Production Simulation                  7.5 ECTS

Ladok code: TM081B, 41133P

The exam is given to: Af3Ma, AI3, IBE2, IBE3, Log3

Name: ________________________________________________

Personal number: ______________________________________

Date of exam: June 2nd, 2015
Time: 02:00pm – 06:00 pm

Means of assistance:
Course literature "Getting Started with Automod", lecture slides (Powerpoint)

Total amount of point on exam:
Requirements for grading:
Correct solution for both tasks required to pass the exam

Additional information:
See next page

Next re-exam date: August 2015, re-examination week

The results are, for the most part, posted within three weeks after the exam, otherwise it’s the following date:

Important! Do not forget to write your name on each sheet you hand in.

Good Luck!

Examiner: Michael Tittus
Phone number: 0733-970037
GROUP A

General instructions:

1. Log in with the user name and password you have received from the person in charge.
2. Create two folders, Task_1 and Task_2. Put all the files for each task in the corresponding folder.
3. You have access to the course literature via the help menu in Automod.
4. Write the answers for each task in a separate Word file and save the file in the corresponding folder.
5. Your solutions need to be correct in order to pass the exam.

Task 1

A factory manufactures electronic circuit boards. Plain boards enter an infinite queue (Q_entry) with an inter-arrival time of exponentially 2 minutes. The first production step is done in a soldering machine (R_solder) and takes a normally distributed time of n 110, 15 seconds. The soldering machine can only work on one board at a time. When finished the boards are placed in another infinite buffer queue (Q_buffer). An inspector (R_insp) inspects the quality of each board, a process that takes a normally distributed time of n 50, 6 seconds. During inspection the boards stay in the infinite buffer Q_buffer.

About 15% of all boards have some faults.

Correct boards are packaged in a packaging machine that has a capacity of 1. Packaging takes exactly 2 minutes. When packed the boards leave the system.

Faulty boards are corrected in a repair machine, a process that takes an exponential time with a mean of 2 minutes. The inspector R_insp then inspects the corrected boards (they stay in the repair machine) for e 50 seconds, before they also leave the system.

All machines have to be modelled together with a processing queue.

Simulate the factory for 2 days (i.e. 48 hours).

Write a simulation program in Automod to simulate the process and answer the following questions:

a. What is the repair machine’s utilization, i.e. what percentage of time does the machine hold a board?

b. How many boards during these 2 days have been defect and had to be corrected?
Task 2

Below you can see part of a transportation system in a plant that works as follows:

Boxes with 7 smart phones in each box enter the transportation system at two incoming conveyor belts, Line 1 and Line 2. At Line 1 boxes arrive with a time interval of 3.5 min and at Line 2 boxes arrive with a time interval of 1.5 minutes. From there the boxes travel to the station close to the robot R_robot.

Statistically, 55% of the smartphones in the boxes are Samsung and 45% are Iphones. The robot unpacks one box at a time, placing all phones on the closest station on Line 3. From there Iphones travel to station sta_1 and Samsung phones travel to sta_2 and leave the system. It takes the robot exactly 8 seconds to take a smartphone from the box and place it on the conveyor belt.

Note that the robot does not have any processing queue. In order to better be able to verify the simulation Iphones should be red and Samsung phones should be green.

As soon as the box is empty the robot removes the box from the belt, an activity that takes exactly 3 seconds. The box then leaves the system.

Simulate the system for one day (24 hours). How many boxes have entered the system at each line and how many Iphones have been unpacked during the simulation?