Lab assignment

Problem Description:

In a manufacturing system, after rough parts are manufactured, they must pass through a finishing station. At most two parts can be processed at the finishing station at a time, i.e. its capacity is 2.

Parts arrive for the finishing process in the warehouse with an interarrival rate uniformly distributed within the interval 120±20 minutes.

There are four types of parts in the system: 8% of the parts are of Type 1, 31% is of Type 2, 10% is of Type 3 and the remaining are of Type 4.

The finishing work consists of 3 steps carried out in order. The time interval it takes to perform each step for each type of part is given in Table 1. The step times are uniformly distributed within the given intervals in the table.

Step 1: Loading the part onto the finishing station.
Step 2: Carrying out the finishing process.
Step 3: Unloading the part form the finishing station

The parts are very heavy so for steps 1 and 3, a crane must be used. There is only one crane in the manufacturing system.

The crane is also used by other departments. Other departments require to use the crane with an interarrival time distributed exponentially with average 60 minutes. For each request, the duration of the time the other departments use the crane is a uniformly distributed random variable in the interval 20±10 minutes. Requests coming from the other departments to use the crane have higher priority than those coming from within the finishing department.

Instead of starting with the model devoid of work-in-process initially, bring five jobs into the model at time 0.0. Assume that no steps have been performed on them yet.

Implement the above simulation using GPSS World. Run the simulation for an 8 hour shift and gather all queue statistics.

Table 1: Times required for completing each step for each type of part.

	Type 1	**Type 2**	**Type 3**	**Type 4**
Step 1	12 ± 3 minutes	15 ± 5 minutes	20 ± 5 minutes	10 ± 3 minutes
Step 2	50 ± 10 minutes	10 ± 2 minutes	30 ± 5 minutes	20 ± 5 minutes
Step 3	12 ± 3 minutes	15 ± 5 minutes	20 ± 5 minutes	10 ± 3 minutes