Littlefield Simulation 2 - Group 4

Decisions
- **Day 53, added 2 machines for station 1, 1 for station 2, 1 for station 3, and changed the contract to number 2**

As a group, we discussed our strategies before the start of the simulation; we realized our group's data was leading us toward buying more machines for all the stations by looking at Shared Google Sheets' data. We utilize the sheets to calculate how the inventory and data would be under different contracts. From there, we found if we bought two more machines for station 1, which made the flow time decrease to 9.88h, we would earn 1250 dollars per order. We also added one more machine to station 2 and 3 just to make sure we can produce the right amount with the inventory. After buying all these extra machines for each station, we realized we might need to change the contract. And we decided to change to contract 2 to get the most potential profits out there. The reason we change to contract 2 is that if we do contract 3, we can't get close to 0.5 in lead time, although we are close to that. Therefore, we decided to end up changing to contract 2.

- **Day 164, added a machine for station 1 and station 3**

After observing utilization rates for station 1 and 3 fluctuating a lot and peaking at 100% around every 10 days, we decided to look and see how it affected our lead times. Being on contact 2, we want our lead times to be under 1 day in order to get the maximum amount of profit. We noticed our lead times being around .4 days on average, except for around every 10 days the lead times spiked over our promised quoted lead time of 1 day to around 2.5 days. These spikes occurred for around 3 days on average and we noticed that it correlated to the queue build up in both station 1 and 3 caused by the over utilization of machines at both stations. In order to solve this issue we decided to add a machine to both stations, with the goal being to lower utilization rates to keep lead times down. Since our lead times were below .5 while the queue was not built up, our goal was to make these changes and then look to upgrade our contract to number 3.

- **Day 180, changed reorder quantity to 300 kits, reorder point to 100 kits, and contract to number 3**

The change we made on day 180 was to change the reorder quantity to 300 kits and the reorder point to 100 kits. We made this change because we had noticed that in the past periods the number of kits had been getting all the way down to zero for multiple days. This meant that we were losing revenue as a result of the lack of available kits. To fix this, we changed the reorder quantity to 300, allowing our supply chain to run continuously producing at a quick rate without burning through our inventory too quickly. We also readjusted the reorder point to 100 so that the inventory would restock before reaching zero. By making this change it ensured the stock never ran out and there was never a day without production and revenue. The other change we made on day 180 was to change the contract to number 3. This had been our goal because this allowed us to best target our ideal lead times. Using our excel spreadsheet, we calculated the change in lead times as a result of changes in contract 2 versus contract 3 and determined that it was to our benefit to change to contract 3.

Improvements

1) Recognizing simulation 1's potential improvements, we made a shared Google Sheet to track everyday data more efficiently. In the sheet, we covered aspects (i.e., input, output, inventory, utility, etc.). We utilized the Google Sheets formula to compute our machine's capacity, and we mainly used the statistics from the sheet to decide whether we needed to purchase an additional machine. This procedure is much easier for us to track the data since we only need to download the data from Littlefield Labs and put them on the sheets. It avoids manual calculation, which greatly reduces the chance of our computational error. However, this approach somewhat does not work well for this simulation since it requires us to have output jumped across all three contracts. Thus, our overall standing is not strong as the first simulation because we did not fully take the cost-efficient benefit into account. To be more specific, I believe our decision is good if we do not consider the cost of the machines. We ended up losing money because the profit added to our additional machine was less than the cost of purchasing the machine itself. So we have an inefficient overprovision for our simulation this time.

2) For this simulation, we didn't track it as we did in simulation 1. However, we discovered that we can change the reorder point and reorder quantity at the very end of this game, which is different from the first simulation. Initially, we were concerned about the lack of inventory, but we decided to let go of that worry and purchased machines. At the same time, we didn't have the courage to change the contract from 1 to 3 because we were afraid of incurring losses. However, later on, we realized that buying more machines to meet contract 3 would allow us to earn more profits, and we also found a way to modify the reorder point and reorder quantity. Although we didn't achieve a high ranking in this simulation, we eventually found the balance point that maximizes profits. Through this simulation, we realized the importance of initiating contract changes early on to obtain higher profits. Had the simulation continued we would have been in a good position to go higher on the rankings, we were not as proactive as we needed to be.

3) Though we recognized after simulation 1 that it would better benefit our performance if we checked our data more regularly during the simulation, we didn't check and record our data as regularly as we had hoped after our experience with simulation 1. There were times when 40 -50 days had passed in the simulation without recording data. This was mainly due to a lack of an objective plan for our group. We brainstormed decisions at different points in time, but without an overarching plan it made it difficult to check up on the data frequently as we did not have anything to look out for. We might have been able to make more precise decisions if we had checked our data more frequently. On top of that, if we checked and log simulation more frequently, we might be able to realize the need to change the contract number from 1-3 faster. Yet overall I think group 4 has learned valuable lessons through our mistakes in the second littlefield simulation. We should have devised a plan to get to contract 3 as fast as possible and monitored the data that would have allowed us to do this. Learning from this, if we were to do this simulation again, we would hold a long meeting before the start of the simulation discussing what our goals are and this would motivate people to check the data more frequently and with purpose.