Parts emporium synopsis

Chapter 13: Parts Emporium

- A. Synopsis. This case describes the problems facing Sue McCaskey, the new materials manager of a wholesale distributor of auto parts. She seeks ways to cut the bloated inventories while improving customer service. Backorders with excessive lost sales are all too frequent. Inventories were much higher than expected when the new facility was built, even though sales have not increased. Summary data on inventory statistics, such as inventory turns, are not available. McCaskey decides to begin with a sample of two products to uncover the nature of the problems—the EG151 exhaust gasket and the DB032 drive belt.

- B. Purpose. The purpose of this case is to allow the student to put together a plan, using either a continuous review system (Q system) or a periodic review system (P system), for two inventory items. Enough information is available to determine the EOQ and R for a continuous review system (or P and T for a periodic review system). Because stockouts are costly relative to inventory holding costs, a 95 percent cycle-service level is recommended. Inventory holding costs are 21 percent of the value of each item (expressed at cost). The ordering costs ($20 for exhaust gaskets and $10 for drive belts) should not be increased to include charges for making customer deliveries. These charges are independent of the inventory replenishment at the warehouse and are reflected in the pricing policy.

- C. Analysis. We now find appropriate policies for a Q system, beginning with the exhaust gasket. Shown here are the calculations of the EOQ

and R, followed by a cost comparison between this continuous review system and the one now being used. The difference is what can be realized by a better inventory control system. Reducing lost sales due to backorders is surely the biggest benefit.

EG151 Exhaust Gasket

New plan Begin by estimating annual demand and the variability in the demand during the lead time for this first item. Working with the weekly demands for the first 21 weeks of 1994 and assuming 52 business weeks per year, we find the EOQ as follows: Weekly demand average = 102 gaskets/week Annual demand (D) = 102(52) = 5304 gaskets Holding cost = $1. 85 per gasket per year (or 0. 21 • 0. 68. • $12. 9) Ordering cost = $20 per order EOQ = 2(5, 304)($20)/$1. 85 = 339 gaskets. Turning to R, the Normal Distribution appendix shows that a 95 percent cycle-service level corresponds to a z = 1. 645. We then find Standard deviation in weekly demand (? t) = 2. 86 gaskets, where t = 1? Standard deviation in demand during lead time (? L) = 2. 86 R = Average demand during the lead time + Safety stock = 2(102) + 1. 645(4) = 210. 6, or 211 gaskets 2 = 4 *This case was prepared by Dr. Rob Bregman, University of Houston, as a basis for classroom discussion.

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Cost comparison After developing their plan, students can compare their annual cost with what would be experienced with current policies.

Cost Category

Current Plan Proposed Plan Ordering cost $707 $313 139 314 Holding cost (cycle inventory) TOTAL $846 $627 The total of these two costs for the gasket is reduced by 26 percent (from $846 to $627) per year. The safety stock with the proposed plan may be higher than the current plan if the reason for the excess backorders is that no safety stock is now being held (inaccurate inventory records or a faulty replenishment system are other explanations). The extra cost of this safety stock is minimal, however. Only 4 gaskets are being held as safety stock, and their annual holding cost is just another $1. 85(4) = $7. 40. Surely the lost sales due to backorders are substantial with the current plan and will be much less with the proposed plan. One symptom of such losses is that 11 units are on backorder in week 21. A lost sale costs a minimum of $4. 16 per gasket (0. 32. • $12. 99). If 10 percent of annual sales were lost with the current policy, this cost would be $4. 16(0. 10)(5304) = $2, 206 per year. Such a loss would be much reduced with the 95 percent cycle-service level implemented with the proposed plan.

DB032 Drive Belt

- a. New plan The following demand estimates are based on weeks 13 through 21. Weeks 11 and 12 are excluded from the analysis because the new product's startup makes them unrepresentative. We find the EOQ as follows: Weekly demand average = 52 belts/week Annual demand (D) = 52(52) = 2704 belts Holding cost = $0. 97 per belt per year (or 0. 21. • 0. 52. • $8. 89). Ordering cost = $10 per order EOQ = 2(2, 704)($10) / $0. 97 = 236 gaskets Turning now to R, where z

remains at 1. 45, we find: Standard deviation in weekly demand (? t) = 1. 76 belts, where t = 1 Standard deviation in demand during lead time (? L) = 1. 76 3 = 3 belts R = Average demand during the lead time + Safety stock = 3(52) + 1. 645(3) = 160. 9, or 161 belts.

- b. Cost comparison After developing their plan, students again can compare the cost for the belts with what would be experienced with current policies. Cost Category Current Plan Proposed Plan Ordering cost $27 $115 485 114 Holding cost (cycle inventory). TOTAL $512 $229. With the belt, the total of these two costs is reduced by 55 percent. The safety stock with the proposed plan may be higher with the proposed system, as with the gaskets, but the added cost for safety stock is only $0. 97(3) = $2. 91.

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The big cost once again is the lost sales due to backorders with the current plan. A lost sale costs a minimum of $4. 27 per belt (0. 48 • $8. 89). If 10 percent of annual sales were lost, the cost with the current policy would be $4. 27(0. 10)(2704) = $1, 155. Such a loss would be much less with the 95 percent cycle-service level implemented with the proposed plan.

Recommendations

For the gasket, the recommendation is to implement a continuous review system with Q = 339 and R = 211. For the belt, the recommendation is to implement a continuous review system with Q = 236 and R = 161. E. Teaching Strategy This case can be used as a " cold-call" case or as a short case prepared in advance of the class meeting. If used without prior student

preparation, it works best as a team assignment. Each team can have a different assignment (P or Q system, gasket, or belt). When used as a cold-call case and time is a concern, the instructor should provide the mean and standard deviation of the weekly demand for the two products. Begin with a general discussion of how to do the analysis, and then work through the analysis. If done with teams, give each time to follow through. After the teams develop their policies, have them make the cost comparison. It brings back the fundamental notions of cycle inventory and ordering costs that were introduced in the Inventory Management chapter. The discussion at the end can broaden into other issues, such as applying the notion of inventory levers and the use of systems other than a Q system to control inventories.

If time permits, the instructor can have the class hand-simulate their policies, using the actual demand data in the first 21 weeks of 1994 for the gaskets and the last 9 weeks of 1994 for the belts. Use a form to record the simulation, either as a handout or transparency. The starting conditions on backorders, scheduled receipts, and on-hand inventory can be what is mentioned in the case for week 21. Simulating the new system is similar to what is to be done in Advanced Problems 28-31 in the Inventory Management chapter.