INC 382

Capstone II for Automation Engineer

PTT Distribution Center

Problem and Clarification

PPT has improved terminal depot to be automatically operated which is call "Terminal Automation System" (TAS). It helps audit the operations and reduce error/mistake in LPG filling up.

Each petrol station must order gas either by phone or online and then make e-payment. After that PTT generates Purchase Order (PO) and send it back to customer for order confirmation. Next, the petrol station appoints a truck driver to the terminal depot and the drivers must follow these instructions:

1. Once the truck arrives the depot, it parks at a rest area which provides 20 parking lots. Then the driver reaches a sales office to check PO, swipe truck ID card at a card reader and obtains lead seal along with filling instruction bill.
2. The driver waits until his turn to fill the gas. The gate controller allocates the queue of truck and calls the truck respectively. When it's his turn, the driver gets on to the truck. Then he drives to an entrance gate and swipes truck ID card.
3. After entrance, the truck goes to a weight station to record the weight of empty truck. (There are 2 weight scales: one for empty truck and one for loaded truck. These 2 weight scales are located in the same area)
4. Next, the driver takes the truck to a bay station to fill the gas. The driver parks the truck at bay, turn off engine, hang a truck key, get wheel stopper and swipe the truck ID card at a batch controller.
5. After swipe the card, the driver fills in the bay number and presses orange button to confirm.
6. Once a batch controller accepts the information, the driver connects a ground wire to the truck and prepare nozzle.

7. After completes all safety instruction, the driver comes to a gas dispenser machine and fill in a compartment number which indicated in a gas instruction bill. Then presses enter button and waits for a while.
8. A gas dispenser machine validates the compartments number and filling amount. If it's correct, the driver presses enter button and waits a minute.
9. If all safety equipment is placed at the right position, red alarm signal will turn on. Then the driver presses a dead man switch to start filling gas to the truck.
10. Once completes filling gas, the driver uninstalls safety equipment from the truck, lock with the lead seal and go back to the weight station to record the weight of loaded truck.
11. The driver takes the truck to the exit and swipes the truck ID card. Then receives invoice which automatically print out. Finally, the truck drives back to its petrol station.

Arena Simulation

The interarrival time of truck are recorded in file: *Truck Data Log 2018.xlsx* which are the time the sales officer generates a gas filling instruction from TAS. You should utilize the read module on advanced process template to create entities and their attributes to the model.

The time driver spent in sales office is estimated from 2 sales officers working in the sales office to be minimum at 8, maximum at 15 and most likely at 10 minutes.

The time to weigh the truck is unknown statistically but the gate controller told us it would be between 5 and 10 minutes.

PTT distribution center now provides 2 types of gas: diesel and gasohol 95 (as information show in data log). There are 2 bays to fill the gas: 1 bay for diesel

which contains 4 compartments (4 gas dispenser machines) and 1 bay for gasohol 95 which contains 2 compartments (2 gas dispenser machines). The flow rate of a nozzle is 200 litres per min. The time the truck start and finish filling gas are also recorded in file: *Truck Data Log 2018.xlsx* and each dispenser machine can be failed sometimes. From the inquiry at maintenance department, the mean time to failure is randomly distributed at 150 hours and the mean time to repair is 2 hours. The travel time of truck between station is evaluated to be 5 minutes randomly on average.

Instruction (Part 1/2 of Arena)

1. Open *Truck Data Log 2018.xlsx* and prepare all essential data.
2. Implement TAS problem using Arena Simulation
3. Setup Project to start from 1st March 2018.
4. Runs simulation for 32 days replication length with 1-replication run

---------- *For Part 2/2, it will be about Animation and Writing to File* ----------