

In the **continuous inventory approach**, at the beginning of each year some firms divide their inventory into 52 equal groups and assign one of them to be physically counted each week. Thus, the physical inventory operation goes on without interrupting production operation or upsetting store room activities. This approach has three advantages. It can be planned and worked into scheduled activities without a shutdown. It can be conducted in an orderly and relaxed manner; these conditions are also conducive to accurate work. Secondly, there is the possibility of detecting and eliminating causes for discrepancies without allowing them to continue throughout the year. Finally, this approach facilitates efficient utilisation of stores personnel. In many store-rooms, withdrawals are heavy early in the day and are much lighter later on. Thus, when the issue clerk's busy work slacks off, he will have backlog of inventory work to do.

In some companies separate staff are appointed for the purpose of continuous stock taking. This approach involves extra cost and only very large companies can afford it.

In the **fixed or periodic inventory**, inventory is taken once a year, generally coinciding with the financial year. This necessitates shutting down the production operation and organising a special crew for the inventory job. This approach is ideal for seasonal businesses. It is troublesome because it is a major task which must be accomplished in a short time, interrupting production operation.

Periodic stock verification is taken once in a year.

I CLASSIFICATION AND CODIFICATION

Good store-keeping requires proper classification and codification of various items stored in stock. Proper classification and codification offer several advantages such as:

1. Systematic grouping of similar items for correct identification of each and every item.
2. The usage of long descriptions is simplified and possible confusion avoided.
3. Avoids duplicate stocks of same item being held under different names, descriptions, brand names, part number, and different stores.
4. Enables reduction in sizes and varieties.
5. Helps in standardisation of materials and helps in finding substitutes.
6. Can be used as a basic for setting up different stores.
7. To arrange bin cards and records in stores, accounts and inventory control sections in the same uniform manner.
8. Ensures accuracy in correspondence, records and posting of receipts and issues in appropriate records.

Classification and codification enables reduction in sizes, and varieties.

Principles of Classification and Codification

The following principles should be observed while establishing an effective classification and codification system:

1. There must be a consistency in the point of view so that the basis of classification should remain unchanged for all items.
2. The system of classification must cover the entire range of items for which it is devised and at the same time allow reasonable scope for extension. This principle is that of comprehensiveness.
3. The third principle is that of mutual exclusiveness which means that there must be only one code number possible for any item.
4. The system developed should be simple enough to be understood and easily adopted by non-specialist personnel. This also means that the codification basis when once understood, the code numbers should be self-explanatory to a certain possible extent.

Consistency, coverage of entire range of items, mutually exclusive code and easily understandable are the principles of classification and codification.

Methods of Classification and Codification

Stores are generally classified on the basis of their nature or usage, the former being the most common method used. Based on nature, stores are classified into specific groups as shown below:

- Raw materials
- Consumable stores
- Tools
- Work-in-process
- Hardware
- Gearbox
- Components
- Spare parts
- Packing materials
- Finished goods
- Motors
- CKD - Completely knocked down items.

Stores can be grouped into 12 groups on the basis of nature or usage.

(II) MATERIALS HANDLING

Many types of materials, viz., raw materials, purchased components, materials-in-process (i.e., semifinished goods), finished goods, packaging materials, maintenance and repair supplies, scrap and waste and rejects or rework are used and handled in manufacturing organizations. These materials are of various size, shape and specific features. The characteristics of the materials to be used in production are determined by product design decisions. The layout of facilities is directly affected by the nature of these materials. For example, large and bulky materials, heavy materials, fluids, solids, flexible and inflexible materials and materials requiring special handling to protect them from conditions such as heat, cold, humidity, light, dust, flame and vibration affect the layout of facilities for handling, storing and processing these materials.

Definition of Materials Handling

Materials handling is defined as the art and science of moving, packaging and storing of substances in any form. Other definitions include:

- (a) Creation of time and place utility.
- (b) Movement and storage of material at the lowest possible cost through the use of proper methods and equipments.
- (c) Lifting, shifting and placing of material which effect saving in money, time and place.
- (d) Art and science of conveying, elevating, positioning, transporting, packaging and storing of materials.

