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Riserless Light Well Intervention Reveals Extent of Production Tubing Damage

Mechanical system identifies multiple thru-tubing leaks and enables effective remediation in subsea well

Project Overview

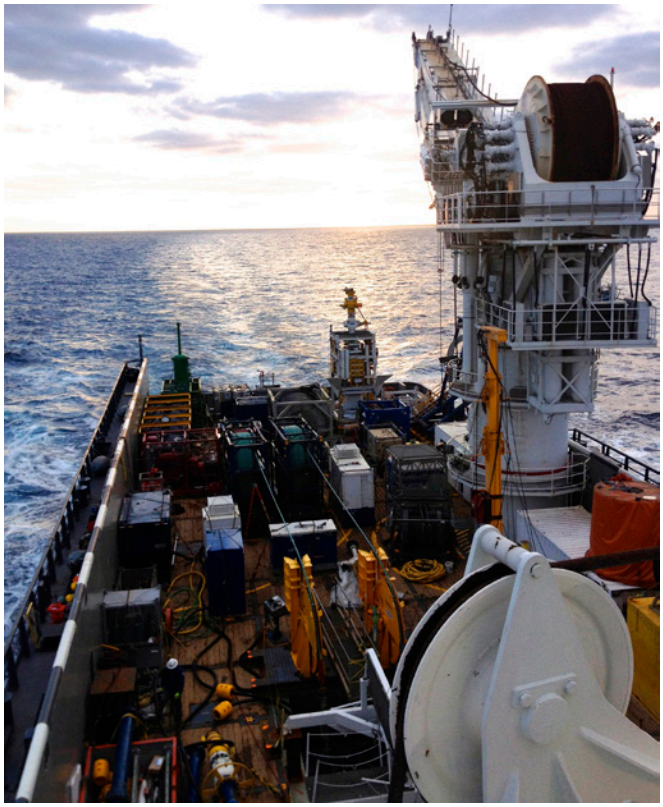
Oceaneering worked with an operator in the Gulf of Mexico to provide a cost-effective riserless light well intervention (RLWI) solution to meet its production intervention requirement. Our mechanical interchangeable riserless intervention system (IRIS) was deployed in 1,372 fsw (418 msw) from a monohull vessel, without the need for a rig or riser, to access, assess, and remediate a tubing and annulus communication issue in a producing well.

Issues

The well had a maximum anticipated surface pressure (MASP) of 9,012 psi (621 bar) and a test pressure of 9,512 psi (656 bar). The operator's intervention requirement included real-time data collection under high pressure, thus necessitating at least one e-line run.

Upon further investigation, the operator was able to ascertain that the leak was above the surface-controlled subsurface safety valve (SCSSV). This enabled wireline operations to be performed above the closed valve with the pressure bled down to 6,500 psi (448 bar) for leak detection operations.

With the e-line toolstring selected specifically to help identify and remediate the operator's production tubing issues, achieving control of the string under high pressure was critical. Such control capabilities, as provided by Oceaneering, are not readily available in competing riserless offerings.



The Oceaneering Solution

The mechanical intervention program required both slickline and e-line toolstrings facilitated by Oceaneering dual-pressure–control heads (PCHs) and run under high pressures. Prior to the operation, onshore system integration testing (SIT) was performed on the the proprietary PCHs and the actual third-party wireline equipment to ensure sufficient pressure control for each type of wireline.

The wireline was tested in dynamic and static modes of operation to ensure performance and reliability. Oceaneering delivered a completed test set to the operator for the specific equipment assigned to the project.

For control and operation of the subsea tree, Oceaneering hosted an additional SIT to prove functionality of the control downlines and third-party graphic and software control interfaces. Contingency equipment was specified to the project to cover eventualities such as hydrate remediation, ROV tooling, and pumping and flushing.

Execution Plan

Oceaneering was engaged by the operator to review and produce a proposal for the execution of a diagnosis and repair of a recently completed production well. A plan was developed and reviewed with the operator, and, upon agreement, execution planning and regulatory approval followed.

The result was a combined wireline (slickline and e-line) intervention plan to detect and, where feasible, repair the damaged tubing.

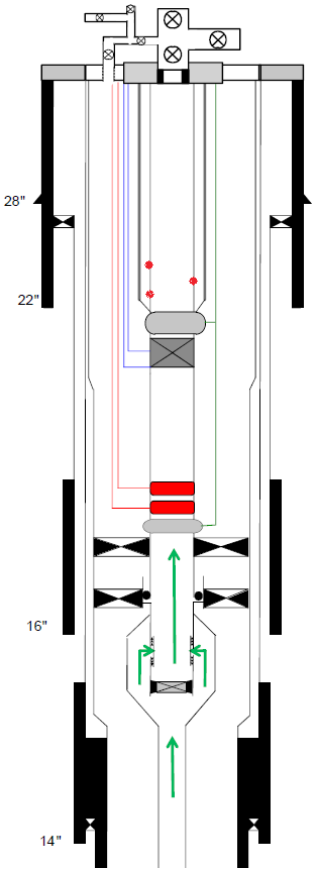
Challenges

From working through the latest regulatory approval process to resolving procedural and equipment integration problems associated with advanced intervention systems, the team worked through several challenges.

Oceaneering and its subcontractors operated as a team to provide a seamless service to the operator. We delivered a single-point solution, serving as prime contractor and managing the project's vessel, ROV, coiled tubing, wireline (e- and slickline), intervention system, fluid, pumping, and workover control system.

Project Highlights

Oceaneering RLWI delivered real-time "in the well" analysis of tubing damage in the high-pressure subsea well. Initially, the operator had planned a physical barrier repair of the damage. However, with e-line diagnostic results, the operator ascertained the exact condition of the tubing and formulated a clear course of action to replace the tubing because repair was not feasible.



Results

Using IRIS, the well in question was accessed multiple times to determine the location and severity of the communication issues between the production tubing and production annulus. Three leaks were located and an attempt to patch the leaks was made. However, after further runs in the well, a 3D model of the tubing was developed and analyzed to confirm that thru-tubing patching was not an option due to buckled tubing at the leak locations.

Although it was ultimately not possible to repair the tubing, the project determined the exact nature of the tubing damage and assisted in identifying a specific remediation plan for the well.

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