GirRI Phase 2 Project:
Installation Challenges on a Brown Field Project

LAFONTAINE Karine
&
FACHAN Olivia
Table of Content

- Context
- Installation Constraints
- Installation Methodologies Presentation
GirRI SURF2 – Location

Rigid spools to be replaced by Flexible spools
Table of Content

Installation Constraint n°1: Complex Area
Main Constraint n°1: Complex Area

- Very congested area at BHOR vicinity:

Complex Area:
- Congested Area
- No vertical access for installation vessel crane
- ROV limited access at BHOR bottom assembly
- Trench

Equipments:
- BHOR limited capacity
- Vecto connector not designed for flexible installation
Main Constraint n°1 : Complex Area

No vertical access to working area:

- Complex Area:
  - Congested Area
  - No vertical access for installation vessel crane
  - ROV limited access at BHOR bottom assembly
  - Trench
- Equipments:
  - BHOR limited capacity
  - Vecto connector not designed for flexible installation
Main Constraint n°1 : Complex Area

- Very limited ROV access at BHOR bottom assembly:
  - Rigid Spools Removal
  - Flexible Spools Installation

- Restriction to installation sequence
Main Constraint n°1: Complex Area

- Soil damaged and existing trenches:

  - Decision to reinforce soil at TDP with Mattresses
Table of Content

Installation Constraint n°2: Equipment
Decision to go with free-hanging configuration for flexible spools:

- Main Constraint n°2: Equipment
  - Complex Area:
    - Congested Area
    - No vertical access for installation vessel crane
    - ROV limited access at BHOR bottom assembly
  - Equipments:
    - BHOR limited capacity
    - Vecto connector not designed for flexible installation

Minimizing loads at BHOR piping:
- BHOR piping integrity checked
- BHOR excursions studied

- Reduce Touch Down Point distance and most appropriate for congested field layout.
- BHOR limited load capacity.

Near Case – Down - FoF: Buoyancy module of 3.8 tonnes upthrust required.
Main Constraint n°2 : Equipment

Horizontal connector has the following drawbacks:

- No lifting point.
- Low Pitch and Roll installation tolerances. (+/-5°).

Custom design of terminations to allow installation with flexible
Table of Content

Installation Methodologies Presentation: Flexible Spools Installation
Installation Methodology: Flexible Spools Installation

- **Buoyant and "standalone" spool connection to riser:**

This technical solution has been selected to:

- Avoid the use of the crane / winch.
- Ensure a better control of the pulling force applied on the BHOR piping.
- Mitigate production short fall.
Installation Methodology: Flexible Spools Installation

- **Inclinometer**
  - Range: -10 to +10° of pitch

- **Yoke and its subsea winch**

- **2.4t Clump Weight**
  - Designed for connector pitch setting

- **Temporary Buoyancy arrangement**

- **Subsea winch**
  - Pulling capacity: 2 t max
  - Failsafe brake hold load: 2 t
  - Fleet angle: +/- 11°
Installation Methodology: Flexible Spools Installation

- **Guide post**
  - Swivel padeye
  - ROV grab bar
  - Window
  - Marking
  - Lifting padeye
  - Padeye of existing guide post
  - Locking pin
  - BHOR IB hub

- **Weak link**
  - Designed to break between 2 and 2.5 t

- Buoy designed for catenary lifting completion
- Rigging composed of soft sling and chain for deployment from installation vessel
- Buoy designed for later yoke & subsea winch recovery by ROV
- Cross beam 4 legs rigging
- 2,4t Clump Weight designed for connector pitch setting
- GirRi2 - BHOR Connection and flexible laying
Flexible spools installation

Installation Methodology: Flexible Spools Installation

Flexible spools installation aids removal
Flexible spools installation aids removal
Installation Methodology: Flexible Spools Installation

Reliability of our solution with:

✓ A proper step by step method,

✓ Sensitivities on the parameters that can be controlled subsea (layback, sagbend, catenary height and buoyancy arrangement uplift),

✓ A clearance analysis,

✓ A robust engineering for removal of installation aids to ensure BHOR integrity.

✓ Structural calculations of BHOR assets performed.
Flexible spools are a key alternative solution for hybrid riser base for green & brown field developments compared to rigid ones. Innovative methods developed for the flexible spools installation in a very congested area. Limited footprint on production: all neighboring assets have been kept in production at all time. This allowed the restart of broken leg of P80 production loop...
Thank you