Subsea Services Alliance

CASE STUDY

SURFACE // SUBSEA // SUBSURFACE

GULF OF MEXICO

// Rare Intercompany Engineering Collaboration Improves Subsea Control Valve Reliability >350%

Well access system continues performing after 4,500 hours of operating time with zero NPT, deepwater Gulf of Mexico

An operator, Subsea Services Alliance, and a third-party valve manufacturer combined their individual expertise and worked together to solve reliability challenges in subsea control valves used in multiple geographies.

Directional control valves malfunctioned in harsh deepwater environment

A major operator in the Gulf of Mexico was the first to deploy the 15,000-psi intervention riser system (IRS) from Subsea Services Alliance to streamline access to its wells located in 6,700 ft of water. The system can be used on any vertical or horizontal subsea tree and enables entering a well using wireline or coiled tubing while maintaining well control. The 33 third-party directional control valves (DCVs) installed throughout the system were similar to the ones used by the operator in multiple regions worldwide and had undergone extensive testing. However, in the harsh environment of the deepwater Gulf, they began to malfunction after the IRS had been in service for <1,000 hours, creating significant operational impact.

Coordinated joint approach enabled comprehensive remedial action

Technical experts from the operator's organization, Subsea Services Alliance, and the DCV manufacturer embarked on a collaborative evaluation and design initiative to improve reliability. The operator's team provided a multiapplication view with an industrywide perspective, while the DCV manufacturer supplied specific product knowledge and details of manufacturing and production capabilities. Subsea Services Alliance defined the reliability, maintenance, and functional requirements and leveraged Schlumberger's cross-domain knowledge of subsea, drilling, and downhole product development as well as its test facilities.

The team used five-why methodology to investigate root causes of previous failures, studied other potential failure modes, consulted with internal and external experts, and created and reviewed designs using proven product development techniques. Seamless integration of the new valves into the IRS was a key requirement. A validation test program was developed and conducted under challenging simulated operating conditions, and test durations were extended to stress the final design beyond required operating envelopes. After 3 months and thousands of engineering-hours, the new valves passed final qualification testing in Houston. Subsequently, a full set of valves was installed on the IRS and system integration testing was performed in Louisiana prior to deploying the equipment.

The improved subsea directional control valve underwent extensive qualification testing that stressed it beyond the required operating envelope.

New valves improved operating time more than fourfold and continue performing, with worldwide potential

The 33 valves have enabled >4,500 hours of IRS operating time with zero NPT, a more than 350% improvement. Subsea Services Alliance keeps a full set of DCVs in stock to support the recommended maintenance protocol of replacement in preference to redressing.

The rare depth of cross-company collaboration not only addressed the challenges in the Gulf of Mexico, it has helped the operator globally. Design improvements have been prepared for similar DCVs owned by the operator in other geographical areas, with significant implications for operating efficiency. The Subsea Services Alliance team received a commendation from the operator's head of global wells for the work done to improve system reliability.

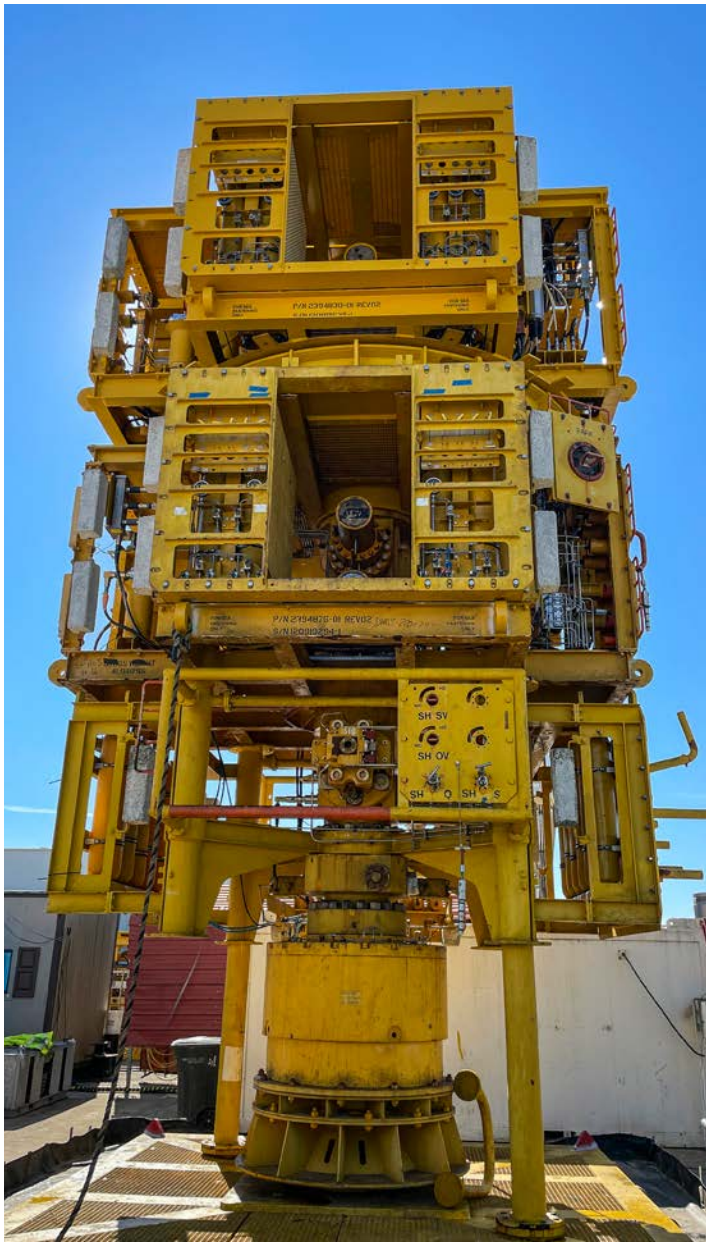
For more details

Read SPE-205831-MS

>4,500 hours
Operating time

6,700 ft
Water depth

Zero
NPT



The 15,000-psi intervention riser system streamlined access to subsea wells and was fitted with 33 directional control valves.

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