MATERIAL COST

Chapter 2

MEANING OF MATERIAL

The term 'material' refers to all commodities that are consumed in the process of manufacture. It is defined as 'anything that can be stored, stacked or stockpiled.' Materials are classified into:

Direct materials are those whose consumption may be identified with specific production units and which usually become a part of the finished product.	**Indirect materials** are those which cannot be conveniently identified with individual cost units.

The term 'inventory' is used to cover the stocks of raw materials, components, work-in-progress and finished goods. It has been defined by the Accounting Principles Board as 'the aggregate of those items of tangible personal property which (i) are held for sale in the ordinary course of business; (ii) are in the process of production for such sales; or (iii) are to be currently consumed in the production of goods or services to be available for sale.'

MATERIAL CONTROL (Inventory Control)

Material or inventory control may be defined as 'systematic control and regulation of purchase, storage and usage of materials in such a way so as to maintain an even flow of production, at the same time avoiding excessive investment in inventories. Efficient material control cuts out losses and wastes of materials that otherwise pass unnoticed.'

ESSENTIAL REQUIREMENTS OR PRINCIPLES OF INVENTORY CONTROL

1. There should be proper coordination and cooperation between various departments dealing in materials, viz., Purchasing Department, Stores Department, Receiving and Inspecting Department, Accounting Department, etc.
2. There should be a central purchasing department under the control of a competent and expert purchase manager.
3. There should be proper classification and codification of materials.
4. Material requirements should be properly planned.
5. The perpetual inventory system should be operated so that up-to-date information is available about the quantity of material in stock.

ESSENTIAL REQUIREMENTS OR PRINCIPLES OF INVENTORY CONTROL

6. • Adequate records should be introduced to control materials during production and the quantities manufactured for stock.

7. • The storage of all materials should be well planned, subject to adequate safeguards and supervision.

8. • The various stock levels like minimum, maximum, etc., should be fixed for each item of material.

9. • Purchases of materials should be controlled through budgets.

10. • An efficient system of internal audit and internal check should be operated so that all transactions involving materials are checked by reliable and independent persons.

11. • There should be regular reporting to management regarding purchases, issues and stock of materials. Special reports should be prepared for obsolete items, spoilage, returns to suppliers, etc.

TECHNIQUES OF INVENTORY CONTROL

- ABC technique
- Stock levels-Minimum, maximum and reorder levels
- Economic order quantity (EOQ)
- Proper purchase procedure
- Proper storage of materials

TECHNIQUES OF INVENTORY CONTROL

- Inventory turnover ratio to review slow and non-moving materials
- Perpetual inventory system
- Fixation of material cost standards (Used in Standard Costing)
- Preparation of material budgets (Used in Budgetary Control

ABC TECHNIQUE (Selective Control)

ABC technique is a value based system of material control. In this technique, materials are analysed according to their value so that costly and more valuable materials are given greater attention and care.

'A' Items: These are high value items which may consist of only a small percentage of the total items handled. On account of their high cost, these materials should be under the tightest control and the responsibility of the most experienced personnel.

'B' Items: These are medium value materials which should be under the normal control procedures.

'C' Items: These are low value materials which may represent a very large number of items. These materials should be under simple and economical methods of control.

The point of classifying stock into A, B and C categories is to ensure that material management focuses on A items where sophisticated controls should be installed. B items may be given less attention and C items least attention.

STOCK LEVELS

In order to guard against under-stocking and over-stocking, most of the large companies adopt a scientific approach of fixing stock levels. These levels are: (i) maximum level; (ii) minimum level; (iii) reorder level; and (iv) reorder quantity. By adhering to these levels, each item of material will automatically be held within appropriate limits of control.

Maximum Level

$$\text{Maximum level} = \text{Reorder level} + \text{Reorder quantity} - (\text{Minimum consumption} \times \text{Minimum reorder period})$$

Minimum Level

$$\text{Minimum level} = \text{Reorder level} - (\text{Normal consumption} \times \text{Normal reorder period})$$

Reorder Level or Ordering Level

$$\text{Reorder level} = \text{Maximum consumption} \times \text{Maximum reorder period}$$

Danger Level

$$\text{Danger level} = \text{Normal consumption} \times \text{Max. reorder period under emergency conditions}$$

Average Stock Level

$$\text{Average stock level} = \tfrac{1}{2}\,(\text{Minimum level} + \text{Maximum level})$$

REORDER QUANTITY (Economic Order Quantity Or EOQ)

Reorder quantity is the quantity for which order is placed when stock reaches reorder level. By fixing this quantity, the purchaser doesnít have to recalculate the quantity to be purchased each time he orders for materials. Reorder quantity is known as Economic Order Quantity because it is the quantity which is most economical to order. While setting economic order quantity, two types of costs should be taken into account:

1. **Ordering cost** This is the cost of placing an order with the supplier.

