CASE STUDY

HALLIBURTON

Brazil

CHALLENGE

- Provide a custom HWO unit to intervene deep and highly deviated offshore wells and change the completion with an ESP on a TLWP
- Heavy completions with constant diameter changes
- Unconventional 10 3/4-in. OD ESP capsule and platform with limited resources

SOLUTION

- Develop and mobilize tailored HWO unit for intervention on the TLWP to provide high operational efficiency and ROI
- Recruit and train qualified regional personnel
- Perform technical site visits and rigorous completion analysis/weight simulations with IWI™ software
- Ensure unit compliance with all regional and global regulatory requirements

RESULT

- Successful deepwater TLWP intervention and ESP changeout with customized, modular, and lightweight HWO unit
- Reestablished well production of 2,000 BOPD
- Operator achieved a cost reduction of 75% compared to a conventional rig
- First successful operation of this kind in region

First ESP replacement with HWO unit from a tension leg wellhead platform in deepwater Brazil

Disrupt offshore interventions with HWO units

Overview

A Brazilian operator planned to redevelop mature assets in an offshore field to efficiently restore well production in a cost-effective manner. The operator sought Halliburton's assistance to provide a custom-built solution to intervene deep and deviated wells to replace the failed electric submersible pump (ESP), when required, on a tension leg wellhead platform (TLWP).

Challenge

The operator required a customized solution for its deepwater platform. With a lack of suitable assets and trained personnel in the region, Halliburton's expertise in how to configure a hydraulic intervention unit to suit their unique offshore location was chosen. Due to the complexity and restrictions imposed by the location a lightweight, modular, and cost-effective intervention unit was required. In addition, the unit had to manage the retrieval and installation of complex completions with non-standard components to operate within the platform constraints and offshore logistical issues.

Solution

With a thorough diagnosis, Halliburton proposed a solution unlike conventional approaches in the region. This involved replacement of a tender-assisted rig with a hydraulic workover (HWO) unit to provide high operational efficiency and return on investment (ROI).

No equipment were initially available in the region. Halliburton mobilized equipment from its global fleet to enable the intervention, recruited and trained suitable and qualified personnel, obtained suppliers in the market and ensured the unit followed Brazilian regulations. To ensure the assembly and operational capability of the HWO unit on the TLWP deck, Halliburton performed rigorous analysis and weight simulations with IWI™ software. Completion study and simulations results defined the operational limits. Combined with the results of technical site visits, Halliburton designed an appropriate equipment set, its proposed layout, and the additional necessary resources. A detailed study of the deck was also undertaken to assess its capacity to support the weight of the required equipment, fluid and pipes.

Based on the diagnostic phase, Halliburton developed and mobilized a tailored HWO unit for intervention on the TLWP. Notable components included:

- Substructure for load management
- Auxiliary decks to accommodate 1800bbls of fluid and required pipe
- A unit with a large 14-in. bore
- A pull-boost system
- Adjustments to the HWO unit work window to accommodate the multiple ESP cables that exited the well
- A structure for the specialist spooler to install new ESP cables

Compared to conventional units, the HWO unit offers several advantages, i.e. it is modular, lightweight, has a reduced footprint, requires fewer personnel on board (POB), and is cost-effective. For this specific intervention, another key advantage was the unit's capability to be tailored to the operator's requirements, included a skidding system that facilitated faster and more efficient movement of the unit between multiple wells.

Result

The deepwater TLWP intervention with a customized, modular, and lightweight HWO unit reestablished well production of 2,000 BOPD. Safety and intervention efficiency was maintained throughout operations and the operator achieved a cost reduction of 75% compared to a conventional rig.

The ESP changeout was successful with a pull boost system to unseat the hanger above the unit's capacity. The BOP stack was stabilized through bad weather, and auxiliary decks accommodated all required intervention equipment e.g. substructures, tanks, pipe racks, pumps, power packs, and spoolers.

This unique operation was the first successful deepwater intervention with the use of HWO unit on a TLWP in the country/region. The project exceeded all operator requirements (well intervention and mobilization) and maintained compliance with all local and global regulations whilst overcoming the operational complexity of highly deviated wells, heavy completions with constant diameter changes, and an unconventional 10 3/4-in. OD ESP capsule whilst operating on a floating production platform with limited resources.