

Operator Uses New Drill Bit Technology to Navigate 9½-Inch Horizontal Section Through Hard Chalk and Chert Layers

CUSTOMIZED DRILL BIT IMPROVES STEERING RESPONSE AND INCREASES ROP, WHILE MAINTAINING GOOD BIT CONDITION

SOUTHERN NORTH SEA, OFFSHORE NORWAY

CHALLENGES

- » Drill 9½-inch horizontal section through hard chalk layered with chert
- » Mitigate excessive vibration while navigating downhole environment

SOLUTION

- » Halliburton Geo-Pilot® rotary steerable system
- » Newly designed 9½-inch GTD55DKOs drill bit, fitted with Geometrix™ 4D Machete™ cutters
- » Halliburton Stega™ efficient layout technique for placing the secondary cutters

RESULTS

- » Successfully drilled a total of 5,698 feet (1,737 meters) with up to 3.2° DLS in just one run
- » Achieved an overall ROP of 69.2 feet/hour (21.1 meters/hour), with minimal damage to the drill bit, thanks to a durable design and optimum cutter placement
- » Saved time and money by completing the job in just one run, without bit failure or requiring bit replacement

OVERVIEW

An operator was drilling in the Ekofisk and Tor formations of the Ekofisk oil field offshore Norway in the southern region of the North Sea. This large, carbonate reservoir is characterized by hard chalk with layers of chert (hard, fine-grained sedimentary rock). It is particularly difficult to drill and geosteer under such conditions. Based on past experience in this location, durable drill bit technology and high rate of penetration (ROP) would be required to successfully navigate the well path and efficiently complete a long horizontal section with minimal bit damage and/or failure.

CHALLENGE

The operator's objective was to drill a 5,698-foot-long (1737-meters-long) horizontal reservoir section, using a Geo-Pilot® rotary steerable system (RSS) assembly, with up to a 3.2° dogleg severity (DLS) in one run. Historically, the presence of chert layers and limestone stringers in this hard chalk formation have caused excessive vibration and damage to the PDC bits' cutting structure, resulting in multiple bit trips and/or downhole tool failure.

SOLUTION

Halliburton Drill Bits and Services deployed a technology team to assess and analyze the drilling performance of offset wells and drill bit conditions. Consequently, the team determined the need for a new drill bit design for this application. The team engineered and custom designed the 9½-inch GTD55DKOs bit, dressed with Geometrix™ 4D Machete™ cutters placed using the Halliburton Stega™ efficient layout technique for the secondary cutters. Bit durability, drilling efficiency, high ROP, and good steering response were the main focus areas for this new design.

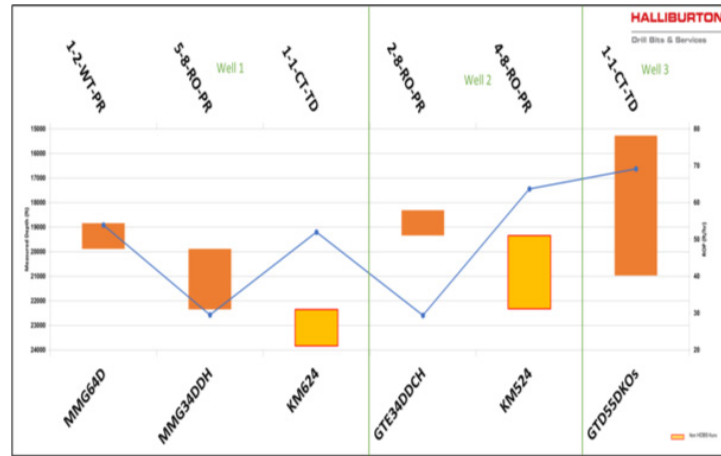


Two views of the 9½-inch GTD55DKOs drill bit

RESULTS

This engineered solution fulfilled the customer’s need for a more efficient, more durable drill bit that exceeded the performance of previously used drill bits in nearby wells.

The GTD55DKOs bit enabled the operator to successfully drill the entire section – 5,698 feet (1737 meters) – at an overall ROP of 69.2 feet/hour (21 meters/hour). The bit came out of hole in excellent condition, with a dull grade of 1-1-CT-S-X-I-WT-TD. The Machete cutters and Stega efficient layout placement proved to be the right technology combination for drilling through chert and hard limestone layers in just one run.



Comparative chart shows superior performance of the GTD55DKOs drill bit over other bits used to drill offset wells in the region.



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Two views showing GTD55DKOs dull condition of 1-1-CT-S-X-I-WT-TD after a long, hazardous run.

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