

Risk Modelling of Safety Critical Systems for Life Extension in Offshore Oil and Gas

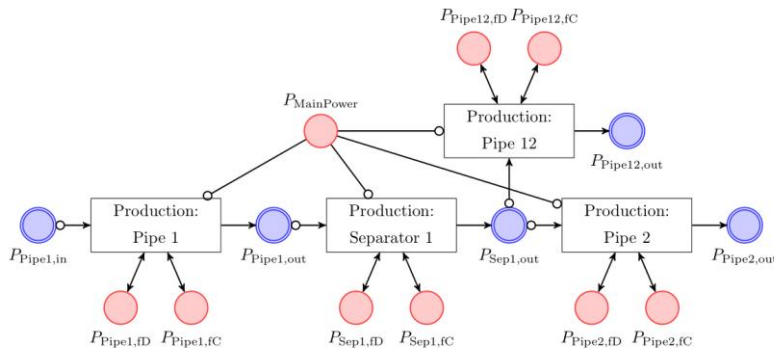
Background

Half of all offshore oil and gas platforms are operating beyond their design life.

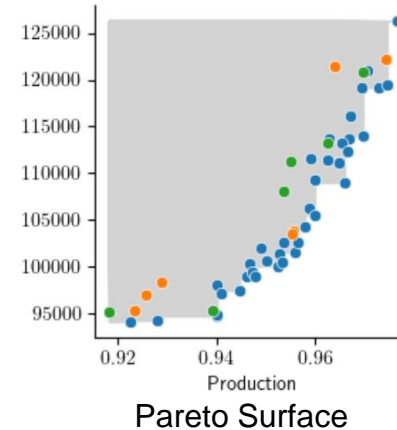
They require Asset Management (AM) strategies to ensure safety, high production availability and low AM expenditure.

Objectives

- (i) Construct a model capable of evaluating the performance of platforms subject to AM strategies.
- (ii) Determine optimal AM strategies for the platform.



A section of the production net



Methodology

- (i) Simulating the platform life-cycle with a hybrid Petri net. Degradation and AM modelled with the discrete net. Fluid flow modelled with the continuous net.
- (ii) Evaluating the risk of hydrocarbon leak through a consequence analysis.
- (iii) A multi-objective genetic algorithm (NSGA-II) to determine a set of optimal solutions on the Pareto surface. Objectives: Production Availability, Escalation Risk, AM expenditure.