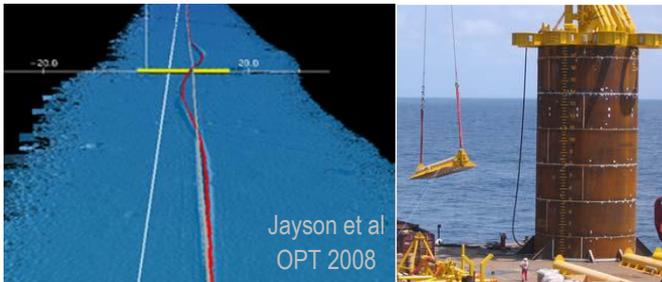


## Lateral Buckling & Walking of Pipelines



### Lateral Buckling & Walking of Pipelines

Crondall Energy is a world leader in developing technology to address global pipeline and walking of pipelines, including detailed elastic-plastic, strain-based design.

The international reputation of our engineer's is based on:-

- Initiation and technical leadership of the SAFEBUCK Joint Industry Project (JIP), which significantly improved industry understanding of lateral buckling and walking; enabling the safe design of hot on-bottom pipelines with lateral buckling as a high integrity, readily applied solution.
- Publication of many of the most frequently-cited papers on the challenging design issues associated with lateral buckling and pipeline walking.
- Leadership in the development and installation of reliable techniques for initiating and controlling lateral buckling and pipeline walking, now adopted on numerous projects.
- Crondall Energy's continuing development of innovative software and design methods to simplify the design process and reduce design complexity.

### Research & Development

Our engineers led and guided test programmes in areas critical to lateral buckling in operation, including pipe-soil response associated with embedment, lateral and axial friction; low-frequency fatigue testing programmes in corrosive environments and full-scale testing and evaluation of local buckling.

### Design Verification and Peer Review

Our engineers have provided FEED and Detailed Design Verification and Peer Review services to several operators on major projects that involved lateral buckling and walking of pipelines, including BP, Chevron, Shell and Woodside.

### Operational Experience & Failure Investigation

Our engineers have a strong reputation for evaluating operational performance to support system integrity and condition monitoring. Extensive experience from failure investigations and resolving unexpected pipeline responses from integrity monitoring surveys, allows Crondall Energy to provide well-founded advice and guidance on global pipeline behaviour.

### Software

To support the complex analysis of global pipeline response Crondall Energy use the general-purpose FE program Abaqus for non-linear structural analysis, as well as developing a suite of in-house software to address key design issues, including the probabilistic modelling of pipeline global response and structural reliability (PROBE) and Pipe-soil interaction (PSI).

### Benefit

Independent verification or technical evaluation is essential on projects involving complex structural analysis, to provide greater confidence in the design, whilst minimising the risk of failure. Peer Reviews of FEED and Detailed Design, supported by verification analyses can optimise the evaluation of design challenges and deliver a robust, cost-effective design solution.

**We use our deep understanding of lateral buckling and walking to help projects manage the technical risk driving their pipeline design.**