Nautilus Manual Mate Connectors for Well Intervention Systems

Teledyne ODI

Interconnect

Background

Helix Energy Solutions was seeking a new electrical interconnect system for a subsea well intervention riser in a Gulf of Mexico subsea oil field. The connectors were required to operate at 300 VDC at 3,000 meters deep. Helix had experienced ground isolation problems using alternative connectors in past projects, so the technical team was particularly concerned with the reliability and performance of the connectors, as electrical failures at that depth are costly to repair and replace.

A potential solution to the application was to utilize traditional dry mate connectors. A wide range of submersible electrical connectors are available on the market today, ranging from dry mate, low voltage configurations to wet mate, higher power systems. A customer application might not require full wet mate capability to connect the system during subsea deployment; however, in general, a wet mate connector typically possesses superior reliability metrics over a dry mate connector, according to data collected during testing and in the field.

Product:
ODI Manual Mate Nautilus Connectors and Field Installed Termination Assemblies

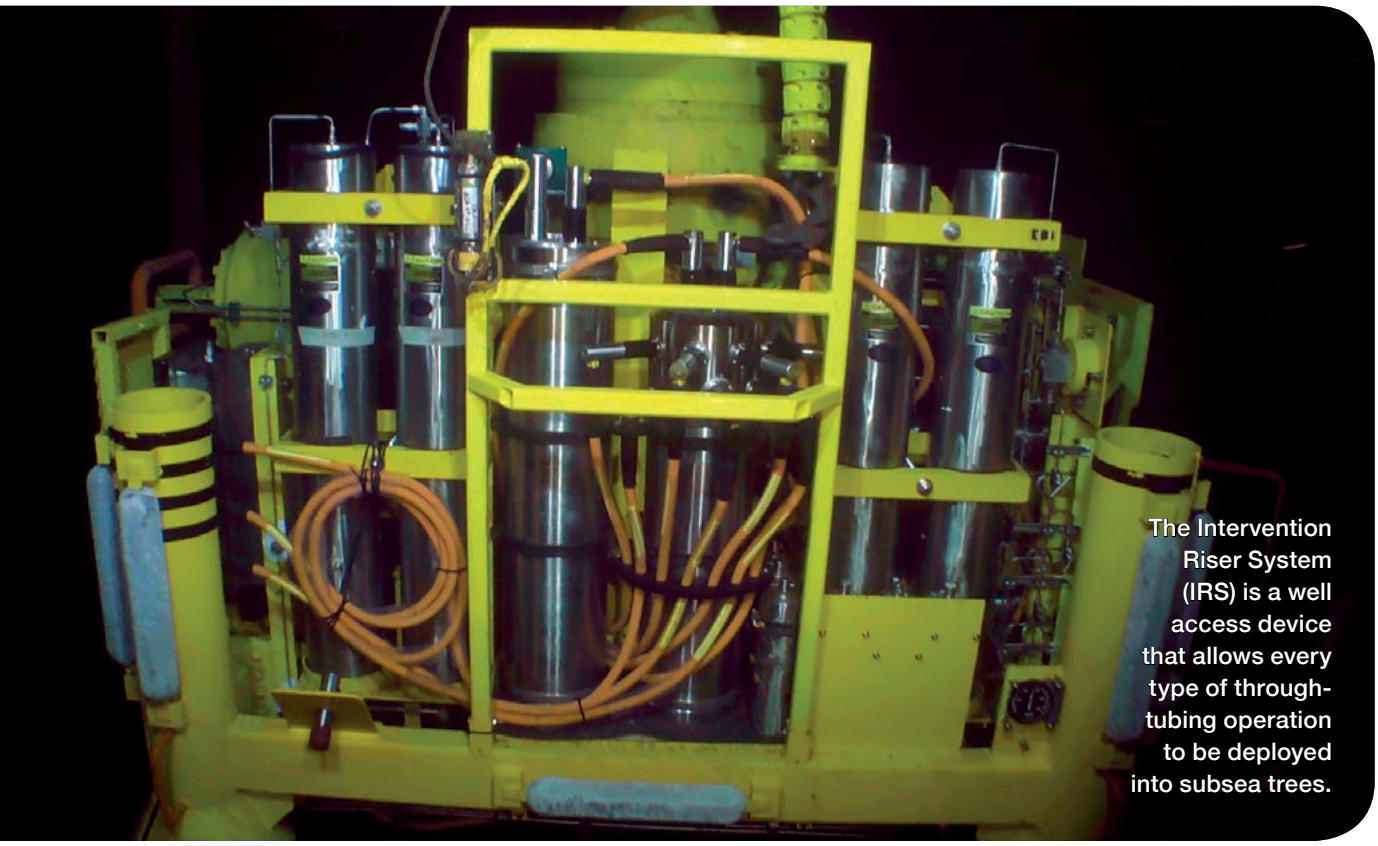
Project:
Subsea Well Intervention Equipment

