Case Study

i-Con™

i-Con drill pipe logging tool

Providing valuable intelligence from the deep over 3 consecutive liner installations
Background
In a field development all wells were completed with 4 ½” reservoir liners to depth in a 6” openhole. The planned completion lengths were for wells A: 1900m, B: 1900m and C: 2100m. The motivation for deploying the i-Con memory tool was to establish clear understanding of how surface actions acted on the downhole tools, verify torque and drag models and optimize running procedures by comparing the downhole logged data with surface data.

Our i-Con is a robust drill pipe logging tool with full ID and slick OD and does not require special operational considerations in the planning and execution of the well operation. Logging was started prior to shipment from the workshop. Logging was done with 1Hz sampling rate, recording data every second during the 36 day period from the tool activation to the tool being returned, thus eliminating the need for extra personnel present at the rigsite.

Solution
The i-Con was placed in the tool string immediately above the liner hanger running tool. On its way to liner hanger setting depth the tool logged liner top forces both working through obstructions, rotating and circulating down and also setting the liner hanger and liner top packer. The i-Con logged all relevant data: temperature, external/internal pressure, tension, compression and torque. The i-Con data was compared with the surface data to analyze impact of surface action on the downhole tools.

“...“We managed to get the liner to TD in this well by using the i-Con information from the previous one”
– Engineer, Operating Company

- Tension/compression, internal pressure and external pressure during the liner to packer activation sequence for the three wells – the liner top packer “ECG” is established. Accurate identification of future potential failures in packer activation can be pinpointed when comparing to the required signature.
- Well A had surface torque limit set at the liner connections torque capacity. Due to trouble running liner into horizontal and what proved to be conservative torque limitations TD had to be set early in Well A.
- Well C took advantage of learning from Well A for torque transfer from surface to liner top. This allowed surface torque limit to be set higher, thus taking advantage of the liner connections capacity during deployment in the horizontal section. This action resulted in reaching TD of the well, by allowing rotation of the liner to the last 1000 feet. This allowed the entire drilled reservoir to be stimulated and produced.
Case Study Snapshot

**Project Area:** North Sea, Denmark

**Challenges:**
- Understanding and learning the details of downhole dynamics during installation of horizontal liners
- Verifying that optimal procedures are in place
- Verifying the validity of torque and drag models

**Solution:**
- Deploying the liners while using the i-Con logging tool without sacrificing operational flexibility

**Results:**
- Quantification of pressure, weight and torque transfer to the liner top
- Good understanding of downhole dynamics during liner installation early in the campaign enabled the operator to utilize the full mechanical capacity of the liner when working it to TD on the third well - while the first well had to set TD early due to conventional use of T&D models
- Improved understanding of differential pressures across tools when working in a complex pressure regime involving circulating multiple different density fluids through an MPD system
- Established the downhole liner hanger and packer activation signatures of proper activation process
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