

## ➤ Specialist Engineering

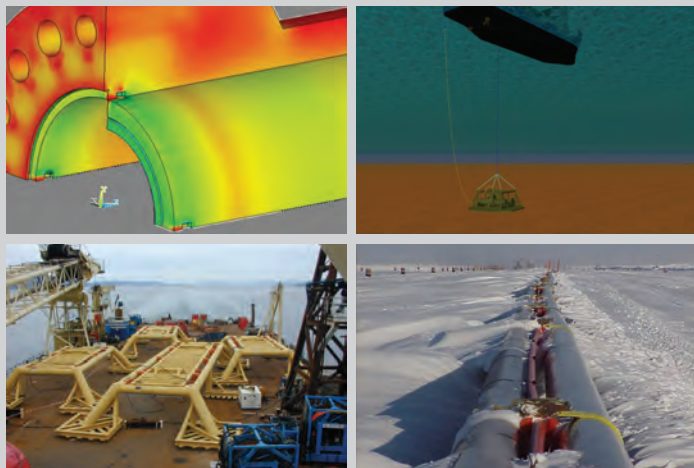
Specialist Engineering for Peritus incorporates four key disciplines:

1. Advanced Mechanics
2. Risk and Integrity Management
3. Materials and Corrosion
4. Geomechanics

Peritus' capability is founded on leading industry personnel with the experience to develop innovative solutions using state of the art tools and analytical methods.

The Oil and Gas industry has undergone major changes in recent years including the emergence of High Pressure High Temperature (HPHT) oil and gas transport systems which place very onerous conditions on system components and can take them well beyond conventional design limits. Projects in ever deeper water, on very soft soils, and projects in harsh environments, including the Arctic, require specialist techniques and methods to accurately assess and model conditions. Deepwater developments are typically characterised by extremely soft soils with complex loading and response characteristics and associated settlement issues. Advanced mechanics is often essential in providing solutions to these complex issues.

Understanding risk is increasingly important as the consequences of failure become more extreme and we strive to make our industry safer and more reliable. Being able to predict the likely performance of the system, potential failure modes, and the frequency and consequences of failures enables us to design safer and more reliable systems.



Peritus recognises the need for advanced materials selection, corrosion, welding and NDE technologies in readiness for complex projects with associated complex materials issues. Materials are increasingly being tested to their limits with HPHT Fields often in combination with high H<sub>2</sub>S and CO<sub>2</sub> conditions.

Expertise in Geomechanics is critical as offshore developments move into the deeper and more challenging regions. Design of offshore facilities require a detailed understanding of seabed conditions including strength, stability, mobility and seismic conditions and how these will interact with facilities founded on the seabed.

All projects have their individual challenges. Peritus strive to bring smart, high value and economic solutions whatever the development.

### Capabilities include:

#### Advanced Mechanics

- Two and three dimensional system and component level modelling using proprietary finite element modelling programs, including ANSYS and ABAQUS
- Structural analysis using first principles with closed formed solutions and/or model testing
- Pipeline lateral and vertical (upheaval) buckling control solutions
- Pipeline walking control solutions
- Ice load development and gouge analysis and solutions
- Advanced pipeline and riser installation analysis
- Rough and/or steep seabed terrain modelling
- Seismic acceleration and displacement modelling
- Modelling of pipelines under debris flows
- Advanced solid modelling – including SURF components such as turret swivels, riser flex joints, bulk heads, buckle arrestors, J Lay collars
- Transient/Dynamic FEA of Bundled pipelines including stability, trawl gear interaction, thermal, earthquake, turbidity and debris flow interaction
- Novel testing methods and pushing the boundaries of design codes

#### Risk and Integrity Management

- Reliability, Availability and Maintainability (RAM) analysis
- System and equipment failure mode analysis (FMEA and FMECA) to predict the performance of new systems and components
- Execution of HAZID, HAZOP, SAFOP, ENVID reviews and management to satisfactory close out

- Quantitative risk analysis (QRA) – frequency and consequence analysis considering risk to personnel, environment and facilities
- Root Cause Analysis (RCA) to investigate incidents and find their causes to prevent reoccurrence
- SIL (safety Integrity Level) and SIF (safety instrumented function) analysis in accordance with international standards IEC 61508, IEC 61511 and ISA S84.01
- Risk-based inspection planning and management for subsea systems, pipelines, risers and mooring facilities
- Preparation of operating and maintenance manuals
- Emergency pipeline repair system evaluation, design and project Management
- Support to operators in the development and implementation of risk and integrity management systems to API 17N and ISO 20815

#### Materials and Corrosion

- Internal / external corrosion evaluation and control
- Materials selection
- Welding and NDE during fabrication, installation and operation
- Fitness for Service assessments
- Fatigue and ECA assessment
- NDE of the fabrication of components and during operation  
Corrosion monitoring

#### Geomechanics

- Geophysical and Geotechnical Survey specification and management
- Seismic and slope stability analysis and interaction with the pipeline
- Bottom founded structures and anchor foundation design
- Pipe-Soil interaction modelling

#### Experience:

Peritus' senior technical team consists of industry experts with extensive international knowledge and expertise in difficult or deepwater environments. Members of this team have worked on some of the most innovative projects of their time, in some of the world's most challenging offshore environments.

## experts in difficult and deepwater environments

The Peritus mission is to provide high end system engineering services to the offshore oil and gas industry with a particular focus on deepwater and difficult environments for:

- Subsea Systems
- Subsea Pipelines
- Risers
- Floating Structures
- Flow Assurance
- **Specialist Engineering**
- Field Development