Materials handling is the art and science of moving, packing and storing of substances in any form.

Scope of Materials Handling

The scope of materials handling activity within an organization depends on the type of the product manufactured, the size of the organization, the value of the product and the value of the activity being performed and the relative importance of materials handling to the enterprise.

- There are three perspectives about materials handling, viz.,
- (a) The traditional point of view.
 - (b) Plant-wide concern for overall flow of materials.
 - (c) The systems point of view.

In the traditional point of view of materials handling, the emphasis is on the movement of materials from one location to another within the confines of the individual plant. The

concern is to find the best way to move the materials from one place to another within the plant.

Plant wide concern focuses the attention on the overall flow of material in the plant. The main concern is the inter-relationships between all handling problems and the possibility of establishing an overall materials handling plan.

The systems point of view of material handling requires visualization of materials handling problems, the physical distribution activities and all closely related functions as one, an all-encompassing system. This point of view involves a much broader consideration of all materials handling activities involving the movement of materials from all sources of supply (vendors), all handling activities within and around the plant and the handling activities involved in the distribution of finished goods to all customers of the firm.

The subject of materials handling as discussed in this chapter is concerned only with handling of materials within the plant.

Importance of Materials Handling

1. Efficient materials handling is important to manufacturing operations. Materials sent by vendors must be unloaded, moved through inspections and production operations to stores and finally to the shipping department. **These movements do not add value to the product but they do add to the cost.**
2. Materials handling analysis is a subset of plant layout. Method study, plant layout and materials handling are all part of the design of a production facility and can hardly be treated as separate. Materials handling system and plant layout enhance effectiveness of each other. A good plant layout enables an operation to use the most efficient handling method. Efficient operation of appropriate materials handling methods reduces costs and enables maximum capabilities to be derived from a given production facility.

Objectives of Materials Handling

Even though the best solution to the materials handling problem, is *no handling*, it is hardly practicable in a manufacturing process. Hence, the *main objective* of materials handling is to reduce the number of handlings as well as the overall cost of material handling equipments and reducing the distances through which the materials are handled.

The following may be considered as other objectives of materials handling:

1. Lower unit materials handling costs.
2. Reduction in manufacturing cycle time through faster movement of materials and by reducing the distance through which the materials are moved. Reduction in manufacturing cycle time results in reduced work-in-progress inventory costs.
3. Contribution towards a better control of the flow of materials through the manufacturing facility.
4. Improved working conditions and greater safety in the movement of materials.
5. Contribute to better quality by avoiding damage to products by inefficient handling.
6. Increased storage capacity through better utilization of storage areas.
7. Higher productivity at lower manufacturing cost.

Materials Handling Principles

Certain principles have evolved to guide facility layout to ensure efficient handling of materials. Although there are no hard and fast rules, they do provide effective guidelines for the efficient movement of materials in most facility layouts.

Higher productivity or lower manufacturing cost is the prime objective of materials handling.

Table 22.1 lists the materials handling principles which provide a frame-work for selecting specific materials handling devices/equipments which are the core of the materials handling system.

Materials handling principles help the efficient movement of materials in most facility layouts.

The seven principles can be summarized in the form of the following guidelines :

1. **Eliminate Handling** : If not, make the handling distance as short as possible.
2. **Keep Moving** : If not, reduce the time spent at the terminal points of a route as short as possible.
3. **Use Simple Patterns of Material Flow** (the simplest path is a straight line path of flow which minimizes the handling distance between two points). If not, reduce backtracking, crossovers and other congestion producing patterns as much as possible.
4. **Carry Pay Loads Both Ways** : If not, minimize the time spent in 'transport empty' by speed changes and route relocations.
5. **Carry Full Loads** : If not, consider increasing the size of unit loads, decreasing carrying capacity, lowering speed, or acquiring more versatile equipment.
6. **Use Gravity** : If not, try to find another source of power that is reliable and inexpensive.

