



PECANHOOD INTEGRITY LTD

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FITNESS FOR SERVICE BROCHURE – PART 2 - PROBABILISTIC APPROACH

THE PROBABILISTIC APPROACH

At Pecanhood, this method is applied as an advanced and rigorous approach, to determine if the rest of the corrosion features will fail by as small leak, large leak or rupture. We also determine the pipeline reinspection interval.

This approach assesses the probability of failure based on the Monte Carlo simulation analysis. We are evaluating the probability mathematically using Probability Density Functions and Integral Calculus in conjunction with Limit State functions in our in-house Mathematica software.

ASSESSMENT OF PIPELINE CORROSION FEATURES, APPLYING THE PROBABILISTIC APPROACH

CORROSION FEATURE ASSESSMENT CODE

The concept of probability of failure is an advanced and rigorous approach to calculate if a corrosion feature is predicted to fail by a small leak, large leak or rupture. The failure modes are defined mathematically.

This approach applies the commonly known technique of Structural Reliability Analysis (SRA). We calculate the current level of Integrity, based on Operational and Inspection data, making use of a Numerical simulation tool ie. The Monte Carlo simulation: 6 Steps are usually performed:

1. **Establishment of Limit states**
2. **Identification of failure causes**
3. **Formulation of Limit State Functions**
4. **Uncertainty analysis**
5. **Evaluation of Failure probability**
6. **Assessment of Results**

‘In the Probabilistic approach, we are reverse engineering. We define an appropriate target for annual failure probability, in order to determine when to repair a feature reported by In-Line Inspection (ILI). From Codes such as DNV RP F101. 1.0×10^{-4} , this equates to 1 in 10 000 years chance that an anomaly will fail.’

DETERMINISTIC ASSESSMENT VS PROBABILISTIC ASSESSMENT

The results from the Deterministic approach are solely for screening all features that require immediate repair. The rest of the features are addressed using the Probabilistic approach.

The probabilistic assessment is applied to all features, to determine the likelihood that a failure will occur at some time in the future, owing to the presence of defects that were not considered severe enough to warrant repair at the time that they were identified by ILI, considering that the features could grow to failure over a period of time.

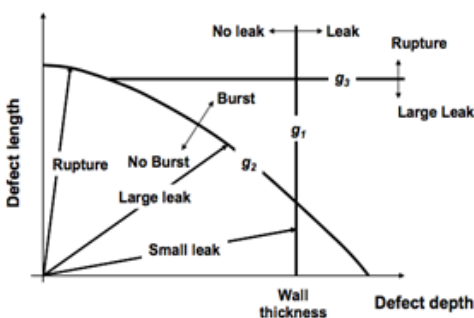


Figure 1: Probabilistic assessment of corrosion features for different limit states



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OBJECTIVE

The objective of structural reliability analysis (SRA) is to determine the likelihood that the pipeline structure can resist the loads applied to it. This is all done using the Monte Carlo simulation tool. Failure occurs if the Resistance, R is lower than the load S. R is derived from the material and geometric properties, while S is derived from the Operational Loads, damage and deterioration. In the Probabilistic approach, we are reverse engineering. We define an appropriate reliability target for annual failure probability, in order to determine when to repair a feature reported by In-Line Inspection (ILI). From Codes such as DNV RP F101. 1.0×10^{-4} , this equates to 1 in 10 000 years chance that an anomaly/feature will fail. We are evaluating the probability mathematically using Probability Density Functions and Integral Calculus in conjunction with Limit State functions. We also determine the optimum pipeline re-inspection interval.

PECANHOOD INTEGRITY LTD. VALUE PROPOSITION

Pecanhood Integrity Ltd is a specialized Engineering consulting firm, established in 2015, to provide specialized skills and support to the Oil and Gas, Mining and Power Generation sectors. Quite simply, our services are targeted towards Plant and Pipeline Asset Integrity and Process Safety challenges. We provide professional and Data driven insights in order to restore the Reliability and Integrity, while avoiding and preventing Emergency situations such as ruptures, societal risks and environmental damage.

We provide a holistic approach ranging from Pipeline Integrity Management (PIM), Pipeline Fracture Mechanics services, Engineering Critical Assessment (ECA), Risk Based Inspection (RBI) programs, Management Consulting, Project Management services, Process Safety Management services, Advanced Technical Training. Quite recently, through our global partnerships, we now offer professional support on Integrity Services and Distribution of Innovative and high Quality Composite Repairs products through our Global partners Rosen Group (<http://www.rosen-group.com>) and 3X Engineering (<http://www.3xeng.com>) respectively. We are 'Your Asset Integrity Management Partner' in Africa.

GET IN TOUCH WITH US

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