

PRIME Stroker / Extended Reach Shifting Tool manipulates multiple frac sleeves in a single run

A North Sea customer required to close six ball-drop activated multistage frac sleeves that had been deployed as part of a well's lower completion string. The sleeves were positioned in the horizontal section of the well at a measured depth of circa 16kft.

Due to the ID dimensions of the frac sleeves and lower completion, a slim stroker/shifting device was required.

An earlier attempt to close the sleeves had been carried out using the specified off-the-shelf shifting tool run with a standard, non-instrumented e-line deployed linear stroker device. During this operation the shifting tool was repeatedly slipping out of the sleeve profile preventing the stroke force required to shift the sleeve to be applied. The well had been in production for several years, and it was suspected that some seizing of the valve sleeve had occurred, possibly from scale build up.

Solution

We recommended the use of the new **PRIME Stroker** and **Extended Reach Shifting Tool** (XR-HST) for the operation, to be conveyed to target depth using the **PowerTrac PRIME Tractor**. Built on the PRIME 2.5" OD tool architecture, the toolstring would have a suitably small and slick OD when deactivated to enable its passage through the completion. Once conveyed to task depth, the shifting tool's proximity centralizer would be expanded and the tool moved up by winch pull to position and engage the shifting dogs in the sleeve's profile. The stroker would then be anchored in the completion, independent of the manipulation sequence. Following this, the stroke sequence would be initiated (stroke in to shift up) to move the sleeve its prescribed distance to close.

Challenges

- Close six ball-drop activated multistage frac sleeves
- The sleeves were positioned in the horizontal section of the well at a measured depth of circa 16kft
- Due to ID dimensions, a slim stroker/shifting device was required

Results

- Six sleeves shifted and verified in single run-in-hole
- Precision and certainty enabled throughout operation from instrumentation and real-time control

With the stroke force capability far exceeding the factory specifications from the sleeve manufacturer, there would be additional force available to overcome any potential sleeve seizing. In addition, the toolstring's instrumentation coupled with its real-time control and limit triggers would provide a high degree of precision and certainty throughout the operation, enabling visibility and verification of shifting of each sleeve before moving to the next, and before pulling out of hole. Extensive interference testing was carried out between this PRIME manipulation toolstring and the frac sleeve via a bespoke, full scale test set-up done in our engineering facility in Stavanger to replicate the sleeve shifting sequence required for the specific field operation.

Result

The operation was carried out successfully, with all six of the sleeves being shifted in a single run in the well. Higher forces were required to shift some of the sleeves, up to 5000kgs in one case – this significantly above the 300kg requirement as specified by the OEM. The **PRIME Stroker** instrumentation provided real-time stroke distance and force information. This, coupled with real-time pressure readings from the XR-HST proximity centralizer and tension data from the tractors lower tension/compression sub combined to provide a high level of certainty throughout the sleeve shifting sequence. This allowed the engineer to better understand the in-situ situation and take immediate and controlled corrective actions, circumventing a false shift scenario due to sleeve seizing and the shifting tool slipping out of the shifting profile – in doing so delivering an efficient and successful operation.

PRIME surface readout information available to the engineer during the operation

