Inventory and Inventory Control Techniques
EOQ and ABC analysis

Course: Industrial Management and Safety

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Module: II

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Inventory

- **Inventory**:
  - It is the detailed list of movable goods such as raw materials, materials in process, finished products, general supplies and equipments, which are necessary to manufacture a product and to maintain the equipment and machinery in good working order.
  - The quantity and the value of every item is also mentioned in the list.

- **Inventory Control:**
  - It is the scientific method of finding out how much stock should be maintained in order to meet the production demands and be able to provide right type of material at right time in the right quantities and at competitive prices.
  - It is the systematic location, storage and recording of goods in such a way that desired degree of service can be made to the operating shops at minimum ultimate cost.
  - Inventory Control Techniques are:
    i. **Economic Order Quantity**
    ii. **ABC analysis**

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Inventory Classification

- **Classification according to function or material flow:**
  1. **Production Inventory:**
     - These are the items going into final product such as raw materials, finished parts or sub assemblies obtained from market.
  2. **Work in process Inventory:**
     - These are the items in semi finished stage.
  3. **Operating and Maintenance Inventory:**
     - These are the items that do not form part of the final product but are either consumables used during manufacturing process or used in repairing and maintenance functions.
  4. **Miscellaneous Inventory:**
     - These are the items other than those mentioned above such as stationary items used in office, scraps arising from production processes, etc.

- **Conventional Classification:**
  1. **Direct Inventories:**
     - These include materials in any form that become integral part of the product.
  2. **Indirect Inventories:**
     - These are the materials that do not become the integral part of the product, but without which the production cannot progress such as cutting fluids, lubricants, etc.
  3. **Finished Products Inventories:**
     - These are the products ready for dispatch to the market (i.e. final products).
  4. **Purchased Parts Inventories:**
     - These are the semi finished as well as finished parts purchased from the market that are used during the assembly of the final product.

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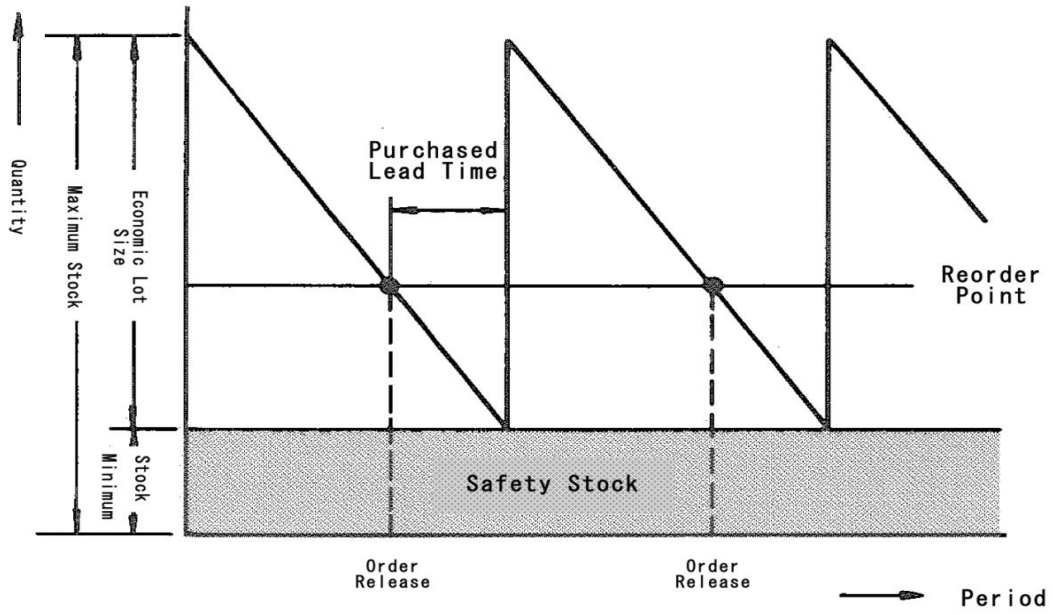
Economic Order Quantity (EOQ)

- **EOQ** is an inventory control technique.
- It is useful in finding when to place new orders.



- **Terms associated with EOQ:**
  - **Maximum Stock:**
    - It is the maximum quantity of material that is allowed to be kept in the stores at any time.
  - **Minimum Stock:**
    - It is the lowest quantity of stores below which the stock is not allowed to fall in normal circumstances.
  - **Standard Order:**
    - It is the difference between maximum and minimum quantity. It is also known as **Economic Order Quantity.**
  - **Reorder Point:**
    - The level of material, at which a new order for the requirement of EOQ is placed.
  - **Lead or Procurement Time:**
    - It is the time taken between placing the order and receiving the materials.
    - Reorder level = Lead time x Consumption
  - **Buffer or Safety Stock:**
    - This is the stock that is not usually consumed in normal circumstances.
    - This is used to keep the production continuous if the lead time increases under unavoidable circumstances.
  - **Cycle Time:**
    - Time between two successive orders.

