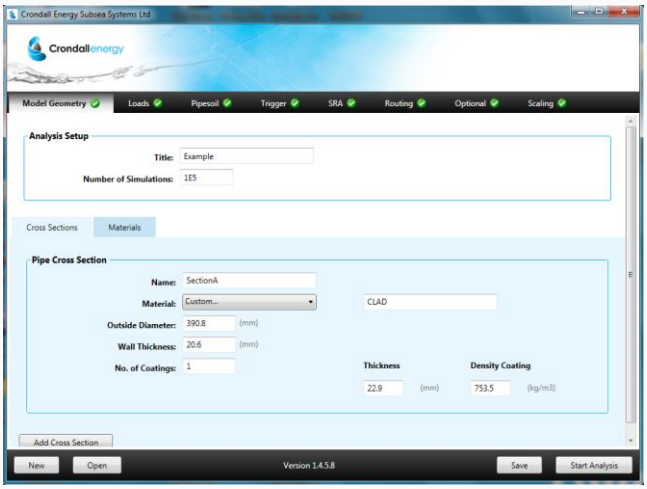


PROBE

Crondall Energy has developed the PROBE computer program to perform a structural reliability analysis of a pipeline undergoing lateral buckling. The program simulates the buckle formation process, calculates the response of the buckles and develops stochastic information for use in the lateral buckling design process.

Calculations Performed

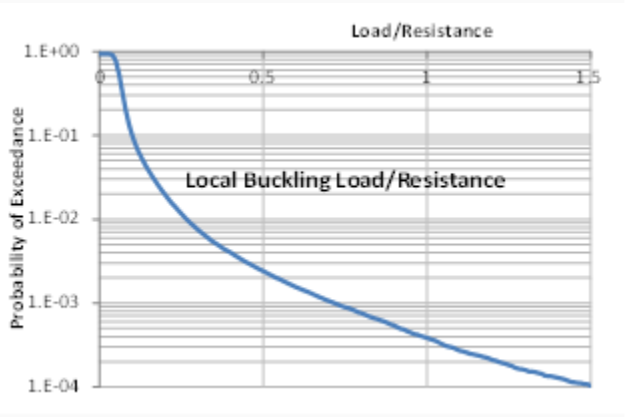
PROBE undertakes the following calculations:

- Calculation of the probability of buckling in the pipeline.
- Calculation of the characteristic VAS along the pipeline.
- Calculation of the conditional lateral friction distribution.
- Calculation of critical buckling force and post buckle force distributions.
- Calculation of the distribution of end expansion and feed-in to the buckles.
- Calculation of the strain distribution at the buckles within the pipeline.
- Calculation of the probability of failure for the pipeline due to local buckling and fracture.

Capabilities

PROBE features allow sophisticated modelling of a pipeline. The program can model:

- Key pipeline features; straight pipe; horizontal route bends; buoyancy elements, ZRB triggers. The properties of the pipeline can vary along the length of the route.
- Complex PSI behaviour. The lateral residual resistance can be linked to the break-out resistance through a correlation equation.



- Temperature profile associated with mid-line tie-ins;
- Pipeline Expansion. The analysis accounts for effect of seabed bathymetry and movement of virtual anchor points prior to buckle formation.
- Horizontal and vertical out of straightness (OOS). Route bathymetry can be read directly into PROBE.
- The lateral buckle response. This is calculated within the program based on the pipe properties, PSI and operating parameters–not specified by the user.

PROBE is the most sophisticated program available to the Industry today for the probabilistic assessment of pipeline lateral buckling.