Installation of an FPSO and subsea hardware in the Mediterranean Sea using non-specialised vessels

UTC - BERGEN
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Aker Marine Contractors - What we do

Mooring & Floaters

SURF Operations

Floatovers

Removal
Work Areas - Assets

BOA DEEP C

BOA SUB C

TURNTABLE
AGENDA

- Oudna Installation Preface
- Vessels
- Installation of Mooring System
- Installation of Flexible Risers/Flowlines and Umbilicals
- Hook-up to FPSO
- Conclusion
OUDNA INSTALLATION - PREFACE

- Tunisian water outside North Africa
- No offshore bases and limited support infra-structure
- Specialized installation vessels?
  - Large mobilization cost
  - Limited availability
- Requirements
  - Anchor handling (large anchors, heavy chain and fibre ropes)
  - Chafe chain and heavy riser guides
  - Flexible risers/flowlines and umbilicals
Oudna location

IKDAM FPSO

Chafe chain with riser guides

NODE

400 m 239mm polyester rope

800 m 135mm 6.6d chain

Stevpris mk5 29 t

6" Prod; 950m

4" Power Fluid 1539m

95mm Umb; 950 m

4" W I ; 1038 m

78mm Umb; 1550 m

Production Well

Water Injection Well
MAERSK 'A' CLASS VESSEL
"Maersk Attender"
Main dimensions = 90.3 x 20.3 m
Free deck = 41.6 x 19.5 m
Winches = 625t(AH)/2 x 400t(tow)
Bollard Pull = 257t (23480 hp)
DP2
70 beds
ASSISTING VESSEL

ANCHOR HANDLING VESSEL
"Odin Viking"
(Viking Supply Ships AS)
Main dimensions = 73.9 x 16.9 m
Winches = 400t (AH)
Bollard Pull = 180t
DP2
26 beds
DECK LAYOUT

FOR MOORING INSTALLATION

A-FRAME AND 2 X WROV IN ALL PHASES
INSTALLATION OF MOORING SYSTEM
INSTALLATION OF "CHAFE CHAIN"

Chafe Chain installation frame, 320Te design load

10 off Guide Frames
MOBILISATION FOR FLEXIBLES INSTALLATION

- 4" PF & 6" Prod (on 26' reel)
- Deck quadrant
- 4" WI (on 26' reel)
- Prod & WI umb
- Hub drive on rails
- 2xTensioner's
- Chute
- Working platform
- Buoyancy elements
MOBILISATION FOR FLEXIBLES INSTALLATION

- Setting up Aquatic tensioners and hub-drive systems
- "Dance floor" assembly around deck quadrant
- Stern chute installation
- Seafastening of reels
- Umbilical reel drive
- Round the clock mobilisation in Freeport, Valletta, Malta
INSTALLATION OF FLEXIBLE RISERS/FLOWLINES

1. Preparations

- Cleaning of well-head hub

2. Deployment of 1st end (subsea end) and tie-in to x-mas tree

- Deployment of Vertical Connection tool
- Landing of Vertical Connection tool
3. Buoyancy section

Installation of Buoyancy elements

Buoyancy section, including temporary buoyancy

4. Paying out product

4” PF Installation

4” PF around deck-quadrant
INSTALLATION OF FLEXIBLE RISERS/FLOWLINES

5. Overboarding of topside end

6. Transfer to- and hang-off in Chafe Chain held by Assisting vessel
INSTALLATION OF UMBILICALS

- Reverse lay direction as opposed to riser/flowlines
- Light weight in water required chain weights to temporarily weigh down during installation of buoyancy section
- Umbilical tie-in done by Flying Lead. WROV – Male-MQC plate connected to Female-MQC on x-mas tree
1. Chafe Chain transferred from Assisting Vessel to FPSO 'Ikdam'

2. Flexibles transferred one by one from Assisting Vessel to FPSO 'Ikdam'

3. Testing / commissioning of flexible flowlines / risers and umbilicals
CONCLUSION

- Complex marine operations may be performed using standard large AHTS, based on innovative engineering and planning
- Effective use of available vessels – Installation of Mooring system and Flexibles using same vessel
- Solution oriented and dedicated project team consisting of own personnel and subcontractors
- The project planning and execution of the operations involved several challenges…
- …But; ”WE DID IT!”
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