

Pipeline integrity and extending marginal system life using machine learning algorithms.

1. Abstract

The condition of critical oil and gas infrastructure deteriorates with age. This can be due to a number of reasons, for example time-dependent degradation mechanisms such as corrosion or fatigue. Pipelines are expensive assets and the change in risk of failure due to degradation can affect the whole economics of operating the asset.

The authors of this paper have applied structural reliability techniques to large numbers of defects on aging assets, this methodology can take time and can become computationally expensive using traditional Monte Carlo simulation.

For this reason, the authors have trained machine learning algorithms to categorise defects by their probability of failure. The population of defects having a high predicted failure probability were selected for probabilistic assessment first, followed by the lower probability populations. Categorisation of defects in this way enabled the authors to improve the efficiency of the assessment process.

By using a blend of custom designed assessment and machine learning software the authors have developed a cost and time efficient method of assessing the risks associated with the life extension of existing assets.