National University
of computer and emerging sciences

Project Proposal

Course:Simulation & Modeling

Submitted To:

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PROBLEM STATEMENT

Consider a Job Shop producing three types of gears, G1, G2, and G3, for a ship. The job shop is spread out geographically on the factory floor and its layout consists of the followinglocations:

- An arrival dock
- A milling workstations with four milling machines
- A drilling workstations with three drilling machines
- A paint shop with two spray booths
- A polishing area with a single worker
- A shop exit

Gear jobs arrive in batches of 10 units and their inter-arrival times are uniformly distributed between 400 and 600 minutes. Of arriving batches, 50% are of type G1, 30% are of type G2, and 20% are of type G3. A gear job arrives at the arrival dock and from there is dispatched to its specific (type-dependent) sequence of manufacturing operations. A sequence consists of a subset of milling, drilling, painting, and polishing operations. Table 1 displays the operations plan showing the sequence of operations and the associated processing times for each gear type.

GEAR TYPE	OPERATION SEQUENCES	PROCESSING TIME(Minutes)
G1	Milling	35
	Drilling	20
	Painting	55
	Polishing	15
G2	Milling	25
	Painting	35
	Polishing	15
G3	Drilling	18
	Painting	35
	Polishing	15

Gears are transported among locations by two trucks running at a constant speed of 100 feet/minute. Each truck can carry only one gear at a time. When a job is complete at a location, the gear is placed into an output buffer, a transport request is made for a truck, and the gear waits for the truck to arrive. Once a gear is transported to the next location, it is placed in a FIFO input buffer. Finally, when the polishing operation is completed, the finished gear departs from the job shop via the shop exit.To analyze the performance of the job shop, plan to run a simulation over 1 year of operation.

Deliverables

The objective of the project is to model the Gear Manufacturing Job Shop in ARENASimulation Software and find:

i. Gear Flow Time (by Type)

ii. Gear Delays at operation locations

iii. Utilization of Resources

iv. Suggest an improvement
