Material Cost

Material cost is the cost of materials used to manufacture a product or provide a service. Excluded from the material cost is all indirect materials, such as cleaning supplies used in the production process. Follow these steps to determine the amount of material cost to assign to a unit of production (such as a completed finished goods item):

1. Ascertain the standard quantity of the material used to manufacture one unit.

2. Add the standard amount of scrap associated with manufacturing one unit.

3. Determine the standard amount of scrap associated with setting up the production run, and apportion it to the individual unit.

4. If any scrap is then sold, apportion the revenue back to the individual unit.

What Is Economic Order Quantity (EOQ)?

Economic order quantity (EOQ) is the ideal order quantity a company should purchase to minimize inventory costs such as holding costs, shortage costs, and order costs. This production-scheduling model was developed in 1913 by Ford W. Harris and has been refined over time. The formula assumes that demand, ordering, and holding costs all remain constant.

Definition

Economic Order Quantity is the level of inventory that minimizes the total inventory holding costs and ordering costs. It is one of the oldest classical production scheduling models. Economic order quantity refers to that number (quantity) ordered in a single purchase so that the accumulated costs of ordering and carrying costs are at the minimum level. In other words, the quantity that is ordered at one time should be so, which will minimize the total of. Cost of placing orders and receiving the goods, and Cost of storing the goods as well as interest on the capital invested.

Formula and Calculation of Economic Order Quantity (EOQ)

$$EOQ = \sqrt{\frac{2 * RU * OC}{UC * CC\%}}$$

EOQ = Economic Order Quantity,
RU = Annual Required Units,
OC = Ordering Cost for one Unit
UC = Inventory Unit Cost,
CC = Carrying Cost as %age of Unit Cost

Example 1:

Demand for the Child Cycle at Best Buy is 500 units per month. Best Buy incurs a fixed order placement, transportation, and receiving cost of Rs. 4,000 each time an order is placed. Each cycle costs Rs. 500 and the retailer has a holding cost of 20 percent. Evaluate the number of computers that the store manager should order in each replenishment lot?

Solution:

$$EOQ = \sqrt{\frac{2 * RU * OC}{UC * CC\%}}$$

$$EOQ = \sqrt{\frac{2 * 6,000 * 4,000}{500 * 20\%}}$$

EOQ = 693 Units

Example 2:

ABC Ltd. uses EOQ logic to determine the order quantity for its various components and is planning its orders. The Annual consumption is 80,000 units, Cost to place one order is Rs. 1,200, Cost per unit is Rs. 50 and carrying cost is 6% of Unit cost. Find EOQ, No. of order per year, Ordering Cost and Carrying Cost and Total Cost of Inventory.

Solution

1. Economic Order Quantity

$$EOQ = \sqrt{\frac{2 * RU * OC}{UC * CC\%}}$$

$$EOQ = \sqrt{\frac{2 * 80,000 * 1,200}{50 * 6\%}}$$

EOQ = 8000 Units

2. Number of Order Per Year

No of order per year = Annual Requirements / EOQ

No of order per year = 80,000 / 8,000

No of order per year = 10 Orders per year

3. Ordering Cost

*Ordering Cost = Fixed ordering cost (F) * Number of Order per year N*

Ordering Cost = 1,200 * 10

Ordering Cost = 12,000 Rupees

4. Carrying Cost

*Carrying Cost = Carrying Cost (C) * EOQ/2*

Carrying Cost = 50*0.06* 8,000/2

Carrying Cost = 12,000 Rupees

5. Total Inventory Cost

Total Inventory Cost = Ordering cost + Carrying Cost

Total Inventory Cost = 12,000 + 12,000

Total Inventory Cost = 24,000 Rupees

Example 3:

Midwest Precision Control Corporation is trying to decide between two alternate Order Plans for its inventory of a certain item. Irrespective of the plan to be followed, demand for the item is expected to be 1,000 units annually. Under Plan 1st, Midwest would use a teletype for ordering; order costs would be Rs. 40 per order. Inventory holding costs (carrying cost) would be Rs. 100 per unit per annum. Under Plan 2nd order costs would be Rs. 30 per order. And holding costs would 20% and unit Cost is Rs. 480. Find out EOQ and Total Inventory Cost than decide which Plan would result in the lowest total inventory cost?

