Perishability
b) Color of the goods
c) Weight and size
d) Safety and security

5. Which step is NOT part of the binning process?

a) Preparing and performing binning
b) Checking binned items for errors
c) Delivering goods to customers
d) Ensuring methods of packing, labeling, and coding are followed

C. State whether the following statements are True or False

1. Warehouses stores a wide range of goods from food to clothing, furniture to electronics and so on.
2. Mechanized systems are mainly used to increase productivity, accuracy, and flexibility.
3. Bin cards help to find the current stock on hand in the warehouse for any item.
4. Dividing a warehouse space into zones includes segregating only the storage area.
5. Stationary Bin Shelving organizers are unaffected by water, grease, and oil.

D. Short Answer Questions

1. What is binning?
2. Note on Bin Card.

E. Long Answer Questions

1. Explain the types of Binning.
2. What are the materials used for binning? Explain.
3. What are the basic key competence required for Binner?
4. Discuss the various functions performed by Binner.

F. Check Your Performance

1. Prepare PPT showing importance of clean area after binning.
2. Make a chart showing instructions of binning.

MODULE 3: LOADING AND UNLOADING OF GOODS

Module Overview

Demand for package delivery is continually growing more and more as consumers perform more of their shopping online rather than in stores. At the same time, the supply chain is moving increasingly towards what is called "just-in-time" delivery. This is where logistics companies have much less room for error. Loading and unloading is the heart of any distribution center, and optimising this part of the supply chain is crucial to maximising overall efficiency.

Loading or unloading involves the movement of goods to and from your vehicle along-with completing associated paperwork. Loading process involves loading the physical inventory into a truck (or a container). After loading, the inventory is still in the warehouse and until the shipping is done the inventory remains in warehouse.

The process of unloading is basically movement of goods which are received (trailer, rail, or other delivery method) to the warehouse floor for inspection/checking. These goods generally arrive on the floor of the container or on pallets. When an order is picked, the picked items are usually placed temporarily at the staging area of a warehouse. With many picked orders lying at the specific outbound area (staging area) in a busy warehouse, it can be chaotic if it is not well managed.

Loading process is to load the physical inventory into a truck or when a truck is assigned to pick up for delivery in a warehouse, that delivery can be for one order, but often enough, a truck is to pick up for more than one order. After the goods are loaded into the truck (called loading), the truck leaves the warehouse (called shipping), reaches the destination, unloads the goods (called unloading) and hand them over to the recipient (delivering).

It is extremely crucial to any supply chain and can make a big impact if done incorrectly. There are many factors that go into a proper loading and unloading procedure. The loading and unloading of cargo is a hazardous process that can cause serious injury or even fatality to warehouse workers if it is not performed with care. Thus, the manpower in the warehouse needs to be properly trained, experienced, reliable and dedicated team of professionals.

This unit will focus on various aspects of loading and unloading of goods. The first session covers material handling equipment used for loading/unloading of goods, the second session deals with Procedure for loading and unloading of goods, the third session describes about the handling of dangerous goods, and the fourth session discusses about the Procedure of parking material handling equipment and reporting daily operation.

Learning Outcomes

After completing this module, you will be able to:

- Identify and operate material handling equipment (MHE) used for loading and unloading goods safely and effectively.
- Follow established procedures for the efficient and safe loading and unloading of goods.
- Implement proper techniques and safety measures for the handling of dangerous goods to ensure safety and compliance.
- Apply correct procedures for parking material handling equipment to ensure safety and prevent accidents.

Module Structure

Session 1:MHEs Used For Loading/Unloading Of Goods

Session 2: Procedure For Loading And Unloading Of Goods

Session 3: Handling Of Dangerous Goods

Session 4: Procedure Of Parking Material Handling Equipment

Session 1: MHES Used For Loading/Unloading Of Goods

Warehouse Associate is responsible for managing the complete cycle of movement of material from unloading from inbound vehicle till loading onto outbound vehicle. The warehouse associate needs to communicate with the *transport supervisor* to ensure that smooth loading and unloading operation takes place throughout the day. He/she needs to collect details like truck schedules, truck reporting on time, late deliveries truck, previous day pending truck, etc., to prioritise the loading/unloading operations.

Loading is the dispatch of the material from the warehouse to the final customer or production units.

Unloading of goods from vehicle/container, receiving supervisor finally inspects stack of goods in vehicle and check for potential damage causing pointers like wet vehicle floor, dusty floor, damaged corner cartons etc. Once receiving supervisor is sure that there is no external/transport related potential causes to damage goods, unloading process of goods start.

MATERIAL HANDLING EQUIPMENT (MHE)

In warehouse, material/consignments are handled manually or by automated machines. Warehouses have various types of equipment used in warehouse operations to receive, store, dispatch and move goods within the warehouse as well.

This equipment is known as Warehouse Material Handling Equipment or simply MHE. They help reduce manual effort while safely and efficiently executing various tasks.

Different types of material handling equipment are used to handle different cargo. Material handling includes the tasks that have to be carried out to move goods from one point to another – be it inside a warehouse or factory or between locations separated in short distance. Material handling equipment is used throughout the entire chain of physical movement or storage of goods.

The right MHE helps to prevent damage to goods while assuring the safety of the personnel handling them. The MHE gives a continuous flow of goods, eliminates unnecessary movements and minimises the required ones to optimum level, thereby helping execute the various functions on time.

There are 4 main categories of material handling equipment:

- Bulk material handling: refers to equipment that transports, stores, and controls bulk materials. E.g. Stackers, Reclaimers, Bucket elevators.
- Engineered or Automated systems: Used to transport and store materials in an efficient way. E.g. Conveyor system, Robots, Guided vehicles.
- Industrial trucks: They are basically powered trucks like forklifts which move materials around the manufacturing floor. These are also utilised to load or unload heavy objects onto delivery trucks efficiently. E.g. Forklift, Side-loaders, and Hand-trucks.
- Storage and handling equipment: Storage and handling equipment is used to hold materials while they aren't being used. E.g. Drawers, Bin, Shelves, Racks, etc.

Types of MHE

Depending on the type of goods handled, some material handling equipment, such as certain types of conveyor belts or rollers, make use of friction or gravitational force to move the goods.

Typically, material handling equipment includes the following:

1. Manual pallet trolley
2. Battery-powered pallet trolley controlled by an operator
3. Forklift
4. Crane

5. Lift
6. Conveyor system
7. Robotics

PERSONAL PROTECTIVE EQUIPMENT (PPE)

MHE should be operated only by well-trained staff. To protect the operator from injury or accidents, Personal Protective Equipment or simply PPE must be used. These are clothing or device designed to be worn by an employee in order to protect him/her from one or more risks that could jeopardies his/her health in the workplace.

PPE gives protection from flying objects, heat, electricity, chemicals, or particulate matter. Using an appropriate PPE and following the prescribed safety procedures is very much required to preventing accidents.

Without the right PPE, workers are more at risk of sustaining injuries when working in a warehouse. They should be adopted into your health and safety policy to make sure anyone onsite is protected from the hazards you'd usually expect to find. By knowing the risks, you can work out which PPE items are needed to reduce the chance of serious injuries.

PPE includes items like:

1. Helmets
2. Protective clothing
3. Protective shoes
4. Goggles
5. Glove

PALLET

It is a common tool or equipment used to store and transport goods as a unit. Materials/consignments can be stacked/stored efficiently, neatly, and safely on pallets in a warehouse. Storage equipment worldwide such as racks, shelves, and pallets, are usually of standard sizes.

Training should be imparted to each and every employee of the warehouse on periodic basis. They should be able to identify the risks and hazards in operations. Mock drills must also be organised.

LOAD CHARACTERIZATION IN WAREHOUSE

A Unit Load is defined as **homogeneous group of a set of products arranged on a support or platform that facilitates the handling and transfer** of goods and hence acts as a logistical unit.

The purpose of the grouping of the load is to reduce the number of movements to a minimum, in order to facilitate its transport and storage.

Types of loads as per volume:

1. Small Loads: are loads that can be carried in one hand and available as a single package. E.g., cartons of juice or soaps.
2. Medium Loads: Slightly bigger than small loads and weigh up to 10kg, but they can still be carried by hand.
3. Large Load (Pallet load): They are larger goods which **require standard packaging and are grouped on a pallet for handling**. Such loads cannot be handled manually hence require mechanical means such as forklifts, etc.

Types of loads as per weight:

1. Light loads: are loads that do not exceed 5kg.
2. Medium loads: these loads have a minimum weight of 5kg and maximum of 25kg per unit load.
3. Heavy loads: the weight of load ranges between 25kg and one ton.
4. Very heavy loads: over one ton.

Quality Checks in Unloading

Goods need to arrive in perfect condition. However, many things can go wrong during the loading/unloading process like:

- Wrong quantity.
- Incorrect packaging and labelling.
- Packages are not sealed and mounted incorrectly.
- Damaged goods or crushed/bulged packages.

Hence, inspections are very important because handling consignments may have chances to result in problems that could impact the quality of the consignment during transportation.

Below are some of the import pointers which needs to be looked towards quality checks.

1. Look for any external sign of damage
2. Witness the box/container opening process.
3. Check the material documents as per work order.
4. Check the amount, packing, and marking of the goods.
5. Check the cleanliness of the unloading and shipment area

UNLOADING PROCESS

Unloading is the start of the warehouse operations. It brings in the cargo to be stored, processed and further dispatched. Being the step one of the cycle, it is essential that it is done in the right manner. The scope of unloading activities starts from parking of the incoming vehicle, unloading, staging, quality check, scanning, put away to the right location and finally updating the records in the system to generate the GRN.

Following are the details of the steps to be undertaken in unloading process (fig. 3.1):

Step 1 Get the Vehicle unloading plan for the day from the supervisor.

Daily Vehicle Plan

Date 07-02-2020

Vehicle Number	Bay	No. of Units	Material	Time
UP16BA2199	4	1000	Detergents	10.30
NL16BA2200	3	500	Multiple	12.00
HR19BA8956	5	125	Air Conditioners	11.30

Step 2 Check which Bay Associate Duty has been assigned by the Supervisor

Duty Chart

Date 07-02-2020

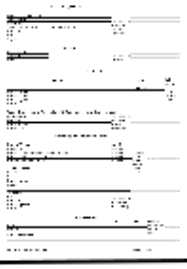
Associate Name	Bay	Shift
Umang	4	9.30 to 6.00
Munnilal	3	9.30 to 6.00
Ishwar	5	9.30 to 6.00

Step 3 Depending upon the material to be unloaded arrange for appropriate MHE

Step 4 Depending upon the material to be unloaded wear the appropriate PPE

Step 5 Park the incoming vehicle at the Dock. Use stoppers like tyres to ensure that it does not hits the bay.

Step 6	Make the entry of the incoming vehicle in the Gate Inward Register. This can be done either by the Associate or the Guard	
Step 7	Open the vehicle in the presence of the driver. See if there are any visual damages to the material on the opening of the vehicle doors	
Step 8	Start Unloading the material. Use the MHE based on the cargo. Refer section.	
Step 9	Unload the complete Cargo in the Staging Area. Do not move this inside the warehouse as yet.	
Step 10	Let the security Guard or Supervisor complete the Count of the material unloaded. This should be blind without tallying with the documents.	

Step 11	Tally Blind Count with the number of boxes on the documents. The number should match.	
Step 12	Inform the supervisor about the completion of unloading and let him fill the complete Goods Receipt Check List (GRCL).	
Step 13	Inspect the material for any damages on the cartons, any damages, leaks or spillages.	
Step 14	In case of any exception found please inform the Supervisor	
Step 15	Once Supervisor confirms, start moving the cargo to the scanning area.	

Step 16	There could be separate designated area for scanning or supervisor may provide the scanning gun for scanning at the staging area itself	
Step 17	Confirm the putaway/Binning location with the supervisor.	
Step 18	Move the cargo to the putaway location. In case it can kept manually unload the material at Binning/Putaway location	
Step 19	In case The material needs to be racked, call the MHE operator and ask to mount the pallet at the designated rack location.	
Step 20	Handover the documents to the WH Executive confirming the completion of loading done, for him to create the GRN. Submit daily unloading report to the Supervisor.	

Fig. 3.1: Unloading Process

Quality Check of Goods

For fresh shipment once goods are unloaded, those are stacked in inbound staging area for quality check. Generally, quality check is performed at external packing level and QC supervisor checks following details:

- Condition of external packing.
- SKU code and respective quantity.
- MRP, Batch number, expiry data, etc.

Once external packing is found damaged then, supervisor goes for detailed QC for those items which are in that pack.

For return shipment, QC process is a bit different and very time consuming. In case of return shipment, each item goes under detailed QC process. In detailed QC process each item is unpacked and physically checked along with matching SKU ID, MRP, Batch no., Expiry date and other required tags/barcodes. In this QC process if any of tags/barcodes are missing, operator must identify those tags/barcodes to print

and label it on item. Once above activities are performed, item is ready for put-away and waits for further course of actions.

Activities

Activity 1: Visit to a warehouse to see the process and steps employed in Loading and unloading of goods and understand the policies of warehouse.

Material Required: 1. Note Book 2. Pen/Pencil 3. Checklist

Procedure:

1. Visit a warehouse along with peers.
2. Meet the warehouse associate and other employees in the warehouse.
3. Take a round and enquire to associate about the following:
   a) To see the process and steps employed in loading and unloading of goods and list out the same.
   b) Understanding the policies of Loading and Unloading.
4. Prepare a report on the basis of the observation.
5. Teacher should evaluate the report.

Activity 2: Prepare a report showing the list of MHE and PPE.

Material required: Check list, Notepad, pen/pencil, drawing sheet, colour pencils.

Procedure:

1. Visit a warehouse and observe the PPE used in warehouse.
   a) Helmets
   b) Protective clothing
   c) Protective shoes
   d) Goggles
   e) Glove
2. Visit a warehouse and observe the MHE used in warehouse.
   a) Manual pallet trolley
   b) Battery-powered pallet trolley controlled by an operator
   c) Forklift
   d) Crane
   e) Lift
   f) Conveyor system
   g) Robotics
3. Observe and correlate it with logistics industry.
4. Ensure about your work completion.

5. Discuss with the classmates in front of your teacher.
6. Prepare report and discuss it with your teacher.

Check Your Progress

A. Fill in the Blanks

1. _____ are loads that can be carried in one hand and available as a single package.
2. Training should be imparted to each and every employee of the _____ on periodic basis.
3. For fresh _____once goods are unloaded, those are stacked in inbound staging area for quality check.
4. The purpose of the grouping of the is to reduce the number of movements to a minimum, in order to facilitate its _____ and storage.
5. Once external _____ is found damaged then, supervisor goes for detailed QC for those items which are in that pack.

B. Multiple Choice Questions

1. QC supervisor checks which of the following details?
   a) Condition of external packing.
   b) SKU code and respective quantity.
   c) MRP, Batch number and expiry data.
   d) All of these.
2. PPE includes items like:
   a) Helmets.
   b) Protective clothing.
   c) Protective shoes.
   d) All of these.
3. What is the primary responsibility of a warehouse associate in relation tothe movement of material?
   a) Manufacturing goods
   b) Managing the complete cycle of movement of material from unloading from inbound vehicles to loading onto outbound vehicles
   c) Designing warehouse layouts
   d) Handling customer complaints
4. Which of the following is NOT considered a type of Material Handling Equipment (MHE) in a warehouse?

a) Conveyor system
b) Forklift
c) Protective clothing
d) Manual pallet trolley

5. What is the purpose of a pallet in a warehouse?
   a) To store goods efficiently, neatly, and safely as aunit
   b) To transport employees within the warehouse
   c) To act as a safety barrier
   d) To provide lighting in dark areas

C. State whether the following statements are True or False

1. Unit Load is defined as homogeneous group of a set of products arranged on a support or platform that facilitates the handling and transfer of goods and hence acts as a logistical unit.
2. For fresh shipment once goods are unloaded, those are stacked in inbound staging area for quality check.
3. The right MHE helps to prevent damage to goods while assuring the safety of the personnel handling them.
4. The MHE gives a continuous flow of goods, eliminates unnecessary movements and minimises the required ones to optimum level, thereby helping execute the various functions on time.

