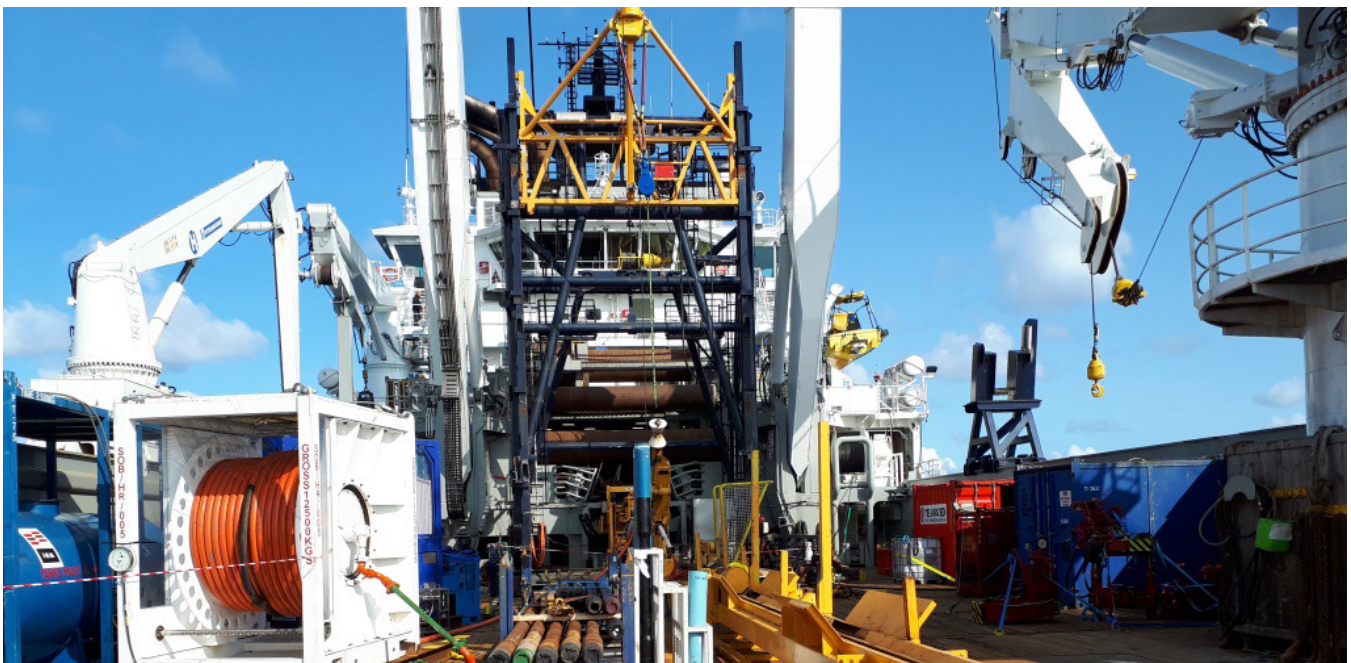


Q3 2018 Well Plug and Abandonment Campaign

Oceaneering develops innovative tooling solution to complete the first phase of its North Sea plug and abandonment campaign



Project Overview

Oceaneering was contracted by two major North Sea operators to plan and execute an eight-well plug and abandonment (P&A) and well severance campaign in the Danish and Norwegian sectors of the North Sea during Q3 2018.

Due to the wide range of equipment required for the different scopes of work, the campaign was divided into two distinct phases, thus reducing cost for the operators without compromising operational effectiveness, efficiency, or safety.

The project's first phase focused on two wells offshore Denmark for one client. During this phase, Oceaneering conducted casing cutting, pulling and an annulus perforation on a mudline suspension well, and also developed and deployed a tooling solution to remove a problematic temporary abandonment (TA) cap on a second well. The tooling solution allowed the TA cap to be removed while safely retaining, monitoring, and managing pressure and fluid.

Since starting work for this client in 2012, Oceaneering has conducted P&A operations for 28 of its wells.

