Managing Customer Responsiveness at Littlefield Labs

Background

Littlefield Laboratories (LL) has opened another lab. The new lab uses the same process as the lab in the assignment "Capacity Management at Littlefield Labs" — neither the process sequence nor the process time distributions at each machine have changed. On day 0, the lab began operations with three preparers, one tester, and one centrifuge, and an inventory of 160 test kits. This left the lab with $1,000,000 in reserves. Customer demand continues to be random, but the long-run average demand will not change over the product's 268-day lifetime. At the end of this lifetime, demand will end abruptly and lab operations will be terminated. At this point, all capacity and remaining inventory will be useless, and thus have no value.

Management would like to charge the higher prices that customers would pay for dramatically shorter lead times. However, historic lead times often extend into several days, so management has been unwilling to quote the shorter lead times.

Operations Policies at Littlefield

LT uses a Reorder Point / Order Quantity raw material purchase policy. That is, test kits are purchased as soon as the following three criteria are all met: (1) the inventory of test kits is less than or equal to the reorder point, (2) there are no orders for kits currently outstanding, and (3) the lab has sufficient cash to purchase the reorder quantity. No order is placed if any of these three criteria are not met. So, for example, a team could prevent kit orders from being placed at all by setting the order quantity so high that there is insufficient cash to place an order.

A reliable supplier delivers exactly the order quantity of kits, four days after the order is placed and paid for. Management considers physical cost of holding kit inventory negligible compared to the financial costs. Other details concerning the purchasing policy can be found in the "Littlefield Labs — Overview" note. The current reorder point and reorder quantity can be changed by clicking on "Edit Data" on the Materials Buffer icon.

Based on a note written by Sam Wood and Sunil Kumar, Stanford University Graduate School of Business.

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 lab starts with).
- price = $1000; quoted lead time = 1 day; maximum lead time = 3 days.
- price = $1250; quoted lead time = 0.5 days; maximum lead time = 1 day.

As before, if a customer order's lead time exceeds the quoted lead time, then the revenue for that order decreases linearly, from the prices above for the quoted lead time to $0 for the maximum lead time. A contract is assigned to a customer order as soon as it arrives at the lab, 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.

You will also notice a few days where zero jobs are completed by the lab. On such days, the daily average lead time and daily average revenues are meaningless, so a value of zero will appear in the plots and downloaded data on those days.

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

Assignment

The lab has been running for 50 simulated days, and management has recalled the high-powered operations team (you) to manage the capacity, scheduling, purchasing, and contract quotations to maximize the cash generated by the lab over its lifetime. Management is not providing any operating budget beyond the cash generated by the lab itself. You will have control of the lab from day 50 to day 218. At 1 hour per simulated day, this translates to 7 real days. At day 218, you lose control of the lab, and the simulation will quickly run another 50 days of simulation. When you lose control of the lab, management expects you to leave the lab parameters set to maximize the lab cash position when the lab shuts down on day 268. All machines and inventory remaining on day 268 have zero value. After the simulation ends on day 268, you can check the status of your lab, but the lab will no longer be running.

Your team should turn in one summary of what actions you took during the week you had access to the lab, 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. The summary cannot exceed 3 pages in length, and no appendices are allowed.