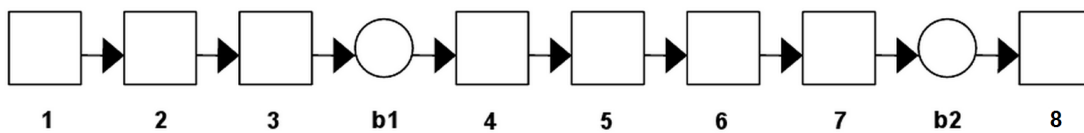


HWK # 7 (Mfg System HWK #2) Fall 2013

Time and Rate

1. Production Flow Issues

a) Estimate the production rate, inventory, and time in the system for the system shown below, made up of eight identical process steps each which is capable of producing 100 parts a day when operating. The two buffers are of infinite capacity. The MTTF is 10 days and the MTTR is 1 day for each machine.



b) Please estimate the number of parts in buffer b1 at any time “t”. State assumptions.

c) Please estimate the number of parts in buffer b2 at any time “t”. State assumptions.

2. TPS Cell

Consider the TPS manufacturing cell shown below. There are 4 machines and 5 walking segments each 5 seconds. The manual time/machine times are indicated next to each machine in seconds.

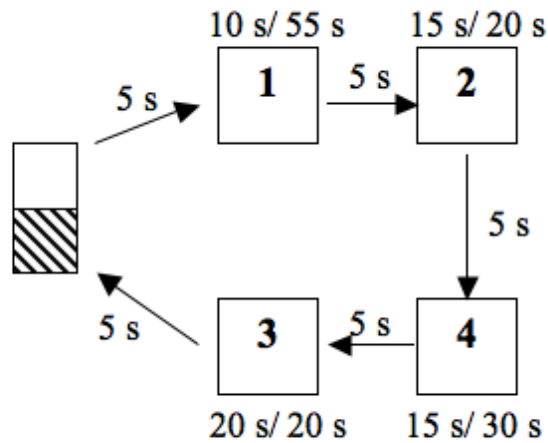
a) Please estimate λ , L and W for the system. State any assumptions.

In order to obtain this performance, machine 1 (a lathe) is running at the maximum material removal rate. At this rate, the cutting insert wears out every 11 minutes of cutting time and require 1 minute to replace. Due to preventative maintenance, the machines never unexpectedly break down. And due to the much longer tool replacement rates for the other machines, they all are replaced during scheduled maintenance.

b) With this new information, re-estimate the production rate of the system. State any assumptions.

You suggest running the lathe at a slower speed. From experimental results, you find that a different set of cutting parameters increases the cutting time from 55 to 65 seconds, but the inserts can now be replaced during the scheduled maintenance.

c) What is the production rate of the system at these new conditions? State any assumptions.



TPS cell showing walking times and manual/machine times all in seconds.

3. Output of photovoltaic (PV) system in cloudy location.

Estimate the power output for a PV system that is 20% efficient (sunlight to electricity). During sunny period the solar radiation is 1000W/m², for light clouds 500W/m² and heavy clouds 100W/m². Meteorological data shows that over the long term the time ratio for the three conditions during daytime hours is 1hr/30minutes/10 minutes respectively. What is the average electric power output of the system during the daytime? And what would the result be if we included daytime (12hrs) and nighttime (12hrs)? State any assumptions.