D. Short Answer Questions

1. Explain types of MHE.
2. State the meaning of PPE.

E. Long Answer Questions

1. Explain QC process.
2. Elaborate Unloading process.

F. Check Your Performance

1. Prepare chart showing list of PPE and MHE
2. List out loading and unloading process and list out steps employed in it.

Session 2: Procedure for Loading and Unloading of Goods

Loading process is the reverse of unloading process. It is the dispatch of the material from the warehouse to the final customer or production units.

Loading is critical as it defines the service level to the final customer. Proper loading also ensures that there is no damage to the cargo during transit. As loading involves

movement of the material outside the warehouse, it is mandatory that it is done correctly and there is no excess or short dispatches of inventory.

Following are the details of the steps to be undertaken in loading process (fig. 3.2):

Step 1 Get the Vehicle Loading plan for the day from the supervisor.

Daily Vehicle Plan

Date	07-02-2020			
Vehicle Number	Bay	No. of Units	Material	Time
UP16BA2159	4	1000	Detergents	10.30
MH16BA2200	3	500	Manhole	12.00
HR19BA8996	5	125	Air Conditioners	11.30

Step 2 Check Bay number wise assignment if Duties to the Associate by the supervisor.

Duty Chart

Date	07-02-2020	
Associate Name	Bay	Shift
Umang	4	9.30 to 6.00
Munnilal	3	9.30 to 6.00
Ishwar	5	9.30 to 6.00

Step 3 Depending upon the material to be loaded arrange for appropriate MHE

Step 4 Depending upon the material to be loaded wear the appropriate PPE

Step 5	Open the vehicle in the presence of the driver. Run Vehicle check list. Check if vehicle is fit to load.	
Step 6	Indent the outgoing vehicle at the Dock. Use stoppers like tyres to ensure that it does not hits the bay.	
Step 7	Make the entry of the outbound vehicle in the Gate Outward Register. This can be done either by the Associate or the Guard	
Step 8	Start loading the material. Use the MHE based on the cargo. Refer section.	
Step 9	After the loading is complete, let the security Guard or Supervisor count the material loaded. This should be tallying with the documents.	

Step 10	After the loading is complete, complete the lashing and strapping of the cargo. Associate need to ensure that cargo is secured enough, not t o move during transit	
Step 11	Once the loading, and lashing is complete, inform Supervisor that vehicle is ready to go.	
Step 12	Handover all transit documents to the driver like Invoice, LR copy, GST documents, Gate Pass and Others.	
Step 13	Once Supervisor approves, close the gate of the vehicle. Seal the gate with lock or Bottle seals.	
Step 14	Prepare the daily report of the vehicles loaded during the day and submit to the supervisor confirming completion of the work.	

Fig. 3.2: Loading Process

Common hazards in loading and unloading are:

- Accidents (major/minor).
- Toppling of improperly stacked or secured cargo.
- Failure of lashing and dunnage.
- Unsafe access.
- Falling off the loading platform.

General Requirements:

1. Do not stand under load.
2. Ensure your hands are away from material and truck during loading and unloading.

3. You should avoid touching the load with your hands when moving or suspended. If it is required to touch the load, use the safe hands approach.
4. Truck drivers not to walk into the work area during cargo handling operations unless authorised.
5. If trucks are required to reverse, then a helper/spotter is required.
6. Equipment, tools, forklifts are to be checked for proper working before starting the loading/unloading operations.
7. Without proper PPE loading/unloading operations should not start.
8. Loading area shall be kept clean and free from obstacles.

Loading/Unloading Requirements:

1. Loading/unloading to be executed under supervision.
2. Delivery vehicle (truck) should not be in engine running condition during loading/unloading.
3. Carry out loading/unloading at specific areas only, meant for the same.
4. Park on firm and level ground. Ensure parking brakes are fully engaged. Put chocks under the wheel.
5. Trucks may be loaded and unloaded either by cranes/forklifts and have only one item loaded/unloaded at a time.
6. Material to be loaded should rest on pallet. The packing should be good to withstand any external impacts.
7. Loading/unloading cargo by forklift is to be done by competent forklift operator.
8. Warehouse employees must not stand on truck during placement or removal of loads by cranes or forklifts. In case it is required then it should be authorised by the supervisor/in-charge.
9. Don't overload vehicle. Put lighter loads on top.
10. Put the material evenly so that the load is evenly distributed.
11. Secure well with appropriate material once loading is completed.
12. See that the materials shipped has not been shifted during transit.

EQUIPMENT SELECTION FOR LOADING/UNLOADING

1. Check the weight of the individual boxes/consignment.
2. Look into the access part, how it will be accessed in a smooth manner.
3. Based upon load and dimension, see if it can be done through hands or material handling equipment.

4. Select the MHE with respect to the load. Check if it is in proper working condition or not.

Dispatch Documents

One of the functions of a warehouse is **to dispatch the consignment.** The goal is to transport material ordered by customers **to the designated delivery point** in time and in good condition. Before material is put into transit, there are certain documents which needs to be accompanied by the vehicle driver as listed below:

1. **Purchase order:** It is a contract between the buyer and the seller which provides information like price, product or services to be delivered, delivery date, etc.
2. **Commercial Invoice (GST invoice):** Basically, it is a commercial instrument which is issued by seller to the buyer. It identifies both the trading parties and lists, describes, and quantifies the items sold, shows the date of shipment and mode of transport, prices and discounts and payment terms. An invoice serves as a demand for payment and becomes a document of title when paid in full.
3. **Proof of dispatch – Waybill, Lorry receipt:** It is a receipt issued by a carrier giving details and instructions relating to the shipment of a consignment. E-Way Bill is a compliance mechanism document through digital interface. The company/person causing the movement of goods uploads the relevant information before the commencement of movement of goods and generates e-way bill on the GST portal.
4. **Packing list (delivery challan):**It is a list which indicates the items that the contents of each package has (box, pallets, etc.). Generally, includes weights, measurements and detailed lists of the goods in each package.
5. **Inspection report:** It is a regular inspection comprising a detailed inspection of finished goods before shipment. These inspections ensure the quality of equipment and protect customers from the risks of delivery in domestic as well as in international trade.
6. **Warranty certificate:** It **is issued** by seller that the goods/equipment supplied under the purchase order/contract are new, unused and as per PO terms.

For export orders below listed documents are required apart from the above mentioned.

1. **Bill of lading:** It is a legal document issued by a carrier (transportation company) to the shipper that details the destination, type and quantity of goods being carried. Bill of lading serves as a shipment receipt when the carrier delivers the goods.
2. **Airway bill:** It is a document issued by international air courier accompanying goods shipped and having information about the shipment and allows it to be tracked.

3. **Certificate of origin:** It is a document that certifies that the goods for shipment are wholly obtained, produced, manufactured or processed in a particular country.
4. **Customs declaration form:** It is a document that lists and gives details of goods that are being imported or exported.
5. **Letter of credit copy:** It is a guarantee letter from bank indicating that a buyer's payment to the seller will be received on time and for the correct amount. If in case buyer is unable to make a payment, then the bank will be required to cover the full or remaining amount of the purchase.

CHECKLIST FOR BETTER OPERATIONAL EFFICIENCY

A checklist is an essential document that lists different tasks, activities, and behavior's that need to be followed to achieve a systematic result. The objective is overseeing tasks or projects and ensuring nothing important is forgotten during execution:

Date	Assessor	Order No.
Transporter	Location	Vehicle No

S No.	Task description	Yes	No
	General		
	Is the vehicle correctly positioned and levelled?		
	Are truck chocks in place and the truck made fundamentally stable?		
	Is there any damage to the truck/trailer?		
	Is vehicle fitness certificate available?		
	Does the vehicle driver have valid license and vehicle registration?		
	Are appropriate people and equipment available for loading/unloading?		
	Any items that require special lifts or a crane to handle them?		
	Unloading		
	Are all items secured to a pallet, cradle, etc.?		
	Are the top loaded items stable?		
	Any spillage seen?		
	Is there any outside damage?		

	Are all valid dispatch documents available?		
	Loading		
	Is freight to be dispatched clean, well packed and secured in cartons or appropriate packaging?		
	Is the material as per purchase order requirements?		
	Is documentation completed and checked for the material being dispatched?		
	Is the load placed in a stable position and is it suitably restrained?		
	Does the total weight of the cargo exceed the truck's carrying capacity or axle loadings?		

Activities

Activity 1: Prepare checklist for better operational efficiency.

Material required: Check list, Notepad, pen/pencil, drawing sheet, color pencils.

Procedure:

1. Collect the materials required to prepare a checklist.
2. Observe and correlate it with logistics industry.
3. Prepare the checklist.

S No.	Task description	Yes	No
	General		
	Is the vehicle correctly positioned and levelled?		
	Are truck chocks in place and the truck made fundamentally stable?		
	Is there any damage to the truck/trailer?		
	Is vehicle fitness certificate available?		
	Does the vehicle driver have valid license and vehicle registration?		
	Are appropriate people and equipment available for loading/unloading?		
	Any items that require special lifts or a crane to handle them?		
	Unloading		
	Are all items secured to a pallet, cradle, etc.?		
	Are the top loaded items stable?		
	Any spillage seen?		

	Is there any outside damage?		
	Are all valid dispatch documents available?		
	Loading		
	Is freight to be dispatched clean, well packed and secured in cartons or appropriate packaging?		
	Is the material as per purchase order requirements?		
	Is documentation completed and checked for the material being dispatched?		
	Is the load placed in a stable position and is it suitably restrained?		
	Does the total weight of the cargo exceed the truck's carrying capacity or axle loadings?		

4. Ensure about your work completion.
5. Discuss with your classmates in front of the teacher.
6. Write the conclusion.

Activity 2: Visit nearby Warehouse to see the process of Loading and Unloading.

Material required: Check list, Notepad, pen/pencil, drawing sheet, color pencils.

Procedure:

1. Make a group of 4-5 students.
2. Ask the warehouse manager about loading and unloading process with delivery (outbound)documents.
   a) picked outbound delivery orders or handling units
   b) load the outbound delivery orders
   c) post the goods issue for the outbound delivery orders
   d) At the end of loading, at the latest when post goods issue, the system automatically creates outbound deliveries for the relevant outbound delivery orders.
3. Also observe the products loaded or unloaded with respect to order.
4. Prepare a report and submit it to your teacher.
5. Present the data with the help of PPT.

Check Your Progress

A. Fill in the Blanks

1. _____ are loads that can be carried in one hand and available as a single package.

2. Training should be imparted to each and every employee of the _____ on periodic basis.
3. Loading is critical as it defines the service level to the final _____.
4. Proper loading also ensures that there is no _____ to the cargo during transit.
5. As loading involves movement of the material outside the warehouse, it is mandatory that it is done correctly and there is no excess or short dispatches of _____

B. Multiple Choice Questions

1. What is the primary goal of the loading process?

a) To minimize the use of manpower

b) To maximize warehouse space

c) To ensure the service level to the final customer and prevent cargo damage during transit

d) To reduce transportation costs

2. Which of the following is NOT a common hazard in the loading and unloading process?

a) Accidents

b) Toppling of improperly stacked cargo

c) Use of proper PPE

d) Falling off the loading platform

3. What should be done if trucks need to reverse during the loading/unloading process?

a) The truck driver should reverse alone

b) A helper or spotter should be used

c) The truck should not be reversed at all

d) The loading/unloading process should be halted

4. Which document serves as a receipt issued by a carrier giving details and instructions relating to the shipment of a consignment?

a) Purchase order

b) Commercial invoice

c) Waybill or Lorry receipt

d) Packing list

5. According to the loading/unloading requirements, which of the following is a mandatory safety measure?

a) Standing on the truck during loading/unloading

b) Performing loading/unloading without supervision

c) Ensuring the truck engine is running during loading/unloading

d) Using proper Personal Protective Equipment (PPE)

C. State whether the following statements are True or False

1. Unit Load is defined as homogeneous group of a set of products arranged on a support or platform that facilitates the handling and transfer of goods and hence acts as a logistical unit.
2. For fresh shipment once goods are unloaded, those are stacked in inbound staging area for quality check.
3. Delivery vehicle (truck) should not be in engine running condition during loading/unloading.
4. Carry out loading/unloading at specific areas only, meant for the same.
5. Park on firm and level ground. Ensure parking brakes are fully engaged. Put chocks under the wheel.

D. Short Answer Questions

1. List down the dispatch documents required to send a cargo, within the country.
2. What is Bill of Lading.
3. What is LC (letter of credit).

E. Long Answer Questions

1. Explain the loading and unloading requirements to be taken care of.
2. What constitutes general requirements under loading/unloading.

F. Check Your Performance

1. Spell out the Procedure of Loading and unloading.
2. Prepare a chart displaying the usage of MHE.

Session 3: Handling of Dangerous Goods

A **hazardous substance** can be any substance, whether solid, liquid or gas, that may cause harm to your health. Hazardous substances are classified on the basis of their potential health effects, whether acute (immediate) or chronic (long-term).

Dangerous goods may be corrosive, flammable, explosive, spontaneously combustible, toxic, oxidising, or water-reactive (refer fig. 3.4). Dangerous goods are classified on the basis of immediate physical or chemical effects, such as fire, explosion, corrosion and poisoning. An accident involving dangerous goods could seriously damage property or the environment.

TYPES OF DANGEROUS/HAZARDOUS GOODS

The dangerous and hazardous goods handling in warehouses are challenging job. The following are the major dangerous and hazardous goods generally handled which are identified with suitable symbols (fig. 3.3):

Explosives: These are substances with the ability to rapidly change the state of their molecules from one state to another, usually from solid to gas, therefore, they can generate a large explosion.

Gases: These are high hazard material because, in order to transport these gases, they must be transported in a container with high pressure in order to reduce their volume.

Flammable liquids: These are composed of elements with a great capacity to burn, such as kerosene, petrol, etc.

Flammable solids: These are solid substances that, when in contact with water, release flammable gases. We find explosive goods and self-reactive goods in flammable solids.

Oxidising agents and organic peroxides: These are materials with a high oxygen content that can react with other dangerous goods such as flammable or combustible liquids and generate a combustion that is difficult to extinguish. This type of goods should not be moved or stored together with other explosive or flammable elements.

Toxic and infectious substance: These are poisonous substances and chemical materials that are seriously harmful to the well-being of people and the environment. These are also the goods coming from scientific studies that have pathogenic agents, and viruses that cause diseases and infections.

Radioactive: These are substances containing unstable atoms and a changing molecular structure. Within this class we find products such as enriched Uranium, Plutonium or Thorium.

Corrosives: These are chemical products with a high content of alkaline or acid components. They are substances that pose a danger because, in contact with other materials or the skin, they can cause immediate damage.

Miscellaneous: These are dangerous goods that pose a risk during transportation and storage, but have not been classified.

Fig. 3.3: Symbol of Dangerous/Hazardous Goods

DANGEROUS/HAZARDOUS MATERIAL HANDLING

1. Check labels on containers like caution label, warning label, danger label. These are usually the indication if something is hazardous.
2. Identify them and then transport, handle, or store as per the rules and regulations.
3. Keep the Safety Data Sheet (SDS) in the location.
4. Learn and know the risks involved is storage of such material.
5. Maintain a different inventory of these material.
6. Keep the spill response equipment at place and train the warehouse concerned personnel.
7. Use FIFO concept in dispatches.
8. In case of expiry date exceeded, inform reporting supervisor immediately.

