

MODEL OF AUTOMOBILE ASSEMBLY PLANT

General Description of the Model

Object Oriented Simulation

José M. Garrido
Department of Computer Science

Updated November 2016

College of Computing and Software Engineering
Kennesaw State University

© 2015, J. M. Garrido

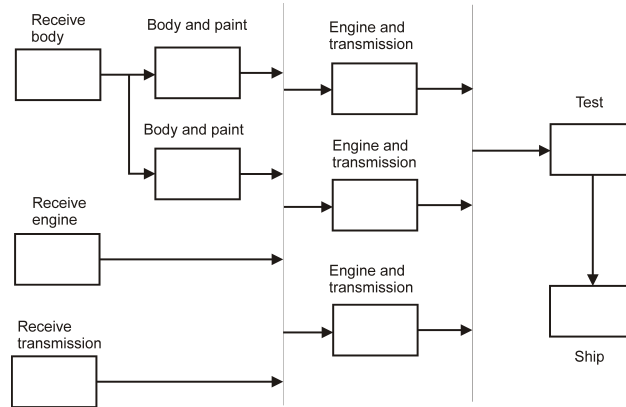


Figure 1: Automobile production line.

1 General Description of the Model

An automobile assembly plant has a production line that produces completely assembled and tested automobiles. The plant receives the engines, transmissions, and body parts from different factories. This simplified plant has several stations to carry out the various stages of production. More than one automobile can be in the same stage of production but in a different station.

In this model, there are six different types of parts that will be modeled as infinite containers (objects of class Bin):

1. The body parts received (there are initially 12 such items)
2. The assembled automobile bodies
3. The engines
4. The transmissions
5. The assembled automobiles
6. The tested automobiles.

Figure 1 shows the different stages of production in the automobile assembly plant. The normal sequence of the production line is shown from left to right. Some of these stages can be performed in parallel. The stages that can perform their activities in parallel are shown one below the other.

2 Stages of the Production line

The plant incorporates a sequence of stages, each requiring units from the previous stage(s). The production line includes the following sequence of stages:

1. Receive body parts from a body factory and place the parts in the production line. The inter-arrival intervals of the body parts follow an exponential probability distribution with a mean inter-arrival period of 7.25 time units.
2. Receive the engines and place them in the production line. The inter-arrival intervals of the engines follow an exponential probability distribution, with a mean inter-arrival period of 6.15 time units.
3. Receive the transmissions and place them in the production line. The inter-arrival intervals of the transmissions follow an exponential probability distribution with a mean inter-arrival period of 9.12 time units.
4. Assemble the body and paint of those body parts available in the production line. The interval to carry out the activities in this stage follows a normal probability distribution with a mean period of 5.25 time units and a standard deviation of 1.10 time units. There are two stations in the plant that carry out this stage of production.
5. Install engine and transmission from the units taken from the production line. The interval to perform these activities follows a normal probability distribution with a mean interval of 7.05 time units and a standard deviation of one 1.15 time units. There are three stations that carry out this stage.
6. Final inspection and test automobile units. This stage places a completed and tested automobile in the production line after inspection and test. The interval to perform these activities is a constant value of 16.75 time units.
7. Ship five automobiles per truck to final destination. This stage takes five completed automobiles and places them on a truck for delivery. The interval that this stage takes follows a normal distribution with a mean interval of 4.20 time units and a standard deviation of 1.12 time units.

Figure 2 shows the activity diagram of the *build_paint* process, which is part of the simulation model to be implemented in OOSimL.

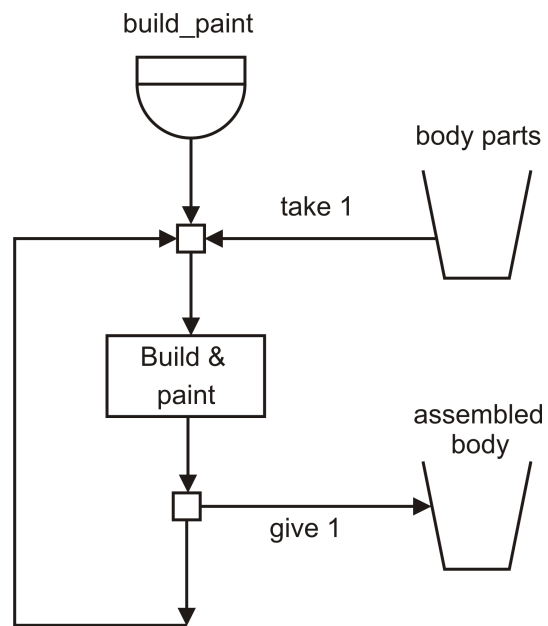


Figure 2: Activity diagram of the build_paint process.