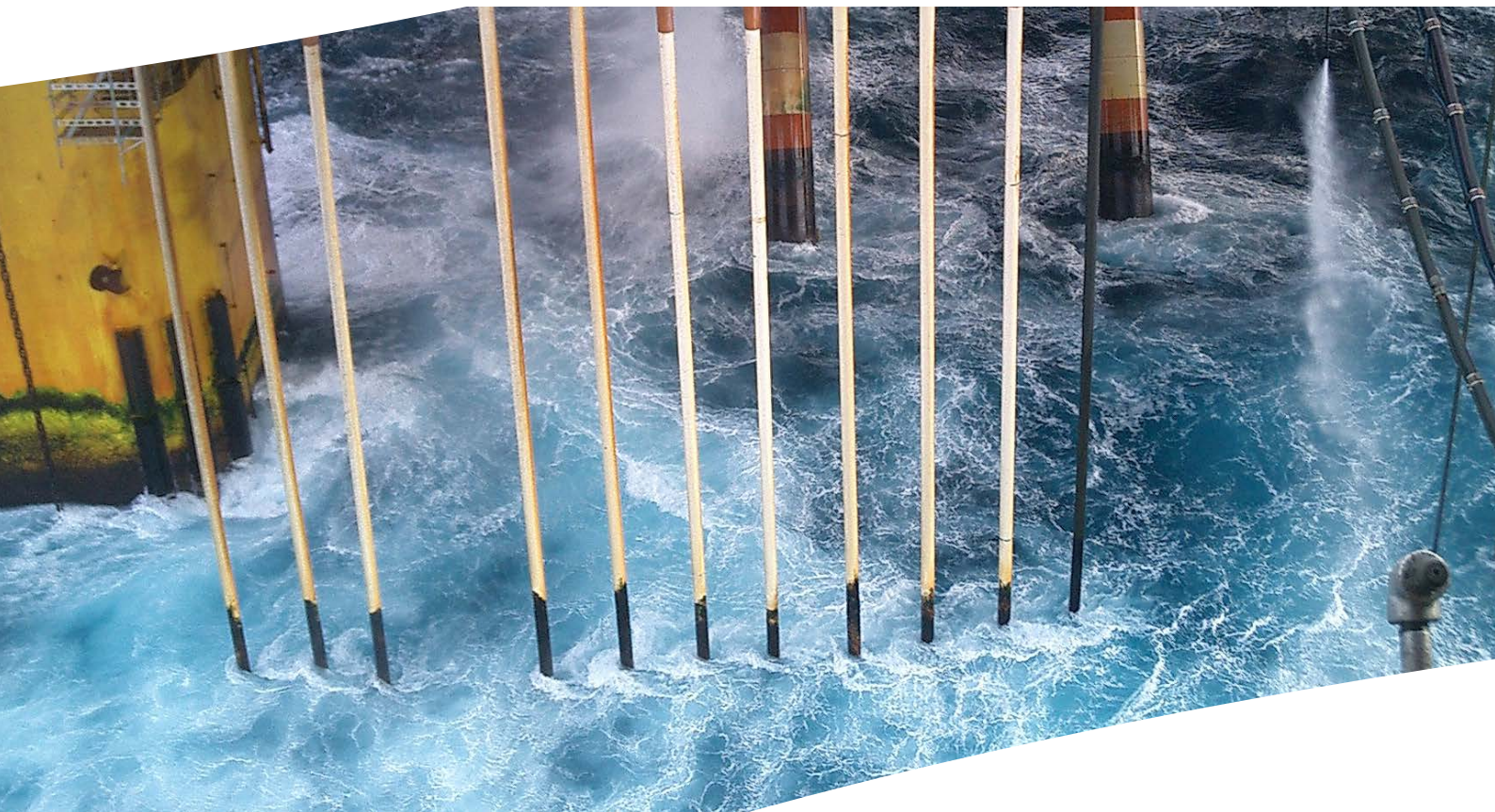


Structural Assessment of Flexible Pipes

Reduce operational downtime and identify reserve capacity

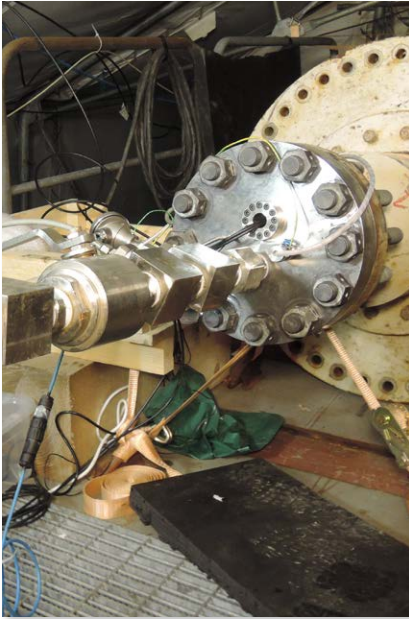


4Subsea is a leading expert on structural assessment and advanced analysis of flexible pipe damages and failures. We help operators maintain safe operation and reduce operational downtime. 4Subsea develops and refines analytical tools and methods based on extensive accumulated experience.

4Subsea offers a wide range of engineering services related to risers and flowlines, umbilicals and power cables. We cover all life cycle phases, starting with technology development and conceptual design through FEED and detailed design, procurement, construction, installation, operation, and decommissioning.

KEY DELIVERABLES

- Structural capacity of flexible pipes, considering anomalies by performing advanced finite element analysis (2D & 3D fully non-linear)
- Modelling as-built geometry and material with observed damages
- Planning and execution of full- and small scale test of flexible pipes
- Planning, execution and evaluation of material tests
- Root cause investigation
- Operational feed-back



Advanced Finite Element Analyses

4Subsea uses capabilities within finite element analyses (2D and 3D) and experience with operation and damage investigation of flexible pipes to provide expert advice for flexible pipe incidents.

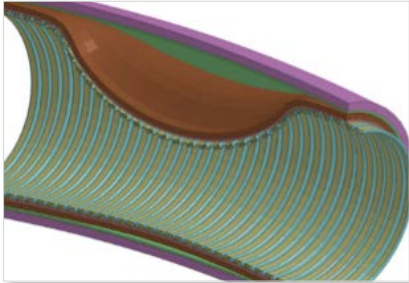
- Impact
- Over bending
- Buckling
- Carcass collapse
- Bore blockage
- Thermal induced axial load

Tools

- Detailed FE analysis using MARC