Spill Prevention:

1. Understand what are dangerous and hazardous goods.
2. Follow safe storage and handling PROCEDURES.
3. Read and follow the Safety Data Sheet (SDS) as well as instructions on the labels.
4. Don't store in unlabelled containers.
5. Inspect storage containers for any damages and leakages.
6. Use appropriate PPE.
7. Don't leave the storing containers open.
8. Seal/close the lids properly.

Action to Spill Response

In the event of a spill or leaking container, the supervisor of the facility should be notified. The person discovering the spill and the site supervisor should record information on the spill (when it occurred, why it occurred, what was spilled, volume spilled, personnel involved, etc.), and keep on file at the storage location.

Damaged or leaking hazardous materials should be removed and stored in a separate, safe space. Ideally, spilled items should be stored in a well-marked, reinforced plastic drum.

Necessary action to contain and control the spill by soaking up, diverting, or containing any liquid flow should be taken immediately to prevent contamination of any surface drains, soils, or waterways like spreading absorbent materials, pads, and dirt, to control the flow.

- Cleaning of spill.
- Oil absorbent pads.
- Brooms and squeezes.
- Plastic trash bins (covered).
- Nitrile, latex, leather gloves.
- Boots.
- Respiratory masks.
- Shovels.
- Sand bags/buckets.
- Helmets.
- Safety cones and danger tapes.
- Face shields.
- Chemical resistant aprons.
- Fire extinguishers.
- Safety manual.

Space Requirements for Dangerous and Hazardous Material

All warehouses should maintain a Layout and Storage Plan based on a grid layout, showing where the different items are stored, and update it regularly.
As a minimum, five areas should be designated in a warehouse:

- Office area.
- Goods receiving area.
- Goods storage area(s) (can include outdoor space).
- Damaged/expired goods area.
- Staging/loading area for items picked and ready for dispatch.

The space for storing dangerous and hazardous goods should have:

- Proper authorization from statutory bodies.
- Good air circulation system to avoid gas accumulation.
- Elevated platforms with proper drainage.
- Electric and lighting installations suitable for dangerous and hazardous material.
- Machinery for transshipment and cleaning of containers.
- Proper washrooms with running water.
- PPE (aprons, masks, gloves etc.) kits arranged.
- Away from general storage area.
- Fire alarm and suppression system.
- Proper earthing and lightening arrestor.
- Floor markings properly painted.

Process for Loss, Damaged Materials Received:

In warehouse we often come to situations where the material received is damaged ones or of less quantity or not as per the purchase order specifications. In such a case a separate process is applied for such materials.

On receipt of such material following treatment (steps) is to be done:

- Open case inspection for all the boxes.
- Mention on the LR (lorry receipt) of the discrepancy.
- Take pictures of the damages/loss.
- Inform the warehouse in-charge, indenter, concerned finance person, concerned purchase person and the supplier.
- The finance person will inform the insurance company of the discrepancies. Concerned insurance surveyor will come and inspect.
- Prepare GRN (goods receipt note) to take in the material. Here, we perform receive and blocking of the material.
- Store the material at a specific area, called quarantine area.
- Once the insurance inspection is done the material is either repaired or returned for replacement.
- If the indenter on inspection says that the material is fit to use, then the issue can be closed.

Activities

Activity 1: Draw a chart showing the list of Hazardous goods and dangerous goods.

Material required: Check list, Notepad, pen/pencil, drawing sheet, colour pencils.

Procedure:

1. Collect the materials required to draw chart.
2. Draw a chart containing:
   a) list of Hazardous goods and dangerous goods.
   b) precautions for handling hazardous goods.
   c) suitable MHE for hazardous/special goods.
3. Check the characteristics from the textbook and from what teacher taught in the class.
4. Ensure about your work completion.
5. Discuss with the classmates in front of your teacher.
6. Write the conclusion.

Activity 2: Visita nearby Warehouse to see the schedule of Loading and unloading.

Material required: Check list, Notepad, pen/pencil, drawing sheet, colour pencils.

Procedure:

1. Make a group of 4-5 students.
2. Ask the warehouse manager about:
   a) loading and unloading schedule with delivery (outbound) documents.
   b) space requirement for loading of goods.
   c) identify breakage and spillage while loading and unloading.
   d) treatment/movement of damaged goods to specific place.
3. Also observe the products loaded or unloaded with respect to order.
4. Prepare report and submit it to your teacher.
5. Present the data with the help of PPT.

Check Your Progress

A. Fill in the Blanks

1. Handling dangerous goods involves checking labels on containers like _____ labels.
2. During spill prevention, it is important to inspect storage containers for any damages and _____.
3. The primary purpose of a purchase order is to list items to be _____.
4. A hazardous substance can be any substance, whether _____, that may cause harm to your health.

5. The person discovering a spill should notify the _____ of the facility.

B. Multiple Choice Questions

1. What is the primary classification basis for hazardous substances?
   a) Color
   b) State (solid, liquid, gas)
   c) Potential health effects
   d) Weight
2. Which class of dangerous goods includes substances with a high content of alkaline or acid components?
   a) Class 1 – Explosives
   b) Class 5 – Oxidising agents and organic peroxides
   c) Class 8 – Corrosives
   d) Class 7 – Radioactive
3. Why are gases classified as high hazard materials?
   a) They are expensive
   b) They require special handling due to high pressure
   c) They are prone to explosion
   d) They are toxic
4. What is the primary goal of dispatching material from a warehouse?
   a) To generate invoices
   b) To transport material ordered by customers
   c) To store material in a designated area
   d) To maintain a checklist
5. What is the recommended action if the expiry date of a hazardous material is exceeded?
   a) Continue using it
   b) Inform the reporting supervisor immediately
   c) Store it with non-hazardous materials
   d) Dispose of it in regular waste bins

C. State whether the following statements are True or False

1. Dangerous goods are classified on the basis of immediate physical or chemical effects, such as fire, explosion, corrosion and poisoning.

2. Warehouses should maintain a Layout and Storage Plan based on a grid layout, showing where the different items are stored, and update it regularly.
3. Dangerous goods are classified based on color coding.
4. In the event of a spill, the person discovering it should not record any information but immediately clean it.

D. Short Answer Questions

1. Define hazardous and dangerous goods.
2. Explain the finer points of storing space under hazardous and dangerous goods.
3. Explain the importance of space management.

E. Long Answer Questions

1. What are the different classes of hazardous and dangerous goods?
2. Explain the process of loss, damage of goods?

F. Check Your Performance

1. Prepare a chart showing MHE used for loading and unloading of goods.
2. Read case studies on situation of breakage and spillage.

Session 4: Procedure of Parking Material Handling Equipment

MHE unattended or not positioned for immediate use are considered parked. Supervisor and operators should apply sound judgement in parking the MHE.

Towards efficiently managing of resources, the overall improvement in operators' safety and to eradicate work accidents, it's vital that a layout planning of our industrial warehouses should be carried out logically and in a rational way. One area that needs to be focused upon is parking of material handling equipment including the forklift vehicles.

VEHICLE PARKING

This is the area specifically planned to park company vehicles and industrial machinery. Have one single parking space and concentrate all vehicles in this area. Park all cars in reverse. This is important as it ensures full visibility when removing the vehicles, and it allows for a quick evacuation, should it be necessary.

Space for Manoeuvring

This is the area intended for work vehicles to carry out all the manoeuvres and necessary tasks for loading and unloading, for docking and undocking the merchandise. In this type of spaces, it's important to support drivers with clear signage and traffic lights as this helps improve the flow and efficiency of work.

Maintenance and Servicing

MHE is the very backbone of your logistics operations. They need to be treated with the care and precision that is due to them. This means undertaking routine inspection, servicing as and when necessary or even periodically, and replacing them when needed, becomes an integral part of your materials management strategy. A pre-shift MHE check could be built into routine SOPs.

The material handling equipment that is used in warehouse impacts the profitability and efficacy of the warehouse operations. Hence, it is important for necessary caring of the equipment and to ensure that the employees handling them are properly trained. Making the most of your MHE may well determine your success as an enterprise.

WREHOUSE LAYOUT

Warehouse layout should not impede the physical flow of work, increase the risk of damage to items, or impact physical safety of any persons in or around the warehouse.

Warehouses ideally follow the 70/30 rule – around 70% of the floor space of a warehouse will typically be used for storage of physical cargo, while around 30% will be open space for movement and work. cargo storage should be clearly visible and easy to navigate and the warehouse person should be able to quickly identify locations of items and conduct piece counts with minimum effort.

Warehouses are generally arranged in easy-to-navigate grid like patterns having lanes, aisles, rows with open spaces between racks, rows and stacks of items that supports free flow of people, cargo and MHE. The width of aisles and rows depends on context; lanes in small storage facilities utilising ground stacking and no MHE should be 0.5 to 1-meter-wide, to enable access to human movement, while lanes in a large warehouse with racking may be up to 4 to 5 meters wide to enable access to forklifts or hand trucks.

There should be what is known as a “fire lane” – a free and open space between cargo and walls of a suggested 40 cm or the safest available space through which an adult human can move to enable quick exit. Exits in a warehouse should never be blocked and should be clearly marked. The materials stored should not be pushed up against walls or touching the ceilings.

Important pointers in parking of MHE

1. Markings to be provided on the surface (internal/external area) to assist the drivers in manoeuvring and positioning the equipment.
2. Vehicles shall be staged in their designated parking area.
3. When MHE is not in use it must have a clear zone of 10 feet of separation from combustible materials.
4. When parked, the MHE will not block fire aisles, fire-fighting equipment, fire alarm, pull stations, stairways, elevators, or exits.

5. MHE will not be warmed up inside the building and will be turned off when not in use.
6. Refueling is not permitted inside the facility and shall only be accomplished in an approved area outside with the engine off.
7. Put diagram/floor plan for the designated parking area.
8. Parking space should have proper clearance for heavy lift equipment (forklifts), ideally 5 feet from all four sides.
9. MHE (forklifts) to be parked on flat and hard surfaces.
10. Inclines or declines should be avoided whenever possible.
11. This area should also not obstruct access to emergency exits, stairways, or fire extinguishing equipment.

Material Coding

In inventory management at warehouse, **item coding** enables efficiency, which impacts positively on all operations carried out in the warehouse. Therefore, each product should be identified and entered in ERP system (WMS- Warehouse Management System) on receipt.

Material Coding is method which uses symbols or numbers in order to represent specifications or categories of materials so that it is easy to recognise, track and monitor the materials in the warehouse.

The process consists of **explicitly identifying the goods** with a code or sign. This code is linked to a label pasted on the product that can be accessed electronically. In warehousing, the most standard labels are **barcodes** and **RFID tags.**

Coding means assigning a code to a product. This code lets us see some of the item's main characteristics: its SKU, ingredients, hazard level, warehouse arrival date, packaging, and expiration date, among other data.

A unique way of identifying is the **objective of coding,** so that there can't be two products with the same code. Warehouse management systems (WMS) play a key role in this process. The **WMS** generates the code for each item, assigns locations to the products in the installation, and monitor the various phases the goods go through, thus it controls their **traceability**.

Methods of coding:

Step 1: Choosing the method to be adopted. Common methods are:

1. **Numeric coding -** Only numbers are used (no letters or signs).
2. **Alphabetic coding -** Composed solely of letters.
3. **Alphanumeric coding -** The code is a combination of letters, numbers, and signs.

Step 2: Labelling the merchandise. This is where the **barcode**, the most universal way to represent a code in a warehouse, comes into play. The laser scanner is charged with reading the bars and converting them into their alphanumeric equivalent, making this a quick and precise system.

Barcodes are much simpler and cost effective than other, and can be used internally as well as externally but should follow norms and standards. The GS1 **(International Article Numbering Association)** has developed a coding system that guarantees the unique identification of products on an international level.

Coding using ERP/WMS:

- The connection between the ERP and the WMS **has to be continuous and bidirectional.** The **ERP** assigns a code to each item in the company's catalogue in a completely automatic way. The code needs to respect the type of coding applied by the company (UPC-A, EAN-13, EAN-128, RFID tags, etc.).
- **WMS** can also generate codes. It is done for items that have arrived at the warehouse without coding and for new products created in the installation, such as kits. By scanning the code, workers can get all information of the item (weight, volume, precautions to take into account when storing it, and turnover).
- The ERP is equipped with the master document or file, which is basically the databases with all the rules and data required to carry out the business activity (among others, transportation agencies, suppliers, and, of course, the item master). The **item master** is most relevant in logistics and coding, in particular, since it includes all the information on the goods. The WMS absorbs all the item-master data to adequately manage the products in the warehouse.
- While designing the WMS a goods slotting strategy needs to be incorporated based on the company's preferences and needs. WMS can organise the products in the warehouse as per criteria such as their nature, volume, weight, status, packaging, and attributes (expiration date, quality, colour, etc.).

DOCUMENTATION AND MIS

Keeping up and preserving the documents (hard and soft copy) is an integral part of warehousing and logistics function. Below are the documents which need to be preserved as per the category.

For inbound and outbound material:

1. Gate entry (security point). Data to be captured are – Date, Time, Vehicle no, Material description, Consignor, Invoice number, and Purchase order number.
2. Purchase order.
3. Commercial Invoice (GST invoice).

4. Proof of dispatch – Waybill, Lorry receipt.
5. Packing list (delivery challan).
6. Inspection report.
7. Warranty certificate.
8. Vehicle fitness, registration and license copy (for outbound).

For export orders below listed documents are required in addition to the above referred ones.

1. Bill of lading.
2. Airway bill.
3. Certificate of origin.
4. Customs declaration form.
5. Letter of credit copy.

Internal inventory documents to be kept are:

1. **GRN (Goods Received Note).**
2. **SO (Sales Order).**
3. **STO (Stock Transfer Order for Interstate).**
4. **Stock/Bin card.**
5. **MRF (Material Requisition Form).**
6. **DC (Delivery Challan).**

Others:

1. **GST certificate copy.**
2. **Shops and Establishment copy.**
3. **Authorisation letter.**

Management Information System (MIS)

These are data that helps to understand and use it for your benefit to arrive at informed decisions. MIS report can be described as a system that provides important information for the management of your company. MIS collaborates with people, technology, and business processes within an organisation.

MIS reports highlight day to day business activities, which enables you to monitor the progress of the function. These reports provide critical insights during decision making. It serves as a reference point to monitor your business and communication.

Below are the most used reports in circulation from warehouse.

1. **Stock report (daily basis).**
2. **Stock aging report (weekly or fortnight basis).**
3. **Daily dispatch report.**

4. **Daily receivables.**
5. **Quarantine report (discrepancies - weekly basis).**
6. **Inventory cost report**

Activities

Activity 1: Visit on exposure of Warehouse.

Material required: Check list, Notepad, pen/pencil, drawing sheet, colour pencils.

Procedure:

1. Make a group of 4-5 students.
2. Ask the warehouse manager about:
   a) how to classify goods as per coding, labelling and marking.
   b) how goods are packed.
   c) selection of PPE while loading and unloading of goods.
3. Also prepare report of daily operations.
4. Prepare a report and submit it to your teacher.
5. Present the data with the help of PPT.

Activity 2: Experiential learning activity: Execute the following exercises in warehouse:

1. Look and note down where the shortage/defective material are stored.
2. Collect the daily dispatch report and copy of GRN.
3. Collect the stock aging report.
4. Collect a Bin card.
5. Take pictures of above papers.
6. Paste it in your notebook.

Check Your Progress

A. Fill in the Blanks

1. _____ should not impede the physical flow of work, increase the risk of damage to items, or impact physical safety of any persons in or around the warehouse.
2. _____can be described as a system that provides important information for the management of your company
3. _____ to be provided on the surface to assist the drivers in manoeuvring and positioning the equipment.
4. Vehicles shall be staged in their designated _____ area.

5. When MHE is not in use it must have a clear zone of 10 feet of separation from _____ materials.
6. When parked, the MHE will not block fire aisles, fire-fighting equipment, _____ alarm, pull stations, stairways, elevators, or exits.
7. _____ will not be warmed up inside the building and will be turned off when not in use.

