

FPSO 5.5" Reconnection Wire Rope Replacement

Client: Woodside Energy Ltd

Overview

AEC was engaged by Woodside Energy Ltd (WEL) to develop a procedure for the replacement of the 5.5" diameter x 84m long reconnection wire assembly located within the Riser Turret Mooring (RTM) of the Okha FPSO, which was approaching the end of its working life. The rope had previously been replaced using a subsea diving spread, however, an alternative was sought to minimise risks, mobilisation time and expenditure. The weight of the rope assembly including fittings was 6.7t.

The Challenge

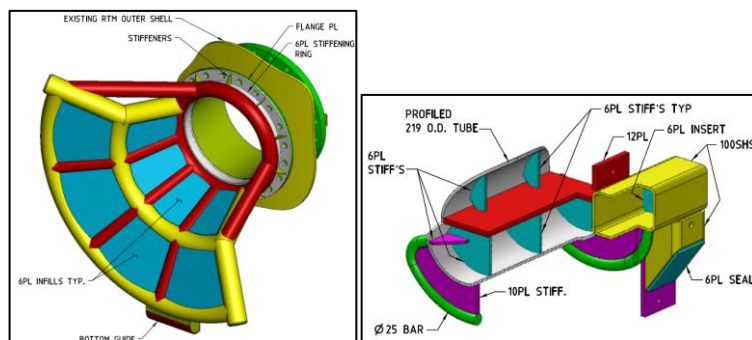
Replacement of the assembly without divers had not been attempted previously due to a number of issues including:

- An existing procedure for replacement between the FPSO and the RTM was developed when the RTM was first built, however, it was for use with a different FPSO. As a result the layout of the Okha deck and it's mooring equipment were not aligned with the existing procedure.
- Obstructions on the Okha forward deck prevented a direct path to the mooring winches, so a winching and spooling spread would need to be mobilised to the FPSO and set up on the forward laydown area for an FPSO/RTM transfer.
- The FPSO weather vanes about the RTM, resulting in constantly changing clearance/clash issues and catenary spans.
- Internal and external RTM openings that the assembly needed to pass through included sharp edges that were potential snag points and wear points for the assembly.

The Solution

Following an initial site visit identifying the key challenges and after consultation with WEL, AEC developed a rope replacement procedure based on direct transfer from the RTM to an Anchor Handling Tug (AHT). Key activities carried out by AEC included:

- Catenary analysis of the wire assembly spanning between the RTM and the AHT to determine load and deflection ranges.
- Assessment of winch load increase due to friction around bends within the RTM.
- Design of a number of structural aids to guide the wire assembly around sharp edges.

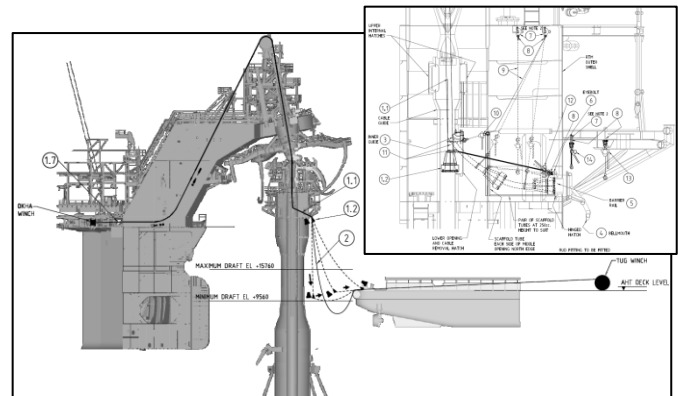


External Bellmouth

Inner Guide (cut away view)

- Detailed assessment of the existing wire assembly based on review of expected loading and current condition.

- Specification of rigging equipment required for the replacement.



- Preparation of a procedure document and detailed sequence drawings.
- Participation in workshops and HAZIDs to ensure all risks were identified and suitably mitigated.
- Management of the fabrication of the structural aids and the supply of the rigging and equipment for the procedure.
- Project management and site supervision for the spooling of the wires in Karratha and mobilisation and demobilisation of the AHT at King Bay Supply Base.
- Site engineer attendance during the rope replacement.



Outcome

The rope was successfully replaced on station using the RTM-AHT procedure. Removal and replacement each took approximately one half of a day work shift.