

Perdido Norte Pipeline Separation USA

Project Facts

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| Industry | Oil & Gas |
| Region | Gulf of Mexico |
| Services | Fabric Formwork |
| Project year | 2013 |
| Operator | Williams |
| Contractor | Saipem USA |
| Water depth | 1,370 meters |

Case Study



Introduction

The Perdido Norte large-diameter pipeline is 312.3km long and is tied back to the Williams Seahawk gas gathering system in the Gulf of Mexico. The project involved separation of the two 18 inch pipelines that crossed at a depth of 1,370m to prevent each one's cathodic protection being affected by the other.

Cathodic protection is a technique used to control the corrosion of a metal surface. For pipelines, a sacrificial metal anode is normally used which corrodes instead of protected metal.



Standard and custom designed formworks for various subsea applications

About Pipeline Rehabilitation

Pipelines may require separating for a variety of reasons; during installation as a preventive measure, and post-installation as a curative course of action

Where pipelines cross they are subject to forces that can cause them to bend: sagging is where it bends down slightly, and depending on the level of bend, may cause the pipeline to snap or crack; and hogging where the pipe could bend upwards.

Material flowing through the pipeline can cause it to move slightly. As this persists, crossing pipelines can rub together causing friction and eventually lead to thinning of the walls, making them more susceptible to corrosion.

As fields become entwined with new installations, this type of remedial work will become more common.

At 2,514m the Perdido Norte is one of the deepest export pipelines in the world.

Ambico FoundOcean was awarded the scope to supply and install a custom designed fabric formwork between the two pipelines to achieve separation while also providing the required support.

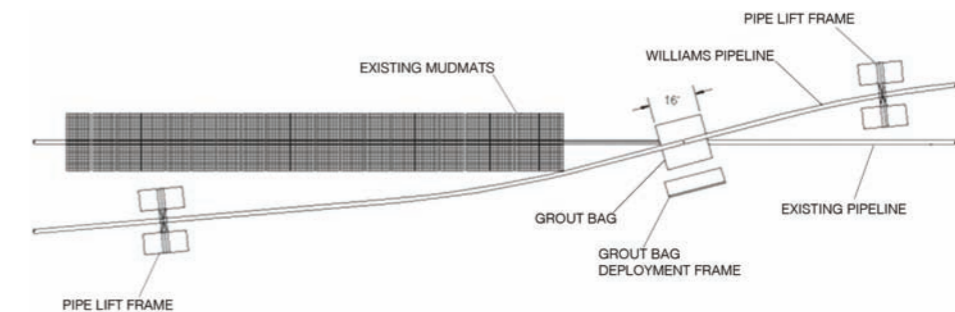
The pipelines cross at a water depth of 1,370m (4,500 ft).

Project Description

The separation was achieved by installing a grout-filled crossover formwork between the two pipelines, which supported the upper pipeline and gave protection to the lower.

To enable FoundOcean to install the 1.2m (4ft) tall, 7.3m (24ft) long formwork, a jack was deployed to the worksite to raise the upper pipeline 18" above the top of the lower pipeline.

The specialist fabric formwork deployment sled has been developed by FoundOcean to be operated by ROV, so that installing and filling formworks can be done safely and swiftly when divers cannot be used.



Side view of the pipeline crossing

Grouting Procedure

On deck, the formwork bags were folded and fastened to the deployment frame using soft harnesses. The grout line between the sled and the formwork was also connected at this stage.

Once at the worksite, the ROV removed the formwork from the sled and maneuvered it into position between the pipelines. The grouting technician on board the vessel mixed the grout and pumped it down the specialist deep-water grout umbilical.

The ROV continuously monitored the orientation and position of the bag to confirm that its compartments were filling evenly. Mixing and pumping stopped when the formwork was completely filled.

The ROV detached the formwork grout line from the deployment sled allowing the self-sealing valve to operate, and guided the sled and main grout line back to the surface.

Mixing System and Quality Control

FoundOcean mixed ordinary Portland cement (OPC) using its 12V grout mixer. Cement was stored in bulk pressurized silos, and pneumatically delivered to the mixer through a hose. The grout was mixed and then stored in a holding tank and pumped to the formwork.

Grout density was controlled by mixing fixed volumes of seawater and cement from the top-mounted surge tank on the mixer. Material samples were taken from each compartment of the formwork and cured as grout cubes, in accordance with specification BS EN 12390-2:2009. They were tested to ensure that the compressive strength met the requirements for the project.



ROV footage of formwork installation

The Perdido project marks another milestone for Ambico FoundOcean, as it once again breaks the record for the world's deepest deployed fabric formwork.

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