B. Multiple Choice Questions

1. In warehousing, the most standard labels are-
   a) Barcodes
   b) RFID tags.
   c) Both.
   d) None of these.
2. MIS Stands for-
   a) Management Information System.
   b) Marketing Information System.
   c) Management Integrity System.
   d) None of these.
3. What is the primary purpose of a purchase order?
   a) To make payments
   b) To list items to be delivered
   c) To track inventory
   d) To conduct inspections
4. What does the 70/30 rule in warehouse layout suggest?
   a) 70% of the floor space for parking
   b) 70% of the floor space for storage
   c) 30% of the floor space for parking
   d) 30% of the floor space for storage
5. What is the purpose of material coding in inventory management?
   a) To confuse warehouse staff
   b) To increase costs
   c) To represent specifications or categories for easy recognition
   d) To slow down operations
6. What is the key role of Warehouse Management Systems (WMS) in coding?
   a) Generating random codes
   b) Assigning locations randomly
   c) Monitoring various phases of goods without control
   d) Controlling traceability and generating codes
7. What is the primary function of a Management Information System (MIS)?
   a) Provides important information for management
   b) Generates random data
   c) Impedes decision-making

d) Delays communication

C. State whether the following statements are True or False

1. Warehouses should ideally follow the 70/30 rule, where 70% of the floor space is used for storage of physical cargo.
2. Inclines or declines in parking areas for MHE should be encouraged for efficient use of space.
3. Material Coding in inventory management involves the use of symbols or numbers for easy recognition and monitoring of materials.
4. The connection between the ERP and the WMS for coding should be unidirectional.
5. MIS reports provide critical insights during decision-making and serve as a reference point to monitor business progress.

D. Short Answer Questions

1. Briefly explain the internal inventory reports under MIS.
2. Define the following:
   a. GRN
   b. STO
   c. MRF
   d. Bin card

E. Long Answer Questions

1. What is material coding? Describe the methods of coding.
2. Explain the important pointers that need to be taken care of while parking MHE in warehouse.

F. Check Your Performance

1. Prepare report of daily operations and share with your teacher.
2. Classify goods as per coding, labelling and marking.

MODULE 4	HEALTH, SAFETY AND SECURITY

Module Overview

Warehouse operations are full of safety risks, and all the staff in the warehouses must be attentive, aware and alert of various potential dangers. They constantly have to take issues seriously which includes falls/slips while operating heavy equipment.

Many times they are exposed to hazardous chemicals which spill, fume or leak resulting in serious health issues in long run. To prevent potential injuries warehouses compliant to health, security and safety standards.

Warehousing with its entire range of activities may result in various hazards/risks. An effective health and safety management system assess every probable safety risk and tries incorporating measures to prevent them. By taking suitable actions, management tries to safeguard its most valuable asset i.e. the employees from any dangerous situation. Proper safety measures not only protect the premises, equipment and goods but the reputation of the employer too. There should be periodic inspection of safety parameters and the security of warehouse. A checklist should also be filled in by the employees in order to understand the necessary safety measures and also their personal hygiene. Any employee if violates health and safety standards have to be warned immediately and in case of non-compliance appropriate actions must be taken. Necessary precautions have to be taken at the warehouse to avoid any accident. Personal Protective Equipment (PPE) plays a very important role in order to assure safety of workers, whereas periodic health checkups increase retention and productivity of employees. In case of unsafe conditions, the workers face electrical hazards, crushing, contaminated air, hearing loss, eye injuries, slips, falls, hits and serious accidents. Also the driving practices within warehouse need to follow all the guidelines tests and inspection certificates.

Staff training is required in following Standard operating PROCEDURES for warehouse activities and materials. Information security is the practice of protecting information. It typically involves preventing unauthorized/inappropriate access to data or the unlawful use, disclosure, disruption, deletion, corruption, modification, inspection, recording or devaluation of information. The targets of Cargo Security are achieved by Controlling data by authentication at the time of information sharing, Training of staff in the areas of transport routes and repercussions in the case of breach of safety. Regular security checks help achieving safety standards.

This unit consists of four sessions the first session focuses on Health, Safety and Security procedures, second session covers appropriate and safe working Conditions at warehouse, third session deals on Standard Operating Procedures, and fourth session describes documents for Health, Safety and Security.

Learning Outcomes

After completing this module, you will be able to:

- Understand and apply health, safety, and security procedures effectively in various settings.
- Identify and maintain safe and appropriate conditions within a warehouse environment.
- Develop and adhere to standard operating procedures to ensure operational consistency and safety.
- Accurately manage and utilize documents related to health, safety, and security compliance

Module Structure

Session 1: Health, Safety and Security Procedures

Session 2: Appropriate and Safe Conditions at Warehouse

Session 3: Standard Operating Procedures

Session 4: Documents of Health, Safety and Security

Session1: Health, Safety and Security Procedures

Occupational Safety and Health Administration (OSHA) revealed that the "Fatal *injury rate for the warehousing industry is higher than the national average for all industries."* In their processes warehouse ensure health, safety and security of their personnel to safeguard proper working conditions, to follow the regulatory guidelines and create a safe environment as risk of injury is very high.

Concept of Health Safety and Security

As the workers operate heavy equipment like heavy pallets, forklifts and trailers on elevated platforms there is a constant risk of slipping, hit, run, fall, trips while working. Many times they are exposed to hazardous chemicals which spill, fume or leak resulting in serious health issues in long run. To prevent potential injuries warehouses compliant to health, safety and security and safety standards

Importance of Health, Safety and Security at Warehouse: The procedures related to Health Safety and Security is important as it;

1. Lowers down the danger of injuries while working.
2. Reduces the risk of theft, pilferage, burglary, flooding, vandalism, fire, earthquake etc.
3. Reduces overall cost.
4. Ensures optimum utilization of time

5. Reduces maintenance of machines.
6. Reduces stress of owners and employees.
7. Reduces the inventory loss.
8. In safe environment workers become more productive.

PRECAUTION IN AREA OF OPERATION (CFS AND ICD)

Container Freight Station (CFS) is type of warehouse which specializes in packing of cargo batches which is termed as Consolidation and removal of cargo batches from container termed as Deconsolidation. Inland Container Depot(ICD) provides a storage facility to containers at a place away from the major port. They are used by companies to ship containers may be before or after transporting them to major port (fig. 4.1 & 4.2).

Fig. 4.1: Container Freight Depot

Fig. 4.2: Inland Container Depot

Major precautions to be used in the area of operation of CFS and ICD are;

- Use of safety equipment like hydraulic lifts or fork lifts while raising the bulky products to avoid injuries.
- Reduce possible hazards related to safety like slipping and tripping, chemical, debris, stray cords, pits and cracks.
- Categorize and marking of Potential Hazard Zone signage /stickers.
- Labeling racks, materials, equipment to prevent severe injuries.
- Proper marking of emergency exits /safest routes.
- Regular training programs about the safety processes in case of emergency.
- Wear protective and suitable clothing like vests, masks, eyewear, hats, and gloves.
- Aware, alert and watchful behavior identifying blind spots.
- Follow safety protocols and guidelines at shelf, racks.
- Organize mock fire and safety drills.
- Regular maintenance of vehicles
- Proper ventilation at premises like usage of exhaust fans, chimneys

IMPORTANCE OF PPE IN CARGO

PPE or Personal Protective Equipment is a device or cloth which protects the operators at a warehouse from any potential threat which may expose them to any risk (fig. 4.3):

1. Prevent the casualties in case of inhalation, touch or absorption with any chemical or irritants.
2. Prevent accidents.
3. Improve health of employees.

4. It protects the hazards like falling of heavy objects, splash of liquid on skin, entry of any foreign particle in the eyes or exposure to loud noise.
5. **Helmets** provide cushions to sudden hard impact and avoid injuries caused by flames.
6. Gloves at while operating a cargo provides care of hands as fingers being delicate can be injured easily in the form of cuts.
7. At Cargo Goggles protect eyes from dust particles, UV radiation or liquid aerosol.
8. Suitable foot wear with grip and resistance to oil is required to protect operators handling cargo as they deal with heavy /sharp objects. Also reduce the exhaustion due to long standing hours.
9. Earplugs, earmuffs or helmet which has earmuff attached reduces noise and protect operator's health while handling cargo.
10. PPE in cargo has multiple pockets for keeping notebooks, record books and small equipment.

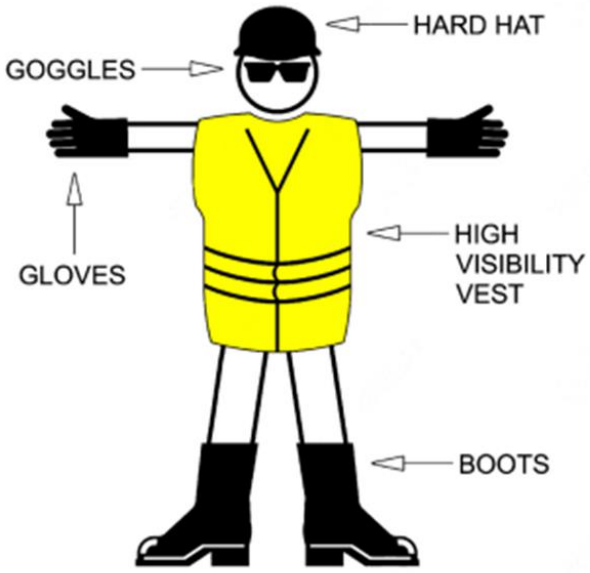


Fig. 4.3: PPE IN CARGO

11. Torch with appropriate beam helps operators in cargo in case of less visibility.
12. Safety Harness prevents the operators in cargo to fall.
13. Breathing apparatus is used in cargo in case of environment of inadequate oxygen.

IMPORTANCE OF PERIODICAL HEALTH CHECK UPS: Hit, Trips/Fall, Noise, dust, Heat/ cold, accidents, noise are common health hazard to an employee at a warehouse (fig. 4.4).

Fig.4.4: Periodic Health Check Ups

Periodic Health Check Ups are organised to;

1. Detect any medical issues or emergencies.
2. Identify potential risk factors.
3. Catch illnesses and symptoms before they begin to cause complications.
4. Develop and promote healthy life.
5. Reduce and prevent injuries related to rigorous work at warehouse.
6. Detect any occupational diseases or abnormalities at early stage so that timely cure can be initiated.
7. Reduces medical costs by arresting the problems at initial level.
8. Promote remedial action and preventive strategies for other workers.
9. Promotes health education and advice.
10. Cut absenteeism related to health issues.
11. Increases retention of employees and their productivity

Health, Safety and Security PROCEDURES reduce risk; enhance productivity and retention of employees at a warehouse.

Activities

Activity 1: Make note of all safety processes in different location (cargo loading area, ramp operation area, etc.) with reference to area of operation

Material /Resources required: Notebook/Pad, Pen/Pencil

Procedure:

1. Divide class in four groups.
2. Visit a warehouse
3. Visit different locations in warehouse and enquire about;
   a) Safety Precautions taken there
   b) Training Programs
   c) Safety processes they follow
   d) Periodic Health Check ups
4. Make notes based on your observations.
5. Discuss the learning with in group.
6. Exchange information from other groups.
7. Conclude the activity by mentioning the learning from the activity.

Activity 2: Prepare and demonstrate and wear all PPE

Material /Resources required: Coloured sheets, Scissors, Pen/Pencil

Procedure:

1. Divide class in groups.
2. Distribute Coloured sheets, Scissors, Pen/ Pencil
3. Every group has to make one PPE with the help of sheets, scissors pen/pencil
4. Demonstrate and display the importance of PPE
5. Make notes based on your observations.
6. Discuss the learning with in group.
7. Conclude the activity by mentioning the learning from the activity.

Activity 3: Undertake and record periodical preventive health checkup of students

Material /Resources required: Notes Pad, Pen/Pencil

Procedure:

1. Organize a preventive health check up
2. Note down the vitals
3. Repeat the activity every three months
4. Record the findings
5. Find out deviations
6. Discuss the changes, if any.
7. Discuss the importance of preventive and periodical health check ups
8. Relate it with the health checkups in a ware house.
9. Discuss the learning with the class.

Check Your Progress

A. Fill in the Blanks

1. Fatal injury rate for the warehousing industry is _____than the national average for all industries.

2. To prevent potential injuries warehouses compliant to health, safety and _____and _____ standards.
3. In safe environment workers become more_____
4. _____provides a storage facility to containers at a place away from the major port.
5. _____ is a device or cloth which protects the operators at a warehouse.

B. Multiple Choice Questions

1. Precautions used in CFS and ICD are**;**
   a) Categorize and marking of Potential Hazard Zone signage / stickers
   b) Reduce possible hazards related to safety like slipping and tripping.
   c) Regular training programs about the safety processes in case of emergency.
   d) all of the above
2. Which is "not" a part of PPE?
   a) Gloves
   b) Ear Plugs
   c) Nose ring
   d) Foot wear
3. Health, Safety and security measures at warehouse;
   a) Reduces the risk of theft, pilferage, burglary, flooding, vandalism, fire, earthquake etc.
   b) Reduces the inventory loss
   c) Reduces overall cost.
   d) All of the above
4. Which is not a purpose of periodic health checkups;
   a) Identify potential risk factors.
   b) Entertainment
   c) Develop and promote healthy life.
   d) Reduce and prevent injuries related to rigorous work at warehouse
5. CFS stands for;
   a) Consignment Freight Depot
   b) Container Freight Depot
   c) Consignment Freight Department
   d) Container Freight Department

C. State whether the following statements are True or False

1. Health, Safety and security measures ensure optimum utilization of time.
2. ICD or Inland container depot provides a storage facility to containers at a place near the major port.
3. At Cargo Goggles cannot protect eyes from dust particles, UV radiation or liquid aerosol.

4. Periodic health check-ups absenteeism related to health issues.
5. Removal of cargo batches from container termed as Deconsolidation

D. Match the Columns

	Column A		Column B
1	ICD	A	Specialised in packing cargo batches
2	Ear muffs	B	Prevent accidents
3	PPE	C	Inland container depot
4	CFS	D	Reduce Noise

E. Short Answer Questions

1. Define the concept of Health, Safety and Security in a warehouse.
2. What is CFS?
3. What is ICD?
4. What do you understand by PPE?

F. Long Answer Questions

1. Describe the importance of PPE in Cargo.
2. Elaborate the precautions to be taken care of in the ware house premises.
3. Describe the purpose of periodic health checkups in a ware house**.**

G. Check Your Performance:

1. Discuss the importance of Health, Safety and Security in a warehouse.
2. Prepare a report on the Periodic Health checkups.

Session 2: Appropriate and Safe Conditions at Warehouse

Safety is a prime condition in a warehouses as little bit of ignorance or negligence results in injuries, dangers, accidents and loss of life.

MEANING OF SAFE AND UNSAFE CONDITIONS

Safe conditions means following the safety rules and regulations in compliance with the industry standards. They are:

1. Appropriate PPE used by the operators
2. Incorporating signage's related to safety
3. Timely communication related to Hazards
4. Firefighting or prevention plan at place
5. Emergency exit plan.
6. Proper maintaining proper training calendar.
7. Proper ventilation.
8. Right placement of Charging stations (away from fire/smoke)

9. Proper handling, disposal and storage of chemicals.
10. Clear aisles and passageways
11. Proper placement and positioning of loads
12. Clear dock edges and right mechanism to support loads.
13. Fall protection system at place
14. Proper first aid and medical facility
15. Plan for action during any emergency.

Unsafe conditions arise when any of these conditions are not met. The results are electrical hazards, crushing, contaminated air, hearing loss, eye injuries, slips, falls, hits and serious accidents. Unsafe conditions, if observed, need to be reported immediately to the concerned authority (fig. 4.5).