2. **Cost of carrying stock** This is the cost of holding the stock in storage.

REORDER QUANTITY (Economic Order Quantity or EOQ)

Mathematical Formulae of EOQ

$$EOQ = \sqrt{\frac{2.A.B}{C.S}}$$

where
EOQ = Economic Order Quantity
A = Annual consumption in units
B = Buying or ordering cost per order
C = Cost per unit
S = Storage or carrying cost as a percentage of average inventory

Alternatively,

$$EOQ = \sqrt{\frac{2.A.B}{S}}$$

where
S = Storage cost per unit per annum

INVENTORY TURNOVER

Inventory or stock turnover ratio tells us how many times in a year stock is used up and replaced. The greater the stock turnover, the more efficient is the stock policy. Stock turnover rate is the ratio which the cost of materials consumed per annum bears to the average stock of raw materials. Thus,

$$\text{Stock Turnover Ratio} = \frac{\text{Cost of materials consumed during the period}}{\text{Average stock of materials during the period}}$$

Stock turnover ratio is an indicator of the rate of consumption, i.e., whether materials are moving fast or slowly. A high stock turnover ratio indicates fast moving materials and a low ratio indicates slow moving materials. Stock turnover rate may also be calculated in terms of days. This is done by dividing 365 days by the inventory turnover ratio. Thus:

$$\text{Stock Turnover in terms of days} = \frac{\text{Days of the period}}{\text{Stock turnover rate}}$$

PURCHASE OF MATERIALS

Just-in-time (JIT) Purchasing

Just-in-time purchasing is the purchase of materials immediately before these are required for use in production. According to CIMA, London JIT purchasing is 'matching receipts of materials closely with usage so that raw material inventory is reduced to near zero level.'

Centralized and Decentralized Purchasing

Broadly speaking, purchase function may be organized in two ways, i.e., centralized purchasing and decentralized purchasing.

Centralization

Centralization of purchasing means that all purchases are made by a single purchase department. Head of this department is designated as Purchase Manager or Chief Buyer.

Decentralization

In decentralized purchasing, each branch or department makes its own purchases. If the branches or plants are located at different places, the decentralized purchasing can better meet the situation by making purchases in the local market by plant or branch managers

PURCHASE PROCEDURE

1. **Purchase Requisition**: Purchases of materials are initiated through purchase requisitions. It is a formal request by the head of a department or an authorized officer to the purchase manager to purchase the specified materials.

2. **Selection of Suppliers:** When the purchasing department receives a duly authorized purchase requisition, a source of supply has to be selected.

3. **Purchase Order and Fol l ow – up:** The purchase order is the form used by the purchasing department authorizing the suppliers to supply the specified materials at the price and terms stated therein.

4. **Receipt of Materi als:** All incoming materials should be received by the Receiving Department which performs the functions of unpacking the goods received and verifying their quantities and conditions.

PURCHASE PROCEDURE(Contd.)

5. **Inspection and Testing of Materials:** Goods received should be inspected for quality to ensure that they comply with the specifications stated.

6. **Return of Rejected Materials:** Where materials received are damaged or are not in accordance with the specifications, these are usually returned to the supplier along with a Debit Note, informing him that his account has been debited with the value of materials concerned.

7. **Passing Invoices for Payment:** When the invoices are received, the process of assembling the business papers connected with each purchase and preparation of voucher begins. Invoices are numbered serially and entered in the Invoice Register. The following documents are assembled in support of the invoice: (a) Purchase Order; (b) Goods Received Note; (c) Inspection Report, if not incorporated in the Goods Received Note and (d) Debit or Credit Note.

PURCHASE PRICE

The invoice received from the supplier provides a base figure of purchase price. The following adjustments have to be made in this figure to arrive at the real material cost.

