Test cases report for the railway-crossing model.

Maxime Perrotin, Eric Conquet.

Introduction.

This document describes the result obtained by running the test cases A to F. For each test case, a MSC scenario is provided together with a SCN file that can be executed with the ObjectGeode simulator, When needed, each scenario has been played for each priority mode provided by the model (All train, Fast trains, Cars and dynamic priority).

TestCase A.

Case specification.

TrackLayout: The opening time of the gate is greater than the time a regular speed train needs for the way between the first sensor and the gate.
Situation: There are no trains between the sensors, and the controller triggers the opening of the gate. Then, a train passes the first controller.
Expected behaviour: The opening of the gate is aborted, and the controller triggers its closing.

Results.

Results show that in any case, the gate is commanded to close if a train approaches even if the opening action is in progress. There are two exceptions to that behaviour:

1) When the crossing is in a mode where priority is for the cars and cars are present,
2) When the crossing is in manual mode and the behaviour is under responsibility of the operator.

TestCase B.

Case specification.

TrackLayout: The stopping signal is in front of the gate.
Situation: The stopping signal is set, while a train approaches. Its braking distance is longer than the interval between the train and the signal.
Expected behaviour: The train passes the signal.

Results.

We provide here no simulation results as the expected behaviour is not exhibited by the model. In fact, a requested change in the specification makes, to our opinion, such a situation impossible to occur.
The change C1 is described by the following sentence:

C1: It is not allowed to set the stopping signal
for a track when a train is between the two sensors.

This means that the stopping signal cannot be set when a train approaches, as far as we understand it.

TestCase C.

Case specification.

Situation: There are several trains on all tracks between the sensors, and
new ones are approaching from time to time. As there are too many cars
waiting at the gate, it has to be opened, therefore, all stopping signals
have to be set.
Expected behaviour: The controller sets the stopping signal
on EACH track as soon as there are no trains between the sensors, and
opens
the gate after ALL stopping signals have been set.

Results.

MSC traces show that the model in all cases exhibits the expected behavior.
The most interesting situation is in the fast train priority mode where any train arriving on a fast track triggers a switch to green of the stopping signal if such a situation arrives when at least one slow track is still occupied.

Testcase D.

Case specification.

TrackLayout: 1 fast track and 2 slow tracks; slow trains take at least
6 time units to reach the gate.
Situation: The following trains enter the system:
at time 0: a slow train on track slow1
at time 1: a slow train on track slow2
at time 2: a slow train on track slow1
at time 3: a slow train on track slow1
at time 4: a fast train on track fast
at time 5: a slow train on track slow1
at time 6: too many cars are waiting
at time 7: a slow train on track slow1
at time 8: a slow train on track slow1
at time 9: a slow train on track slow2
at time 10: a fast train on track fast

Results.

Different behaviour can be seen depending on the priority mode which has been selected.

Testcase E.

Case specification.

TrackLayout: 1 fast track and 2 slow tracks; slow trains take at least
6 time units to reach the gate.
Situation: The following trains enter the system:
at time 0: a slow train on track slow1
at time 1: a slow train on track slow1
at time 2: too many cars are waiting
at time 4: not many cars waiting
at time 5: a slow train on track slow2

Results.

In that case, all car signals occurring when gate is in the closing process are saved by the model. When the closing timer expires, those signals are processed and used to update the value of the more_than_one variable that can be used to trigger the go signal.

Testcase F.

Case specification.

TrackLayout: 1 fast track and 2 slow tracks; slow trains take at least
6 time units to reach the gate.
Situation: The following trains enter the system:
at time 0: a slow train on track slow1
at time 2: too many cars are waiting
at time 3: a slow train on track slow2
at time 4: not many cars waiting
at time 5: too many cars are waiting
at time 7: a fast train on track fast
at time 8: not many cars waiting

Results.

Same remarks as in the previous test case.