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An Analysis of the Challenges of Manufacturing and Installing One of the World's Deepest Pipelines

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Abstract

Corus Tubes was the sole supplier of 457mm (18 inch) linepipe for the Williams Perdido Norte project. At 2514msw Perdido is one of the deepest large diameter export pipelines in the world. The depth of the pipeline coupled with the severely undulating seabed bathymetry, made it one of the most challenging projects completed to date. In total, 312.3km of 457mm (18 inch) outside diameter linepipe was delivered in thicknesses ranging from 19.1mm to 27.0mm; dimensions well beyond the production capabilities of most UOE mills. The characteristics of the UOE process are described below.

At its UOE pipe mill in Hartlepool, UK, Corus Tubes has over 15 years of experience in deepwater pipe manufacturing technology. During the Perdido Norte contract, this experience enabled the manufacture of pipe to the highest quality. For the pipeline to be installed, survive and perform at 2514msw Corus Tubes worked closely with Williams to ensure that the pipe was manufactured with the optimum properties for the installation and operational conditions. The resulting pipe product exceeded its specified requirements in terms of dimensional control and mechanical properties.

Pipe of this quality, apart from ensuring deepwater integrity, helps realise tangible benefits during the installation phase by offering a high level of product consistency that facilitates welding. Despite demanding offshore welding defect acceptance criteria, pipeline fabrication was successfully completed with very low levels of repair, attributable in part to the quality of the pipe produced. This paper documents the factors that led to the successful design and supply of the Perdido Norte linepipe. Corus Tubes' technical achievements will be described in detail from collaboration in terms of pipe specification, through plate selection and supply, to eventual pipe manufacture and delivery. Furthermore, this paper concludes with a summary by Williams of how the pipe performed during installation and finally offers a joint vision of future challenges and advances that will drive pipeline technology into ever-deeper waters.

Introduction

In 2002, a major oil and gas discovery was made at the Great White Field in the Gulf of Mexico. The discovery, located about 350 km south of Galveston, Texas in the Alaminos Canyon Block 857 had water depths of over 2514m (**Figure 1**). The partners in the field held interests in several surrounding blocks in water depths up to 2895m. The decision was made to utilise a common floating production facility, the Perdido Regional Development Host, and to export the oil and gas through a pipeline network.

Williams contracted with the oil operating company to build and operate the Perdido Norte oil and gas export pipelines. Both deepwater export pipelines were to be based on a 457mm (18 inches) diameter UOE design. Gas export from the Perdido Regional Development Host was to be via a 168km line to tie into Williams existing Seahawk gas gathering system, allowing transportation of approximately 265 million cubic feet per day. Heavier hydrocarbon products would be exported via a 120km oil line to tie into Exxon Mobil's Hoover Offshore Oil Pipeline System (HOOPS).