Technical Session
Pipeline Bundles Technology

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Agenda

1. Overview
2. Fabrication, Testing, Launching & Installation
3. Bundle Advantages
4. Bundle Technology
5. Q & A
Bundle Overview
Overview of Pipeline Bundle Systems

• A Pipeline Bundle is a carrier pipe within which any combination of individual pipelines and umbilical components are carried.
• The individual components terminate in “Towheads” within which manifolding may take place.
• A Towed Pipeline Solution provides a low stress installation method where-by a pipeline bundle is towed and installed using the Controlled Depth Tow Method.
Overview of Pipeline Bundle Systems

- 81 bundles in 37 years
- Longest segment = 7.7km
- Overall longest = 28.7km in series
- Deepest @ 410m Water Depth
- Shallowest @ 42m Water Depth
- Longest tow = 1,000km
- Largest OD = 56.4” Carrier
- Heaviest Towhead = 546Te
- Hottest production fluid = 210°C
- U-value <0.7 W/m²/K
Overview of Pipeline Bundle Systems

3 Australian Bundles:
- ESSO Bream/Tuna
- BHP Griffin
Bundle Fabrication, Testing, Launch and Installation
Bundle Fabrication Site, Scotland

- Established in 1978
- Runs 7.8km inland
- Covers a total area in excess of 300,000m²
Bundle Fabrication

40.16m

8.32m
Bundle Onshore Pre-commissioning

Hydrotesting of the Flowlines and EHU testing is completed onshore prior to launch therefore reducing offshore risk and duration/cost.
Bundle Launch and Tow Offshore
Bundle Advantages
Bundle Advantages – Insulation Options

- Passive Insulation System
- Pipe-in-Pipe System
- Indirect Hot Water Heating
- Electrical Active/Trace Heating
Bundle Advantages – Flow Assurance

The environment within the carrier pipe provides an ideal opportunity for innovative solutions in Flow Assurance.

**Geometry of pipelines**
- The pipelines can be arranged to facilitate heat transfer between product lines or from dedicated heating lines.
- Heat transfer analysis confirmed by experimental results.

**Active Heating Systems**
- Warm-up before Start-up
- Increase Temperatures for Low Production Rates
- Keep System Temperature High during Shutdowns
- Reduce Chemical Injection
- Six Active Heating Systems installed in the North Sea
- Hot Water Circulation over distances of 15 km
Bundle Advantages - Design

• **On-Bottom Stability is enhanced**: Trenching replaced by flooded carrier annulus.
• **Improved Thermal Performance** (Heated – Hot Water or Trace Heating)
• **Corrosion Performance improved**: Use of Lined CRA instead of Clad flowlines, no coating required on internal flowlines, carrier only. Onshore provides better environment for sensitive CRA welding, both for quality and reduced cost compared to offshore.
• **High Temperature Flowline Design (160°C+)**
Bundle Advantages - Installation

- Eliminate expensive pipelay/heavy lift vessels from Overseas are replaced by local Tugs.
- Weather Stand-By reduced
- Flexible Installation Sequence to adapt to suit drilling schedule
- Testing and commissioning of complete system onshore therefore reducing offshore time.
- Simplified Field with reduced number of subsea structures, tie-ins and spool installations.
- Fast hook up and commissioning for early first oil dates
- Installation under existing or temporary floating assets
- Lateral Buckling Mitigations removed: No need for expensive triggering subsea structures or buoyancies: production lines are contained within the outer carrier pipe, they can also be pre-tensioned during onshore assembly in case of High Temperature
Pipeline Bundles Technology
Bundle Technology - Deepwater

- Existing Carrier Technology → 550m (current projects), estimated max ~750m
- Carrier Technology can be extended to 1300m,
  - Launch as per existing 550m WD bundle,
  - Increase carrier pressure with downline once launched to full installation pressure (~130bar),
- Retains all the benefits of carrier bundle technology in deepwater,
- 1300m → 1500m, External Low Cost Buoyancy Modules,
- 1500m+ → External Solid Buoyancy Modules
Bundle Technology - Deepwater

• Direct Bundle to Bundle connector,
• Developing as part of the
• Improves economics for longer Bundles;
  – Removes need for metrology & tie-in spools,
  – Removes intermediate towheads,
  – Reduces offshore schedule,
  – Improved flow assurance,
  – Reduces/removes diver time,
Potential in South East Asia

- SEA subsea development driven by deepwater i.e. Gehem Gendalo in East Kalimantan, Limbayong, Gumusut In North Borneo
- Average Water Depth of SEA fields under development by subsea tie-back is 800meters vs North Sea = 170meters.
- Deepwater subsea tie-back fields under development, HPHT fields would benefit from Pipeline Bundles Technology
PROJECT “X” FIELD LAYOUT CONVENTIONAL
PROJECT “X” FIELD LAYOUT WITH BUNDLED TECHNOLOGY
ANY QUESTIONS?

CONTACT US
THANK YOU