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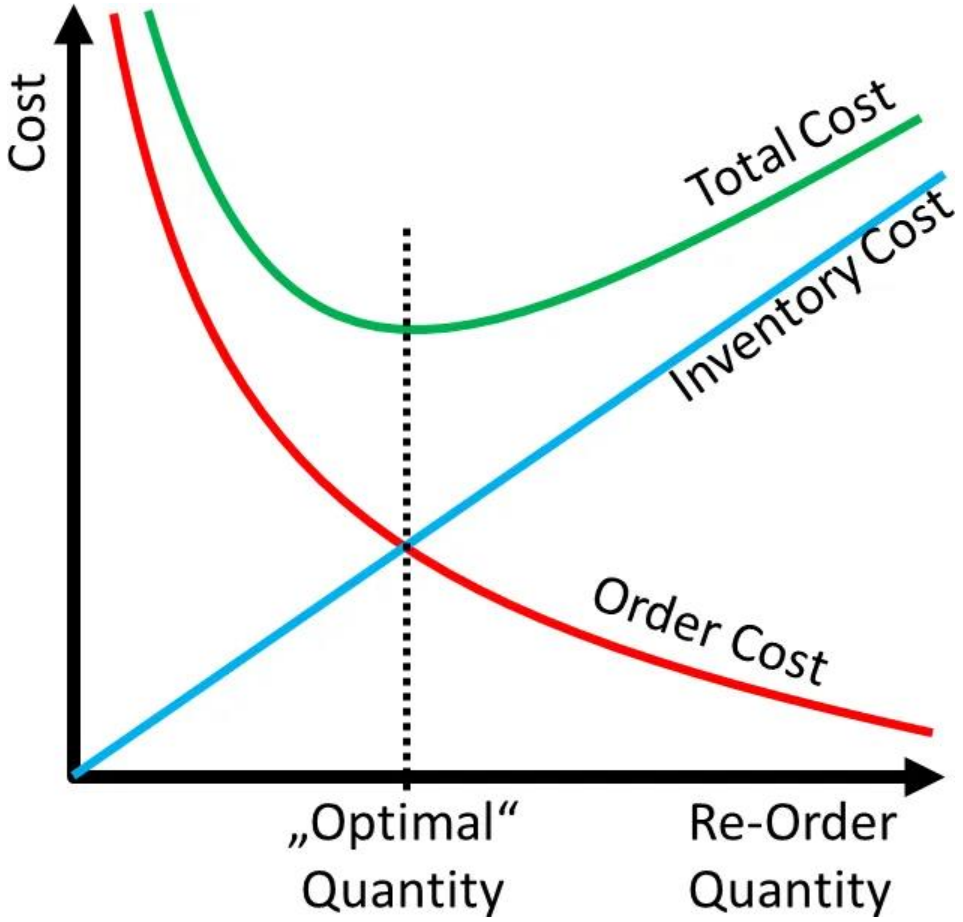
EOQ - Continuation

- The determination of EOQ consists of the calculation of two costs:
  - i. **Procurement Cost or Ordering Cost or Buying Cost includes expenditure made on:**
    - Calling quotations
    - Processing quotations
    - Placing Purchase Orders
    - Receiving and inspecting
    - Verifying and payment of bills
    - Other incidental charges, etc.
  - ii. **Inventory Carrying Cost includes expenditure made for:**
    - Insurance
    - Storage and handling
    - Obsolescence and depreciation
    - Deterioration
    - Taxes
    - Interest, etc.



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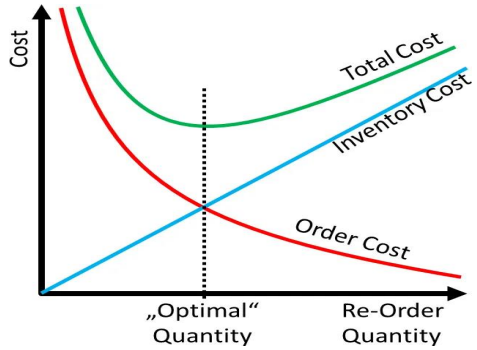
EOQ – Mathematical Formula



- **EOQ =** $\sqrt{\frac{2AP}{C}}$
- **Total Inventory Cost =** $\sqrt{2APC}$
- **Total Annual Cost = AC_0+**$\sqrt{2APC}$
  - P = Procurement cost per order
  - C = Inventory carrying cost per unit
  - A = total items consumed per year
  - C_o = Cost of each item

- **Derivation of EOQ formula:**
- **Total procurement (ordering) cost per year =** $\frac{AP}{Q}$
- **Inventory carrying cost per year = Average inventory x annual inventory carrying cost per unit**

