
Ch 5. Material Handling & Packaging.

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Introduction.

Definition of Material Handling.

- Materials handling is defined as efficient short-distance movement that usually takes place within the confines of a building such as a plant or a warehouse and between a building and transportation agency.
Introduction.

Four Dimensions of Material Handling: Movement, Time, Quantity, Space.

- The movement aspect of materials handling involves the conveyance of goods into and out of storage facilities. Efficient materials handling means efficient movement of goods to, from, and within the storage facility.

- The time dimension of material handling is concerned with readying goods for production or for customer order filling.

- The quantity issue addresses the varying usage and delivery rate of raw materials and finished goods, respectively. Material-handling systems are designed to assure that the correct quantity of product is moved to the needs of production and customers.

- Material-handling equipment consumes space in the warehouse and plant. This space in a facility is fixed, and the materials-handling system must utilize this space effectively.
Introduction.

General Objectives of Material Handling Management.

- Increase effective capacity of warehouse.
- Minimize aisle space.
- Reduce number of times product is handled.
- Develop effective working conditions.
- Reduce movements involving manual labor.
- Improve logistics service.
- Reduce cost.
Material Handling Equipment.

Storage & Order Picking Equipment.
- Racks, shelving, drawers, and operator controlled devices such as forklift trucks.

Transportation & Sorting.
- The order picker can use a large selection of powered and non powered equipment for transporting and sorting items located in the racks, shelves, and drawers.
- Examples of apparatus of this type include forklift trucks, platform trucks, hand trucks, cranes, and carts. This equipment performs multiple functions in addition to transportation and sorting, such as order picking.
Material Handling Equipment.

Shipping.

- Shipping of products to customers involves preparing items for shipment and loading them onto transportation carriers. Equipment such as pallets, palletizers, strapping machines, and stretch wrappers are important.
Material Handling Equipment.

Powered and Nonpowered Forklift Trucks.

- The counter balanced lift truck.
- Tow tractors.
- Pallet trucks or jacks.
- Reach trucks.
- Sideloaders.
Material Handling Equipment.

Nonautomated Storage units - Storage Racks.
Material Handling Equipment.

Gravity flow storage racks.

[Coyle, pp308-335]
Material Handling Equipment.

Automated System.

Minimizing Inventory at Apple Computer with a flexible miniload AS/RS

[Coyle, pp308-335]
Material Handling Equipment.

Carousels.

*Horizontal carousels*

A. End elevation  
B. Side elevation  
C. Plan view

Horizontal Carousels.
Functions of Packaging.

General Function of Packaging.

- **Containment.** - Product must be contained before they can be moved from one place to another. If the package breaks open, the item can be damaged or lost, or contribute to environmental pollution if it is a hazardous material.

- **Protection.** - The contents of the package must be protected from damage or loss from outside environmental effects such as moisture, dust, insects, and contamination.

- **Apportionment.** - The output must be reduced from industrial production to a manageable, desirable consumer size: that is, translating the large output of manufacturing into smaller quantities of greater use to customer.
Functions of Packaging.

General Function of Packaging.

- **Unitization.** - Primary packages can be unitized into secondary packages (e.g., placed inside a corrugated case), which can then be unitized into a stretch wrapped pallet, and ultimately into a container loaded with several pallets. This reduces the number of times a product must be handled.

- **Convenience.** - Packaging allows products to be used conveniently, that is with little wasted effort by customers. (e.g., blister packs, dispensers)

- **Communication.** - Packaging allows the use of unambiguous, readily understood symbols such as a universal product code (UPC).
Packaging Design.

Packaging Design Principle.

- Packaging, warehouse handling systems, and all warehousing operations are interrelated within the firm's logistics system, and all must be managed effectively. Packaging should be designed to provide the organization with optimal levels of logistics efficiency and effectiveness.

- Some Consideration for Packaging Design.
  - Standardization.
  - Pricing.
  - Product or package adaptability.
  - Protective level.
  - Handling ability.
  - Product packability.
  - Reusability and recyclability.
  - High storage space utilization.
  - Information communication.
Performance Check.

1. In general, manual warehouse systems do the BEST job when:
   I. Very high throughput of products.
   II. Very low throughput of products.
   III. Only under moderate throughput situation.

   A. I        B. II       C. III       D. I, II

2. What types of heavy equipment are typically found in warehouse operations?
   I. Counterbalance lift truck.
   II. Tow tractors.
   III. Jacks or pallet trucks.
   IV. Sideloadin lift trucks.

Performance Check.

3. What is TRUE about gravity flow storage racks?
   A. They are often used to store low demand items.
   B. Products with uniform size and shape are well suited for such a system.
   C. Racks are sloped backward.
   D. Items flow to the rear from the front.

4. What is NOT an example of automated materials handling systems?
   A. Carousels and conveyors.
   B. Gravity flow racks.
   C. Man-made machines.
   D. Car-in-lane.
Performance Check.

5. Automated systems can provide several benefits for warehouse operations. Which of the following is NOT one of the identified benefits?
   A. Operating cost savings.   B. Improved service levels.
   C. Planning cost efficiencies.   D. Increased control.

6. Some of the disadvantages of automated systems include:
   I. Initial capital cost.
   II. Downtime and reliability of equipment/maintenance interruptions.
   III. Capacity problems.
   IV. Improved service levels.

7. Which of the following is NOT one of the three most common used piece of transportation equipment in the warehouse?
   A. Vertical and horizontal carousels.        B. Conveyors.
   C. AGVs.                                  D. Operator-controller trucks or tractors.

8. Packaging characteristics from a marketing perspective include all of the following EXCEPT:
   A. Tracking.             B. Color.           C. Brand name          D. Display.
9. From a logistics perspective, the functions of packaging include:
   I. Organize and protect.
   II. Identify and track.
   III. Promote and display.

   A. I  B. II  C. I, II  D. II, III

10. There are six general functions of packaging, which of the following does NOT represent one of those?
Performance Check.

Solutions:

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