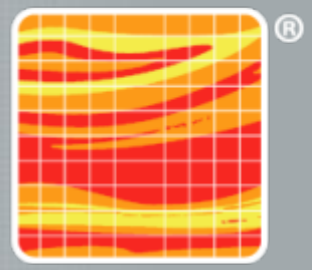


PROSPECT

A SUPERIOR ENERGY SERVICES COMPANY

energy engineering

Subsea Dropped Object Analysis

Content

- Company Background
- Subsea Dropped Objects
- Current Mitigation Techniques
- Subsea Installation Analysis
- Finite Element Analysis (FEA)
- Computational Fluid Dynamics (CFD)
- Case Studies
- Questions

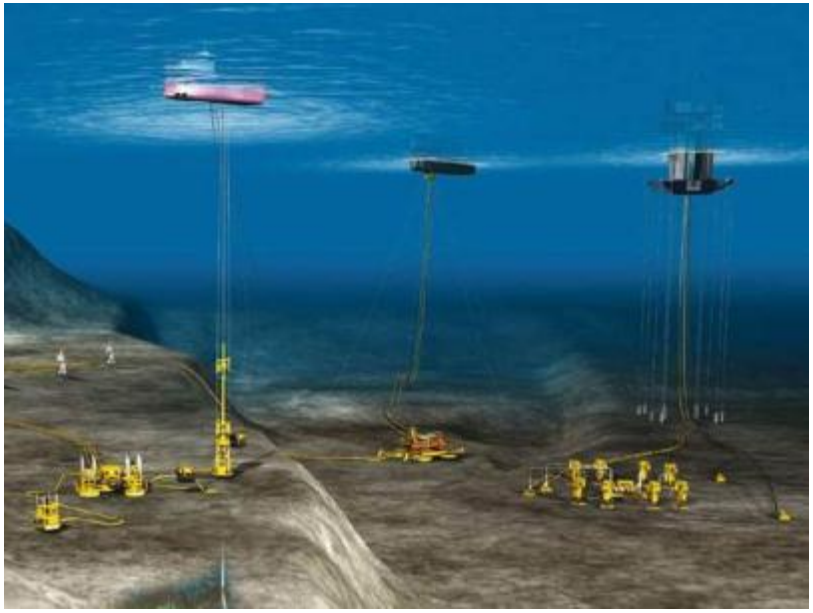
Company Background

- Founded 1999
  - Became part of Superior group Dec 2009
- Multidiscipline services
  - Design
  - Analysis
  - Management
- International Resources
  - Aberdeen, Derby, Houston, Singapore
- Client Orientated
  - Focus purely on client needs to provide a fast effective service of the highest quality

Subsea Dropped Objects

Subsea Asset Protection

- Modern Oilfield
  - Large subsea infrastructure
- Congested seabed
  - High Risk of dropped objects impacting and damaging assets



Current Mitigation Techniques

- DROPS potential consequence table
  - Lookup table for range of objects with potential to be dropped
  - Gives approximate drop cone, velocity and impact
- Recommended Practice
  - DNV-RP-F107 2010
  - Probability based quantification of events
  - Drag coefficients and terminal velocity highly generalised based on shape
- Explicit Analysis
  - Use of latest software and analysis techniques
  - Fully quantify numerical values and potential consequences

Prospect Dropped Object Analysis

Prospect Drop Analysis Tools

Prospect can provide;

