

# Case Study: Oil & Gas

## PROJECT DETAILS

Delivery of the integrated lining system to a water-injection riser set in 6,562 feet of Water

## LOCATION

UK & Netherlands

## COMPLETION DATE

April 2011



## Challenge

- The Single Leg Offset Riser (SLOR) concept is being used for the first time with a polymer lining system designed specifically for this application.
- The SLOR was installed by J-Lay, with manufacturing of the base double joints being completed in the UK and shipped to Angola for installation.
- The SLOR configuration included bespoke sections for the upper and lower riser assemblies which also required lining.
- With a 20 year service life, the design of the polymer lining system has to accommodate the J-Lay installation process and very high operating pressures.
- The vertical orientation of the riser in 6,562 feet water depth raises a number of engineering questions about tightness of fit, self -support and anchoring for the liner system.

## Solution

- **Teamwork:** On behalf of BP, Heerema Marine Contracting was responsible for the design, manufacture and installation of the SLOR by J-Lay using their SSCV Balder. Design of the SLOR was by 2H, with Pipeline Technique Limited (PTL) responsible for the fabrication of the riser. PTL selected Swagelining Limited for the design and delivery of the polymer lining system. All of these stakeholders worked openly with each other to identify every technical issue that could be considered as relevant to the first time use of the technology in the SLOR
- **System Design:** In what is potentially the most extensive polymer lining system design report yet completed for a water injection system, Swagelining Limited led the drive to produce a wide range of PQT evidence that the liner system was fit for purpose. Every individual aspect of the performance of the liner system was analysed for insertion and in-service loads. Where appropriate, design calculations were developed and a substantial Pre-Qualification Test program was established and successfully completed.
- **Historical Performance Data:** Swagelining Limited supported the validation exercise by the production of extensive historical records from previous projects including the condition assessment of a 13 year old Swagelined spoolpiece with WeldLink® attached, recovered from the seabed. Further data from extensive fully instrumented hydrotests of Swagelined spools with WeldLink® Connectors supported the confidence that the system would prove fit for purpose.

## Impact

- The water injection system comprising Swagelined polymer liners and WeldLink® Connectors was successfully hydrotested to 5,945 psi without ingress of water behind the liner proving the technology to these elevated levels.
- Despite a very challenging fabrication schedule, PTL were able to complete the riser double joints with time to spare and within budgeted costs. The challenging upper and lower assemblies were successfully Swagelined as a separate scope undertaken at HMC fabrication shops in Holland. The SLOR now has internal corrosion protection from end to end to ensure it remains 100% operational for its full service life
- The combination of WeldLink® Connectors with Swagelining Technology confirms that an Integrated Lining System- where materials, technology and proprietary components are combined under expert leadership - provides a solid basis for polymer lining of deep water pipe liners and risers.

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