Quantity discount	• This is an allowance made by the supplier to the purchaser to encourage large orders.
Trade discount	• This is an allowance made by the supplier to a purchaser who has to re-sell the material, e.g., discount allowed by the manufacturer to the wholesaler.
Cash discount	• This discount is allowed by the supplier to a purchaser to encourage prompt payment of invoice.
Sales tax and other levies	• Items, like sales tax, excise duty, customs duty and octroi, should be added to the purchase price.
Transport charges	• These include sea, land and air freight, dock charges, insurance, etc. on materials purchased.
Cost of containers	• If containers are separately charged, all such costs should be included in the purchase price i.e. (i) the cost of containers if these are not returnable; and (ii) the difference between the cost of container and the amount refunded when container is returned, where containers are returnable.

STOREKEEPING

Storekeeping is the function of receiving of materials, storing them and issuing these to workshops or departments.

Stores Organization

There are mainly two types of stores organization, i.e., central stores and departmental sub-stores. From control point of view, it is ideal to have one central store for receiving and issuing all materials. However, this is not always practicable because in large factories, where there are many production departments, the location of the central store may not be convenient to all such departments. Thus, where it is not advantageous to keep central stores, departmental sub-stores should be maintained.

Imprest System

Under this system, a number of sub-stores exist, each drawing their supplies from the central store. Each sub-store is given, as a commencing stock, sufficient supplies for a little more than the re-stocking period. At the end of the period, the storekeeper of each sub-store will requisition from the central stores the number of articles required to bring the stock upto the predetermined quantity.

CLASSIFICATION AND CODIFICA TION OF MATERIALS

Classification of materials refers to grouping of materials according to their nature in suitable categories. Codification is the procedure of systematic assignment of symbols for each item of store. Such codes may be either numeric, alphabetic or a combination of numerical and alphabetical symbols.

Basic Principles of Coding: While assigning codes, the following principles should be kept in mind:

1. **Exclusive** Each code number should relate to only one type of material.
2. **Clear** Code must be clear and should identify materials without any ambiguity.
3. **Brief** Codes should be brief because long codes are prone to error.
4. **Elastic** Code should be such that new materials can be added easily.
5. **Mnemonic** As far as possible, codes should be easier to remember.

Systems of Coding

1. Numerical and Decimal In this method, a number is allotted to each item. Sub-groups are indicated by decimals.	2. Alphabetical or Mnemonic In this method, each item of store may be denoted by a combination of alphabets. As alphabets represent the first sound of description of materials, it becomes easy to remember the codes.	3. Alpha-numerical This is a combination of numerical and alphabetical methods.

STORES RECORDS

The stores records are of two types:

1. **Perpetual Inventory Records** These records show the movement of stores, i.e., the receipt of materials, issues of materials to production department and also balance in stock. Bin card and stores ledger are the two basic perpetual inventory records.

2. **Documents** The documents are used to authorize movement of materials into and out of stores. These documents include Goods Received Note, Bill of Materials, Materials Requisition Note, Materials Return Note and Material Transfer Note.

Bin Card (Stock Card): A bin card is attached to the bin, drawer or any other container in which material is stored. An entry is made at the time of each receipt or issue and the new balance in stock is calculated. All these entries of receipts and issues are supported by documents, such as Goods Received Note, Materials Return Note, Stores Requisition Note, etc.

Stores Ledger: The stores ledger is maintained in the cost accounting department and is one of the basic records for material accounting in a cost system. This record gives the same information regarding stores as bin card and in addition, it gives the monetary values of materials. Separate ledger folios are maintained in it for each item of material. There are mainly three sections in this ledger, i.e., receipts, issues and balance, each of these with appropriate sub-divisions showing date, quantity, unit price and total cost.

STORES RECORDS(Contd.)

Goods Received Note

- A copy of Goods Received Note is sent to the storekeeper along with the materials for his records. The storekeeper uses this document for posting on the receipt side of the bin card.

Stores Requisition Note (or Materials Requisition Note)

- It is a document which is used to authorize and record the issue of materials from store.
- It is a key document in virtually all costing systems and serves the dual purpose of:
- (a) authorizing the storekeeper to issue material
- (b) providing a written record of usage of materials

Bill of Materials (Specification of Materials)

- It is a master requisition which lists all the materials required for the completion of a job. So, a bill of materials is a special form of stores requisition note which is generally used by departments having standard materials requirements or a comparatively fixed list of materials.

Materials Return Note

- When materials issued are in excess of requirements, the unused materials are returned to stores together with a Materials Return Note.