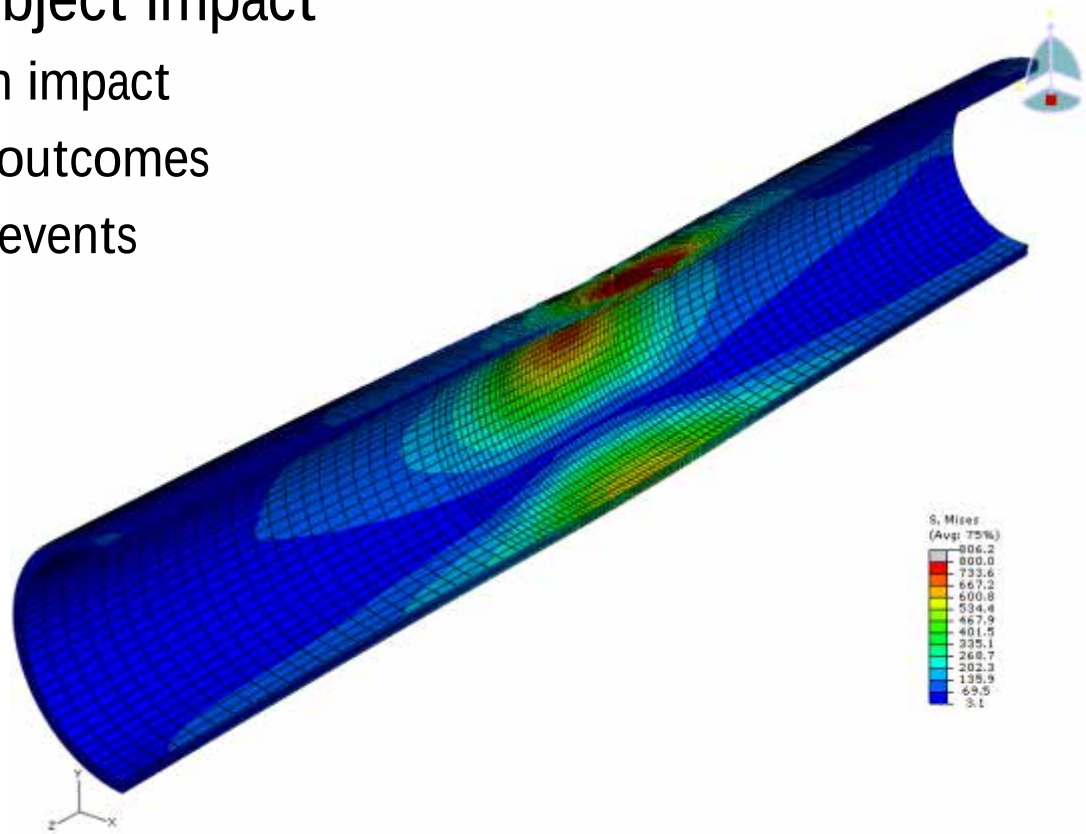
- Real world behaviour
  - Physics based simulations which replicate real events
- Numbers behind the risks
  - Mitigation methods can be tested and compared
- Worst case scenarios
  - Outcomes if the worst does happen
- Front end engineering
  - Prevent incidents rather than react

Subsea Installation Analysis

- Simulate an asset during move from vessel to subsea location
  - Pipe Lay
  - Cable Lay
  - Subsea Hardware
  - Splash Zone Deployment

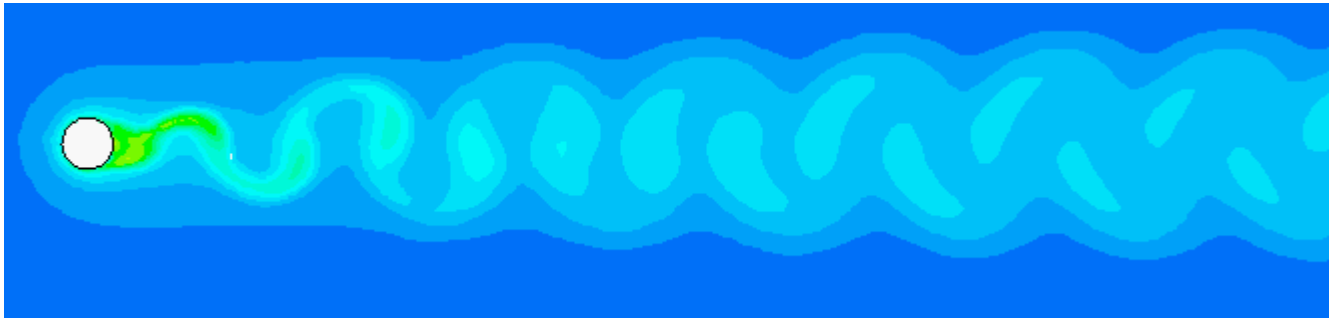
Finite Element Analysis (FEA)

