

S&C Derailment Risk Model

Background

S&C condition deteriorates at a high rate and repairs are costly.

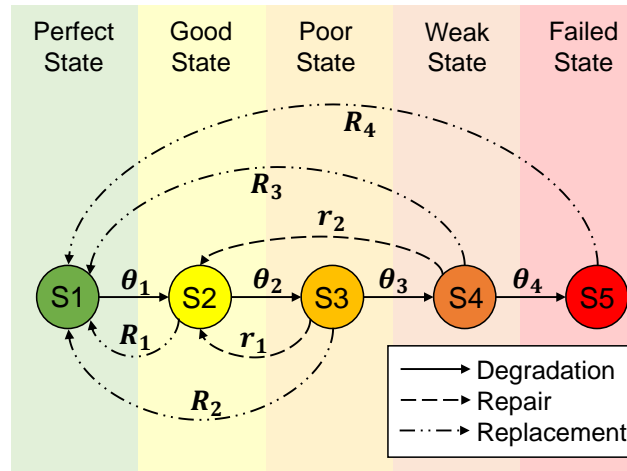
The risk of derailments at a S&C can be reduced by ensuring that the S&C does not reach a failed state through maintenance and inspection.

Objective

Combine component degradation with maintenance and inspection strategies for several key S&C derailment risk areas using a modular Petri net model.

Model Inputs

Parameters	Description
$\theta_1, \theta_2, \theta_3, \theta_4$	Governs degradation rate for each state of each component.
R_1, R_2, R_3, R_4	Governs replacement rate for each state of each component.
r_1, r_2	Governs repair rate for each state of each component.
I	Governs inspection rate for each component.

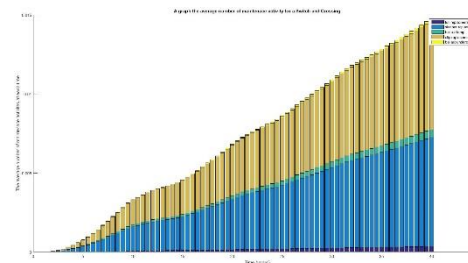


Each component has 5 states from working through to failed, there are various maintenance activities.



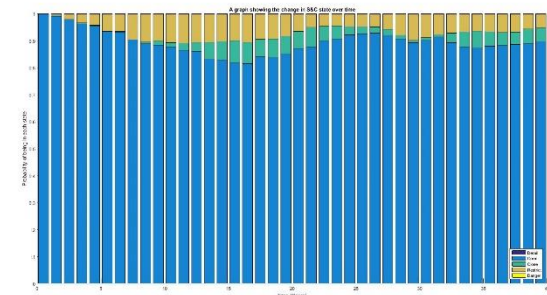
4 derailment risk areas are considered:

- Derailment due to geometry error
- Derailment due to stretcher bar failure
- Derailment due to rail wear
- Derailment due to rail break



The occurrences of maintenance activities over time can also be predicted.

Results



The changes in the condition of the S&C over time for the following categories:

- Open
- Open with Speed Restrictions
- Closed for maintenance
- Closed due to a failure