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Oceaneering repairs leaking pipeline in the offshore Southeast Asia region

Project team successfully remedies fault on 22 inch gas pipeline 80 meters below sea level

Project Overview

Oceaneering was contacted in November 2016 by a customer requiring a solution to repair a 22 in pipeline. The integrity of the gas pipeline was compromised and a leak identified. The asset in question is located off the coast of Singapore in the Southeast Asia region and is deployed at a depth of 80 meters.

The Oceaneering Solution

Oceaneering designed and manufactured a special-order diverless clamp that was hinged on one side and would open and close like a clam shell with the aid of hydraulic cylinders. The clamp, once positioned on the pipeline in the area of the leak, would be closed around the pipe and sealed. This would be accomplished using a remotely operated vehicle (ROV) capable of interfacing with the clamp. The ROV would torque the clamp's body bolts and set the actuator studs, effectively setting the seals and grips that would secure the

clamp to the pipeline and making a seal on the pipeline capable of achieving a test pressure of 1.5 times the working pressure of the pipeline.

The Oceaneering team also designed and manufactured a deployment frame that could be used to accurately position the clamp over the leak. The deployment frame included a gantry system which allowed the clamp to be suspended within the frame and maneuvered both vertically and horizontally.

Execution Plan

In order to successfully execute the work, a comprehensive plan was put in place. In addition to designing and manufacturing the clamp, we needed to perform factory acceptance testing (FAT) on the clamp and complete a system integrated test (SIT) of all equipment that was used to set the clamp on the pipeline to seal the leak. The breadth of the Oceaneering portfolio was highlighted through the use of an in-house free span rectification frame, weld seam removal tool,coating removal tool, straightness gauge and subsea dredge. Operational stages are outlined below.

Stage 1 – Wet storage of equipment (permanent free span rectification frame and 12 inch dredge mud mat assembly). This included confirmation of permanent frame settlement in the seabed which was used as a reference prior and during final installation of the frame post successful clamp installation.

Stage 2 – We were required to complete the removal of protective concrete coating (19.7 ft / 6 m) and weld seams (9.8 ft / 3 m) from the damaged section of pipeline in order for the clamp to be installed and seal on the pipeline.

Stage 3 – Pipeline metrology was also required. A straightness gauge confirmed the pipeline was within API 5L requirements and within tolerance of clamp design. We also successfully

installed the locating clamp which was used for guidance to ensure correct placement of the clamp.

Stage 4 – Diverless smart clamp installation using bespoke diverless clamp deployment frame involving correct bolt torqueing patterns and loads and completion of pressure testing.

Stage 5 – Installation of permanent free span rectification frame using correct torque figures achieved via Class I-V Torque Tool to ensure additional weight of the pipe was transferred off the pipe onto the frame clamping / jacking mechanism.

Challenges

The customer had an extremely demanding schedule. The FAT needed to coincide with tight air freight deadlines and the SIT strategically scheduled to ensure all elements required to complete the repair were in place. The deployment frame was manufactured in Singapore while the clamp was manufactured at Oceaneering facilities in Houston, Texas. A decision was made to complete SIT in Malaysia prior to shipping the components offshore. Logistically, challenges were evident. The clamp was shipped by air and the frame via vessel to meet the SIT schedule. SIT include the integration of Oceaneering equipment as well as that of third party vendors involved in executing the work scope.

Results

The clamp was successfully deployed, installed, and sealed the leaking pipeline. The design life of the clamp is in excess of 25 years and ensures the customer can execute safe, successful operations for decades to come. Our experience and products enabled the customer to maintain flow of gas through the pipeline while we executed the repair.

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