- Computer modelling of component stress and deflection
- Dropped object impact
  - Forces on impact
  - Visualise outcomes
  - Quantify events



Computational Fluid Dynamics (CFD)

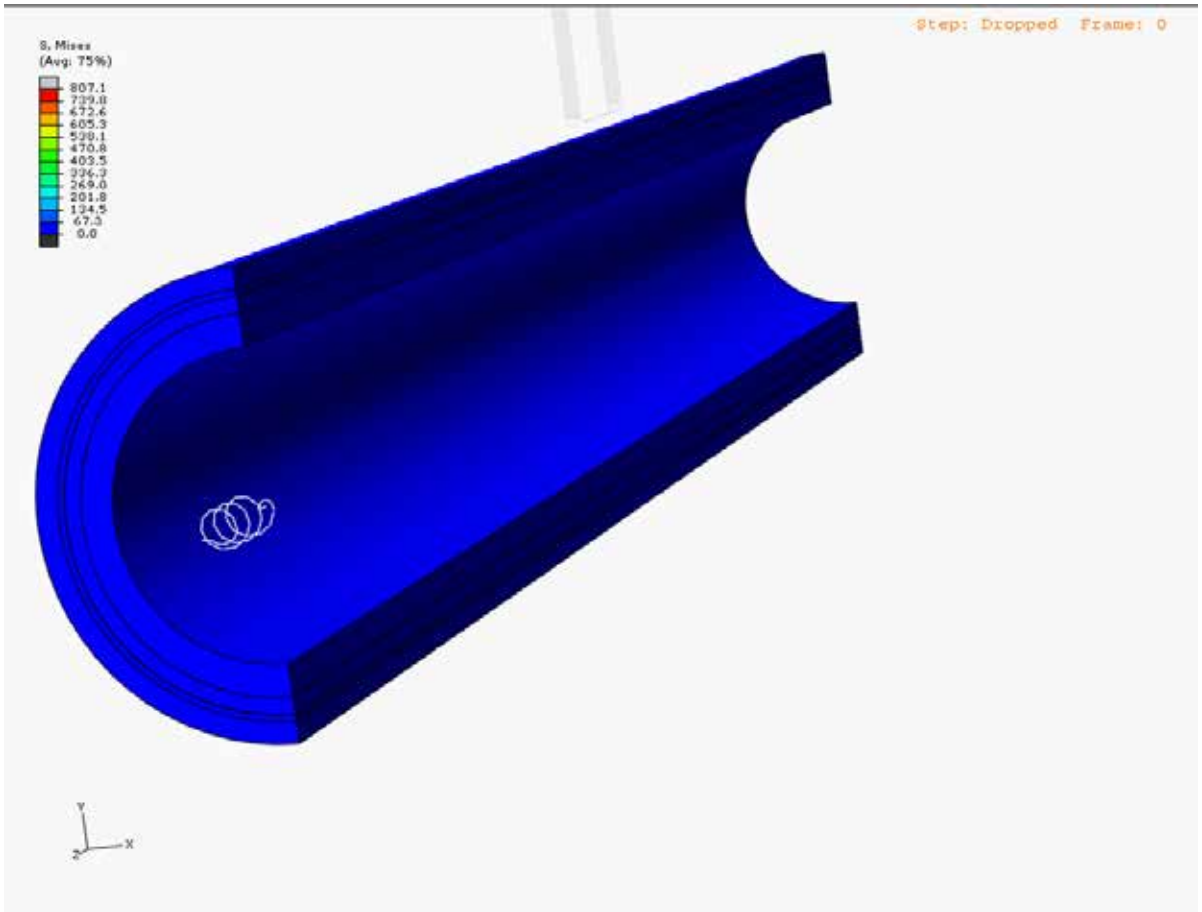
- Computer modelling of fluid dynamics and subsequent loading
  - Determine where a dropped object is likely to land
  - “Virtual Wind Tunnel” for sea currents
  - Displacement forces
  - Objects drag coefficient
  - Determine an objects likely impact velocity



