CASE STUDY

HALLIBURTON

Indonesia

Successful deployment and high reliability of expandable liner hanger systems for subsea well completion in Indonesian offshore field

Operator achieves reliable first ELH installations in field

CHALLENGE

- Complex wellbore environment
- RIH limitations associated with CLH systems insufficient to reach TD
- Long lateral section with highly deviated wellbore and high hang load capacity
- Tight spot in 8.5-in. OH
- Longer static time before setting process

SOLUTION

- Quick-lock VersaFlex® ELH
- High-torque VersaFlex® ELH

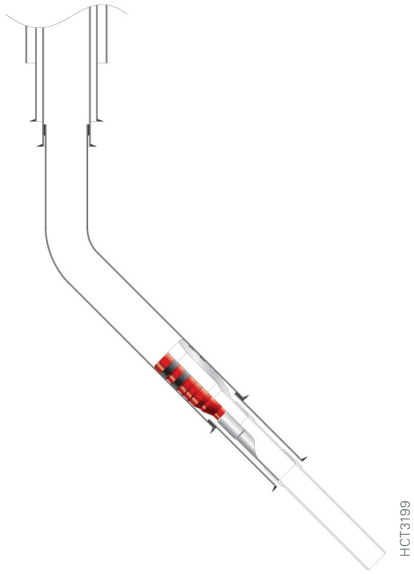
RESULT

- Successfully deployed to target depth, expanded ELHs, and retrieved running tools in complex environment with long liner and high inclination
- First installation of the quick-lock and high-torque VersaFlex® ELHs in operator's campaign
- Since implementation in the deepwater environment of Indonesia, VersaFlex® ELHs have been installed with zero HSE or SQ issues

Overview

An international oil company has operated in Indonesia, specifically offshore, since 2001. A re-entry well operation was scheduled for a well originally drilled in 2015. The goal was to sidetrack the well using a semi-submersible dynamic positioning rig at a water depth of 343 m. The re-entry operation would be performed in a complex well environment with a directional S-type drilling curve with high inclinations of (70°) in the 12.25 to 14-in. open hole (OH) and a 54° inclination in the 8.5-in. OH sections.

This was the operator's first campaign (second well) wherein VersaFlex® expandable liner hanger (ELH) technology was deployed rather than conventional liner hanger (CLH) technology. Despite the complex well environment, the VersaFlex ELH technology performed flawlessly and consistently met job requirements in this deepwater well environment.



Versaflex® ELH system provides a reliable solution for subsea well completion

Challenge

The planning phases were broken into two distinct sections:

Section 1: During the planning phase for the 10 3/4 × 13 5/8-in. long lateral section with a 12 1/2 to 14-in. OH section at 3710 m MD TD, a high run in hole (RIH) compression load needed to be addressed. A liner hanger system was deployed to a setting depth of 1090 m MD and a shoe depth of 3164 m MD, while high hang load capacity and swab and surge effects were effectively managed.

Section 2: In the second phase, the 7 × 10 3/4-in. section with 8.5-in. OH and 70° inclination at hanger depth, a liner hanger needed to pass through a tight tolerance. During deployment, constant fluid losses and two days of static time without circulation resulted from a rig problem on the surface.

CASE STUDY

VersaFlex® ELHs can accommodate complex wellbore environments and meet operator expectations.

Pressure integrity in the hanger was critical to support high-pressure pumping for the cased hole frac pack lower completion well design that was to follow the liner hanger installation.

In the long lateral section, tight spots increased the likelihood for the liner hanger to potentially release prematurely during wash and ream activities, high fluid losses could potentially cause elastomeric damage or setting issues. These potential risks could lead to failure to deploy to depth or obtain a set ELH, which was essential to obtain well integrity for the completion design.

Solution

VersaFlex® ELHs were selected for this wellbore configuration. System sizes were 10 3/4× 13 5/8 in. and 7 × 10 3/4 in. Both systems feature a VersaFlex integral liner hanger/packer, which is made up of an integral tieback receptacle (TBR) above an expandable solid hanger body and a lower sleeve designed to withstand the tensile and torque loads during deployment. Elastomeric elements are bonded onto the hanger body. As the hanger body is expanded, the elastomeric elements are compressed in the annular space. This virtually eliminates the liner hanger/casing annulus and provides liner-top pressure integrity as it delivers impressive tensile and compressive load capability upon being set. With no moving parts, slips, or cages, the simple VersaFlex ELH system design helps eliminate the risk of the liner hanger/packer from setting prematurely.

Equipment was set with a SSR II™ casing wiper plug, SSR II landing collar, and Super Seal II® float collar and shoe. This equipment was deployed on a VersaFlex ELH running tool equipped with high torque mandrels, J-Slot lockout device and quick lock collet to accommodate heavy hang weight and wash and ream capability.

Preplanning and design collaboration with all stakeholders addressed potential risks associated with the operation beforehand. Competent field personnel executed the operation without deviation from the approved wellsite instruction.

Result

Halliburton successfully deployed both VersaFlex ELH systems to TD with zero health, safety, and environment (HSE) or service quality (SQ) issues. The system was set using a flapper mechanism, and the expansion process was clearly indicated. An overpull anchor test was performed effectively. Subsequently, the running tool was released as designed and successfully retrieved to the surface. The pressure test of the system demonstrated good liner top integrity.

The VersaFlex ELH design offers high reliability in scenarios with long liner lengths where challenges related to wash and ream capability, and inadequate RIH compression load can cause CLH systems to fall short or set prematurely.

The VersaFlex® ELH system is designed for ease of use to reduce complexity and provide high reliability compared to CLHs in deepwater environments.

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