

TATA STEEL



Case Study

Forties pipeline project

Project Name: Forties replacement pipeline

Client: Apache North Sea

Location: North Sea

Scope of work

- 5.25km 14" (355.6mm) outside diameter high frequency induction linepipe
- External three-layer polypropylene coating
- Despatched to Technip's Evanton spool base in Scotland
- Completed within nine weeks from order placement



ADDING FLEXIBILITY TO RIGID PIPELINES

As a leading steel producer, Tata Steel capitalises on decades of experience, expert knowledge and global capabilities to deliver pipeline solutions for challenging and complex projects around the world.

The Forties project in the North Sea is a prime example of how, by working in partnership with our customers, we can help them to meet their project challenges. Apache needed coated linepipe ready to lay within 10 weeks from order placement to meet a lay window. Through co-ordination of the complete supply chain from steel making through to line pipe production and coating we delivered against this challenge.

Independent companies acquiring maturing assets within the North Sea need to undertake integrity reviews of their infrastructure. Where these assets are showing signs of deterioration, the race is on to upgrade the facilities in order to maximise access to the remaining reserves. Key to achieving these upgrades is the timely supply of high quality, cost effective pipeline solutions as demonstrated by the Forties project.

The Forties Field is located in block 21/10 in the central North Sea, approximately 178 km north east of Aberdeen in the United Kingdom Continental Shelf (UKCS). Apache bought the field in 2003 and has since doubled production. The Forties infield pipelines are critical assets for exporting the field's oil production and as part of the company's extensive integrity management campaign, Apache instigated a number of inspection programmes to assess the condition of the network.

The original Forties Bravo to Forties Charlie pipeline was installed in 1975 and was used to transport processed crude oil until December 2006, when its use was changed to the transportation of multi-phase hydrocarbons and water. The pipeline had not been internally inspected for 17 years and while the general state was serviceable, the results showed extensive corrosion.

While none of the reported corrosion features were assessed as being unsafe at the current Maximum Allowable Operating Pressure (MAOP), the estimated remaining life for the pipeline was two and a half years. As the pipeline was operated at less than 30% Specified Minimum Yield Stress (SMYS), the most likely mode of failure was through a leak due to future corrosion damage at the deepest defects.

In order to protect the environment, maximise production and improve integrity, Apache contracted Tata Steel to fabricate, coat and deliver 5.25km of high frequency induction (HFI) steel linepipe. This was to be completed within an extremely tight lead-time of just ten weeks in order to meet a lay vessel window of opportunity.

Integrated approach

As a pioneering leader in the supply of innovative pipeline solutions, we worked closely with subsea engineering and management contractors JP Kenny Caledonia Ltd, who in accordance with PD 8010 Part 2, created linepipe with a design life of 20 years. From this design and specification, a total of 5400 metres of 14" (355.6mm OD) linepipe was fabricated, coated and delivered in a period of just nine weeks.

Due to the urgent nature of the project and the bespoke steel chemistry required, more than 1,000 tonnes of steel slab were cast before being hot rolled into coil at Tata Steel's Strip Products facility in Port Talbot in South Wales. The steel coil was then transported by rail to our HFI mill in Hartlepool.

The pipe was cold formed from steel strip by inducing a current into the edges of the strip with the use of an induction coil. The HFI weld was created with no filler material and there was no direct electrical contact in the process.

To ensure the reliability and integrity of the linepipe, it was put through a series of rigorous NDT tests before being cut into the required length.

On completion of the pipe manufacture, the pipe joints were coated by BSR Pipeline Services with three-layer polypropylene and delivered to Technip's Evanton spool base in the north of Scotland in preparation for spooling onto the Apache lay vessel. The pipe was not only delivered three days ahead of the tight schedule, but was above the contracted specification in mechanical and dimensional properties.

The spool base received, inspected and then fabricated six pipe stalks of 976m and one of 183m each comprising of between 77 and 80 pipe joints with the shorter length being 15 pipe joints. The field joints were coated using mechanised three-layer polypropylene tape with flame sprayed polypropylene (FSPP) on all repair welds, flanges and onshore tie-in welds. The coated pipe from Tata Steel was received over a period of six days and the stalks were completed a day after receipt of the final linepipe joints.

Key to the success of the project was communication and honesty across all companies involved in the supply chain.

Neil Scott, Operations Manager of Tata Steel's HFI mill said: "To meet this demanding project schedule it was essential to have a high level of transparency about the customers problem and the challenges they were trying to overcome. With Apache we were able to appreciate the project requirements in full thus allowing us to communicate the client's needs across our internal supply chain. By understanding the customer's business at both technical and commercial levels we were able to ensure that performance, efficiency and effectiveness were maximised and all parties were fully supported in the delivery of their individual scope of supply.

"This working relationship is an excellent template for other operators and contractors to follow and would allow companies in the North Sea, where project life cycle is much shorter, to complete projects more efficiently, cost-effectively and with quality and safety as the over-riding priority."

Mark Richardson, subsea projects manager of Apache North Sea said: "The professionalism and dedication of the Tata Steel team ensured that this project was completed ahead of schedule and delivered to our exact specification. The team were engaged with the latest knowledge, understanding and design of the project and their commitment delivered outstanding results on time and within budget."

Fast Track Success

Despite the ultra-fast track nature of this project the pipeline was installed within one day of the original base line schedule produced. The final tie-in phase was completed in April 2008 to coincide with a planned Forties Field shutdown. The speed of delivery was a significant achievement when compared to the last pipeline to be replaced in the Forties Field in 1994, which took over two years and exceeded budget.

The innovative use of HFI for Apache offered a number of key benefits; consistently shorter procurement schedule, superior ovality and wall thickness tolerance to that of seamless linepipe, therefore significantly reducing costs at both the design and installation stages, while also maintaining exceptional product integrity.

This project illustrated exceptional teamwork throughout the supply chain, resulting in the timely delivery of an innovative and successful solution - proving that safety, quality and innovation need not be conflicting factors when working against the clock.

"Offering an innovative approach to the reel-lay method through the use of HFI linepipe has not been fully exploited in the North Sea and its use could have significant implications when considering the economics for future North Sea developments"

Neil Scott – Operations Manager, UK Coil





FORTIES PROJECT TIMELINE

Day 1: Apache place order with Tata Steel for coated linepipe

Day 35



Steel manufacture completed at Tata Steel's Port Talbot Works

Day 36



Steel coil arrives at Tata Steel's 20" HFI Pipe mill in Hartlepool

Day 37



Pipe making commences at Tata Steel's 20" HFI Pipe mill

Day 42



All coil rolled into pipe and despatched to BSR Pipeline Services ready for coating

Day 55



BSR commence coating of linepipe

Day 57



All pipe lengths coated and waiting despatch to Evanton spoolbase

Day 64



Coated pipe delivered to Evanton spoolbase ready for reeling onto CSO Apache lay vessel

Day 69



CSO Apache vessel begins spooling of pipe ready for pipelay



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