TTM591-004

Littlefield Game 2 Plan

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Based on the 10 days demand, average demand for first 10 days of the game was 25.4 jobs per day. Therefore, we will calculate interarrival time based on 25.4 jobs per day. Accordingly, interarrival time is 0.9448 hrs or 57 mins (24/25.4 x 60). Moreover, average demand for first 286 days is expected to be constant. Therefore, we will consider simulation end time as 6864 hrs (286 x 24). Based on simulation 1 HW, processing time for each machine in station 1 is 3.46 hrs, in station 2 is 1.165hrs and in station 3 is 2.74 hrs. Since, utilization and que size for station 2 and station 3 is very high but que size for station 1 is very low and utilization is also below 1, we should first reduce the utilizations and que size for station 2 and station 3. This can be done by buying machines for station 2 and station 3.

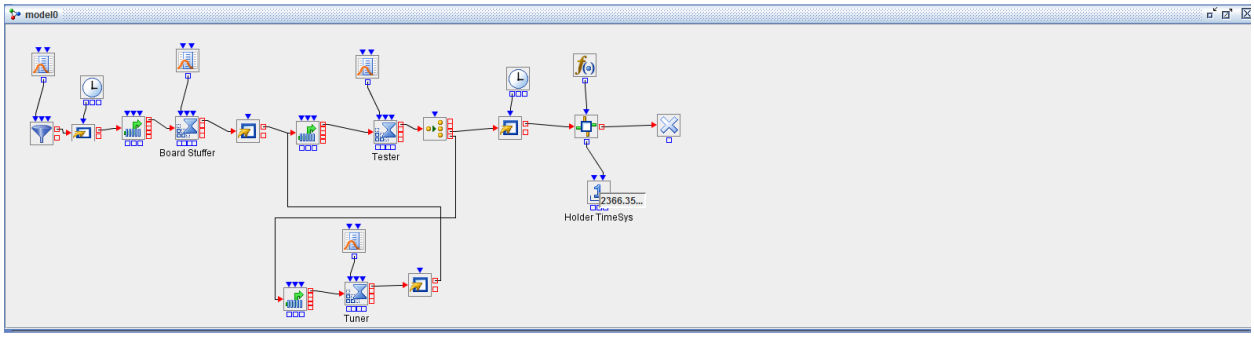
SAS simulation could be a very good toll for making decision on number of machines to buy for each station. In current state, we have 4 m/c in station 1, 2 m/c each for station 2 and station 3. Running our first simulation using 10 replicates and above process parameters, we find following results that can be seen from Appendix A: Average utilization for Station 1 in long run is expected to be 0.91 but for station 2 and station 3 to be about 0.99 as expected. Moreover, maximum weight time for station 1 is 43.9 hrs (1.82 days) but for station 2 and station3 is 283.9 hrs (11.82 days) and 1940 hrs (80.83 days) respectively. In addition, **average time in the system is 1180 hrs (49.16 days)**. In conclusion, meeting delivery time of 1.5 days is not possible in the current scenario and our simulation also suggest us to buy atleast 1 m/c each for station2 and station3.

Now, running second simulation with 3 machines each in station 2 and station 3, we find following results: Average utilization for Station 1 in long run is expected to be 0.91 but for station 2 to be 0.82and station 3 to be about 0.96. Moreover, maximum weight time for station 1 is 43.9 hrs (1.82 days) but for station 2 and station3 is 14.41 hrs (0.6 days) and 68.83 hrs (2.86 days) respectively. In addition, **average time in the system is 37.66 hrs (1.57 days)**. In conclusion, meeting delivery time of 1.5 days still seems difficult for all orders in this scenario. Because station 3 maximum wait time is 2.86 days, our simulation suggest that we can buy one more m/c for station 3. To confirm this, we ran one more simulation.

Finally, running third simulation with 3 machines in station 2 and 4 machines in station 3, we find following results: Average utilization for Station 1 in long run is expected to be 0.91 but for station 2 to be 0.82 and station 3 to be about 0.72. Moreover, maximum weight time for station 1 is 43.9 hrs (1.82 days) for station 2 is 13.80 hrs (0.57 days) and for station 3 is 14.66 hrs (0.61 days) respectively. In addition, **average time in the system is 20.41 hrs (0.85 days).** In conclusion, meeting delivery time of 1.5 days seems possible in this scenario.

Conclusion: Given 25.4 average daily demand, we used 35 jobs per day to calculate our ROP to include some safety stock. Therefore, our ROP will be 140 jobs (8400 kits). Given shortage in cash, we will stick with current order quantity of 8000 kits. However, we have less than $200,000 in current Cash to pay for next order. Therefore, we plan to borrow $200,000 to pay for next order. To buy 1 m/c for station 2 ($150,000 each) and 2 m/c for station 3 ($140,000 each), we also need to borrow $430,000. Therefore, total loan that we need to take is $630,000. Overall, we need to pay instant $31, 500 loan processing fee that we have in our current cash. We plan to make remaining changes in parameters later as the game progresses and revenue situation stabilizes.