Unsafe Working Environment -

- Slip or trip of the employee caused by spillages or wet floors.
- Uncovered power cords or hoses.
- Working overtime, much beyond scheduled hours can also cause accident due to fatigue.
- Lack of proper ventilation.
- Broken windows, damaged doors, defective plumbing and broken floor surfaces can cause accidents and affect work practices.
- No proper usage of PPE by the employees while carrying out warehousing activities. It is warehouse associate's responsibility to ensure that all the workers are using all the required Personal Protective Equipment (PPE) for safe working.

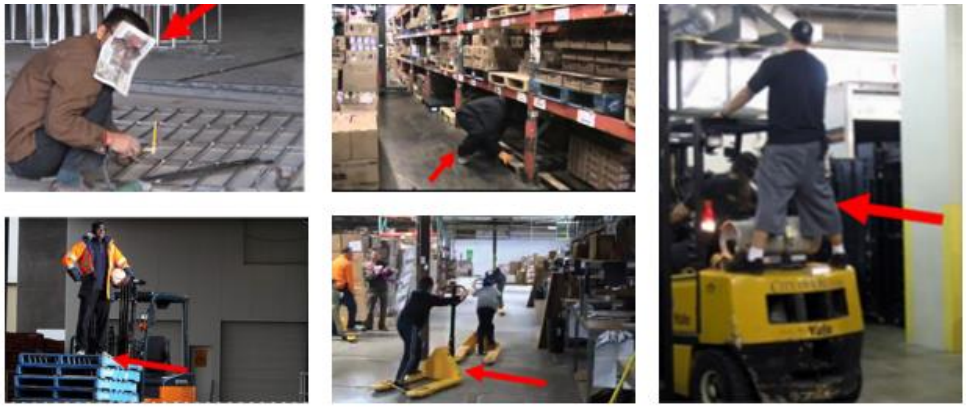


Fig.4.5: Unsafe Conditions at Workplace

Regular inspections of warehouse prevent many risks and hazards. A safety checklist, digital or manual, is powerful tool for evaluation of safe practices at warehouses.

Safety of Equipment: Safety of equipment create safe working environment and strengthen harmless behaviour at warehouses.

The safety concerns related to major equipment's are:

1. **Forklifts:** They are very important equipment used at warehouses. If not maintained they can cause serious accidents. Daily inspection of forklifts and training of operator is always recommended.
2. **Docks:** Warning signage's and mechanisms always reduce risks at loading docks.
3. **Conveyors:** Conveyors need to be maintained proper in regular intervals. To avoid entanglement at conveyors workers, use safeguarding equipment's.
4. **Vehicle safety:** Trained drivers need to deployed on vehicles which are regularly maintained.
5. **Fire alarms/smoke detectors:** Testing of fire alarms has to be done weekly and in most of the places smoke alarms is tested once very month.
6. **Pallets and racks:** To ensure safety of pallets and racks stacking height and recommended weight capacity has to be followed.
7. **Personal Protective Equipment (PPE):** It will serve the purpose only when maintained properly otherwise results in uncontrolled hazards.

Importance of Stacking, Ladders, Smoke Detectors, Tags, Labels and Signage's:

For smooth operations and maintenance of warehouse stacking, ladders, smoke detectors, tags, labels and signage's are used. Their importance in warehouse operation is (fig. 4.6):

1. Stacking: At warehouse all the material which are stored in tiers has to be stacked in blocks, interlocked and placed in a secured way to avoid sliding, tripping or falling. It helps to;

   a) Increase capacity of warehouse
   b) Reduce damage of products
   c) Allows easy transportation
   d) Makes warehouse operations more flexible.

2. Ladders: It is important as it provides flexibility of usage, easy access anywhere at warehouse and helpful in accomplishing many necessary tasks of the day.

3. Smoke detectors: In case of fire, smoke detectors help in timely exit from the premises preventing any mishap and facilitate easy exit.

4. Tags: Tags are used in warehouses appropriately track and identify the assets and inventory. Warehouse nameplates or tags offer long lasting labeling and identification.

5. Labels and signage's: Signage's create a productive, secure and safe environment.

Fig. 4.6: Label at Warehouses

A barcode label/plate is attached to the packages or stored products and is used in tracking. In a warehouse labelling ensures automation in picking of product, and control over assets.

IMPLEMENTATION OF 5S AT Warehouse: It is a practice designed by Japanese companies for creating a well-organized warehouse resulting in better utilization of resources along with saving of time and money (fig. 4.7).

Following are the benefits of implementation of 5S in a warehouse:

1. It makes a warehouse neat and clean
2. It Improves warehouse productivity
3. It Improves the work quality
4. It saves the operation costs of warehouse.
5. It improves Delivery Performance
6. It Improves all aspects related to safety.
7. It helps in elimination of waste.
8. It improves morale of ware house staff.

Fig.4.7: 5S at Workplace

5S is implemented in these steps;

1. **Sort or Seiri:** Discard all the items that you no longer have any use for to clear valuable space for incoming materials or products in need of storage. Keep only what you need and set priorities through processes like FIFO (First in First Out)

or LIFO (Last in First Out). With the help of red tapes red tag boards and/or equipment tags.

2. **Seiton /Set in right order/Stabilize/Straighten**: It helps in organ sing or streamlining the warehouse. It is important to eliminate waste taking time and resources in mind so that waste can be eliminated. The tools used in seitonare:
   - Warehouse signs in the form of instructions and reminders
   - Markers on floor and aisle to improve and help the foot traffic
   - Inventory tags and Labels to identify the right content at the right time

3. **Seiso or Shine:** It helps in maintaining good housekeeping in the warehouse. Any spills or leaks has to be attended to avoid any hazard.

   The tools used are; It's important to maintain cleanliness in the facility to be able to clearly evaluate where efficiency is lacking with the help of
   - Janitorial supplies which incorporate industrial cleaning supplies
   - Spill kits.

4. **Seiketsu** or **Standardize**: It helps in implementing the new system and consistent with performance so that efficiency can be improved with the help of:
   - Work manual to document the standards which are to be implemented.
   - Regular training programs which includes team building as well as technical trainings to handle chemical spills, equipment breakdown or emergencies
   - Work Posters and charts/videos

5. **Shitsuke or Sustain:** It helps in evaluation of newly incorporated standards with help of
   - Surprise inspections
   - Constant evaluation

5S is endless, regular and continuous striving for perfection.

STANDARD DRIVING PRACTICE

At warehouses there is a constant risk while driving lift trucks or forklifts or any other vehicle. Standard driving Practices are followed to prevent crush or impactful accident. It includes (fig. 4.8):

1. Only adults (aged above 18) with practical training and valid license are allowed to drive vehicles at warehouse.
2. Drivers have to maintain the speed limits.
3. Reversing with in premises has to be avoided without proper help and visibility support. One-way routing system is always better.
4. Visibility has to be maximized in premises. While driving mirror should be set at proper angle and the staff has to be trained to look both the ways before or while leaving the aisle.
5. Zero Tolerance rule is there for dangerous driving. Racing in any case has to be avoided.

6. Aisles has to be free of any obstructions. Any disposal of packaging materials
7. Regular maintenance and inspection of all the vehicles is by a trained and certified professional.

Fig. 4.8: Vehicle Inspection at the Dock

8. Driver are provided checklist which has to be filled daily. It includes seal inspection, warning lights, deflated tyros, strange noises, faulty seatbelts etc., (fig. 4.9).

Fig. 4.9: Vehicle seal Inspection

9. Safety signs and notices are incorporated to caution the drivers tower seat belt, watch pedestrians etc.
10. Floor has to be maintained not too steep or sharp in order to avoid overturning or any probable vehicle damage.

In last step before unloading of goods from vehicle/container, receiving supervisor finally inspects stack of goods in vehicle and check for potential damage causing pointers like wet vehicle floor, dusty floor, damaged corner cartons etc.

Activities

Activity 1: Prepare a Chart on Safe and unsafe conditions in a warehouse

Material /Resources required: Coloured pencils, Drawing sheets

Procedure:

1. Divide the class in three groups
2. Assign a title/topic for chart preparation to each groups
3. Complete the chart mentioning the salient features related to Safe and unsafe conditions in a warehouse.
   a) Warehouse Security Cameras
   b) Warehouse Lighting
   c) Alarm Systems
   d) Security Patrols
   e) Access Control Systems and Security Cages
   f) Inventory Tracking
   g) Entryway Security Doors
   h) Window Security
4. Discuss learnings within the group
5. All the groups explain the chart one by one.
6. Conclude the activity by mentioning the learning from the activity.
7. Teacher should display that chart in class.

Activity 2: Visit Logistics Laboratory and Demonstrate the importance of Stacking, ladders, smoke detectors, tags, labels and signage

Material /Resources required: Notes pad, Pen/Pencil

Procedure:

1. Visit the logistics laboratory
2. Observe stacks, ladders, smoke detectors, tags, labels and signage
3. List out 10 different products and note down its maximum height of the stacking items or boxes in meters
   a) Cement Bags: Maximum Stacking Height: 1.5 meters
   b) Soda Cans: Maximum Stacking Height: 2.5 meters
   c) Cardboard Boxes (lightweight): Maximum Stacking Height: 4.0 meters
   d) Wooden Pallets: Maximum Stacking Height: 6.0 meters
   e) Plastic Bottles: Maximum Stacking Height: 3.0 meters
   f) Milk Crates: Maximum Stacking Height: 1.8 meters
   g) Brick Piles: Maximum Stacking Height: 1.0 meters
   h) Steel Drums: Maximum Stacking Height: 2.4 meters
   i) Glass Bottles: Maximum Stacking Height: 1.2 meters
   j) Paper Rolls: Maximum Stacking Height: 2.0 meters
4. Prepare notes in the pad.
5. Demonstrate the topic.

6. Make notes based on your observations.
7. Discuss the learning with in group.
8. Conclude the activity by mentioning the learning from the activity.

Activity 3: Perform Role Play on Standard Driving Practice and 5 S at the work place

Material /Resources required: Notes Pad, Pen/Pencil

Procedure:

1. Divide the class in groups
2. Assign each groups one topic for role play
3. In the class perform role play on Standard driving practice and 5 S at work place.
   - **a)** Pre-Trip Inspection
   - **b)** Obeying Traffic Laws
   - **c)** Defensive Driving
   - **d)** Maintaining Safe Speed
   - **e)** Proper Signaling
   - **f)** Safe Following Distance
   - **g)** Regular Vehicle Maintenance
   - **h)** Use of Seat Belts
   - **i)** Avoiding Distractions
   - **j)** Handling Adverse Conditions
4. 5S at Workplace
   - **a)** Sort (Seiri)
   - **b)** Set in Order (Seiton)
   - **c)** Shine (Seiso)
   - **d)** Standardize (Seiketsu)
   - **e)** Sustain (Shitsuke)
5. Teacher should give suggestion for role play performed by students.
6. Ask students to prepare report and submit it to your teacher.

Check Your Progress

A. Fill in the Blanks

1. At warehouses there is a constant _____ while driving lift trucks or forklifts.
2. _____ helps in evaluation of newly incorporated standards.
3. _____ are used in warehouses appropriately track and identify the assets and inventory.
4. To ensure safety of pallets and racks _____and recommended _____ has to be followed.

5. _____ need to deployed on vehicles.

B. Multiple Choice Questions

1. Which one is not a major equipment used in warehouse;
   a) Fork lifts
   b) Conveyors
   c) Mikes
   d) PPE
2. Which of these are Safe conditions in the ware house;
   a) Timely communication related to Hazards
   b) Firefighting or prevention plan at place
   c) Emergency exit plan
   d) All of these
3. Uncovered power cords or hoses' come under
   a) Safe conditions at warehouse
   b) PPE at warehouse
   c) Unsafe conditions at warehouse
   d) None of these
4. For easy tracking at warehouses we use;
   a) Signage
   b) Tags
   c) Stacks
   d) Smoke detectors
5. Maintaining good housekeeping is;
   a) Seiso
   b) Seiton
   c) Sort
   d) Shitsuke

C. State whether the following statements are True or False

1. Drivers have to maintain the speed limits in the warehouse.
2. Seiso helps in organasing or streamlining the warehouse.
3. 5 S is designed by French companies.
4. Signage create a productive, secure and safe environment.
5. Warning signage's and mechanisms always reduce risks at loading docks.

D. Match the Columns

	Column A		**Column B**
1	Clear aisles	**A**	Smoke detectors
2	Fire	**B**	Label
3	Fragile	**C**	Spill Kits

4	Seiso	**D**	Safe Condition

E. Short Answer Questions

1. Define Safe conditions in the warehouse
2. What is the use of ladders and stacks in the warehouse?
3. Why safety of equipment's is important?
4. What is the importance of labels in a warehouse?

F. Long Answer Questions

1. Describe 5 S in the ware house. Discuss its importance.
2. Compare and explain safe and Unsafe conditions in a warehouse
3. Explain the safety concerns of the equipment's.

G. Check Your Performance:

1. Discuss the importance of 5S at a work place.
2. Prepare a comparative chart between Safe and Unsafe conditions.
3. Explain standard driving practice in a warehouse.

Session 3: Standard Operating Procedures

Hazardous material is one which is capable of producing effects such as fire, explosion, and sudden release of pressure and may cause acute health effects like burns, injuries, convulsions or even organ damage. In spite of several challenges hazardous material is required in various stages of manufacturing and stored in a warehouse.

DANGEROUS AND HAZARDOUS GOODS

Hazardous materials are generally assigned to one or more of the following classifications (fig. 4.10).

1. Flammable Liquid - Liquids having FP (Flash Point) under 37 degrees Centigrade.
2. Combustible Liquid - Liquid having FP (Flash Point) from 37 to 94 degrees Centigrade and the liquid produces enough vapors to ignite if exposed to an ignition source.
3. Flammable Solid - any substance which can cause fire.
4. Oxidizer - Any substance which freely yield oxygen and result in fire.
5. Corrosive - Any substance which can destroy or damage any other substance.
6. Organic Peroxide – It is reactive, toxic and can cause decomposition.
7. Poison – Any substance which can present a risk to health /life.
8. Compressed Gas – It is in liquid /gas form in a vessel. It includes lecture bottles, cylinders, aerosol cans which may be either flammable or poisonous.

9. Cryogenics – Any Substance which are exceptionally cold like liquid nitrogen, liquid helium or dry ice and may cause suffocation in case of non-ventilation.
10. Radioactive - any material having a specific activity greater than 0.002 micro curies per gram (u ci/g).
11. Biomedical - tissues, organs, and blood from humans and primates.

Fig.4.10: Hazardous Material and Goods

HANDLING DANGEROUS AND HAZARDOUS GOODS

For handling hazardous material in the warehouse:

a. **Have the right procedures and that works according to the current regulations** Procedures are made to ensure that following requirements are met in the warehouse

- The requirements for safety
- To prevent cargo damage,
- To ensure correct and punctual delivery of goods from warehouse.

Meeting all of these requirements make PROCEDURES right. Ensure the warehouse is operating the right PROCEDURES for cargo and organization requirements.

b. Staffs needs to be certified for handling dangerous goods

The transport and storage of hazardous goods is a difficult practice. It requires thorough knowledge and understanding of the regulations.