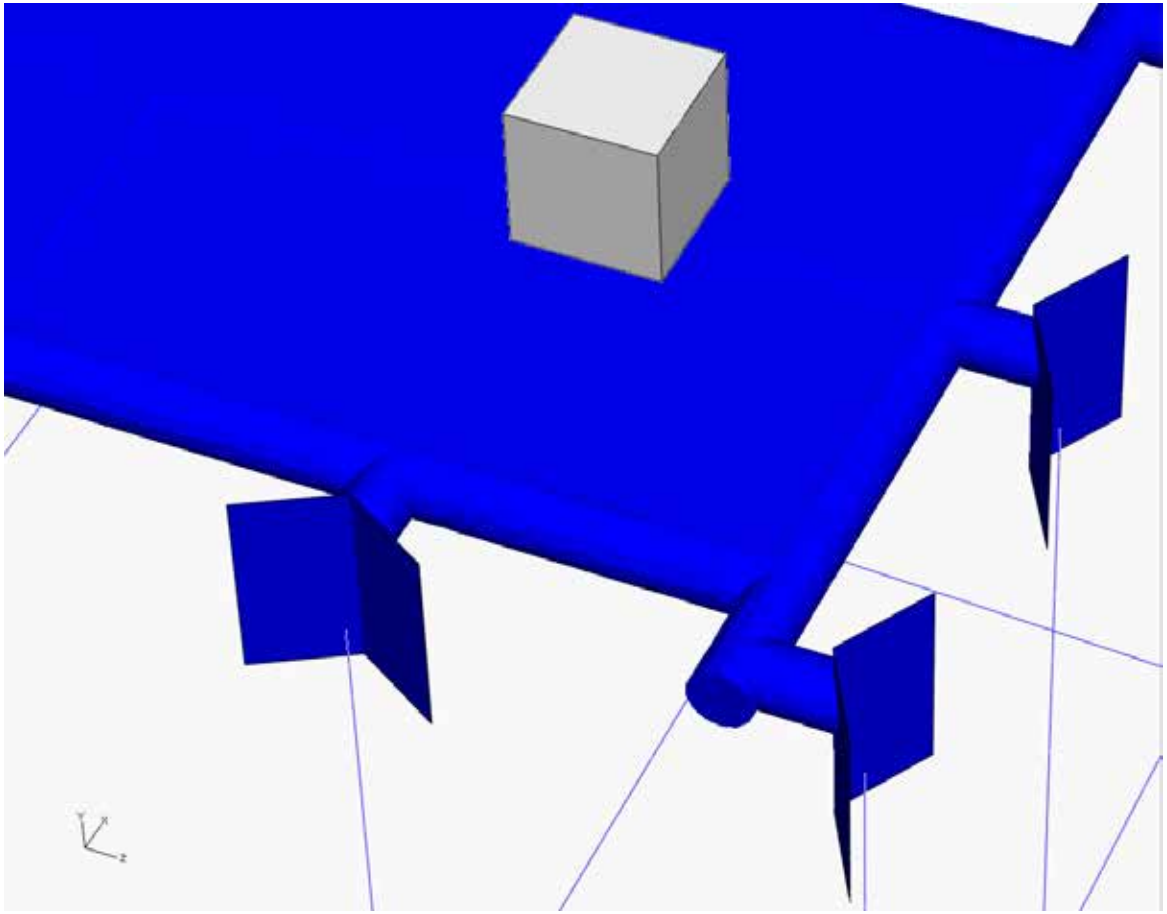
Case Studies

Dropped Object - Installation

