

**Case study:** Continental shelf, United Kingdom

# AutoTrak eXact service and Talon force bit drilled challenging well profile in congested field

An operator in the continental shelf, United Kingdom, needed to drill a challenging well profile through the Lower Cretaceous Chalk group. The corkscrew-shaped well profile required a long turn of  $>370^\circ$  while building from  $23^\circ$  to  $91^\circ$ , with an overall buildup rate (BUR) of  $5.8^\circ/100$  ft (30 m), and a turn rate of up to  $7^\circ/100$  ft. The well profile also included two electrical submersible pump (ESP) tangent sections.

The operator had already experienced steering issues in a number of offset wells due to the stick/slip-inducing chalk that was compromising tool face control. And the congested field required a detailed well plan, including specialized anti-collision rules with separation factors of less than 1.0 as well as field-specific procedures, to avoid the other wells in proximity. Drilling a high-quality pilot hole and ensuring exact placement of the liner were essential to achieving the operator's objectives and critical to the overall completion.

To ensure precise steering control and optimal well placement, Baker Hughes deployed a  $6\frac{3}{4}$ -in. **AutoTrak™ eXact high-build rotary steerable service** paired with a customized  $8\frac{1}{2}$ -in. **Talon™ Force high-velocity drill bit**. Unlike other systems that use a "push-the-bit" or "point-the-bit" steering principle, AutoTrak systems maintains a continuous proportional steering vector throughout drilling operations using three precision-controlled pads mounted on a slow-rotating sleeve. This steering principle

is unique to the AutoTrak service, and delivers smooth, in-gauge holes, exact well placement, and faster, more reliable drilling performance.

After the desired well path was established during the pre-drilling phase, a custom Talon Force bit was designed to complement the steering capabilities of the AutoTrak eXact service and perform the required BUR for the well. Because AutoTrak service uses internal hydraulics to power the independent steering pads, the steering control is not affected, or artificially restricted, by drilling dynamics like bit pressures, flow rates, and drilling fluid properties. This flexibility allowed the operator to match the bit design to the formation challenges.

Throughout the run, **EZCurve™ depth-of-cut control technology** minimized torque fluctuations at the bit to reduce stick/slip and enable optimal steerability and control through the difficult chalk. To provide extra durability, the bit was outfitted with **StaySharp™ premium polished cutters**, which displayed excellent dull condition despite the length of the run.

The AutoTrak system checked azimuth and inclination every millisecond and automatically adjusted steer forces second-by-second for precise wellbore positioning and continuous proportional steering control. Using real-time formation evaluation, course corrections were implemented with ease—adjusting the AutoTrak system's well path through the congested field with smooth precision.

## Challenges

- Congested field requiring anti-collision operations
- Complex well profile including:
  - $7^\circ/100$  ft (30 m) maximum turn rate
  - $360^\circ$  turn while building from  $23^\circ$  to  $91^\circ$
  - Two ESP tangent sections
- Well located in stick/slip inducing chalk formation
- Drill bit needed to remain highly steerable and stable in tangent sections

## Results

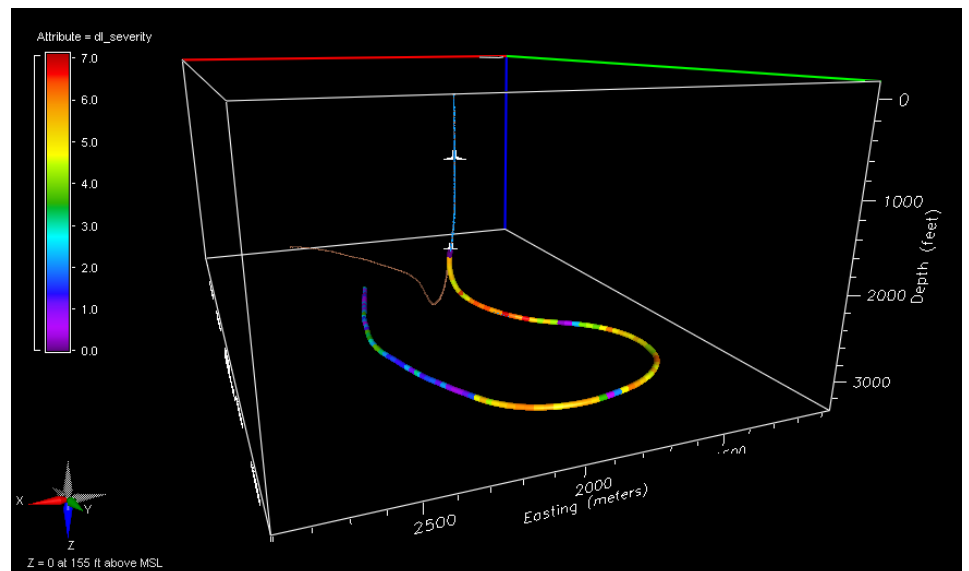
- Drilled complex well profile within planned timeframe
- Achieved required maximum BUR of  $6^\circ/100$  ft (30 m) and flat turn rate of  $7^\circ/100$  ft (30 m)
- Maintained bit cutter condition to total depth
- Achieved a rate of penetration (ROP) of 48.7 ft/hr (14.8 m/hr) through chalk

A total azimuthal turn of  $>370^\circ$  was achieved while building from  $23^\circ$  to  $91^\circ$  inclination, and the AutoTrak eXact system met the planned maximum BUR of  $6^\circ/100$  ft (30 m) and a flat turn rate of  $7^\circ/100$  ft (30 m).

Despite the challenging well profile, the integrated AutoTrak eXact RSS and Talon Force bit successfully drilled a total of 7,861 ft (2396 m) in 166 hours, and delivered the well in a total of 206.1 hours, which was in line with the operators planned drilling timeframe.



The AutoTrak eXact system's bottomhole assembly (BHA) featured a custom Talon Force bit with EZCurve technology and StaySharp cutters to provide superior steering performance in the chalk formation.



The AutoTrak system delivered a complex well profile through the Lower Cretaceous Chalk group while avoiding multiple offset wells in close proximity.