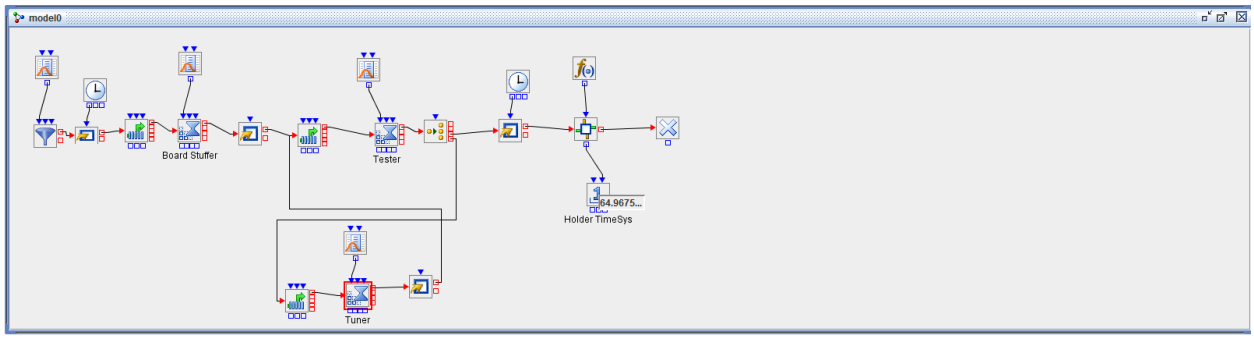
Simulation 1 Results:



experiment0

PointName	StartTime	EndTime	Replicates	MeanValueTimeSys	AvgUtilization1	AvgUtilization2	AvgUtilization3	MaximumLengthSt..	MaximumWaitStati...	MaximumWaitStati...	MaximumLengthSt..	MaximumWaitStat...	MaximumLengthSt..
point 1	0	6,864	10	1180.6312221175...	0.9128331347833...	0.9976761196583...	0.9986956300387...	49.8	43.957225754179...	283.91795896154...	503.5	1940.8984470536...	1964.5

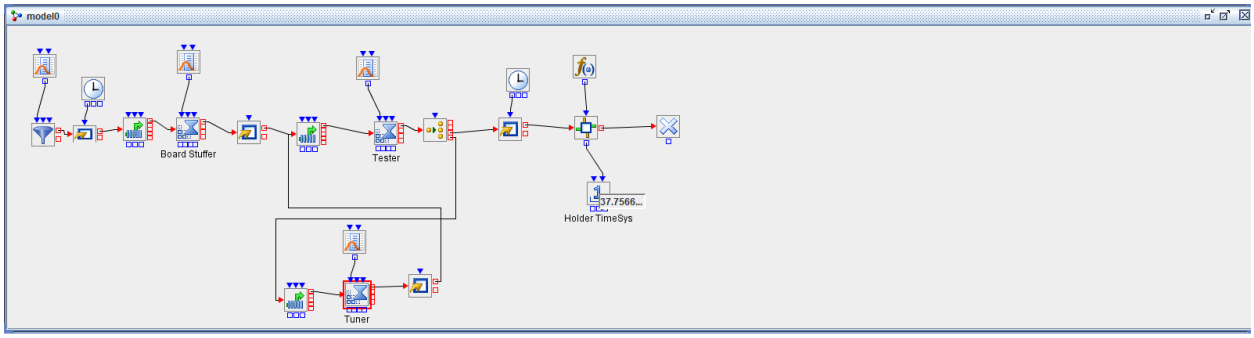
Simulation 2 Results:



experiment0

PointName	StartTime	EndTime	Replicates	MeanValueTimeSys	AvgUtilization1	AvgUtilization2	AvgUtilization3	MaximumLengthSt..	MaximumWaitStati...	MaximumWaitStati...	MaximumLengthSt..	MaximumWaitStat...	MaximumLengthSt..
point 1	0	6,864	10	37.664128741452...	0.9128331347833...	0.8210897013699...	0.9605626518369...	49.8	43.957225754179...	14.415880077733...	32.1	68.835992354620...	77.2

Final Simulation Results:



experiment0

PointName	StartTime	EndTime	Replicates	MeanValueTimeSys	AvgUtilization1	AvgUtilization2	AvgUtilization3	MaximumLengthSt..	MaximumWaitStati...	MaximumWaitStati...	MaximumLengthSt..	MaximumWaitStat...	MaximumLengthSt..
point 1	0	6,864	10	20.418860550701...	0.9128331347839	0.8219905110638...	0.7219430481241 5	49.8	43.957225754179...	13.804762211092...	31.4	14.665935402745...	19.3