Customer:
Helix Energy Solutions

The ODI Nautilus manual mate jumpers shown in the Helix IRS equipment during integration and installation

Close up of FITA system

4 Way ODI Nautilus Manual Mate Connector with 90° Termination (Bulkhead and Cable End shown)



The Intervention Riser System (IRS) is a well access device that allows every type of through-tubing operation to be deployed into subsea trees.

What was the solution?

To solve the challenge of connector reliability the company had experienced in past projects, Helix opted for the more reliable wet mate interconnect solution over the traditional dry mate connectors that had historically been used for decades in subsea drilling applications. The Helix team selected a combination of more than sixty 4-way and 12-way ODI Nautilus wet mate connectors, and over eighty 4-way and 12-way bulkhead connectors in the manual mate configuration with a 90° Field Assembled Cable Termination (FITA).

A notable selection process criterion was that the ODI Nautilus connector had a proven track record of reliability and evidence-based failure rates — not that it was the most suitable geometrical configuration, or least costly solution available on the market.

To provide further support, Teledyne provided an on-site field service representative to train Helix technicians on proper care and maintenance of connectors and terminations. The in-person training included safe handling practices as well as factory-recommended inspection and storage procedures of the jumper assemblies, going above and beyond the industry's typical practice of simply providing an Operations and Installation Manual to the customer.

Highlights:

- Helix opted for the more reliable wet mate interconnect solution over the traditional dry mate connectors that had historically been used for decades in subsea drilling applications.
- Reliability data showing historical connector performance established confidence in these connectors over the desired lifetime.

What were the benefits of selecting this particular approach/solution compared with the others proposed?

The benefits of choosing Teledyne connectors over the other solutions available are twofold. First, having the reliability data to show the historical performance of these connectors in the field under similar operating conditions — with objective metrics such as Mean Time Between Failures (MTBF) and Failures In Time (FIT) — gives the end user the confidence that the connectors will provide the desired lifetime of connectivity, without risk of replacement or repair.

Second, the level of support that Teledyne offers both before and after delivery can mean a lower lifetime cost of operation, due to reduced risk of failure and lower maintenance and replacement costs over the lifetime of the system. In addition, the life of the connectors can then potentially be extended by the end user, due to in-person training on proper system handling and maintenance.

Teledyne
ODI

Products & Services:

- Electrical & Optical Wet-mate Interconnect Systems
- High Power Interface Solutions
- Subsea Distribution Systems
- New Product Development
- Cable Terminations

The IRS System deployed subsea. The silver cylinders are used to house the electronics. On the far left are three cables that lead into a subsea manifold. The remaining cables are connected to sensors dispersed throughout the system.

Customer Quotes on Solution

The Helix project team stated that they were pleased overall with the project execution and that the project management and delivery process was 'spot on.' The Company's VP of Tooling and Engineering shared that the system has now been to "2500 meters multiple times with no issues whatsoever with connectors or umbilical terminations."

The training classes conducted by a Teledyne Oil & Gas field service team member were considered a value-added component of the project, and something that was not available from other industry suppliers. The Helix team appreciated Teledyne's level of support from the conception of the project, when initial data and documentation was supplied quickly and completely, up to the on-time delivery of the connector assemblies, and subsequent field installation and training.

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