Latest Evolution of Vessel Lay Equipment, to Meet the Challenges of Deepwater Installations

SUT Perth, 14th February 2018
1. TechnipFMC Fleet
2. Skandi Africa:
   - Crane
   - Lay Spread
TechnipFMC Fleet

REEL-LAY VESSELS
- Deep Energy
- Deep Blue
- Apache II

S-LAY VESSELS
- G1200
- G1201

DIVE SUPPORT VESSELS
- Deep Arctic
- Deep Explorer

LONG TERM CHARTERED VESSELS
- North Sea Atlantic
- North Sea Giant

CONSTRUCTION VESSELS
- Skandi Africa
- Deep Orient

RLWI
- Island Performer

Plus 8 purpose built vessels for the Brazilian Market:
- Skandi Vitoria*
- Skandi Acu*
- Skandi Niteroi*
- Skandi Buzios*
- Coral Do Atlantico
- Skandi Olinda*
- Estrela Do Mar
- Skandi Recife*

*JV with DOF
Skandi Africa
A state-of-the-art deepwater construction support vessel

- Length: 160.9 meters
- Speed: 12 - 16 knots
- Accommodation: 140 people
- DP3 and ICE-1B class notation for harsh environments
- 900 Te AHC main crane, 150 Te AHC knuckle-boom crane
- Large 2,700m² main deck and 3,500Te under deck storage
- 2 TXLX ROV systems capable of operating to 4,000 m
- 650 Te Tiltable Lay System Tower (TLS) for flexible lay operations – product diameter from 50 to 630mm

50-630 mm  650 Te  3500 Te
Maximum product diameter range  Tiltable Lay System onboard vessel  Under Deck Carousel
Crane Developments
Crane Developments

A fully programmable system:

- At the push of a button

Main Stages of a Subsea Lift improved:

- Vessel to Vessel Lift Mode
- Splash Zone Mode
- Subsea Land-out Mode
- Deep Water Lowering Mode

Increased workability & reduce strain on system
Crane Developments

1) Vessel to Vessel Lift Mode

- Main considerations:
  - Personnel Safety during rigging
  - Structure Integrity during ops
  - Structure control in-air

- Outcome:
  - Account for vessel to vessel relative motions
  - Remove ‘Snap-load’ risk
  - DAF reduced / optimised lifting configurations
  - Increased operability
  - Increased safety
Crane Developments

2) Splash Zone Mode

- Main considerations:
  - Maximise wave kinematics
  - Risk of slack-lining
  - Hull clashing

- Outcome:
  - Reduced exposure to slack slings
  - Increased vessel operability [Hs]
Crane Developments

3) Subsea Land-out Mode

- Main considerations:
  - Structure designed for specific landing velocity [~0.5m/s]
  - Suction loads risk / overloading, landing on soft seabed
  - Structure position guidance

- Outcome:
  - Seabed recontact risk mitigated
  - Remove overload risk, crane attached to seabed
  - Increased vessel operability [Hs]
Crane Developments

4) Deep Water Lowering Mode

- Main considerations:
  - Crane slewed forward & inboard
  - Resonance*

- Resonance Mitigation:
  - Natural period of resonance shifted outside wave period range
  - Traditional route: Pennants & PHC unit

*Resonance – Excitation of the lifted package caused by the natural frequency of the hoisting system being near the wave period – generally more of an issue in deeper waters
Crane Developments

Crane Simulation Modelling [CSM]

- Crane manufacturer interface
- Orcaflex lifting scenario
- Fed into complex model

Resonance Mitigation Benefits

- PHC units removed
- Reducing risk of crane damage
- Reduced vessel time: ~ €1.0M saving on 1st Project
- Significant operability increase - 1.0m Hs to 2.0m Hs

- CSM cost only €15k
Lay Spread Development

*Special mention to Huisman for their input to these slides- www.huismanequipment.com/en/
Lay Spread Developments

A Drive for Innovation

- Changing infrastructure, remote, deeper waters
- Upscaling and improved handling
- Deeper water & Larger equipment = Higher top tension
- Safety and structural integrity consideration:
  - Longer, heavier & more end terminations
  - Improved efficiency, repeatability, safety

Efficient, safe installation = higher lay speed
Lay Spread Developments
Lay Spread Developments

End Handling System [EHS] – 1st & 2nd End

- Improved efficiency, control & safety
- Chinese fingers, loose rigging & multiple winches removed
- Driven rigid arm, rotated around aligner wheel
- Hoisting pipe termination from deck - latching system
- 180° rotation into firing line
- Fully reversible for recovery
- Horizontal motions fixed
Lay Spread Developments

**Retractable Dual Tensioners:**

- Retract out of firing line when not required
- Full ramp height available

**‘XYZ’ Hoisting Beams:**

- Conventional hoisting beams setup set at fixed pitch
- Movable beams increase versatility & reduce rigging time
- Beams skid transversely & independently
- Heavy loads transported from side of ramp to firing line
Lay Spread Developments
Successfully implemented on……

**Total Moho Nord [Congo] - 1200mwd**
- Large EPCI
- Over 21km of flexibles
- Associated Structures, Jumpers, etc

**Total Kaombo [Angola] – 1900mwd**
- 400 day SKAF campaign
- 500+ Team in 17 TechnipFMC centres
- 50+ Rigid Spools & Jumpers
- 18 Dynamic & Static Umbilicals
- 14 structures [manifolds & piles]
Thank you