  $= \frac{Q}{2}$xC
- **Total inventory cost =** $\frac{AP}{Q} + \frac{Q}{2}$ **x C .....(1)**
- **For minimum total cost,** $\frac{AP}{Q} = \frac{Q}{2}$ **x C →Q =** $\sqrt{\frac{2AP}{C}}$ **.....(2)**
- **But at minimum total cost, Q = EOQ .....(3)**
- **Therefore, EOQ =** $\sqrt{\frac{2AP}{C}}$ **(from (2) and (3))....(4)**
- **Total Inventory Cost =** $\sqrt{2APC}$ **(from (1) and (2))**
- **Total Annual Cost = = AC_0+**$\sqrt{2APC}$

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A B C Analysis

- A B C analysis helps in segregating the items from one another and tells how much valued the item is controlling it to what extend is in the interest of the organization.
- It is useful in relative inventory control in which maximum in which maximum attention can be given to items which consumes more money and a fair attention to medium valued items.
- The low valued items can be reduced to routine procedure.
- The policy can be applied in various fields of materials management like purchase, sales, inspection, inventory control, store keeping , etc.

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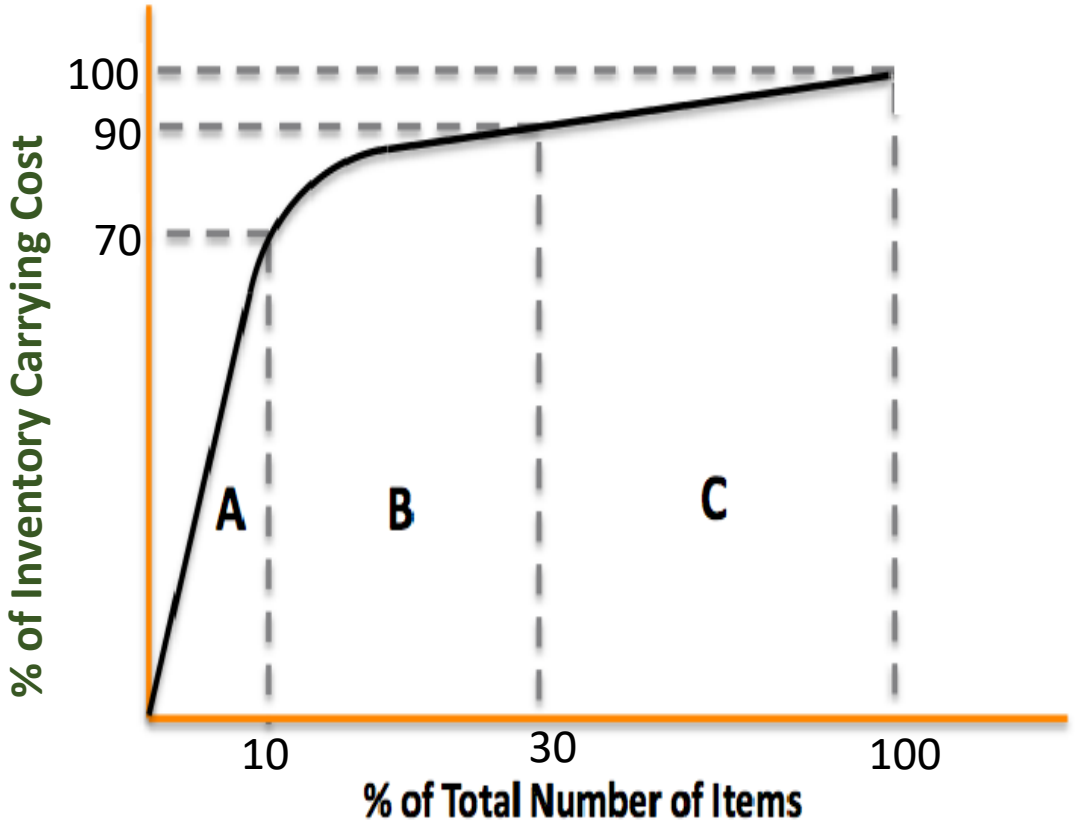
- According to ABC analysis of inventory control, all the items in the industry are divided into three categories based on percentage of quantity of items and percentage of value of items:
  - **A – Class Items:**
    - These constitute 10% of items and account for 70% of total inventory cost.
    - These are high valued items and require careful and close inventory control, proper handling and storage facilities.
    - Though they are high valued items, they are limited in number.
  - **B - Class Items:**
    - These constitute 20% of total items and account for 20% of total inventory cost.
    - These are medium valued items.
    - These items require care but not so intensively as in the case of A class items.
  - **C - Class Items:**
    - These constitute 10% of total inventory cost and 70% of total items.
    - These are low valued items like pins, washers, rubber bands, etc.
    - They usually do not need much control.

A B C Analysis

Merits of ABC Analysis:

1. It becomes possible to concentrate all efforts in areas which need genuine efforts.
2. It is based on selective approach and hence it is the most effective and economical method.
3. It helps in placing the orders, deciding the quantity of purchase, safety stock, etc. thus saving unnecessary stockouts or surpluses.



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