



## Managing Customer Responsiveness at Littlefield Technologies

### Background

Littlefield Technologies (LT) has developed another DSS product. The new product is manufactured using the same process as the product in the assignment “Capacity Management at Littlefield Technologies” — neither the process sequence nor the process time distributions at each tool have changed. The LT factory began production by investing most of its cash into capacity and inventory. Specifically, on day 0, the factory began operations with three stuffers, one tester, and one tuner, and a raw materials inventory of 9600 kits. This left the factory with zero cash on hand. Customer demand continues to be random, but the long-run average demand will not change over the product’s 318-day lifetime. At the end of this lifetime, demand will end abruptly and factory operations will be terminated. At this point, all capacity and remaining inventory will be useless, and thus have no value.

Management is currently quoting 7-day lead times, but management would like to charge the higher prices that customers would pay for dramatically shorter lead times. In addition, because the factory is essentially bootstrapping itself financially, management is worried about the possibility of bankruptcy. To minimize this threat, management policy dictates that new equipment cannot be purchased if the remaining cash balance would be insufficient to purchase at least one order quantity’s worth of raw materials.

### Operations Policies at Littlefield

LT uses a Reorder Point / Order Quantity raw material purchase policy. That is, raw kits are purchased as soon as the following three criteria are all met: (1) the inventory of raw kits is less than the reorder point, (2) there are no orders for raw kits currently outstanding, and (3) the factory has sufficient cash to purchase the reorder quantity. No order is placed if any of these three criteria are not met. Kits are purchased in multiples of 60 because orders arrive in batches of 60. A reliable supplier delivers exactly the order quantity of batches, four days after the order is placed and paid for. Management considers physical cost of holding inventory negligible compared to the financial costs. Other details concerning the purchasing policy can be found in the “Littlefield Technologies — Overview” note. The current reorder point and reorder quantity can be changed by clicking on “Edit Data” on the Materials Buffer icon.

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Currently (as in the first assignment) the factory releases orders into the factory in processing lots of 60 receivers. However, in this assignment, you may split the incoming orders into smaller processing lots as they are released into the factory. Specifically, you may choose to release each order of 1 lot of 60 receivers, 2 lots of 30 receivers, 3 lots of 20 receivers, or 5 lots of 12 receivers. A 1.4-hour fixed setup time at the stuffer (e.g., to load kits and components) is incurred for each lot regardless of lot size. Steps on the other machines do not have significant setup times.

Customers are willing to pay a premium for fast lead times, and you now have three pricing contracts to choose from:

- price = \$750; quoted lead time = 7 days; maximum lead time = 14 days. (This is the contract that the factory starts with).
- price = \$1000; quoted lead time = 1 day; maximum lead time = 5 days.
- price = \$1250; quoted lead time = 0.5 days; maximum lead time = 1 day.

A contract is assigned to an order as soon as it arrives at the factory, and that contract cannot be changed subsequently for that order. Contracts for future orders can be selected by clicking on “Edit Data” on the Customer Order icon.

Once the market has matured on day 150, a bank is extending a line of credit to Littlefield Technologies at 20% annual interest compounded daily. In addition, a processing fee of 5% is incurred right after the loan is received. You can borrow and repay loans beginning on day 150 by clicking on “Cash” on the menu bar below the factory schematic, and then clicking on the appropriate button on the bottom of the resulting window.

You are also allowed to buy and sell machines and change the scheduling rule at the tester.

## **Assignment**

The factory has been running for 50 simulated days, and management has recalled the high-powered operations team (you) to manage the capacity, scheduling, purchasing, lot sizing, and contract quotations to maximize the cash generated by the factory over its lifetime. Management is not providing any operating budget beyond the cash generated by the factory itself. You will have control of the factory from day 50 to day 218. The simulator will run at a rate of 34 simulated days per 1 real day, so the 168 days of the assignment will run for 4 days, 22 hours and 35 minutes. At day 218, you lose control of the factory, and the simulation will quickly run another 100 days of simulation. When you lose control of the factory, management expects you to leave the factory parameters set to maximize the factory’s cash position when the factory shuts down on day 318. After the simulation ends on day 318, you can check the status of your factory, but the factory will no longer be running. Any remaining machines and inventory will be worthless. Team scores and ranking are based “cash balance,” which Littlefield Technologies defines as cash on hand minus debt.

Your team should turn in one summary of what actions you took during the time you had access to the factory, why you took those actions, and in retrospect whether you think you did the right thing. Show analysis to justify your conclusions. Your team’s grade will be partially based on your performance, but mainly based on your summary.