Q1: Sumco Pump Company Example

Sumco, a company that sells pump housings to other manufacturers, would like to reduce its inventory cost by determining the optimal number of pump housings to obtain per order. The annual demand is 1,000 units, the ordering cost is $10 per order, and the average carrying cost per unit per year is $0.50. Using these figures, if the EOQ assumptions are met, we can calculate the optimal number of units per order

Solution

*Annual demand = 1,000 units
*ordering Cost = $10 Per order
*Average carrying Cost Per unit Per year = $0.50

$D = 1{,}000 \quad C_o = \$10 \quad C_h = \$0.50$

optimal number of units Per order = EOQ

$$EOQ = Q^* = \sqrt{\frac{2DC_o}{C_h}} = \sqrt{\frac{2(1{,}000)(10)}{0.50}}$$

$$\boxed{EOQ = 200 \text{ units}}$$

Total annual Cost = order Cost + Holding cost

$$T_C = \frac{D}{Q} C_o + \frac{Q}{2} C_h$$

$$= \frac{1{,}000}{200}(10) + \frac{200}{2}(0.50)$$

$$= \boxed{\$100}$$

Q2:

Patterson Electronics supplies microcomputer circuitry to a company that incorporates microprocessors into refrigerators and other home appliances. One of the components has an annual demand of 250 units, which is constant throughout the year. The carrying cost is estimated to be $1 per unit per year, and the ordering cost is $20 per order.

a. To minimize cost, how many units should be ordered each time an order is placed?

b. How many orders per year are needed with the optimal policy?

c. What is the average inventory if costs are minimized?

d. Suppose the ordering cost is not $20, and Patterson has been ordering 150 units each time an order is placed. For this order policy to be optimal, what would the ordering cost be?

a) $D = 250 \quad C_h = \$1 \quad C_o = \$20$

$$EOQ = Q^* = \sqrt{\frac{2DC_o}{C_h}} = \sqrt{\frac{2(250)(20)}{1}} = \boxed{100 \text{ units}}$$

b) Number of orders Per year $= \frac{D}{Q}$

$$= \frac{250}{100} = \boxed{2.5 \text{ orders Per year}}$$

c) Average inventory $= \frac{Q}{2}$

$$= \frac{100}{2} = \boxed{50 \text{ units}}$$

d) $D = 250 \quad C_h = \$1 \quad Q = 150$ units

$C_o = ?$

$$Q = \sqrt{\frac{2DC_o}{C_h}} \rightarrow 2DC_o = Q^2 C_h$$

$$C_o = \frac{Q^2 C_h}{2D} = \frac{(150)^2 (1)}{2(250)} = \boxed{\$45}$$

Q3: 6-18

Lila Battle has determined that the annual demand for number 6 screws is 100,000 screws. Lila, who works in her brother's hardware store, is in charge of purchasing. She estimates that it costs $10 every time an order is placed. This cost includes her wages, the cost of the forms used in placing the order, and so on. Furthermore, she estimates that the cost of carrying one screw in inventory for a year is one-half of 1 cent. Assume that the demand is constant throughout the year.

(a) How many number 6 screws should Lila order at a time if she wishes to minimize total inventory cost?
(b) How many orders per year would be placed? What would the annual ordering cost be?
(c) What would the average inventory be? What would the annual holding cost be?

Note: to convert from cent to dollar divide on 100
--→0.5 cent / 100 = 0.005 dollar

$\boxed{6.18}$ $D = 100{,}000$ $C_o = \$10$ $C_h = \$0.005$

(a) $EOQ = Q = \sqrt{\dfrac{2DC_o}{C_h}} = \sqrt{\dfrac{2(100{,}000)(10)}{0.005}}$

$= \boxed{20{,}000}$

(b) Annual ordering cost $= \dfrac{D}{Q} C_o$

$= \dfrac{100{,}000}{20{,}000}(10) = \boxed{\$50}$

(c) Average inventory $= \dfrac{Q}{2} = \dfrac{20{,}000}{2} = \boxed{10{,}000}$

Annual holding cost $= \dfrac{Q}{2} C_h$

$= 10{,}000(0.005)$

$= \boxed{\$50}$