Materials Transfer Note

- Materials may have to be sometimes transferred from one job to another. Where such transfers are permitted, these should be supported by a special document known as a Material Transfer Note.

INVENTORY SYSTEMS

There are mainly two inventory systems, viz., Periodic Inventory System and Perpetual Inventory System. There are mainly two inventory systems:

Periodic Inventory System: Under this system, stock-taking is undertaken at the end of the accounting year.

Perpetual Inventory System: A perpetual inventory system is defined as 'the method of recording stores balances after each receipt and issue to facilitate regular checking and obviate closing down for stock-taking.' Perpetual inventory system is operated by taking the following steps:

1. **Reconciliation of bin cards and stores ledger accounts:** The records of each item of store are kept simultaneously at two places i.e., bin card and stores ledger, which are the perpetual inventory records. The balance of an item of store as shown in the bin card should agree with that shown in the stores ledger.

2. **Continuous stock-taking:** In any perpetual inventory system, the book balances as shown by bin cards and stores ledger should agree with actual physical balance in store. Under this system, a few items of stores are counted daily or at frequent intervals and compared with the bin cards and stores ledger by the stores auditor.

Materials Abstract (Materials Issue Analysis Sheet): This is 'a document which is a classified record of material issues, returns and transfers.' In other words, all materials requisitions, materials return notes and material transfer notes are analysed periodically by the cost accounting department to ascertain the material cost of each job.

METHODS OF PRICING MATERIAL ISSUES

Methods of Pricing

Important Methods:

1. First-in, First-out Price (FIFO)
2. Last-in, First-out Price (LIFO)
3. Simple Average Price
4. Weighted Average Price
5. Replacement Price
6. Standard Price

Other Methods:

(*i*) Highest-in, First-out (HIFO)
(*ii*) Next-in, First-out (NIFO)
(*iii*) Specific Price
(*iv*) Base Stock Method
(*v*) Periodic Simple Average
(*vi*) Moving Simple Average
(*vii*) Periodic Weighted Average
(*viii*) Moving Weighted Average
(*ix*) Inflated Price

METHODS OF PRICING

First-in, First-out (FIFO) Method: This method is based on the assumption that materials which are purchased first are issued first. It uses the price of the first batch of materials purchased for all issues until all units from this batch have been issued. After the first batch is fully issued, the price of the next batch received becomes the issue price.
Three important effects of using FIFO method are:
(a) Materials are priced at the actual cost
(b) Charge to production for material cost is at the oldest prices of materials in stock
(c) Closing stock is valued at the latest price paid

Last-in, First-out (LIFO) Method: It is based on the assumption that the last materials purchased are the first materials to be issued. Thus, the price of the last batch of the materials purchased is used first for all issues until all units from this batch have been issued, after which the price of the previous batch of materials purchased is used.
Three points should be noted regarding this method:
(a) Material issues are priced at actual cost
(b) Charge to production for material cost is at latest prices paid
(c) Closing stock valuation is at the oldest prices paid and is completely out of line with the current prices

METHODS OF PRICING

AVERAGE COST METHODS: These methods are based on the assumption that when materials purchased in different lots are stored together, their identity is lost, and therefore, issues should be charged at an average price.

Simple Average Method

- Simple average price is calculated by adding all the different prices of materials in stock, from which the materials to be priced could be drawn, by the number of prices used in that total.

Weighted Average Method

- This method gives due weight age to the quantities held at each price when calculating the average price. The weighted average price is calculated by dividing the total cost of material in stock, from which the material to be priced could have been drawn, by the total quantity of material in that stock. The simple formula is that weighted average price at any time is the balance value figure divided by the balance units figure.

Replacement Price Method

- Replacement price is the price at which materials would be replaced, i.e., the market price on the date of issue. This method is used when it is desired to reflect the current prices in cost.

Standard Price Method

- Standard price is a predetermined price which is fixed for a definite period, such as a year. Under this method, all receipts are posted in the Stores Ledger Account at actual cost and issues are priced at standard price. The difference between actual and standard prices, is transferred to Material Price Variance Account.

