INVENTORY PROBLEMS

Supply Chain Lot Sizing in Workstations

Dellpaq Computer Corporation sells high-end workstations. They do most manufacturing and assembly work in Taiwan, but maintain a warehouse in the U.S. (in Portland, Oregon) to facilitate quick delivery to North American customers. In addition to their technology, minimizing order and holding costs and retaining a fast response time to delivery are critical factors to their ability to compete. Dellpaq predicts a steady demand of 300,000 of its AMX-based systems each year for the next three years.

Dellpaq purchases the AMX processor and motherboards from its leading Taiwanese supplier (the LETNI Corporation) at the cost of $200 per set, and assembles them into complete systems in a Dellpaq-Taiwan factory. The average total cost of an assembled system is approximately $3000. Dellpaq ships assembled systems by boat to its central warehouse in Portland. The loading plus shipping costs are $100,000 per trip plus $25 per system. The ship capacity is 10,000 sets. Placing a shipment order takes about 5 hours of direct labor, and shipping takes a week to arrive at Dellpaq's central warehouse facility in Portland.

Unloading at the warehouse occurs at the rate of about 10 systems per employee hour, and requires rental equipment that costs $50/hour.

The warehouse storage capacity is 15,000 systems, and every system must be routed via the warehouse before being routed by air freight to its final customer. At the warehouse, the employees have several tasks:

a. arranging the systems in storage according to the options packages at the rate of 20/employee/hour;
b. removing the sets for shipment upon receipt of an order requires $1/8^{th}$ of an hour per set; and
c. surveillance/security equipment at the facility costs about 10,000 hours per year.

All the workers in the chain cost the same: $10/hour of labor. The cost of shipping a system from the warehouse to a customer is $20/system for packaging materials and $45 per system for delivery. Dellpaq computer expects a pre-tax rate of return of 20% on its investment. What ordering policies would you recommend to Dellpaq?

Fast-Clockspeed Components

Digital Devices Incorporated (DDI) is in an intensely competitive market for high-speed signal processing chips. They have perennially been an industry leader, but now find that within ten weeks of the release of a new chip, a swarm of copycat competitors rush in and kill any further profitability for their product. Thus DDI basically launches a product that has an expected economic life of ten weeks. DDI is about to launch a new version of its *Fruitfly* TM signal-processing chip. They estimate that the demand until the swarm arrives has a normal distribution with a mean of 150,000 and a standard deviation of 45,000. The margin on the chip (price minus variable cost) is expected to be about $100 for the first ten weeks; after which the market completely dries up for DDI's product. (The price charged is $150 and the cost is $50.) They must commit now with their foundry supplier as to how many *Fruitfly* TM chips to produce. What number should they choose?