

Business Case TCP Jumper Spool

Introduction

The fully bonded TCP has advantages that are particularly beneficial when the pipe is used as a well jumper or other jumper spool applications. In this application, for conventional rigid spools, high costs are incurred that are related to procurement and fabrication of the complex jumper geometry, metrology, transport and installation. Compared to rigid jumpers, radical cost savings in excess of 50% on overall cost are achieved with TCP. Also compared to unbonded flexible, significant cost saving is achieved due to much lower procurement cost.

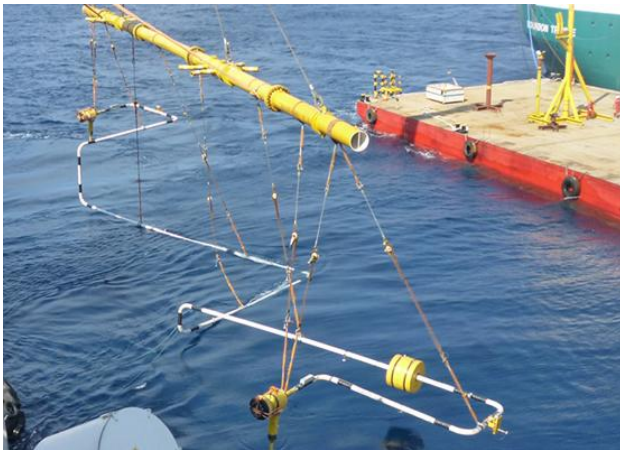
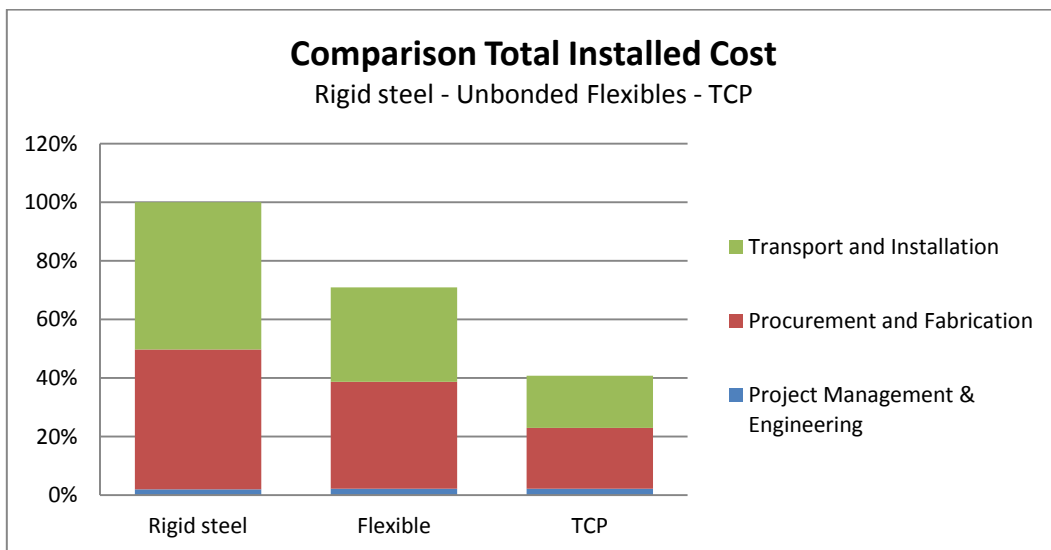


Figure 1 Offshore installation of typical rigid jumper (left) and TCP Jumper (right)

The flexibility and low stiffness of the TCP Jumpers allows the jumper to cope with the installation tolerances and in-place displacements due to pipeline expansion and dynamic riser motions. As a result, it is no longer required to do metrology to accurately establish the as-installed locations of the subsea hubs. Depending on the selected configuration (U-shape, arch or L-shape) the TCP Jumper can compensate for target box tolerances and/or post-flowline installation LBL tolerances. The TCP Jumper can therefore be pre-fabricated, taking the jumpers away from the critical path and reducing overall project schedule and cost.



Total Installed Cost Reduction

Actual cost reductions achieved with TCP Jumpers are significant. A detailed cost analysis, based on actual specifications for a West Africa deepwater project, results in a cost reduction of 60% compared to rigid steel jumpers and 30% lower cost for TCP compared with unbonded flexible jumpers. The case study considered installation of 5 well jumpers. The cost saving compared to steel is in excess of 1 mio USD for each jumper.

Business Case

TCP Jumper Spool

TCP Jumper Benefits

TCP Jumper benefits are summarized as follows:

- Procurement cost
 - TCP Jumpers are less expensive than unbonded flexible on cost/m and shorter lengths are required
 - TCP is typically competitive with or less expensive than most Corrosion Resistant Alloy materials on a cost/m basis
- Scheduling
 - Manufactured in advance, terminated prior to installation
 - Significantly more tolerance in length than rigid pipe
- Reduce Fabrication and Buoyancy costs
 - No large and complex jumper geometry to weld and insulate
 - No large spreader bars needed
 - No buoyancy required on most designs
- Local Content
 - TCP can be stock produced in long lengths and cut to length locally
 - Simple and robust end-fittings allow quick installation of the end-fittings at local yards
- Reduce Transport costs
 - TCP Jumpers can be coiled down on deck or on reels
 - More pipe can be transported in a single mobilization
- Wet-Storage
 - Multiple jumpers stored on a single reel, carousel or basket can be wet-stored on the seabed
 - Reduction of transportation and mobilization costs
- No Metrology Required
 - Large absorption of tolerances to XT / PLEM/Riser location
 - Several configuration scenarios available
- Reduce Installation costs
 - Lower specification of vessel needed for installation
 - Multiple methods of deployment: direct over-boarding via VLS/HLS, conventional with compact spreader bar, pull off direct from barge / transport vessel
 - Compact TCP Jumper allows installation with field support vessel



Figure 2 TCP Jumper end-fitting assembly and storage on subsea deployment pallets at local yard