Littlefield game report

Team 4

Ziming Cui

Yuqing Gu

Xiaohu Xiao

Zeyao Yang

Operations：

1) At day 51, bought one machine at station 1.

Reason: We find out that before 50 days, compare to station 2, the utilization of station 1 is relatively high. Also, though the utilization of station 3 also high, the queue before station 3 is only about 6, while station 1 queue is approximate 20. So, we the bottleneck of the factory is station 1 currently.

Assessment： We underestimate the demand, the adjustment we made did help, but not enough. Though the average utilization for station 1 is 51.4%, the variability caused a long queue for step 1 and 3. The utilization increased to 1 during the following days, and station 1 queue reached 267.58 in day 52. For the same reason, we should also buy one machine for station 3.

2) At day 52-62, changed the scheduling policy of satiation 2 from FIFO to pro2, and reverse.

Reason: We found out that the utilization and waiting queue is decreasing on station 3, while the utilization on station 2 in increasing. So, we evaluated that step 2 may become the new bottleneck, so we change the priority of step 2 to make it get more capacity. And at day 62, we found that the situation in station 2 and 3 is on the contrary, so we changed the scheduling policy back.

Assessment: We wrongly evaluate station 2 as the bottleneck and set the work flow, while oversaw the true problem. This change increased the demand for step 3, thus the average queue of station 3 accrue from 6 kits to 57 kits.

3) At day 70, bought one machine at station 3.

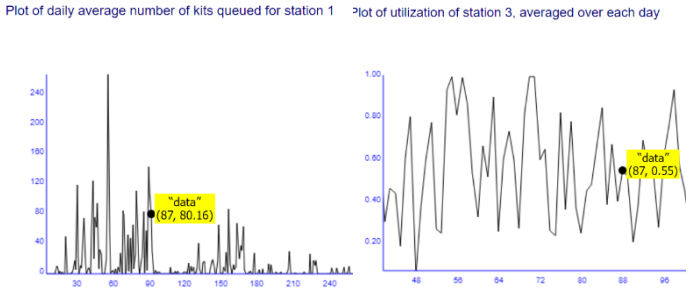
Reason: The average job lead time increased from 0.48 to 0.67, and while other line remains the same, the queue line in front of station 3 started to grow. So, we presumed that step 3 has become the bottleneck, we need to increase the capacity of station 3.

Assessment: This decision proved to be helpful, because the lead time of jobs dropped immediately after the change, and the problem of queue became less sever. But this improvement came too late, for the queue in front of station 3 increased to 400 at day 70 and 71, this should be done earlier.

4) At day 87, bought 2 machines at station 1, buy 1 machine at station 2.

Reason: First, the total amount of cash was tent to drop, so, we judged the demand out of capacity of out factory, it cannot fulfill orders to get the full payment. Second, the job arrival rate is increasing: average arrival per day for the first 50 days is about 2.6, for day 51 to 70 is about 5.5, for day 71 to 87 is about 7.8, the demand is raising. Third, we observed that the utilization of station 1 is constantly high,

and of station 2 is increasing. So, we decided to increase our capacity: for station 1, due to the high utilization and the increasing trend of job arrival rate, we thought it is reasonable to double its capacity. For station 2, though the utilization of station 2 is under 50% on average, because it is on charge of two steps, we thought after increase the total capacity of the factory station 2 may become bottleneck. So, we also bought one machine for it. Since the utilization of station 3 has decreased after we purchased one at day 70, we did not change it this time. good



Assessment： This was proved to be a good operation: we have more capacity to handle out jobs. After this change, the queue problem has improved, the lead time kept a low level, and we seldom lose money due to late jobs.

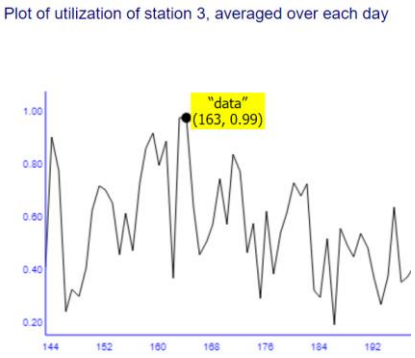
5) At day 138, bought one machine at station 3.

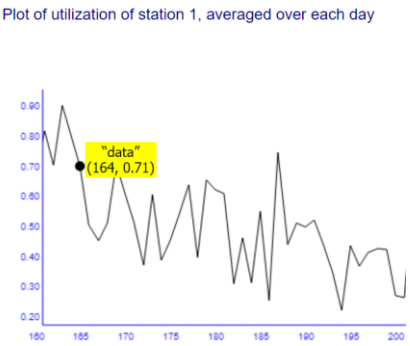
Reason: The lack of capacity at station 3 became severe after we bought more machines for others, also, the job arrival was at increase. So, we assumed that it is the right time to add more machines to it.

Assessment： To increase demand, we need more capacity. It is a good decision, after the purchase, the utilization has dropped, and the queue before station 3 is shorter.

6) At day 164, bought one machine at station 1, change the prioritize step4 at satiation 2.

Reason: For station 1, caused by the increase in job arrival, the utilization has come back to 70% like before, while the demand is still growing, and while the increasing rate of jobs has slowed, we decided to add one machine for it. On the other hand, the utilization of station 3 also increased. While the problem of station 3 did not improve after our two purchases, we consider the priority of steps 2 and 4 as the reason. When the production capacity of station 3 is not enough, station 2 will process more step 2 products because the amount of step 4 products is not enough. In this case, FIFO will further increase the burden on station3 and slow the delivery of orders. But, if step 4 processed prior, the amount of processing step would 2 decline, it should be able to reduce the burden on station3 and ensure the required delivery speed on the same time. Therefore, we choose to adjust the scheduling policy of satiation 2.





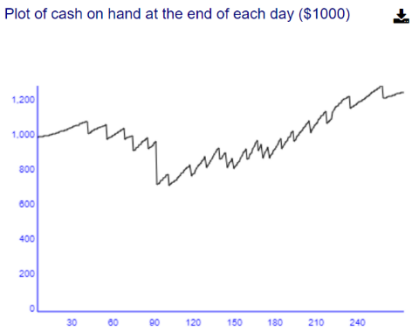
Assessment: The utilization of station 1 and 3 decreased, which means that our adjustment worked. But at the same time, the number of job arrival started to drop. So, it is hard to evaluate the effect of our operation accurately, it may be a good change but come too late.

7) At day 215, sold two machines at station 1, one machine at station 2, one machine at station 3.

Reason: For day 170 – 210, the demand declined, we do not need that much capacity, so we decided to sell idle machines. Since the average utilization of station 1, 2, and 3 is about 46%, 34%, 52%, the highest utilization is 0.77, 0.46, 0.85, we evaluate 30% of capacity in station 3, 50% of capacity in station 2, 30% of capacity in station 3 to be idle.

Assessment: Selling machines is a reasonable decision, though it costs a lot since the huge difference between the purchase price and selling price, it can still help to improve our factory's efficiency by keeping the utilization at a reasonable rate. Also, the benefits of these machines have made up for the losses from that difference.

Summary



- First, we did not prepare enough before the game bega and spent too much time after the game started to familiar the system; second, we did not consider the whole process in the big picture, always making decisions after things happened. The poor decision we made cause a loosing of money: most of the time in the early period (for about 30 days) of the game, the demand were out of our capacity, and we did not fill up for it in time. There are delay of orders and lack of capacity.

But on the other hand, after we were more and more familiar with the system, got more and more statistics, we started to make more appropriate decisions. After day 87, we stated to earn money. It also remind us to be prepared and see things at the big picture