Littlefield Simulation 1 - Group 4

Decisions

- **Day 53, added a machine in station 1**

After analyzing the first 50 days of data, the first thing we noticed as a group was the utilization rate of our 1 machine at station 1 was peaking at 100%. This was causing a lot of buildup in the station 1 queue and was ultimately increasing our lead times over the 1 minute promised threshold. In order to preserve revenue loss, we decided to buy another machine at day 53.87 to lower the stress on our station 1 machine, lower queue times, and increase profit. This decision proved to be very effective as everything played out as we expected it too.

- **Day 55, added a machine in station 3**

On Day 55, we noticed a lot of orders in queue for station 3, which caused lead time to increase. We also noticed that the utilization rate for station 1 was lower while that of station 2 was much higher. Meanwhile, our calculation showed that the mean of the orders were completed in the 10 day range. This was increasing as the days went on, so we thought it was a good idea to add more machines for station 3.

- **Day 96, added a machine in station 1**

On day 96, we analyzed the charts and graphs provided and noticed that the utilization of the machines at station 1 had been high for the days prior. Our data on the utilization of the machines in station 1 showed that for days 85 and 86 the machines reached their full capacity. This caused us concern as we were once again having a buildup of the station 1 queue that would increase lead times and cause potential loss. We decided to observe the machines over the next couple of weeks in order to be certain the issue would not subside by itself. During this observation period, the utilization rate for Days 88, 91, 92 and 96 respectively were 0.98, 0.91, 0.95, and 0.96. While not peaking all the way to 1 it became clear that the utilization was going to constantly be high and would need intervention. As a result our team decided the best course of action was to purchase another machine for the station and mitigate the potential for future loss.

- **Day 127, added a machine in station 3**

We predicted the regression of the utilization of station 3 and we think that's the time to add one more machine. And the data looks pretty good after we bought it, the rates lowered which put less pressure on the queue time and helped keep our lead times low to secure all the revenue we can get.

- **Day 127, added a machine in station 1**

Several days before day 127, we made a simple linear regression of how the daily average number of kits queued for station 1 and it showed that around day 127, the queue would be over 1; also we made one for the utilization of station 1, the prediction of how the utilization would be was that it would up to 1 at day 130. From the plot of the utilization of station 1 data, we find out the utilization rate is 99% on day 127, and the average number of kits queued for station 1 is precisely 2.35 on day 127. We find it would be a good idea to buy another machine in station 1. This purchase lowered the utilization rates as expected allowing our process to flow more smoothly.

- **Day 159, added a machine in station 2**

We found out the daily average number of kits queued for station 2 is continually increasing. The order data in the queue for day 159 is 9.22. Another fact that we noticed is that the utilization rate for station 2 remains high for a couple of days, and on day 159, the utilization rate reaches 100%. We realized we should buy an additional machine in station 2 to maximize its output and make it more efficient.

Improvements

As a group we tried to check the data as much as we could throughout the days but we did miss some important cues that the data was showing us. We were able to check on data at least once a day. This was due to being a little bit late to checking the new data that was coming in. Since multiple days are passed during the simulation in one actual day, we missed opportunities. If we were to run the simulation over again we would assign each group member a specific time slot to check the data to make sure we have all parts of the day covered so we would not miss any important cues. We could potentially increase our profit if we could make changes as soon as problems occurred.

Another aspect that we can improve on in future attempts is our ability to recognize and solve problems with more efficiency. While we tried our best to spot errors in our assembly line, we sometimes had debates over when or how to solve a problem. This issue lessened greatly over the course of the project, but can still be further improved. As the days went on, our team better understood the data given allowing us to better predict when a machine would need to be purchased. As we see more and more data and continue to be presented with more experience, our reaction times will be quicker and we can improve our ability to make decisions quickly and correctly.

One more improvement we could have made is to assign each person a specific task and track the data through a shared folder. All of our team communication is through iMessage, which is sometimes hard to follow if there are several updates coming within a day. If we are using Google Docs or Sheets as a supplement and updating the details in the shared folder within a daily routine, we would be done more efficiently.