OTHER METHODS OF PRICING

Highest-in, First-out (HIFO) Method	• In this method, materials issued are charged at the rate of the highest priced materials in stores. This highest rate is continued to be used until material at that highest price is exhausted, after which the next highest price is used.
Next-in, First-out(NIFO) Method	• Here materials are not charged at a price which has been paid, but rather at a price at which an order has been placed, i.e., the price of materials that will be next received.
Specific Price or Identifiable Cost Method	• Special materials purchased exclusively for specific jobs or work orders should be charged to those specific jobs at the specific (actual) price. This method can always be used where materials are purchased and set aside for a particular job or work order until required for production.
Base Stock Method	• This method assumes that minimum (base) stock is always held in stock and is not issued. This is in the nature of a fixed asset and is carried at original cost. Any quantity in excess of base stock is valued according to one of the other methods, i.e., FIFO, LIFO, Average, etc.
Periodic Simple Average Method	• This method is similar to simple average method except that the issue price here is computed periodically (normally at the month-end) and not at the time of each issue of material.

OTHER METHODS OF PRICING(Contd.)

Periodic Simple Average Method: This method is similar to simple average method except that the issue price here is computed periodically (normally at the month-end) and not at the time of each issue of material.

$$\text{Periodic simple average price} = \frac{\text{Total of purchase prices during the period}}{\text{No. of prices during the period}}$$

Periodic Weighted Average Method: Like periodic simple average method, in this method also average price is calculated at the end of a given period (which is usually one month).

$$\text{Periodic weighted average price} = \frac{\text{Total cost of materials purchased}}{\text{Quantity purchased}}$$

Moving Simple Average Method: In this method, the periodic simple average is further averaged. For this purpose, a number of periods (or months) is decided first and then the total of the periodic average prices of the given periods is divided by the number of periods taken.

Moving Weighted Average Method: In this method, the moving average price is calculated in exactly the same way as the moving simple average price except that periodic weighted average prices are taken for averaging.

Inflated Price Method: This method is used where materials are subject to some inevitable losses that may arise from evaporation, breaking the bulk, etc. The issue price is slightly inflated to ensure that the loss is covered and the full cost of the material concerned is recovered.

MATERIAL LOSSES

Losses of materials may arise during handling, storage or during process of manufacture. Such losses or wastages are classified into two:

1. **Normal Loss** This is that loss which has necessarily to be incurred and thus is unavoidable.
2. **Abnormal Loss** This is that loss which arises due to inefficiency in operations, bad luck, mischief, etc.

Control of Material Losses

- Proper storage conditions should be provided, mainly for perishable materials.
- Store room should be well guarded to avoid the risks of fire or theft, etc.
- To reduce obsolescence, materials should be issued on first-in, first-out basis.
- Accuracy of weighing instruments should be periodically checked.
- A systematic procedure should be developed regarding movement of materials from one place to another.
- Specialized material handling equipment should be employed so as to minimize losses in materials handling.

Accounting Treatment: In order to absorb normal material losses in cost, the rates of usable materials in stock are inflated so that such losses are covered. Alternatively, normal material loss is transferred to factory overhead. Abnormal material losses, such as those due to breakage, theft, fire, flood and abnormal evaporation, are charged to Costing Profit and Loss Account.

WASTE, SCRAP, SPOILAGE AND DEFECTIVES

Waste: It is defined as 'that portion of a basic raw material lost in processing, having no recovery value.' Waste has the effect of reducing the quantity of output.. If waste is a part of the normal process loss, the cost will be absorbed by the good production. On the other hand, if it is a part of the abnormal process loss, it is transferred to Costing Profit and Loss Account.

Scrap: As per Cost Accounting Standard-6 (CAS-6) 'scrap is the "discarded material having some value in a few cases and which is usually either disposed of without further treatment (other than reclamation and handling) or re-introduced into the process in place of raw materials." ' Scrap is treated as (a) As other income credited to Profit and Loss Account (b) Credit to overheads (c) Credit to job or process

WASTE, SCRAP, SPOILAGE AND DEFECTIVES

Spoilage: Spoiled work results when materials are damaged in manufacturing operations is such a way that they cannot be rectified. For accounting purposes, spoiled work should be divided into normal and abnormal. The cost of normal spoilage should be borne by good production. Abnormal spoilage, caused due to inefficiency and treated as controllable should be transferred to Costing Profit and Loss Account.

Defectives: It is defined as 'that production which is below standard specifications or quality and can be rectified by incurring additional expenditure (of material, labour, etc.) known as rectification costs.' Where defective work is easily identifiable with specific jobs, the rectification costs should be debited to the jobs concerned. Where, however, such work cannot be conveniently identified with jobs, the rectification costs may be debited to overheads.