



# Subsea Development

## Advanced Engineering for Field Development

**SafetyatSea** combines a strong grounding in Naval Architecture and Marine Engineering with a diverse computational modelling facility to support the effective development and operation of subsea infrastructure.

### Concept and Feasibility

**SafetyatSea** provides advanced engineering services for front-end and feasibility studies. A foundation in Naval Architecture combined with extensive experience in computational modelling allows **SafetyatSea** to provide support to clients during the concept and design stages of new development projects which require:

- Vessel requirement and design
- Thermal management
- Means of escape assessment

### Naval Architecture

**SafetyatSea's** continuous involvement in challenging design, upgrade and conversion projects has allowed us to develop a strong naval architecture team capable of most design tasks. We are recognised as worldwide experts in stability and are the experts of choice for companies involved in difficult or novel projects or as a safe pair of hands for more standard calculations and design work. Services include stability design, loading manuals, inclining experiments, dimensioning of means of escape, evacuation planning and evaluation.

**SafetyatSea's** experience in rule development on behalf of flags and class has allowed us to bring our expertise to many design projects where compliance with prescriptive regulation is difficult, expensive or simply impossible. As specialists in quantitative risk and performance-based assessments, **SafetyatSea** has helped our clients to obtain approval of alternative design arrangements.

Alternative design arrangements are those which deviate from prescriptive (SOLAS) construction requirements, and are usually related to intact/damage stability, fire protection, escape and evacuation. In many such cases, such arrangements have benefits for practicality of building, operation and cost, without compromising (and sometimes) enhancing safety.

#### Additional services include:

- Vessel design & stability analysis
- Deck conversion and modification
- Hydrostatic and hydrodynamic studies
- Seakeeping, green seas and slamming assessments
- Two body dynamics and drift off
- Mooring analysis



## Construction

**SafetyatSea** is able to assist with vessel handling and multi-body dynamics encountered during the construction phase of subsea tie-backs. Computational modelling techniques and stability analysis allow an understanding of the limitations critical to the deployment of subsea infrastructure.

Calculating hydrodynamic coefficients of drag and added mass allows **SafetyatSea** to identify windows for safe operation ensuring product stability and integrity.

## Further Information

For further information please contact:

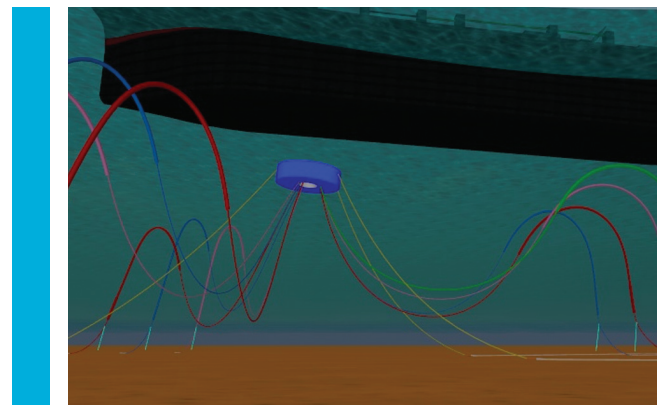
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The stability of field infrastructure in-situ may also be assessed through the use of Computational Fluid Dynamics (CFD) to assess the on-bottom stabilities of field components.

**SafetyatSea's** activities cover:

- Vessel stand-off
- J-Lay and S-Lay analysis
- Deployment and retrieval assessments
- Clashing assessments
- Dropped object assessments
- Seabed preparation
- On-bottom stability



## Operation

The use of Computational Fluid Dynamics (CFD) and Finite Element Analysis (FEA) modelling techniques, which account explicitly for discrete fluid-fluid interaction, fluid-solid interaction and conjugate heat transfer, allows **SafetyatSea** to support the successful establishment and efficient operation of tie-backs and through the provision of:

- Multiphase fluid modelling
- Erosion modelling
- Thermal management modelling
- Non-linear structural assessments

