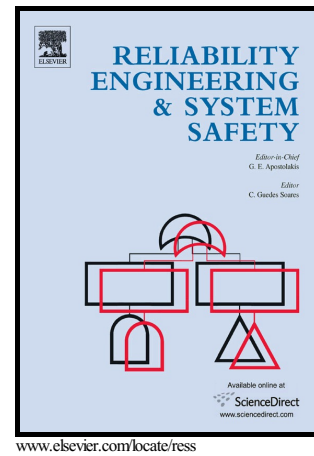


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Availability Assessment of Oil and Gas Processing Plants Operating under Dynamic Arctic Weather Conditions

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Abstract

We consider the assessment of the availability of oil and gas processing facilities operating under Arctic conditions. The novelty of the work lies in modelling the time-dependent effects of environmental conditions on the components failure and repair rates. This is done by introducing weather-dependent multiplicative factors, which can be estimated by expert judgements given the scarce data available from Arctic offshore operations. System availability is assessed considering the equivalent age of the components to account for the impacts of harsh operating conditions on component life history and maintenance duration. The application of the model by direct Monte Carlo simulation is illustrated on an oil processing train operating in Arctic offshore. A scheduled preventive maintenance task is considered to cope with the potential reductions in system availability under harsh operating conditions.

Keywords: Dynamic weather conditions, failure rate, repair rate, equivalent age, preventive maintenance, availability, Monte Carlo simulation, oil and gas, Arctic offshore.

Acronyms

| | |
|------|--|
| ALM | Accelerated Life Model |
| ALT | Accelerated Life Test |
| AR | Auto-Regressive |
| ARMA | Auto-Regressive Moving Average |
| CM | Corrective Maintenance |
| CDF | Cumulative Distribution Function |
| MC | Monte Carlo |
| MDT | Mean Total Downtime |
| MTTF | Mean Time to Failure |
| NCS | Norwegian Continental Shelf |
| O&G | Oil and Gas |
| PDF | Probability Density Function |
| PHM | Proportional Hazard Model |
| PM | Preventive Maintenance |
| RAM | Reliability, Availability, and Maintainability |

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