The people in the warehouse need to the have the knowledge and skills for dealing with the transportation and security of hazardous materials/dangerous goods -

Only proper trained staff is able to successfully apply rules concerning the transport and storage of dangerous goods. Trained staff with the right knowledge and skills knows about the risks involved and how to work with these risks. Without training it is extremely difficult to achieve a detailed understanding of the regulations.

c. Separate storage of Hazardous goods according to classification

Many of the dangerous goods are not compatible. They have to be stored and handled separately. Warehouses use a barrier or distance to avoid any problem.

d. Documentation should be up-to-date and available to staff at all locations

STANDARD OPERATING PROCEDURE OF WAREHOUSE ACTIVITY

Standard Operating Procedure: for a warehouse is carried out in these activities (fig. 4.11):

i. Warehouse receiving starts with incoming inventory at warehouse
ii. Received goods are matched with the purchase order
iii. Quality Checking of the incoming goods
iv. Initiation of returns
v. Classification of items and storage
vi. Documentation and proper reporting
vii. Maintenance of warehouse
viii. Initiation of fulfillment at the right time
ix. Labeling and Packing
x. Coordination of Logistics
xi. Check for any un approved/unauthorized exit

Along with it following checks are done;

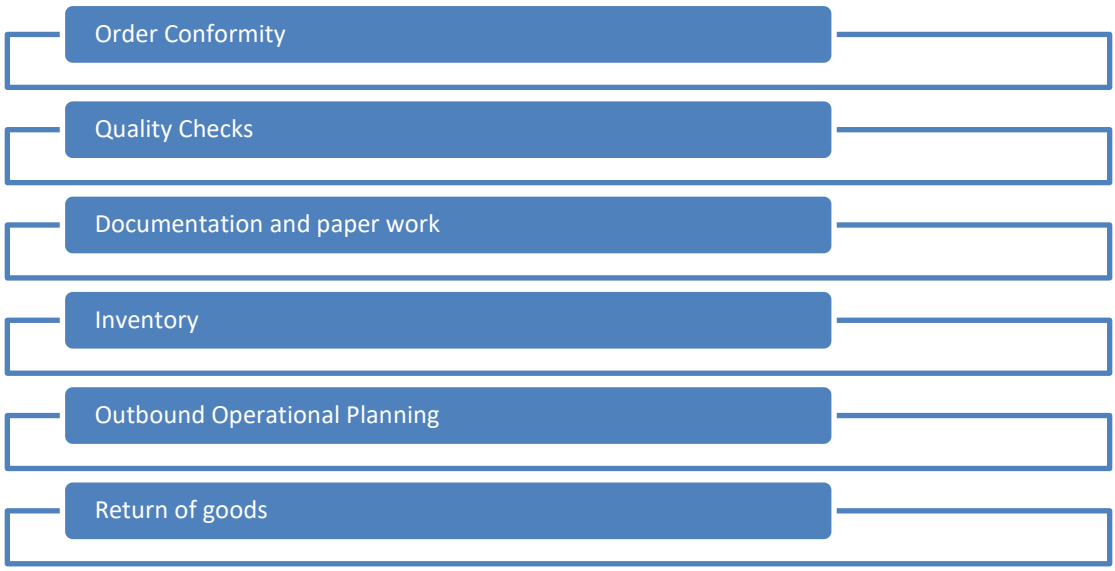


Fig.4.11: Procedure: of checks at warehouse

STANDARD MATERIAL HANDLING PROCEDURE: Materials handling comprises of packaging, moving and storing of the materials in the warehouse.

Standard material handling procedure results in increase output, maximize productivity, control costs, and maximize productivity. It involves (fig. 4.12):

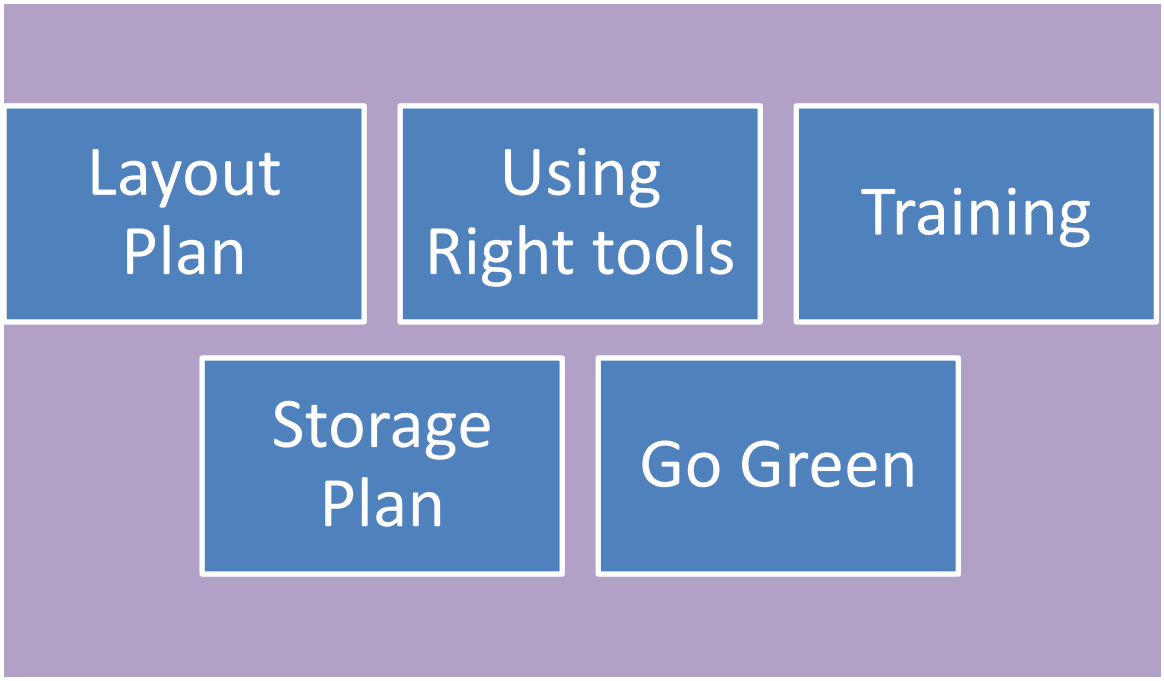


Fig. 4.12: Material Handling Procedures at a Warehouse

1. **Layout plan:** Following things in mind are kept while planning a layout for material handling;
   a) Smooth functioning
   b) Minimize risk of safety
   c) Maximizing space
2. **Using right equipment/tools:** Selecting right tool during loading/unloading /transportation.
3. **Training:** Training program for automation and up gradation of material handling PROCEDURES at warehouse.
4. **Storage plan**: Keeping following things in mind;
   a) Ease of access
   b) Reduce injury
   c) Reduce overhead
   d) Reduce material damage
5. **Go green:** In material handling it is important to follow ecological balance;
   a) Recycle of equipment
   b) Reusable Packaging
   c) Returnable containers
   d) Reducing fuel consumption
   e) Go digital to avoid paper work.

HEALTH RISK SAFETY AND SECURITY PROCEDURES

Warehousing with its whole range of activities can result in various hazards and risks of slips, trips, fall, fire, harmful substances. To avoid these risks following Safety and security PROCEDURES are maintained (fig. 4.13):

A. Vehicle safety

When forklifts and reach trucks are used in the warehouse, it is essential to prevent any injury due to impact or crush. It is observed that most of the times the accidents happen while reversing.

Fig. 4.13: Rules for Forklift Safety

Following are some of the safety PROCEDURES for using Forklifts: **Slips, Trips, and Falls**

Various reports indicate slips and falls are the single biggest reason for work related injuries across the world. To prevent slips, trips, and falls, company should follow the tips mentioned (fig. 4.14):

Fig. 4.14: Rules for Slips

B. Lifting

Lifting can be done both manually and using MHE. Both the situations pose safety hazards if not done properly (fig. 4.15).

To minimize lifting risks, Company should follow the tips mentioned

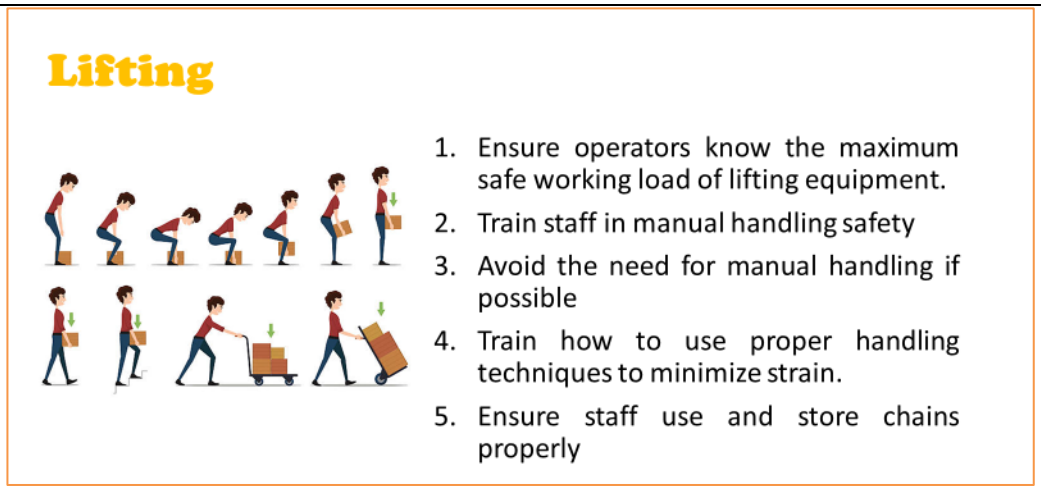


Fig.4.15: Rules for Lifting

C. Fire Safety

Fire is the biggest hazard warehouse faces. Along with loss of valuable material stored in the warehouse, Fire can even lead to injuries or fatalities to the people working there

(fig. 4.16).To maintain fire safety, company should follow the tips mentioned

Fig. 4.16: Rules for Fire Safety

D. **Charging Stations**

Charging stations in warehouse facilities are used to recharge forklifts, BOPT and other power equipment. If proper guidelines are not followed, fires and explosions can occur(fig. 4.17).

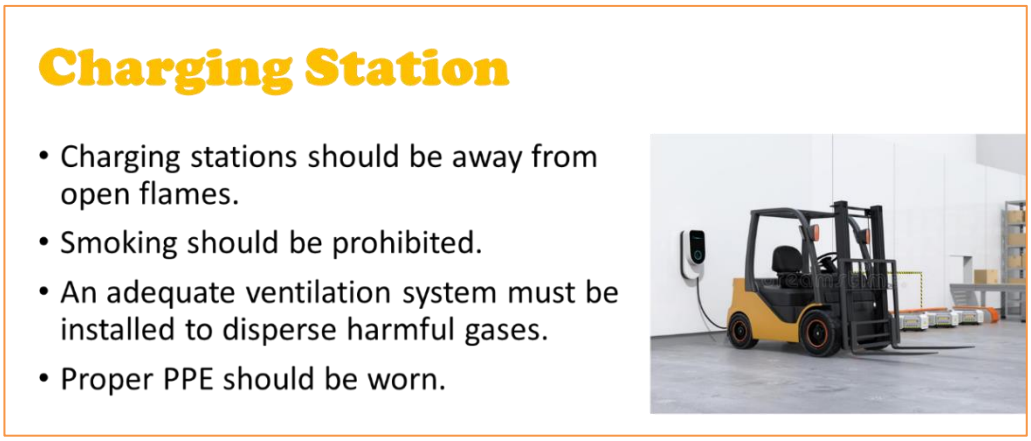


Fig. 4.17: Rules for Charging Stations

E. **Conveyors:** They are used in warehouses to move goods within the premise. There is constant risk of being jammed in the equipment or struck by any falling object. To remain safe, it is important to (fig. 4.18):

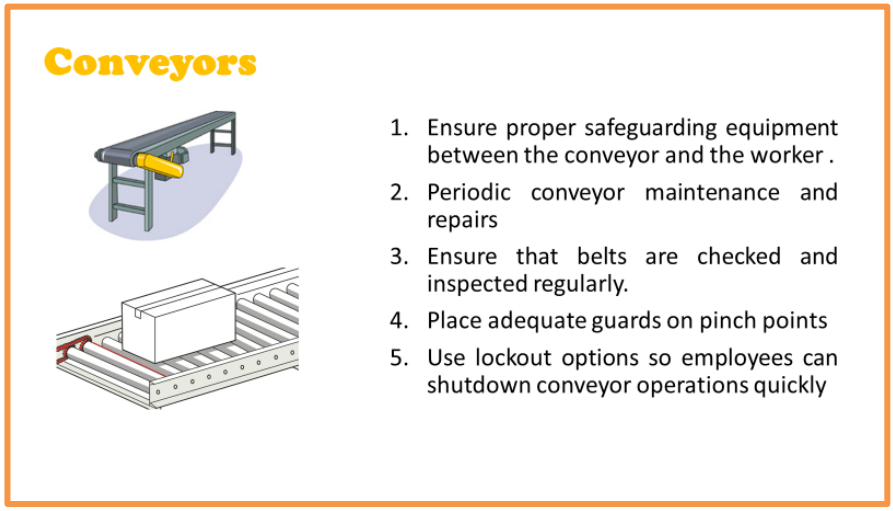


Fig. 4.18: Conveyors

F. **Docks**

Warehouses use docks to load and offload material from the trucks. The hazards that exist with docks include driving forklifts off docks and equipment accidents involving products improperly placed that fall on employees. They use the PROCEDURES of security like creating a green gate at ports/custom area/factories where all security checks are done(fig. 4.19).

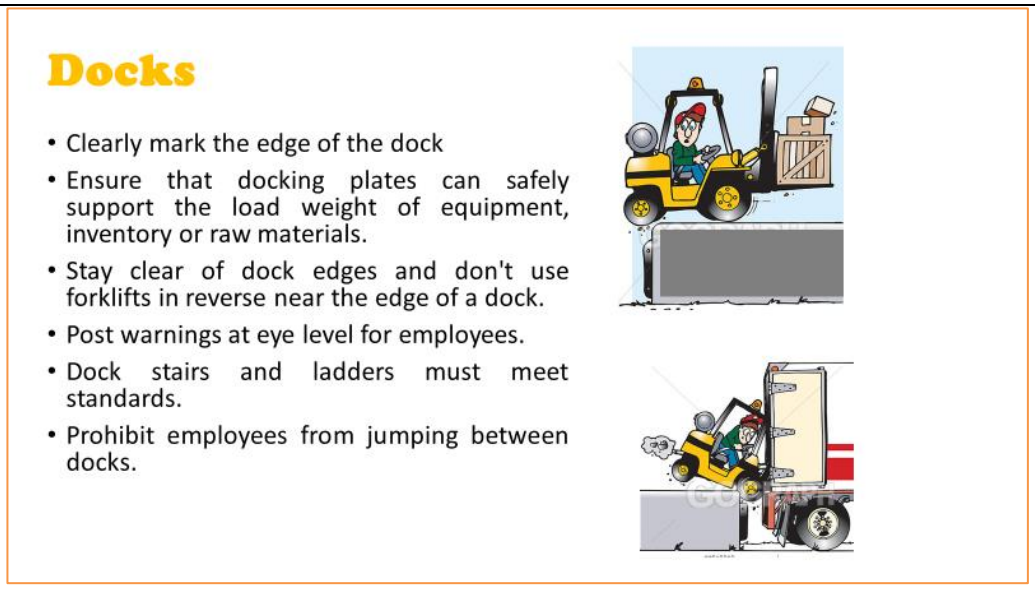


Fig.4.19: Docks

Besides the above precautions, two important points in safety are usage of PPE and employee training.

G. Personal Protective Equipment

Employees need to wear PPE all the time while working in the warehouse. If PPE is not worn and an accident occurs, it can lead to serious injuries or even fatalities.

I. Training to Staff

Sense of awareness about safety is the most important factor in safety implementation. Most of the companies run formal safety training programs where all safety related measures are explained and formally practiced. There are regular refresher courses to further reinforce the concept of safety.

- Ensure that all employees are trained and carry up to date knowledge on safety procedures
- Employee should be educated about the consequences which originate by following unsafe work practices
- Any employee not following safety procedures should be strongly dealt including terminating services if required.
- All the staff should be well aware to avoid the accident.
- Companies may implement incentives for zero-accidents and zero near-misses.

DATA SAFETY REGULATIONS

Warehouse is the repository of several important data and information. All inward movement, outward movement and stock information are recorded in the warehouse. Warehouse carries information about the pricing of the products, the discount structure, the sales numbers, stock data and several other vital information. All these information needs to be protected and should be in the right hands only(fig. 4.20).

