MOHAWK COLLEGE OF APPLIED ARTS AND TECHNOLOGY

Computer Engineering Technology

Automated Manufacturing (CENG10018)

Project 2 - Mohawk's Stone Cutting

A- Background

Mohawk Hamilton transformed a large covered area, as shown in Figure 1, into a custom stone cutting operation. In the shop, large stones are cut to a specific size and a basic shape for various landscaping uses. As business grew, Mohawk gave priority to his wholesale customers.

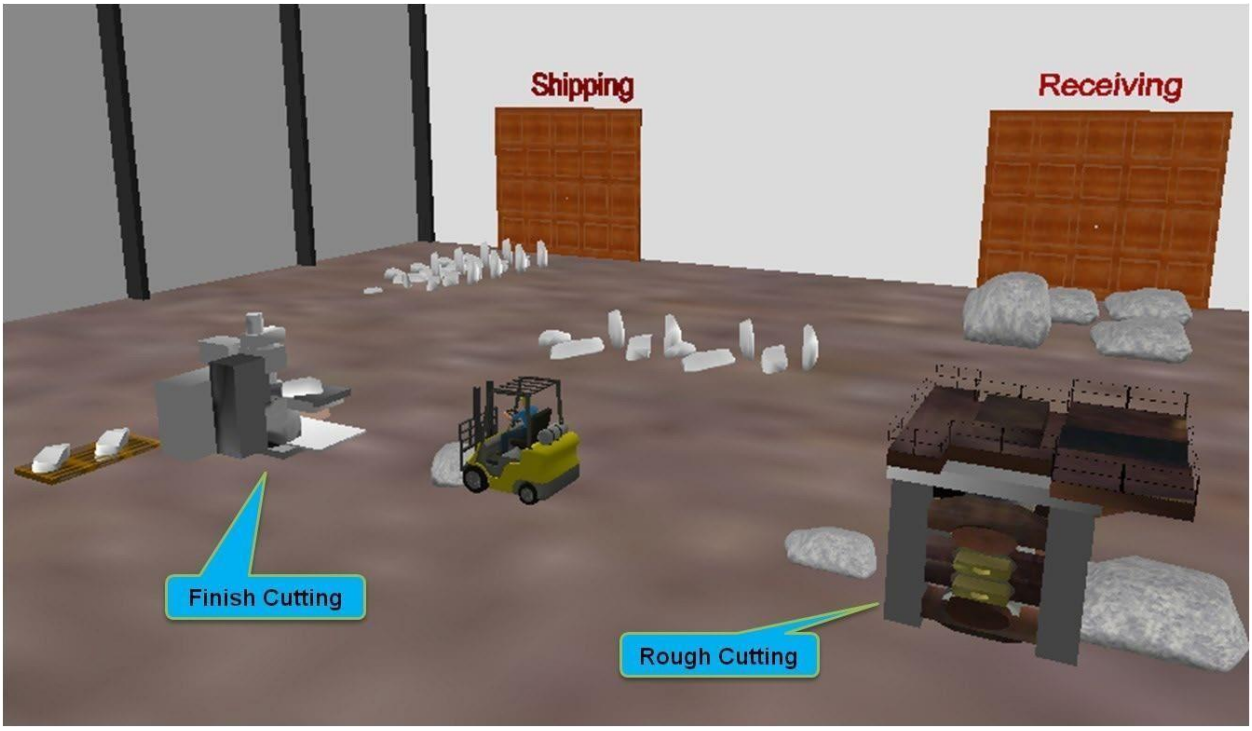

Fig.1 Mohawk's Stone Cutting operation.

Now that the business is nearly as large as the wholesale side, he is worried that by giving certain customers priority he will start losing new customers. Wholesale projects are usually larger and take more time in rough cutting but less in the finish cutting as the custom pieces require more work. His profit margins are larger on the custom projects.

B- Problem statement/Objective

1) Provide a simulation that shows the current wait times for orders and the possibility for improving production for both types of customers.
2) Explore/Utilize Emulation module feature that make FlexSim able to connect to OPC DA servers and KepwareServerEX software for data exchange.

C- Operating data

Custom project arrive at the shop with an interarrival time of X0 minutes **distributed exponentially** (X represents the last non-zero digit in your student number). Wholesale jobs each arrive at the shop with an interarrival time that is **exponentially distributed** with a mean of Y0 minutes (Y represents the first non-zero digit in your student number_. Mohawk has enough rough stones to fill all orders.

The distances (feet) between the equipment and the entry and exit bays are:

From	To	Distance (ft)
Entry Bays	Rough Cutting	200
Rough Cutting	Finish Cutting	400
Finish Cutting	Exit Bay	200
Exit Bay	Entry Bay	400

All stones first go through a rough cutting process and then are taken for final cutting. The stones are transported by a forklift truck between the entry bays (one for wholesale projects, one for custom projects).

Process times in minutes to cut the stones are

- Rough Cutting:
  Wholesale: Triangular distribution: min. 15, max. 25, mode 19. Custom: Triangular distribution: min. 10, max. 18, mode 12.

- Finish Cutting:
  Wholesale: Triangular distribution: min. 10, max. 15, mode 12. Custom: Triangular distribution: min. 15, max. 25, mode 19.

The forklift travels a set circular route around the area between the equipment and entry and shipping areas at a speed of 50 ft. per minute. It takes 15 seconds to load and 20 seconds to unload.

D- Expected results\tasks;

1- Write your name and student# into the 3D model.
2- Using the Dashboard; monitor the average wait time for each type of order before process starts (Wholesale Queue and on the Custom Queue).
3- Using the Dashboard, monitor the total orders received for each type of order (Wholesale Queue and on the Custom Queue).
4- Using the Dashboard, monitor the total orders shipped for each type of order (Wholesale Queue and on the Custom Queue).
5- Determine the number of each type of order that is received and processed during a 40Hour period?
6- Utilize Emulation module feature and KepwareServerEX software for OPC DA data exchange.
7- What is the bottleneck? would a buffer between the cutters help?
8- Estimate the benefits of reducing the travel time for the truck by clearing a path through the center of the shop area or having another forklift.

E- Modeling and analysis issues

1- How will wholesale orders get priority? Is there an easy way in the simulation to change from priority to FIFO? Remember that the order the input queues are attached to the Rough cutting machine indicates their priority.
2- What would you recommend to better observe the material flow, visual changes?

Report

Create a short report that has,

- Title page with your name, date and project description.
- A detailed guide (steps) on how to create the simulation file.
- Project expected results and modeling analysis.
- A statement of authorship.

Grading

The project is worth 12.5% of your final mark.

Submission

Please submit the **Project-report** and the **FlexSim-3D** files to the specified project folder, onlineCANVAS.