The Oceaneering Solution

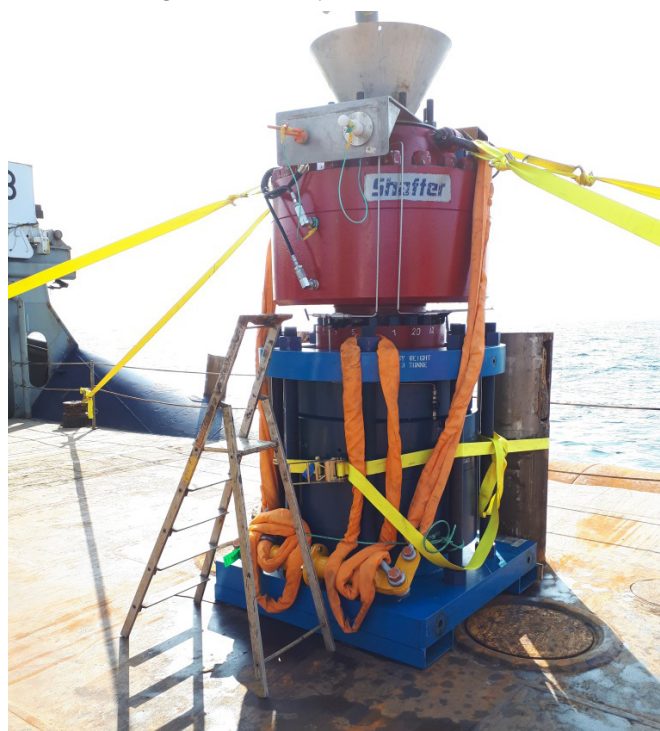
The most significant challenge that Oceaneering faced in the project's first phase was the potential for retained pressure to be found trapped below the TA cap, which needed to be removed. Previous attempts to do so, using standard procedures, had failed

due to an unusual field modification made 30 years ago. In the event the operation had to be suspended, the final arrangement of the physical tooling solution had to be capable of being left in situ without concern for an uncontrolled release of hydrocarbons into the environment.

Oceaneering's decommissioning team and supply chain partners determined they would need to source existing oilfield equipment that could be quickly and cost-effectively repurposed to offer a competent technical and commercial solution. Instead of employing normal drillpipe intervention techniques, the team used an annular BOP as a stripper, mating it to a proprietary slip-lock conductor connector, in a tool configuration the team named the conductor stripper assembly (CSA). By working closely with its supply chain partners during a greatly compressed development period, Oceaneering was able to source, assemble, and carry out a successful systems integration test of the final tooling solution.

The CSA was utilized in combination with a specially constructed workstring arrangement that allowed for the subsea containment, monitoring, venting, fluid diversion, and automatic pressure relief of any potential well fluids—all while allowing the workstring to operate with a mixture of manually operated equipment (chain tong) and mechanically operated equipment (drill pipe tongs) operated equipment, and without returns to the vessel.

For the first operational phase, Oceaneering utilized the *MV Island Valiant* vessel. The Oceaneering project team enabled 24/7 live streaming of subsea operations direct to the operator's project team. The live streaming improved efficiency as it allowed the onshore



teams to review what was occurring in real time, eliminating the need to send video clips and images back and forth to clarify issues.

The first well Oceaneering worked on was prepared for the subsequent setting of a surface cement plug (See phase 2 case study 'Q3 2018 Well Cementation and Wellhead Removal Campaign (Rig Chase)'). The second well was inspected, the condition verified and original equipment manufacturer

documentation provided to the client for the actual wellhead system installed.

Using a vessel and a risk-based approach instead of a jackup rig created significant cost savings for Oceaneering's client. Not only did the client save the costs of renting and moving a jackup, but using a vessel allowed Oceaneering to change locations if a challenge arose, thus allowing work to continue while a solution was created to mitigate the challenge.

Operational Metrics (Phase-1):

Quayside (mob, port call, demob)	2,7 days
Transit	2,8 days
On Location	10,4 days
NPT	0.9 days
WOW	0 days