In addition to the above guidelines, there are certain other very important aspects of materials handling such as the following :

- (a) Materials handling consideration should include the movement of men, machine, tools and information.
- (b) The flow system must support the objectives of receiving, sorting, inspecting, inventorying, accounting, packaging and assembling.

Since the considerations and objectives do conflict, it is essential to take a system decision followed by delicate diplomacy to establish a material movement plan that meets service requirement without sub-ordinating safety and economy.

Table 22.1 : Materials Handling Principles

Sl. No.	Principles
1.	Materials should move through the facility in direct flow patterns, minimizing zig-zagging or backtracking.
2.	Related production processes should be arranged to provide for direct material flows.
3.	Mechanized materials handling devices should be designed and located so that human effort is minimized.
4.	Heavy and bulk materials should be moved to the shortest distance during processing.
5.	The number of times each material is handled should be minimised.
6.	Systems flexibility should allow for unexpected breakdowns of materials handling equipments, changes in production system technology, etc.
7.	Mobile equipments should carry full loads all the times.

Materials Handling Costs

The costs of materials handling arise from two sources: the cost of owning and maintaining equipment and the cost of operating the system. While the costs of owning the equipment are generally known since entries are available in the books of accounts, the costs of operating the handling system are elusive as records are not generally maintained.

Materials handling costs include cost of owning and maintaining equipment and cost of operating the system.

Every effort should be made to reduce materials handling costs, particularly because they do not add any value to a product. The product will not be worth any more to the consumer simply because it was moved, but it will cost the customer more.

How to reduce handling costs? There are three fundamental ways of minimising the costs.

- (a) Eliminating the handling itself whenever and wherever possible.
- (b) Mechanising, largely by conveyors and power driven trucks, whatever handling still remains.
- (c) Making the necessary handling more efficient.

Primary requisite for any action to be taken towards minimising handling costs is to have a record maintained for them. It is here that majority of the companies are not doing the right thing.

I ORGANISATION FOR MATERIALS HANDLING

Materials handling is a job that directly affects each area in a plant, and as such requires a carefully planned organisational structure. The structure varies with the industry, the type of manufacturing process, the product manufactured, its bulk, and its value. Emphasis depends on the amount of handling required in the manufacturing process. In small firms, for example, the materials handling function may be one of several duties assigned to the plant engineer, the purchasing manager, or the production manager. As firms grow in size, however, an increase in specialisation is usually manifest in this area until a stage is reached where a separate department is developed to study procedures and devise better materials handling techniques. When thus organised, materials handling is a function and is often a part of the industrial engineering section. In some organisations, however, materials handling is subordinated to materials management, production, purchasing, storing or maintenance. Irrespective of which department it is subordinated to, materials handling should be centralised under one head so that an overall co-ordinated approach is possible.

Unit Load Concept

One of the basic requirements of efficient materials handling is observance of the Unit Load Principle, which implies that the larger the load handled, the lower the cost per unit handled.

A unit load is understood as a number of items, or bulk material, so arranged that the mass can be picked up and moved as a single object, too large for manual handling. It is implied that any single object too large for manual handling is a unit load.

Simply stated, the unit load principle means that it is quicker to move a lot of items as a unit than it is to move each one of them individually. With machines at our disposal, these units can be made for machine size rather than man size.

In grouping materials into units many companies use skids, or pallets so that mechanical trucks can be employed to lift and move the unit. Not only do skids and pallets save time in handling materials, but goods so handled are more compact and require less floor space because they can be stacked.

The use of the principle of unit load has been so effective that many firms today are insisting that materials which they buy be supplied on a unit load basis (palletised, for example,) rather than in individual units or packages.

Despite the obvious advantages, unit load has specific disadvantages which should not be ignored.

Organisation of materials handling vary with the industry, manufacturing process, product manufactured, its bulk and its value.

Unit load refers to the number of items so arranged that the mass can be picked up and moved as a single object.

Unit load concept helps reduce or lower the cost per unit handled.