Littlefield game report

Team 4

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1. Capacity and contracts:

We increased our capacity twice:

1.1 The first increasement

Increased capacity due to high utilization of three stations as soon as we took control. All three stations have reached 100% utilization. The high utilization, queue situation, and long lead time all indicated a lack of capacity that needed to be dealt with. So, we changed our capacity for stations 1,2,3 from (1,1,1) into (5,2,3) which we used for the first time. And we also switched the scheduling rule to the

After this improvement, we judged our lead time to be within one day, so, we switched our job contract to the second one to make the profit of one job from $750 to $1000.

These changes are necessary, and our factory became more lucrative.
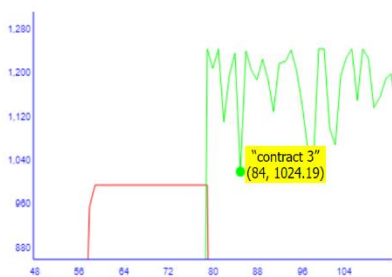
But on the other hand, our decision is too conservative, the capacity is enough for contract 3 and the underage cost of it is about $185 per job (count by subtracting the average revenue under contract 2 from which under contract 3). With the experience of the first little field game, we knew that with the arrangement of machines (5,2,3), the average lead time is under 0.5 days, which is the quoted lead time for contract 3. Given the short life span of our product, we should be more aggressive to earn more money.

1.2 The second increasement

We increased the number for all stations by 1. Cause station 2 needs to handle two processes simultaneously, we increased its volume first, followed by the other two.
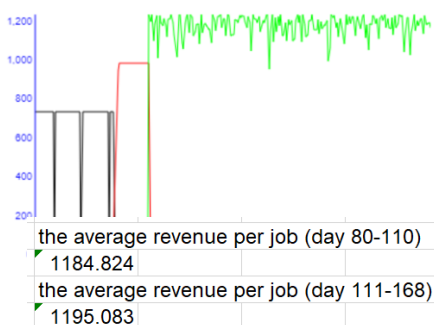
Though this change has shortened the lead time and increased the average interest per job by about 1%, this benefit cannot balance the expenditure of purchasing. We partly believed that the vibration of average revenue was caused by a lack of production capacity, due to the queuing issues that arise from time to time. While we dismissed that the processing time of the flow may be about 12 hours. This modification proved to

be superfluous for newsvendor products.

2. Inventory:

We change the Q and R into 200 batches (12000sets) and 60 batches （3600sets）

(K=1000, Unit Cost: 10, L=4days, Ch=0, μ=13, σ=3.6)

2.1 For the reorder point(R):

Cause the daily demand continues to be random, and does not change during the product's life span, we use the history data to compute the demand deviation, which is normally distributed with a mean of 13 and a standard deviation of 3.6. Set our service level as 90%, and we get our reorder point, using the formula $R = R_0 + ss = D * L + Z_\alpha * \sigma_L$.

It proved that 90% service level is quite high, after the modification, there is no more stock out situation.

2.2 For the reorder quantity(Q):

Because storage of inventory will not cause holding costs, we cannot compute the best reorder quantity, so, we did not make a big change to it. Our decision was made by instance, that we changed the 7 days order rotation into 14 days. Without other consideration.

This judgment was wrong and costly both by multiple order placement and excess inventory waste. By the end of day 268, we still stocked 8280 sets to be damped.

Plot of inventory level in kits (not an average)
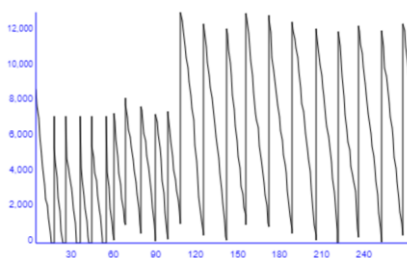
Scince the storage is free and only fixed ordering costs were charged. The required inventory within the remaining days should be calculated based on the average demand for the first 50 days: 13*60*216=168480 sets, and placed an order with the forecast demand of raw materials. By the end of day 218, set a reorder quantity based on the current inventory if necessary.

3. Summary:

With the experience last time, we are more familiar with our work and reduced experimental decisions this time. While the lack of overall understanding of the problem still caused some problems.

At last, we reached fourth standing with a cash balance of 2,086,399. We came up with two main faults that caused this outcome.

3.1 About capacity:

First, for selling products with a limited life span, it is unnecessary to increase our capacity for the second time. Though made improvements, the input-output ratio of this purchase made it needs a long period for us to earn the investment back. So, our cash was growing fast, nevertheless, the result was not lucrative enough, due to buying productivity cost too much and the selling period being too short.
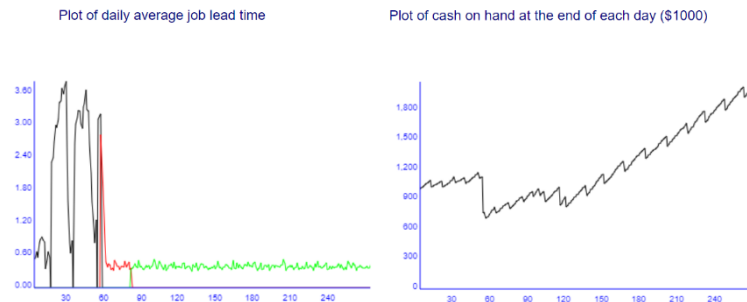
Second, we were not confident enough to face new contrast of offers. Through the plot of cash and average job lead time, it is obvious that with the machine arrangement of (5,2,3) the factory can handle the most profitable contract. And the last experience tells the same story. While we did not make a bold decision, this hesitation took its cost.

3.2 About inventory：

For a product with a short life span, a constant reorder plan may be unnecessary. The purchase should aim to match the actual demand. The best way is to place a one-time purchase by the volume a little less than the estimated amount and adjust by the end of our control if necessary.

However, due to our wrong decision-making, we ended up with a large amount of raw material left.

We over purchased capacity and inventory, the remain had no residual value and were obsoleted after day 268.