

Track Condition Petri Net Model

Background

Track geometry deteriorates with time and use.

Its state is controlled by the maintenance activity such as Tamping. Tamping breaks the ballast and changes the deterioration process.

Objective

Combine the degradation with the maintenance strategy to predict the track geometry condition, the no of interventions and the whole life costs.

Input Data

P2: (needing maintenance) $\sigma = 3$

P3: (speed restriction) $\sigma = 4.25$

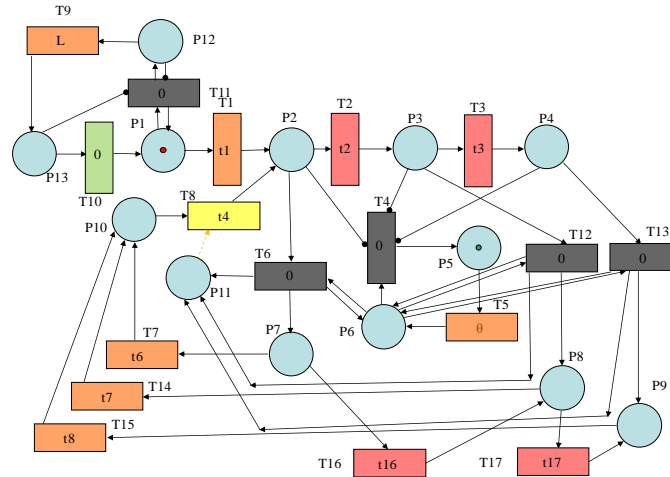
P4: (line closure) $\sigma = 5$

Measurement train every 28 days

Normal priority intervention has a $N(\mu = 100, \sigma = 15)$ days.

Emergency priority $N(\mu = 0.5, \sigma = 0.125)$ days.

Section renewal (track, sleepers and ballast) after 30 years.



Analysis Results

- Average number of interventions per lifetime 3.57 (routine 3.32, speed restriction 0.21, line closure 0.04)
- Percentage of time in the good condition: 98.1055%
- Percentage of the time in the state requiring maintenance: 1.835%
- Percentage of the time in a state needing a speed restriction: 0.0486587%
- Percentage of the time in a state needing a line closure: 0.0108306 %