Solution:

Plan 1st

$$EOQ = \sqrt{\frac{2*RU*OC}{UC*CC\%}}$$

$$EOQ = \sqrt{\frac{2*1,000*40}{100}}$$

$$EOQ = 28$$

Total Inventory Cost = [Fixed ordering cost (F) * Number of Order per year N] + [Carrying Cost (C)* EOQ/2]

Total Inventory Cost = [40 * 1,000/28] + [100* 28/2]

Total Inventory Cost = 1,440 + 1,400

Total Inventory Cost =Rs. 2,840

Plan 2nd

$$EOQ = \sqrt{\frac{2*RU*OC}{UC*CC\%}}$$

$$EOQ = \sqrt{\frac{2*1,000*30}{480*0.20}}$$

$$EOQ = 25$$

Total Inventory Cost = [Fixed ordering cost (F) * Number of Order per year N] + Carrying Cost (C)* EOQ/2

Total Inventory Cost = [30 * 1,000/25] + [480*0.20* 25/2]

Total Inventory Cost =1,200 + 1,200

Total Inventory Cost =Rs. 2,400

Plan 2nd is best

Example 4:

A local TV repairs shop uses 36,000 units of a part each year (A maximum consumption of 100 units per working day). It costs Rs. 20 to place and receive an order. The shop orders in lots of 400 units. It cost Rs. 4 to carry one unit per year of inventory.

Requirements:
(1) Calculate total annual ordering cost
(2) Calculate total annual carrying cost
(3) Calculate total annual inventory cost
(4) Calculate the Economic Order Quantity
(5) Calculate the total annual cost inventory cost using EOQ inventory Policy
(6) How much save using EOQ
(7) Compute ordering point assuming the lead time is 3 days

Solution: (1) Calculate total annual ordering cost

Ordering Cost = Fixed ordering cost (F) * Number of Order per year N

Ordering Cost = 20 * 36,000/400

Ordering Cost = Rs. 1,800

Solution: (2) Calculate total annual carrying cost

Carrying Cost = Carrying Cost (C) * EOQ/2

Carrying Cost = 4* 400/2

Carrying Cost = Rs. 800

Solution: (3) Calculate total annual inventory cost

Total Inventory Cost = Ordering cost + Carrying Cost

Total Inventory Cost = 1,800 + 800

Total Inventory Cost = Rs. 2,600

Solution: (4) Calculate the Economic Order Quantity

$$EOQ = \sqrt{\frac{2*RU*OC}{UC*CC\%}}$$

$$EOQ = \sqrt{\frac{2*36000*20}{4}}$$

EOQ = 600 Units

Solution: (5) Calculate the total annual cost inventory cost using EOQ inventory Policy

Total Inventory Cost = [Fixed ordering cost (F) * Number of Order per year N] + Carrying Cost (C) * EOQ/2

Total Inventory Cost = [20 * 36,000/600] + [4* 600/2]

Total Inventory Cost = 1,200 + 1,200

Total Inventory Cost =Rs. 2,400

Solution: (6) How much save using EOQ

How much save using EOQ = 2,600 -2,400 = Rs. 200

Solution: (7) Compute ordering point assuming the lead time is 3 days

Re-order level= Maximum consumption * Lead Time [maximum]

100 * 3 = 300 per day

Fixation of Stock Levels: Formulas and Calculations

(i) Maximum Level of Stock = (Reorder Level + Reorder Quantity) – (Minimum rate of consumption x Minimum reorder period)

(ii) Minimum level of stock = Reorder level – (Average rate of consumption x Average reorder period)

(iii) Safety Stock = (Annual Demand/365) x (Maximum Reorder Period – Average Reorder Period)

(iv) Reorder level or Ordering level = Maximum rate of consumption × Maximum reorder period. Alternatively, it will be = safety stock + lead time consumption

[lead time consumption will be = (Annual consumption -s- 360) × lead time]

 (v) Danger level = It is slightly below the minimum level. It is a level at which special efforts should be made to obtain supplies of materials, i.e.

Average Consumption x Maximum reorder period for emergency purchases.

 (vi) Average Stock level = Minimum **stock Level** + 1/2 of Reorder Quantity.