DEEP WATER

MATURE FIELDS

UNCONVENTIONALS

Operator Sets New Benchmark Drilling Long Lateral in S-Shaped Well

CRUZER™ DEPTH-OF-CUT ROLLING ELEMENT INCREASES ROP AND IMPROVES GEOSTEERING CONTROL TO REACH TOTAL DEPTH IN JUST ONE RUN

NORTHWESTERN FEDERAL DISTRICT, RUSSIA

CHALLENGES

- Drill an S-shaped well through the hard bedrock of a Silurian formation
- Design a drill bit tool to improve ROP and steerability with the goal to efficiently reach TD (in fewer runs than in the past)

SOLUTIONS

Deploy the following combined drill-bit technology tools:

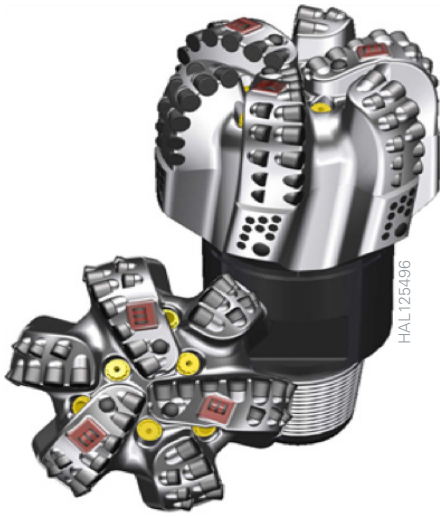
- GeoTech® Cruzer™ depth-of-cut rolling element
- Halliburton 8⅝-inch GTD65DMU fixed cutter drill bit

RESULTS

- Drilled 5,010 feet (1527 meters) at 43 feet/hour (13 meters/hour) in an S-shaped well to TD
- Improved tool-face control and steerability with reduced bit wear, as evidenced by dull condition upon POOH
- Increased ROP by 50 percent, completing the job in just one run and in 13 days less than typical
- Set new benchmark as fastest run compared to offset wells drilled in the area

OVERVIEW

A major customer in Russia's Northwestern Federal District was faced with having to drill an S-shaped well through the hard bedrock of a Silurian formation in the Komi Republic, one of Russia's largest and oldest oil provinces. The Silurian is a geologic period spanning 24.6 million years – from the end of the Ordovician Period 443.8 million years ago (Mya) to the beginning of the Devonian Period 419.2 Mya.



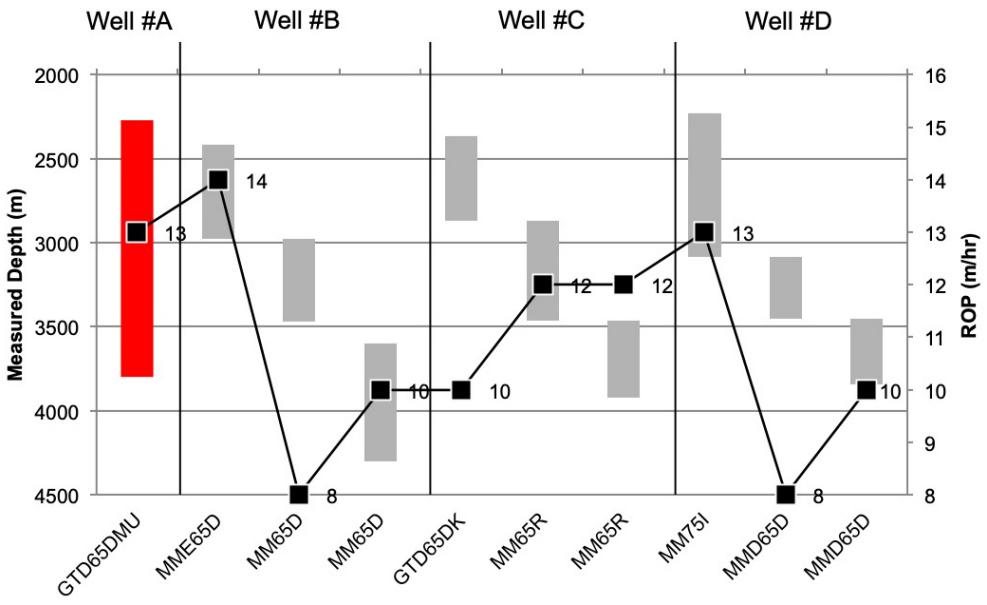
8⅝-inch GTD65DMU drill bit with Cruzer™ depth-of-cut rolling element

Previously drilled offset production sections typically required two to three runs, using various motorized bottomhole assemblies (BHAs). This job, however, called for a more sophisticated tool with better steerablity and rate of penetration (ROP) to successfully navigate the curves and reach total depth (TD). The main concern was a long lateral section of 5,010 feet (1527 meters), for which the operator decided to try a new directional drilling solution recommended by Halliburton Drill Bits and Services. Specifically, a Cruzer™ depth-of-cut rolling element was added on to the Halliburton 8⅝-inch GTD65DMU fixed cutter drill bit. This turned out to be the right decision, as the shoe-to-shoe interval – from 7,454 feet (2272 meters) to 12,465 feet (3799 meters) TD – was drilled in just one run with the enhanced feature, which increased ROP while providing the directional driller more precise control.

NEW TECHNOLOGY MAKES A DIFFERENCE

The GeoTech Cruzer technology was developed for controlling the depth of cut without taking energy away from the cutting structure. This depth-of-cut rolling element helps maximize ROP, while delivering better tool-face control, thus ensuring that intervals are drilled consistently on target. In this Komi region field test, the tool lived up to its reputation, enabling the operator to set a new benchmark as the fastest run of any offset wells drilled in the area at 43 feet/hour (13 meters/hour). It also demonstrated impressive steerability and ROP in sliding mode at 33 feet/hour (10 meters/hour), which is two times faster compared to the offset wells' performance.

Overall, the field ROP was increased by as much as 50 percent, saving the project more than 13 days and associated costs. Finally, the bit was pulled out of hole (POOH) in excellent dull condition, thanks to its abrasion resistance, impact resistance, and thermal mechanical integrity – allowing the operator to utilize an aggressive cutting method with improved control and steerability.



Bit Type	MD In (m)	MD Out (m)	Run Length (m)	Hours	ROP (m/hr)
GTD65DMU	2272	3799	1527	119	13
MME65D	2418	2979	561	40	14
MM65D	2979	3470	491	60	8
MM65D	3601	4300	699	70	10
GTD65DK	2364	2869	505	49	10
MM65R	2869	3463	594	50	12
MM65R	3463	3922	459	37	12
MM75I	2229	3083	854	68	13
MMD65D	3083	3451	368	48	8
MMD65D	3451	3843	392	40	10

Graph and supporting chart data showing bit performance results for the GTD65DMU bit type with Cruzer™ depth-of-cut rolling element deployed at this asset, compared with other types of drill bits deployed at offset wells in the Komi region. The GTD65DMU enhanced bit solution clearly delivered the highest ROP – a big accomplishment for such a long lateral run in this mature field.

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