



PECANHOOD INTEGRITY LTD

PECANHOOD INTEGRITY LTD

FITNESS FOR SERVICE BROCHURE – PART 3 – ASSESSING GOUGES

THE GOUGE APPROACH

At Pecanhood, we are careful when assessing gouges on pipelines. The popular Kastner et al method is used only when the gouges and the line pipe properties satisfy the criteria i.e. Material toughness

When the Kastner approach is not satisfied, we assess gouges using the PAFCC or generic BS7910 or API 579 methods.

The Ultimate goal is to assess the defect by predicting the failure stress and to determine if the Safe Operating Pressure is lower or higher than the Design pressure.

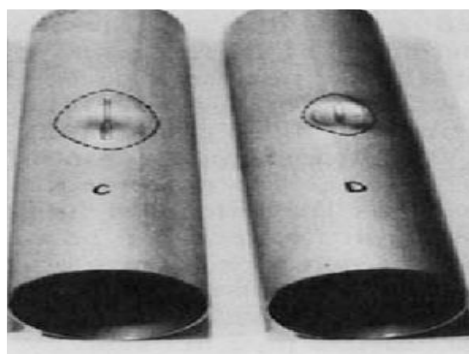


Figure 1: C – Gouge, D – Dent – Gouge combination

ASSESSMENT OF GOUGES ON PIPELINES

GOUGE FEATURE ASSESSMENT CODE

Gouges are defined as surface damage to a pipeline, caused by contact with a foreign object that displaced or removed material from the pipe wall.

It's highly imperative to know the following and to take Safety precautions, prior to proceeding with calculations or assessment of gouges:

1. **Injurious defects such as gouges require operating pressure reduction**
2. **Is the line pipe low toughness?**
3. **Is the Gouge associated with a dent?**
4. **Is the Gouge in a seam weld, girth weld or Heat affected zone (HAZ)?**
5. **NDT must be done on the gouge to check for presence of cracking**

‘In assessing Gouges, a lot of good work has been done already at Battelle in the 60’s and 70’s. Equations fit for longitudinally oriented defects are available, while the circumferentially oriented defects are best assessed using Kastner et al method’.

The predicted failure stress calculations originate from the work conducted in the 1960’s and 70’s at Battelle Memorial Institute in Ohio. Tests and development of appropriate equations were developed including the Flow stress and Folia factor significance. The failure criteria is referred as the NG-18 or the Log-Secant equations.

In the 1980’s Kastner, Rohrich, Schmitt & Steinbuch developed a much better model of assessing circumferential and helical oriented defects.

The ultimate goal is to assess the defect by predicting the failure stress, then calculate the lower bound estimate of the failure stress. In order to achieve that, we must add an uncertainty factor for the model. Lastly, we calculate the Safe operating pressure using the lower bound estimate of the failure pressure. If the Safe Operating pressure is lower than the Design pressure of the pipeline, the defect is not acceptable.



PECANHOOD INTEGRITY LTD

MODEL UNCERTAINTY

In accounting for model uncertainties, an appropriate factor is applied corresponding to the 95% one tail confidence interval. The model uncertainty factor is added to the failure stress. The equation is as follows

$$\sigma_{failureL} = \sigma_{failure} + (\beta L - t(\alpha \sqrt{s^2 + \text{Var}(\beta L)}))$$

OBJECTIVE

The objective of structural reliability assessment of gouges is to determine the likelihood that the structure can resist the loads applied to it i.e. Internal pressure, bending, axial loading . In assessing Gouges, a lot of good work has been done already at Battelle in the 60's and 70's, these equations are fit for longitudinally oriented defects, while the circumferentially oriented defects are best assessed using Kastner et al method.

PECANHOOD INTEGRITY LTD. VALUE PROPOSITION

Pecanhood Integrity Ltd is a specialized Engineering consultancy, established in 2015, originally to provide specialized skills and support to the Oil and Gas industries. Quite simply, our services are targeted towards Plant and Pipeline Asset 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 Engineering Critical Assessment, Risk Based Inspection programs, Management consulting, Project Management, Advanced Technical Training. Quite recently, through global partnerships, we now offer professional support on Integrity Services and Distribute Innovative +high Quality Composite Repairs products through our Global partners Rosen Group and 3X Engineering respectively.

We are 'Your Asset Integrity Management Partner' in Africa.

GET IN TOUCH WITH US

PECANHOOD INTEGRITY LTD.

The Pecan Orchard, 205 First road
Walkers Fruit Farm Midvaal, Gauteng
South Africa

Phone: +27 63 8299423

Email: Info@pecanhood.com

Website: www.pecanhood.com

Your Asset Integrity Management Partner