

Case study: Troll Field, North Sea

Baker Hughes drilled 6084-m horizontal section in one run, set new 8½-in. run length record

The complex geology of the Troll oil reservoirs in the North Sea has long presented challenges to drilling operations. Significant time spent drilling through abrasive sandstone can cause excessive wear on the bottomhole assembly and bit. These issues are heightened by unpredictable zones of very hard calcite cementation.

To address these challenges on a recent drilling operation, Baker Hughes chose the **Talon™ Force high-velocity PDC drill bit** equipped with **Stabilis™ cutter technology** to extend bit life in the Troll field's abrasive and impact-prone drilling environment.

Together with the **AutoTrak™ rotary closed-loop system**, the Talon Force drill bit set a new 8½-in. run length record in the Troll field drilling 6084 m (19,961 ft) in one run.

The Talon Force bit selected for these applications included six blades and 19-mm Stabilis cutters. The cutters' geometry adds a secondary bevel on the face of the cutter to increase its strength, protect against ROP-limiting chipping and spalling, and extend run lengths—making it the ideal bit choice for the Troll field. This cutter feature also provides smoother and more consistent torque response across changing depths of cuts to

improve ROP and overall performance. In addition, the cutters can withstand a higher degree of wear and improve torsional stability in interbedded or directional applications.

The BHA design also included the:

- **CoPilot™ real-time drilling optimization service** to deliver enhanced wellsite efficiency, reliability, and borehole quality
- **OnTrak™ integrated measurement-while-drilling and logging-while-drilling system** that takes measurements close to the bit
- **LithoTrak™ advanced LWD porosity, formation density, and borehole imaging service**

Proactive, strategic operation planning, active optimization of drilling parameters during drilling, and cross-discipline coordination among Drilling Services, Drilling Fluids, and Reservoir Navigation experts laid the groundwork for minimizing torque and drag in the long horizontal.

From the start of drilling, **LUBE-622™ environmentally acceptable lubricant** was added to the water-based mud to lower friction and maintain low vibration and torque values. The well path was adjusted while drilling to reduce dogleg severity to below 3.0°/30 m (100ft). Vibration data was

Challenges

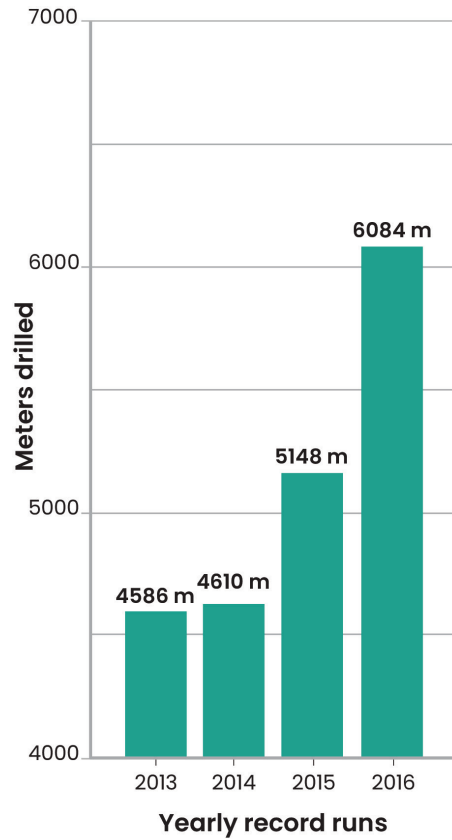
- Drilling through faults while avoiding deflections, low ROP in hard calcite stringers, stickslip, and vibrations
- Geosteering in thin oil columns of sandstone interbedded with calcite cementation
- Avoiding collisions with offset wells

Results

- Drilled 6084-m horizontal section in one run
- Set new 8½-in. run length record in field history

low throughout, with the little that was seen being formation related.

Rate of penetration in the 6084-m horizontal section (5.2% calcite cemented sandstone and 10.8% total calcite content) was maintained at an average of 22.9 m/hr (75 ft/hr). The well's TD was 7901 m (25,922 ft). This performance set a new run length record for the 8½-in. hole section.



The AutoTrak RSS continues to set run-length records in Troll field.