Fig. 4.20: Data Safety Regulation

Information security's primary focus is the balanced protection of the confidentiality, integrity and availability of data while maintaining a focus on efficient policy implementation all without hampering organization productivity.

Following are some of the steps which can be used to protect the data(fig. 4.21):

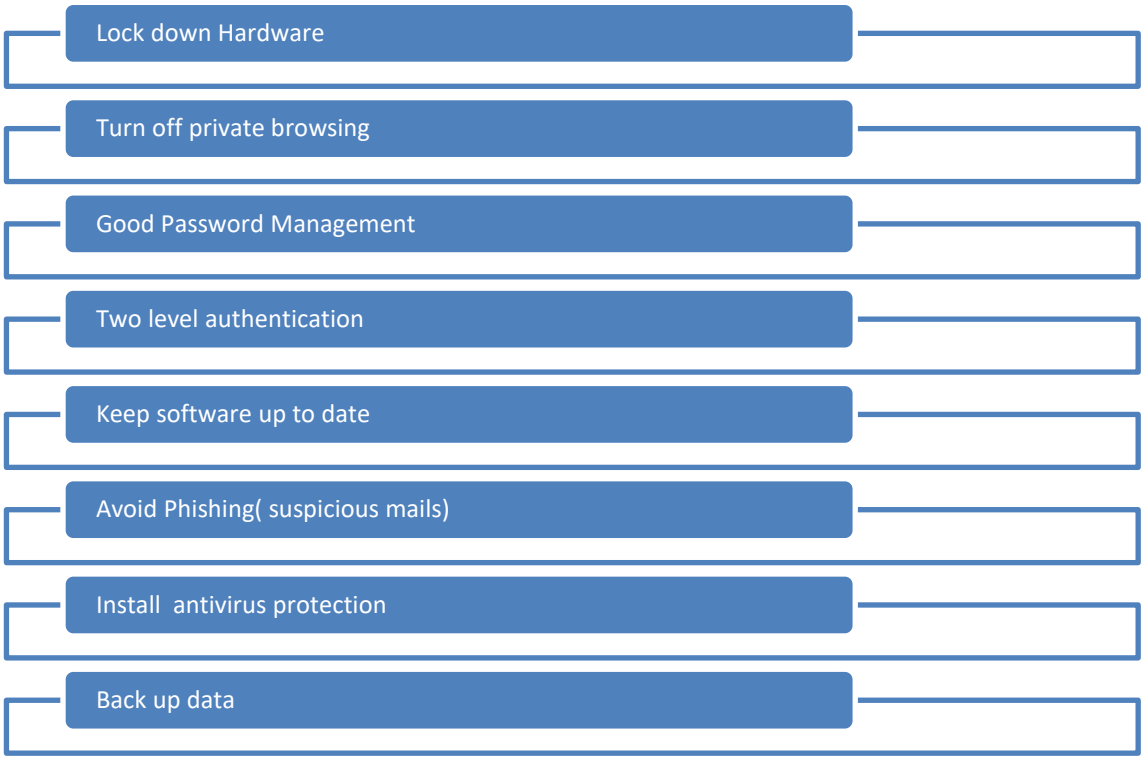


Fig. 4.21: Data Protection

Data safety is achieved by blocking all the private sites or browsing at office, managing password and changing it at regular intervals. The authentication of data access is done at two levels keeping software up to date. There should be junk folders for suspicious mails and antivirus need to be active all the time. A protocol for data backup has to be established.

STANDARD PROTOCOL IN EMERGENCY

In ideal warehouse should try to prevent accidents from happening as far as possible. Despite all precautions, if accidents still occur, following action needs to be taken.

When Incident takes place-

1. Take control at the scene and try to restore order.
2. First aid and emergency calls. Provide immediate assistance to the injured; else call for help. Caring for injured personnel is the top priority.
3. Stop people from getting hurt for example In case of any spills other employees need not pass by.
4. Identify people and conditions on the scene. The people are the witnesses to the event.
5. Keep material evidence. Protect the scene and control access again.

Once the immediate emergency is stabilized, the following measures must be taken:

1. Assess how much damage is, how severe it can be, and that you need additional resources to investigate.
2. Make proper notifications. Make sure senior management is aware. Also call the affected families, any regulatory agencies you need, and your insurance companies.

Other Actions

1. The initial report should be completed and submitted for all assessments within 24 hours of the accident.

Subsequent reports, including recommended actions, should be finished within 48 hours and 30 days.

Finally

1. If an accident occurs, it is best to follow a written Procedure: and learn about the process from staff and management.

The learning from the incident and how to prevent it in future should be clearly documented (fig. 4.22).

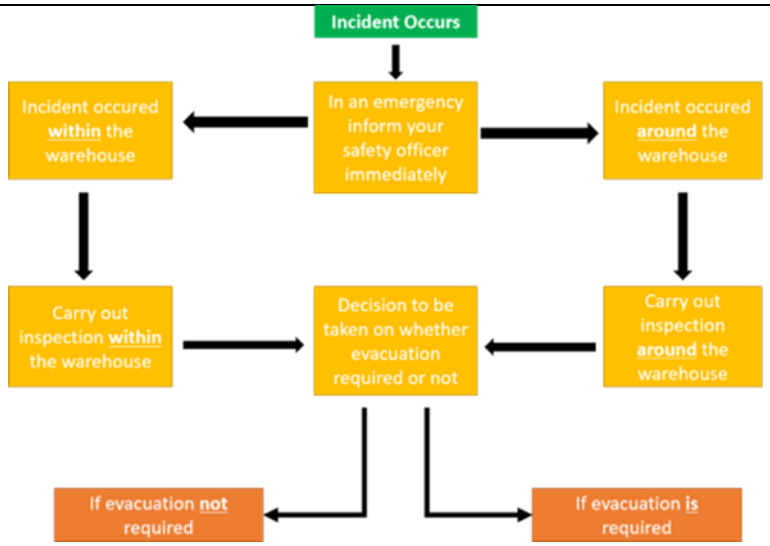


Fig. 4.22: Implementation of Standard Protocol in Case of Emergency

CONCEPT OF ESCALATION MATRIX

Escalation matrix is a system or document that outlines when an escalation of a problem /issue has to happen with delegating the responsibility of handling(fig. 4.23).

Type of Escalation	1st Escalation Level	2nd Escalation Level	3rd Escalation level
Scheduling			
Quality			
Material Handling			
Logistics			
Health			
Safety			
Security			

Fig. 4.23: Escalation Matrix

At warehouses escalation happens in three ways(fig. 4.24):

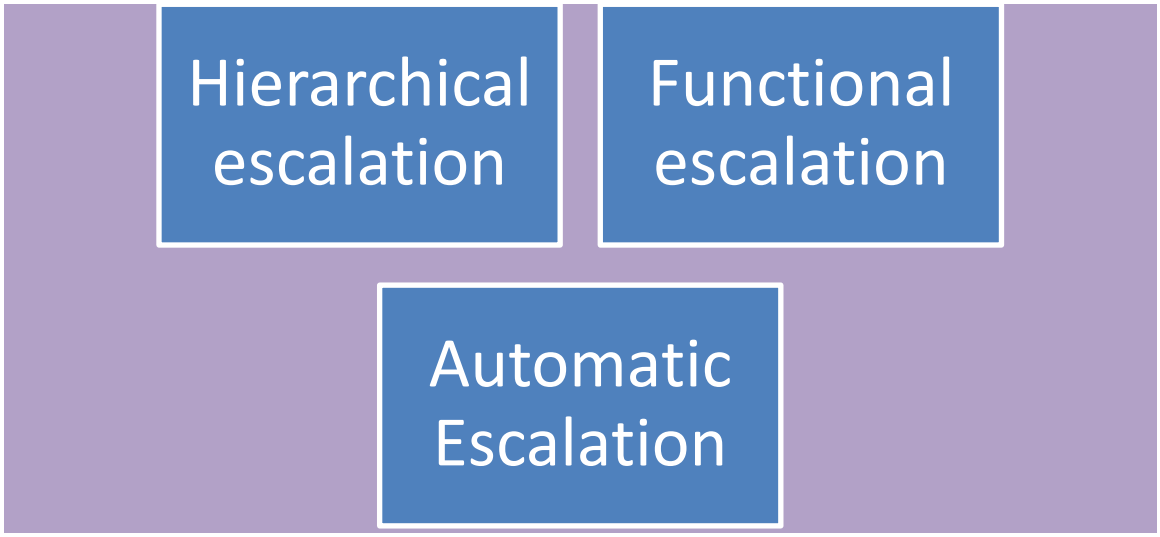


Fig. 4.24: Types of Escalation at Warehouse

1. **Hierarchical Escalation:** The problem or issue is escalated to more senior / experienced person.
2. **Functional Escalation:** The issue is escalated to more skilled employee with better technical knowledge or system knowledge.
3. **Automatic Escalation:** The issue is solved with the help of tool or software.

Activities

Activity 1: Prepare a Quiz on Standard Operating procedures

Material /Resources required: Colored pencils, Drawing sheets

Procedure:

1. Divide the class in four groups named A, B, C and D.
2. Ask Question related to Standard Operating procedures covering all topics.
3. Allot time to each question and award 10 points for every right answer.
4. Pass the question, if any team is not able to answer and award 5 points.
5. Final tally the points of each team.
6. Declare the winner
7. Discuss learning with the class
8. Conclude the activity by mentioning the learning from the activity.

Activity 2: Prepare a Chart Preparation on Dangerous and Hazardous Groups
Material /Resources required: Colour pencils, Drawing sheets

Procedure:

1. Divide the class in four groups.
2. Assign a title/topic for chart preparation to each group
3. Complete the chart mentioning the salient features related to on Dangerous and Hazardous

a) Classification and Labelling
b) Storage Requirements
c) Handling Procedures
d) Personal Protective Equipment (PPE)
e) Transportation Guidelines
f) Emergency Response Plans
g) Training and Certification
h) Legal and Regulatory Compliance
i) Risk Assessment and Mitigation
j) Monitoring and Reporting

4. Discuss learning within the group
5. All the groups explain the chart one by one.
6. Display Chart in the class
7. Conclude the activity by mentioning the learning from the activity.

Activity 3: Group discussion on health risk safety and security procedures

Material /Resources required: Notes pad, Pen/Pencil

Procedure:

1. Create groups in the class
2. Start discussions on Health risk safety and Security procedures in a warehouse.
   a) Hazard Identification and Assessment
   b) Safety Training and Education
   c) Use of Personal Protective Equipment (PPE)
   d) Emergency Exits and Evacuation Plans
   e) Fire Safety Measures
   f) Chemical Spill Response Procedures
   g) Security Access Controls
   h) First Aid and Medical Services
   i) Regular Safety Audits and Inspections
   j) Incident Reporting and Investigation
3. Discus the safety aspects at all points at a warehouse
4. Make notes and important points
5. Discuss learning in the class

Activity 4: Perform Role Play on Standard Protocol in Emergency

Material /Resources required: Notes Pad, Pen/Pencil

Procedure:

1. Divide the class in groups
2. Create a situation of emergency in a warehouse
3. Demonstrate through role play the actions deployed at the time of incident and after that.

a) Immediate Threat Assessment
b) Activation of Alarm Systems
c) Evacuation Procedures
d) Communication with Emergency Services
e) First Aid Administration
f) Containment of Hazardous Materials
g) Headcount and Accountability
h) Emergency Response Team Coordination
i) Post-Emergency Debriefing
j) Review and Update of Emergency Plans

4. Make notes of the important points and learning from role play.
5. Ask students to present their views.
6. Discuss the learning with the class.

Activity 5: Demonstrate Security procedures

Material /Resources required: Notes pad, Pen/Pencil

Procedure:

1. Divide the class in groups
2. Make a list of security procedures at premises and/or data security, security procedures like
   a) green gate in port
   b) customs area
   c) factory security
   d) data safety regulations etc.
3. Demonstrate the procedures.
4. Allow other groups to ask questions
5. Ask for suggestions for any other security action which is left.
6. Discuss learning with the class.

Check Your Progress

A. Fill in the Blanks

1. Ideal warehouse should try to _____ accidents.
2. Data safety is achieved by implementing _____ measures and changing it at regular intervals.
3. Warehouses use_____ to load and offload material from the trucks.
4. Many of the dangerous goods are not allowed for _____ without proper authorization.
5. Any substance which can cause fire is called _____.

B. Multiple Choice Questions

1. Liquids having FP (Flash Point) less than 37 degrees Centigrade is called;
   a) Flammable Liquid

b) Combustible Liquid
c) Poison
d) Oxidizer

2. SOP of warehouse activity includes;
   a) Initiation of returns
   b) Classification of items and storage
   c) Maintenance of warehouse
   d) All of these
3. Storage plan does not include;
   a) Ease of access
   b) Owner details
   c) Reduce injury
   d) Reduce overhead
4. Data safety is achieved by;
   a) Avoiding Phishing
   b) Password management
   c) Installing antivirus
   d) All of these
5. Which is a type of escalation at warehouse?
   a) Hierarchical Escalation
   b) Automatic Escalation
   c) Functional Escalation
   d) All of these

C. State whether the following statement is True or False

1. Data safety cannot be achieved by blocking all the private sites or browsing at office
2. In case of emergency taking control at the scene and restoring order is required.
3. Conveyors are used in warehouses to move goods within the premise.
4. Hazardous material is not required in various stages of manufacturing and stored in a warehouse.
5. Go green includes Reusable Packaging

G. Short Answer Questions

1. Define Dangerous and Hazardous goods
2. What do you understand by SOP of warehouse activities?
3. What is a lay out plan?
4. What do you understand by Vehicle safety?
5. Define the concept of Escalation matrix?

E. Long Answer Questions

1. Explain in detail the Standard Protocol in Emergency.
2. Explain in details Health Risk Safety and Security Procedure: in a warehouse.
3. How Dangerous and Hazardous goods are handled? Explain in details

F. Check Your Performance

1. Draw a chart of Dangerous and Hazardous Goods.
2. Demonstrate SOP of ware house and Material handling at a ware house
3. Discuss Health Risk Safety and Security procedures in a warehouse.

Session 4: Documents of Health, Safety and Security

Documentation is another vital part of warehousing operations. The way bank is the custodian of depositor's money; warehouse is also the custodian of the value in the form of inventory. Any loss to inventory is a loss of money.

DOCUMENTS OF HEALTH, SAFETY AND SECURITY

Warehouses prepare Safety Data Sheet (SDS) /Material Safety Data Sheet (MSDS) or Product Safety Data Sheet (PSDS). It is a document that contains information on safety and health protection when working with various substances and products (fig. 4.25).

Fig. 4.25: Scanning Safety Data Sheet

Safety data sheet (formerly known as material safety data sheet) contains information such as;

a. The properties of each chemical;
b. Risks to health and the environment;
c. Safety measures;
d. Precautions when handling, storing, and transporting the chemical;
e. Provides clues for each chemical
f. Personal protective equipment (PPE) required;
g. First aid procedures;
h. Spill cleaning Procedure:

All employees must be trained to read, understand, and access safety data sheets. The safety rules and procedures are mandatory to be followed specially in a hazardous cargo.

The staff in the warehouse should be aware of the cargo and goods that are stored at any minute. Having precautionary statements near the dangerous goods everybody knows the action to take when any emergency happens.

The most common ISO Certification used in warehouses are ISO 9001, ISO 14001, ISO 45001 and ISO 27001. It helps to develop systems like digitalization of warehousing management, the synchronization of processes –inbound /outbound and realization of order.

Among these ISO 45001 is a standard for occupational health and help in reducing work-related injuries, accidents and diseases.

CARGO SECURITY MANAGEMENT

Securing cargoes is the extreme importance activity at a warehouse as it may result in heavy losses, casualties' injury and in some cases loss of life at the warehouse or during loading or unloading /exit.

Cargo security management protects the stock from theft but also secures the containers against any unwanted incoming materials like drugs or bombs. These security concerns are multiplied at warehouses with very large storage capacity(fig. 4.26).