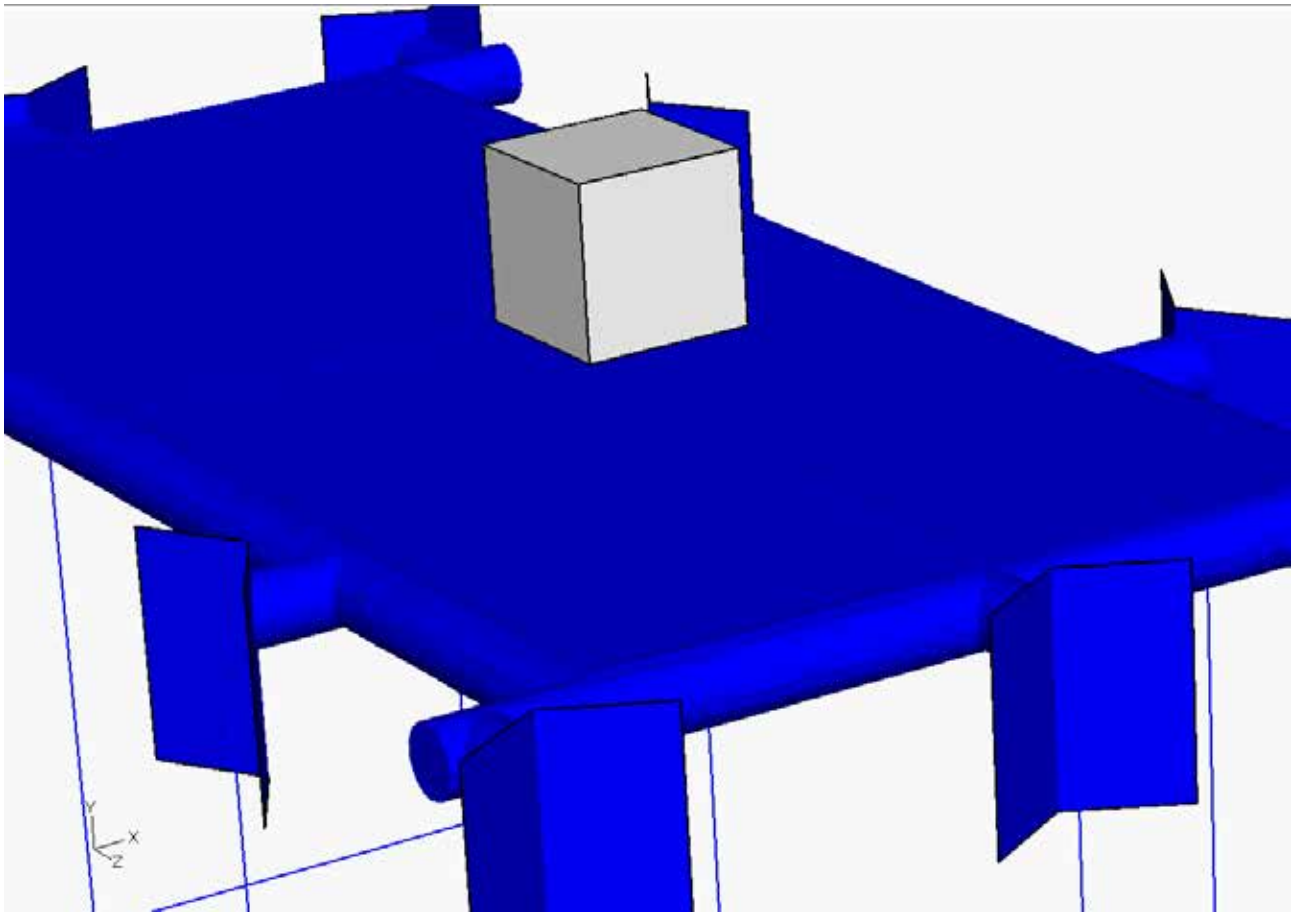
Flexible Riser Impact (FEA)



