

Oceaneering Delivers Umbilicals to Support Jeju Island Offshore Renewable Energy Project



Project Overview

Oceaneering was contracted by a customer for the design, manufacture, factory acceptance test, and delivery of a 1-mi (1.6-km) length of power and optical fiber subsea cable for the renewable energy sector. The cable was divided into two sections consisting of a 656-ft (200-m) dynamic length and a 4,593-ft (1400-m) static length. Both were spooled onto a steel, road-transportable reel bound for a field offshore of Jeju Island, the largest island off the coast of South Korea.

We offered a series of verification testing and were awarded the scope to verify the fatigue performance of the submarine cable. A comprehensive flex fatigue test regime consisted of 100,000 single bend cycles over a 3-ft (1-m) bend radius, performed on a test sample taken from the completed cable. Test methodology was generated and completed in Scotland at the Oceaneering Rosyth facility's onsite Testing, Quality, and Reliability Centre of Excellence.

The project was awarded based on a fast-tracked delivery schedule. Delivery of the cable demonstrates the Oceaneering entry into, and development of, new opportunities in the renewable energy sector. There was also added scope relating to the customer's requirement to test the submarine cables in accordance with Cigre 623.



The Oceaneering Solution

Oceaneering stood out from its competitors, based on its field-proven range and historical success in delivering manufactured umbilical solutions including electrical, optical, and hybrid designs suitable for use in varied subsea applications. Our extensive knowledge of

materials and applications engineering are regularly combined to manufacture high-quality and reliable products. The Oceaneering approach was to establish a positive working relationship with our client, demonstrate technical leadership, and quickly adapt to new approaches related to renewable energy industry practices.

During project execution, Oceaneering was tasked with reviewing and adhering to Cigre 623, namely tension bending testing, tensile testing, and full-scale fatigue testing of the umbilical. Oceaneering demonstrated an astute understanding of each test requirement, and supported client requirements by providing a detailed technical review of test methods and their relevance to infield applications.

Inevitably, this enabled our client to discuss the practicality and applicability of Cigre 623 testing with its end client. During this time, we proposed an alternative test regime including dynamic flex fatigue testing in accordance with API 17E (3rd Edition) and BS ISO 13628-5 standards. This type of testing was deemed more applicable to the design requirements. The flex fatigue test methodology was completed at a maximum number of flex cycles at a low-level angular deflection to identify any deterioration in the performance characteristics of the cable. Testing was conducted in-house at the Rosyth facility.



Execution Plan

The management of critical path items identified within the project execution plan was critical for ensuring on-time delivery. Tasks that needed immediate action included calculating cable component lay lengths, expediting procurement specifications for long-lead items, establishing advanced communications between Oceaneering and approved vendors, responding expeditiously to technical clarifications, and ensuring reduced lead times. The project also required the development of submarine cable production packages and involved detailed engineering handover meetings to the production team. The process engineering team was also tasked with investigating alternative manufacturing equipment to ensure that the fast-tracked nature of the project was met.

Challenges

Project areas that benefited from this increased focus included:

- » Open and honest communication with the client, demonstrating technical leadership and the development of client requirements
- » An understanding of the technical requirements for the renewables sector
- » An investigation of potential cost savings for additional scope and optional items
- » Accurate and sustained scheduling from the baseline at the start of the project to the delivery of final documentation
- » Improvements in lead times for critical procured items

Detailed analysis of alternative production methods to allow flexibility in manufacture and ensure on-time delivery.

Results

Attention to detail and experience in project management and execution ensured that this fast-track project was delivered safely and on time. The submarine power cables provided our client with high-quality, cost-efficient solutions that leveraged our in-house know-how, assets, and resources by applying a combination of state-of-the-art technology and innovation.



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