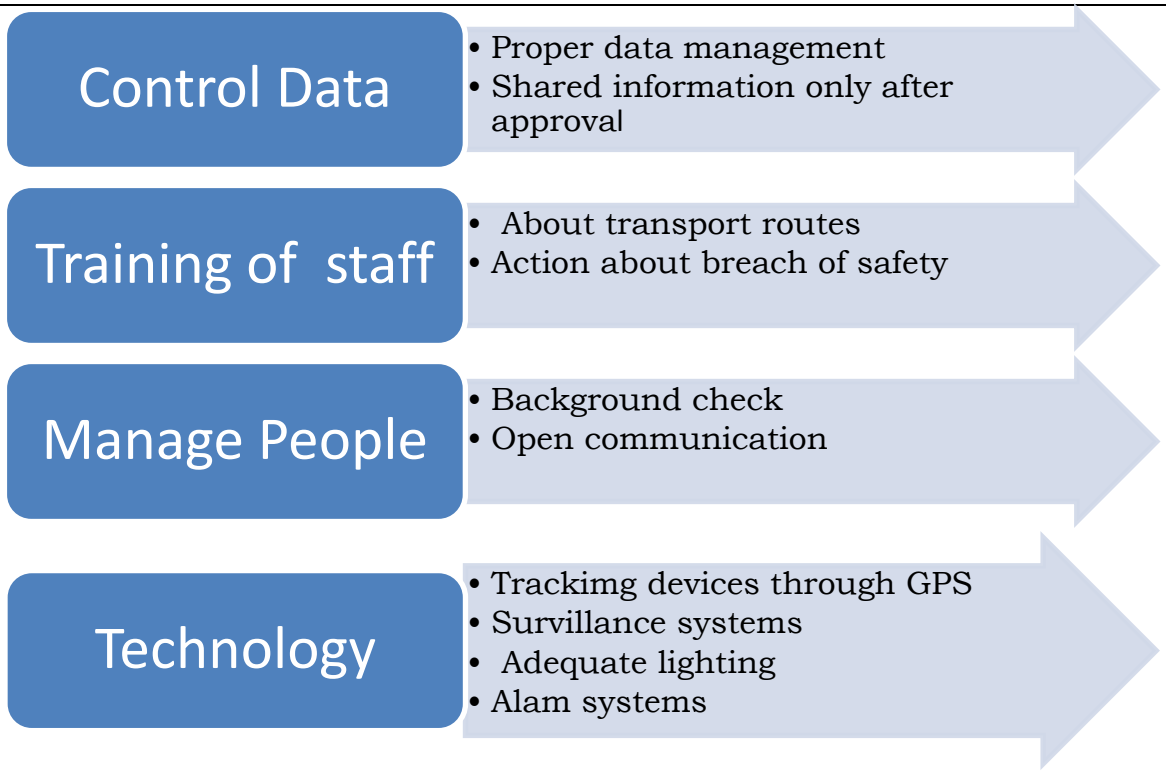


Fig. 4.26: Elements of Cargo Security Management

The targets of Cargo Security are achieved by Controlling data by authentication at the time of information sharing, Training of staff in the areas of transport routes and repercussions in the case of breach of safety. Managing people by recruiting right kind of staff with clean background and clearly communication of the safety policies and protocols. Technology helps managing cargo by updated surveillance systems, adequate lighting in the premises, modern alarm systems and GPS tracking.

LOADING INSTRUMENTS AND CERTIFICATES REQUIRED

The instruments and certificates required can vary greatly depending on the industry, the specific task at hand, and the regulations in your jurisdiction. It's important to check with the employer, industry regulations, and local authorities to ensure they have all the necessary instruments and certificates required for their specific job or task. Additionally, staying up-to-date with any changes in regulations or requirements is crucial to maintaining compliance and safety.

Material Handling Equipment (MHE): When it comes to Material Handling Equipment (MHE) for loading and unloading products, there are several options available depending on the type of products being handled, the layout of the facility, and the specific requirements of the task (fig. 4.27).

Name	Picture	Description
Hand Pallet Truck (HPT)		One of the most important equipment in the Warehouse. Used to lift and move pallet within the warehouse.
Battery Operated Pallet Truck (BOPT)		This is Battery Operated version of Hand Pallet Truck. Used in large warehouses for fast movement of Material.
Integrated Dock Levelers		Aids loading and unloading of goods by acting as bridge between truck and Loading Bay edge.
Forklifts		Another very important equipment in the Warehouse. A forklift is a powered industrial truck used to lift and move materials over short distances. It can pick up goods a height with HPT or BOPT cannot do.
Reach Trucks		Reach trucks are designed for 'reaching' extreme heights. They are used for highly racked warehouses for lifting of Pallets.
Stackers		Suitable for stacking, double pallet handling, order picking and horizontal transport. Available both in Manual and Electric version.
Chain Pulleys and Hoists		These are used to lift and lower heavy loads in the warehouse. Again, available in Electric of Manual versions.

Dollies		Used to move heavy equipment, boxes, and other bulky items within the warehouse.
Trucks		Can be made wooden, steel, aluminium, or plastic, used for movement within the warehouse.
Utility Carts		Movement of material like Garments and tools inside the warehouse.

Fig. 4.27: Loading Instruments

All the instruments should have fitness certificates at the time of operation. After security check of vehicle and consignment confirmation security office instructs transporter to place vehicle on warehouse dock (in some cases after halting at parking the placed-on dock). Once vehicle is place on dock, receiving supervisor first inspects the vehicle condition for potential damage because of water leakage and dust.

After vehicle inspection as second step supervisor go for vehicle seal inspection whether it is intact or not and also checks for seal number.

IMPORTANCE OF SECURITY CHECKS: Security checks are of prime importance in a warehouse and helps to:(refer fig. 4.28)

1. Prevent employee theft
2. Minimize monetary losses
3. Minimize stress to owners and employees
4. Reduce loss of inventory
5. Avoid situations of emergencies
6. Check damages in building
7. Check obstructions in the processes
8. Avoid fire situations
9. Check the hazardous substances
10. Check ventilation
11. Inspect the aisles
12. Check the record of quality checks

Fig. 4.28: Security Check List

Safety check list covers the type of risks and threats in a warehouse and helps to ensure that all the safety rules and regulations are followed**.**

Activities

Activity 1: Chart Preparation on Cargo Security Management and Documents of Health, Safety and Security

Material /Resources required: Colored pencils, Drawing sheets

Procedure:

1. Divide the class in groups.
2. Allot topic to a group.
3. Discuss in the class about the topic.
4. Ask them to prepare a chart
5. Prepare the chart mentioning the salient features related to the topic
6. Discuss learning within the group
7. Explain the chart
8. Display Chart in the class
9. Conclude the activity by mentioning the learning from the activity.

Activity 2: Conduct Group Discussion on Loading Instruments and Certificates required and Importance of security checks**.**

Material /Resources required: Notes pad, Pen/Pencil

Procedure:

1. Create groups in the class
2. Allot topics to the groups
3. Enlist the loading instruments and certificates required for it in your pad.
4. Prepare a list of safety and security procedures signage's realed to tags labels and signage's
5. Start discussions on the topics.
6. Discus the utility of each instrument
7. Discuss Importance of security check in a warehouse
8. Make notes and important points
9. Ask questions
10. Discuss learning in the class

Check Your Progress

Fill in the Blanks

1. _____is a vital part of warehousing operations.
2. _____security management protects the stock from theft.
3. Once vehicle is place on dock _____ First inspects the vehicle condition for potential damage.
4. _____includes the obstructions in the processes.
5. Technology helps managing cargo by updated _____systems.

B. Multiple Choice Questions

1. Use of Technology in Cargo systems involves;
   a) Tracking devices through GPS
   b) Surveillance systems
   c) Adequate lighting and alarm systems
   d) All of these
2. Safety data sheet does not include;
   a) Risks to health and the environment;
   b) Age group of owner
   c) Precautions when handling, storing, and transporting the chemical;
   d) Provides clues for each chemical
3. Which is used to move heavy equipment, boxes, and other bulky items within the warehouse?
   a) Utility Carts
   b) Chain pulleys
   c) Dollies
   d) Stackers
4. The importance of security check is;
   a) Minimize monetary losses
   b) Reduce loss of inventory

c) Avoid situations of emergencies
d) All of these

5. Which ISO stands for occupational health?
   a) ISO 9001,
   b) ISO 14001,
   c) ISO 45001
   d) ISO 27001

C. State whether the following statements are True or False

1. All employees must be trained to read, understand, and access safety data sheets.
2. Securing cargoes is the not at all important at a warehouse.
3. All the instruments should have fitness certificates at the time of operation.
4. Utility Carts are used for movement of material like Garments and tools inside the warehouse.
5. Alarm system is a part of Cargo management.

D. Match the Columns

	Column A		**Column B**
1		**A**	Integrated dock levelers
2		**B**	Hand pallet truck
3		**C**	Fork lifts
4		**D**	BOPT

F. Short Answer Questions

1. What do you understand by Documents of Health, Safety and Security?
2. How people are managed in Cargo security?
3. What are Utility Carts?
4. What is security check list?

G. Long Answer Questions

1. Explain in details loading instruments used in a warehouse.
2. Describe Cargo security management.
3. Explain Safety data sheet and importance of security checks

H. Check Your Performance:

1. Discuss elements of Cargo Security management
2. Demonstrate the Loading Instruments used in warehouse

Answer Keys

MODULE 1: INTRODUCTION TO WAREHOUSING

Session 1: Basics of Logistics and Supply Chain

A. Fill in the Blanks

1. distributors
2. outbound
3. logistics.
4. logistics
5. information

B. Multiple Choice Questions

1. c
2. d
3. a
4. d
5. a

C. State whether the following statements are True or False

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

SESSION 2: Fundamentals of Warehousing

A. Fill in the Blanks

1. warehousing, warehouse.
2. specialized
3. consolidation.
4. order cycle time.
5. logistics

B. Multiple Choice Questions

1. a
2. d
3. d
4. a

C. State whether the following statements are True or False

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

SESSION 3: Warehouse Layouts

A. Fill in the Blanks

1. bulk
2. Cubic capacity
3. Administrative and clerical
4. Efficient
5. physical arrangement

B. Multiple Choice Questions

1. d
2. d
3. b
4. c
5. d

C. State whether the following statements are True or False

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

Session 4: PPE's and MHE's in Warehousing

A. Fill in the Blanks

1. Personal Protective Equipment.
2. Material Handling Equipment.
3. helmets
4. Material handling equipment
5. Hazards

B. Multiple Choice Questions

1.b

2.c

3.a

4. C

5. C

C. State whether the following statements are True or False

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

MODULE 2: PICKING, PACKING, KITTING, LABELLING AND BINNING

Session 1: Picking of Warehouse Products

A. Fill in the Blanks

1. Inventory management
2. Raw materials
3. Inventory
4. perishable

B. Multiple Choice Questions

1.c

2.b

3.d

4.c

5.b

C. State whether the following statements are True or False

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

Session 2: Packing and Labelling of Warehouse Products

A. Fill in the Blanks

1. manual entry or a barcode scanner
2. shipping labels and packing slips
3. Secondary wrapping
4. Label
5. edges

B. Multiple Choice Questions

1. a
2. d
3. b
4. b
5. c

C. State whether the following statements are True or False

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

Session3: Kitting of Warehouse Products

A. Fill in the Blanks

1. Kitting
2. Bill of Materials
3. Labels
4. Barcode
5. scanner

B. Multiple Choice Questions

1. a
2. d
3. d
4. b
5. b

C. State whether the following statements are True or False

1. False
2. True

3. True
4. True
5. True

Session 4: Binning of Warehouse Products

A. Fill in the Blanks

1. Warehouses
2. Storage
3. Binning
4. BOM
5. Warehouse labels

B. Multiple Choice Questions

1. d
2. c
3. b
4. b
5. c

C. State whether the following statements are True or False

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

MODULE 3: LOADING AND UNLOADING OF GOODS

Session 1: MHE's used for Loading/Unloading of Goods

A. Fill in the Blanks

1. Handheld items
2. warehouse
3. shipment
4. transport and storage

B. Multiple Choice Questions

1. d
2. d
3. b
4. c
5. d

C. State whether the following statements are True or False

1. True

2. False
3. True
4. True

Session 2: Procedure for Loading and Unloading of Goods

A. Fill in the Blanks

1. Handheld items
2. warehouse
3. shipments
4. products, handling

B. **Multiple Choice Questions**

1. c
2. c
3. b
4. c
5. d

C. State whether the following statements are True or False

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

Session 3: Handling of Dangerous Goods

A. Fill in the Blanks

1. caution
2. leakages
3. delivered
4. solid, liquid, or gas
5. supervisor

B. Multiple Choice Questions

1.c
2.c
3.b
4.d
5.b

C. State whether the following statements are True or False

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

Session 4: Procedure of Parking Material Handling Equipment

A. Fill in the Blanks

1. Warehouse layout
2. Management Information System (MIS)
3. Markings
4. parking
5. combustible
6. fire
7. MHE

B. Multiple Choice Questions

1. c
2. a
3. b
4. b
5. c
6. d
7. a

C. State whether the following statements are True or False

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

MODULE 4: HEALTH, SAFETY AND SECURITY

SESSION 1: Health, Safety and Security Procedures

A. Fill in the Blanks

1. higher
2. security and environmental
3. productive
4. ICD (Inland Container Depot)
5. clothing

B. Multiple Choice Questions

1. d
2. c

3. d
4. b
5. d

C. State whether the following statements are True or False

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

Session 2: Appropriate and Safe Conditions at Warehouse

A. Fill in The Blanks

1. movement
2. Audit
3. Barcodes
4. proper stacking, weight limits
5. Warning signs

B. Multiple Choice Questions

1. c
2. d
3. c
4. b
5. a

C. State whether the following statements are True or False

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

Session 3: Standard Operating Procedures

A. Fill in the Blanks

1. prevent
2. security
3. forklifts
4. storage
5. flammable

B. Multiple Choice Questions

1. a
2. d
3. c
4. d
5. d

C. State whether the following statements are True or False

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

SESSION 4: Documents of Health, Safety and Security

A. Fill in the Blanks

1. Security management
2. Effective
3. dock personnel
4. Workflow optimization
5. tracking

B. Multiple Choice Questions

1. d
2. b
3. c
4. d
5. c

C. State whether the following statements are True or False

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

Glossary

Word	Meaning
Logistics and Supply Chain	Fundamental concepts of managing the flow of goods from production to consumption.

Operational Processes	Activities and procedures involved in the functioning of land transportation.
Transportation Tools	Various vehicles and machinery employed for effective land transportation.
Documentation Requirements	Necessary paperwork and permits for the smooth execution of land transportation.
Order Booking	Initiating the transportation process by placing orders for consignments.
Vehicle Classification	Different types of vehicles suitable for transporting goods over land.
Cost Analysis	Assessment and understanding of the financial aspects associated with transportation.
Vehicle Regulations	Adhering to legal requirements and standards for vehicles used in transportation.
Processing Procedures	Steps involved in processing consignments for transportation.
Receipt Documentation	Document acknowledging the receipt of goods in a lorry or truck.
GST Permits	Compliance with Goods and Services Tax regulations for dispatching vehicles.
Shipment Tracking	Monitoring the movement and status of consignments during transportation.
Transporter Laws	Understanding laws and regulations governing transporters in land transportation.
Planning Strategies	Developing efficient routes and collecting relevant data for transportation.
Stakeholder Collaboration	Ensuring effective coordination with all parties involved in transportation.
Expertise	Application of technical knowledge for optimal route planning and vendor coordination.
Gate Operations Fundamentals	Fundamental aspects of gate operations in land transportation.
Warehousing Procedures	Operations within warehouses related to transportation.

Hazardous Material Transport	Guidelines and protocols for safely transporting hazardous goods.
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