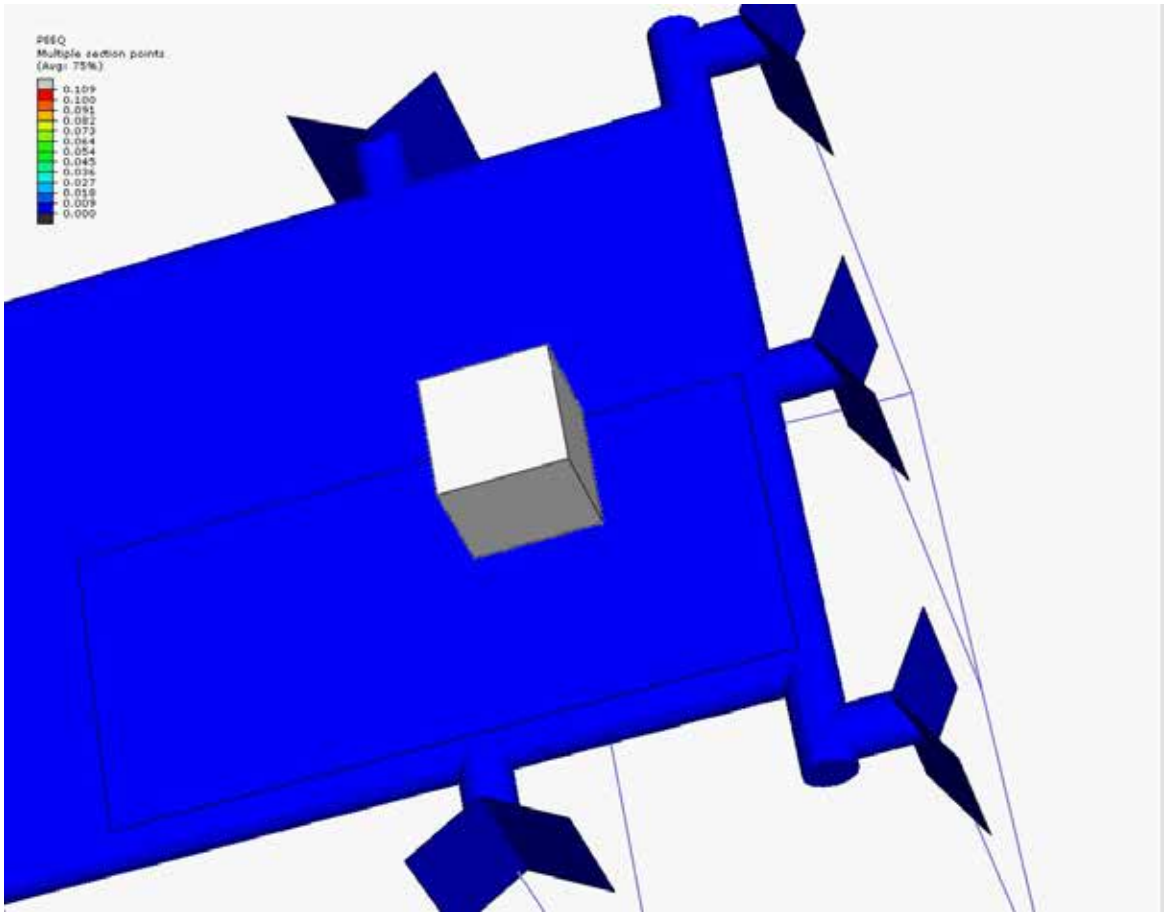
Subsea Manifold Impact (FEA)



Subsea Manifold Impact (FEA)



Subsea Manifold Impact (FEA)



Questions

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