

BUSI4496 Supply Chain Planning and Management

Inventory Management Problems

Problem 1:

A local machine shop buys hex nuts and molly screws from the same supplier. The hex nuts cost 15 cents each and the molly screws cost 38 cents each. A setup cost of \$100 is assumed for all the orders. This includes the cost of tracking and receiving the orders. Holding costs are based on a 25% annual interest rate. The shop uses an average of 20,000 hex nuts and 14,000 molly screws annually.

(a) Determine the optimal size of the orders of hex nuts and molly screws, and the optimal time between placements of orders of these two items.

(b) If both items are ordered and received simultaneously, the setup cost of \$100 applies to the combined order. Compare the average annual cost of holding and setup if these items are ordered separately; if they are both ordered when the hex nuts would normally be ordered; and if they are both ordered when the molly screws would normally be ordered.

Problem 2:

Weiss's paint store uses a (Q, R) inventory system to control its stock levels. For a particularly popular white latex paint, historical data show that the distribution of monthly demand is approximately normal, with mean 28 and standard deviation 8. Replenishment lead time for this paint is about 14 weeks. Each can of paint costs the store \$6. Assume that excess demands are back-ordered. Fixed costs of replenishment are \$15 per order and holding costs are based on a 30% annual rate of interest. (Assume 4 weeks/month and 48 weeks/year.)

(a) Calculate Q and R using a managerial approach so that there is no stock-out in 90% of the order cycles.

(b) What is the safety stock for this paint?

(c) Suppose that, unfortunately, he really wanted to satisfy 90% of his demands (that is, achieve a 90% fill rate). What fill rate did he actually achieve from the policy determined in (a).

Problem 3: (Exam 2006)

A paint store uses a (R, Q) inventory system to control its stock levels. For a particular yellow latex paint, historical data show that the distribution of monthly demand is approximately normal, with mean 100 cans and standard deviation $\sqrt{1250}$ cans. The replenishment lead time for this paint is two months. The owner of the paint store, says: "I want to be sure that I 'never' run out of cans of yellow latex paint. I always try to keep at least a three months' supply in stock. When my inventory position drops below that level, I order another three-month supply. I've been using that method for 10 years, and it works". Each can of paint costs the store £10. Assume that excess demands are backordered. Fixed costs of replenishment are £50 per order and holding costs are based on a 30 percent annual rate of interest.

- (a) What value of R and Q is the shop owner currently using? How large is the safety stock?
- (b) What fill rate (type 2 service level) is achieved with the shop owner's policy?
- (c) How would you set R and Q if the goal is to achieve a type 2 service level of 98%? (Use a managerial approach.)