- 2D model and axis symmetric modelling
- 3D model for validation and non-axi symmetrical cases

Structural Assessment

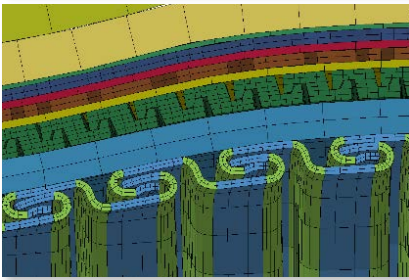
- Advisory services
- Capacity estimates
- Blockage position
- Material properties/ageing issues
- Cross section interlayer geometry/friction
- Operational history, pressure & temperature scenarios
- Basis for risk assessment
- Operational guidelines



Validation by Testing

4Subsea has unique experience with full- mid- and small scale testing and validating of established guidelines and FE analysis. This includes material tests, carcass tests and in total six full scale tests of bore blockage in recovered full length flexible risers and flowlines.

- Planning and execution of full scale test
- Small scale test - material
- Data for validation of FE analysis



4Subsea is a leading provider of technology and services that help operators maintain production from subsea oil and gas fields and offshore wind farms. By combining expert engineering competence, practical experience and a digital service, we ensure the integrity of assets all the way from reservoir to deck.

We deliver solutions on a unique digital platform, aiming to be in the forefront of digitising oil, gas and offshore wind operations worldwide. The company was established in 2007, and clients include all the major oil and gas operators as well as the large suppliers of subsea equipment.

Click [here](#) to view a short video of our solutions and offerings.

4Subsea - Share ideas, move forward

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