Maximising Riser Deployment Opportunities

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‘Always Part of the Solution’
Presentation Overview

- First Subsea
- Field development and tie-backs
- Flexible Risers and Umbilicals
- Diverless Bend Stiffener Connector
- Getting Connected:
  - BP Gulf of Mexico ï Fibre Optics
  - Neptune DWPP ï LNG Installation
- Summary
First Subsea

- Formerly *ballgrab*®
- Established in 1994
- MBI in September 2001
- Innovative design & engineering
- Extensive Oil & Gas experience
- QMS to ISO9001:2000
- Representatives worldwide
- Ball & Taper technology
Ball and Taper Principle

- Simple mechanical mechanism
- Individual multi-point grip
- All grip elements are in compression
- High load and fatigue resistance
- Ball and Taper design is scaleable
- Established and proven technology
- Numerous applications worldwide
- Mooring, pipelines, subsea connections
Field Development

- Flexible risers and dynamic umbilicals are being deployed more readily into existing infrastructure as well as new field developments.
- Use of tie-back to existing facilities to optimise field performance, maximise marginal fields and develop satellite fields.
- Increased offshore production capacity from floating and subsea assets.
- More efficient and transportation allow longer distances and larger tie-backs.
- Developing subsea production requiring increased control and communications.
Flexible Risers & Umbilicals

- Flexibles replacing steel catenary risers (SCRs) in both tie-back and new installations
- Greatly reduced time (and cost) of installation and vessel requirements
- Ideal for shallow to ultra deep water applications
- Proven riser technology along with ancillaries and installation methodologies
- Increasing development of flexible risers and dynamic umbilicals
- Suited to riser and umbilical deployment on crowded platforms
Diverless Bend Stiffener
Diverless Bend Stiffener

- Developed for various flexible applications
- Utilizing existing & proven technologies
- Time & cost savings through:
  - Completely diverless operation
  - Quick & easy engagement
  - Simple release procedure
- Minimal or ZERO ROV intervention
- Optional pull-in systems & hydraulics
DBSC Arrangement

- &Tube or Female
- Male Tool
- Interface
- Pull In Wire
- &Tube or Receptacle
- Pull In / Termination Head
- DBSC
- Spool Piece (optional)
- Bend Stiffener
- BS Tip Clamp (optional)
- Flexible Riser / Umbilical
‘Type I’ DBSC Overview

- Designed to suit existing I & J Tubes
  - Interface directly into I/J Tube bore
  - Retrofits into existing installations
- Utilizing existing pipeline technology
- No diver intervention required
- Minimum ROV intervention
- Hydraulic activation & setting
  - Secured with hydraulic pre load
  - Controllable engagement
- Mechanical locking system
‘Type II’ DBSC Overview

- Two part (Male/Female) design
- Developed for new build applications
  - Flanged or welded to I/J Tube fabrication
  - Optimising I/J Tube & flexible dimensions
  - Machined receptacle ïgrooves & stop
  - Designed to reduce bending moment
  - Requires NO diver or ROV intervention
- Utilizing proven Ballgrab technology
- Simple mechanical operation
- Reduced size, weight & cost
DBSC Installation

Type II DBSC

Type I DBSC
DBSC Installation – ARC/SPR

- Auto Release Clamp (ARC)
- Integrated within Type II DBSC
- Completely ROV-less System
- New patent pending

- Shear Pin Release (SPR)
- Existing installation philosophy
- Use with Type I OR II DBSC
DBSC Disconnection

- Alternative release mechanisms:
  - ROV/Diver installed release clamp
  - Mechanical release / manual override
  - Integrated hydraulic system
- Established disconnection methodology:
  - Support DBSC/BS assembly using clamp (or similar)
  - Clamp DBSC flanges using release mechanism
  - Clamping DBSC disengages balls from "Tube
  - DBSC free to be lowered from receptacle / "Tube
- Designed to suit access restrictions
DBSC Design Verification

- Joint development with Trelleborg
- DNV verified fatigue testing regime
- Ultimate Load State (ULS) testing:
  - Axial Load
  - Bending moments & shear force
  - Torque
- Pull-in load testing & misalignment
- Extensive FAT / SIT simulations
- Customer & development testing
- Ongoing research & development
Tyco/BP - Gulf of Mexico

- Part of a 1,400 km subsea fibre optic communications network tie-back
- Connection of BP Spars (2007/8):
  - Holstein (10\(^\text{o}\)ID \(\phi\)Tube)
  - Horn Mountain (14.5\(^\text{o}\)ID \(\phi\)Tube)
  - Mad Dog (16\(^\text{o}\)ID \(\phi\)Tube)
- Existing I/J tubes with Bellmouths
- 450\(^\text{o}\)deep diverless connection in 1,325 ï 1,650m W/D
- Type I DBSC design employed
Neptune LNG Project

- Neptune Deep Water Port Project (DWPP)
  North and South buoys in 80m W/D
- APL Submerged Turret Loading (STL)
- Four Type II DBSCs installed
- Female connector integrated into STL buoy construction during design and fabrication
- Male connector installed on flexibles:
  - Gas Riser (467mm) into 30øJ tube
  - Control Umbilical (102mm) into 10øI tube
- Quick Diver/ROVless installation
DBSC Summary

- Developed for all types of Flexible Riser and Dynamic Umbilical applications
- Small footprint for crowded platforms
- Safe installation, time & cost savings
- Minimal or ZERO ROV intervention
- Optional pull-in system & hydraulics
- First Subsea / Trelleborg partnership
- Utilizing existing proven technologies
- Maximising deployment opportunities
Thank You ...

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‘The innovator of engineering excellence, specializing in connection and mooring solutions’