UNCONVENTIONALS

Williston Basin Operator Increases Drilling Efficiency Via Intelligent Bit Technology

CEREBRO® IN-BIT SENSOR DRIVES CRUZER™ DEPTH-OF-CUT ROLLING ELEMENT AND SHYFTER™ CUTTERS TO DELIVER OUTSTANDING CURVE PERFORMANCE

NORTH DAKOTA, UNITED STATES

CHALLENGE

» Design a high-performance drill bit for efficient drilling of an unconventional well in the Rockies

SOLUTION

» GeoTech® GTD55RMU drill bit with Cerebro® in-bit sensing to optimize engagement of the Cruzer™ depth-of-cut rolling element and Shyfter™ cutters (passive and active depth-of-cut control elements, respectively)

RESULT

» Improved tool face control, increasing ROP and minimizing reactive torque
» Reduced uncertainty and increased efficiency for the entire run

OVERVIEW

Historically, drill bit design primarily relied on data capture at the surface. The introduction of Cerebro® intelligent bit technology gives Halliburton Drill Bits and Services the ability to map the downhole motion of the bit and any associated drilling dysfunctions. We can now use this data to gain a better understanding of the given application and design a more efficient bit for the drilling conditions.
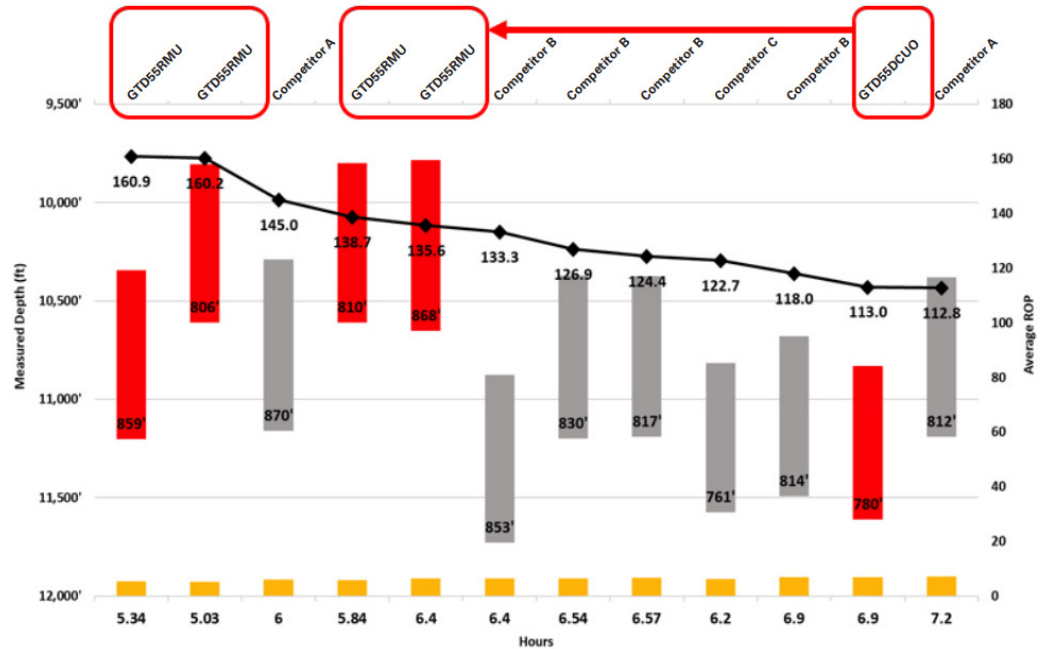
Using the 8-3/4 in. GeoTech® GTD55RMU Cerebro-enabled drill bit design, an operator in the Williston Basin achieved optimal engagement of the Cruzer™ depth-of-cut rolling element through the curve, without sacrificing efficiency. The Shyfter™ R2 cutters provided required durability while improving lateral efficiency to achieve the required build-rates for the interval.

IMPROVED DRILLING PERFORMANCE

Initial Cerebro tests were conducted, collecting data directly from the tool, which showed that when the Cruzer rolling elements were engaging, the fastest rate of penetration (ROP) was reached, while also minimizing torque. However, the Cruzer's rolling elements were only engaging small percentages of the run. The GeoTech GTD55RMU Cerebro-enabled drill bit design incorporated these findings by changing the engagement of the Cruzer cutter. After decreasing the depth of cut at which the Cruzer cutter was engaging, results continued in a positive direction, thus, optimizing drilling performance.
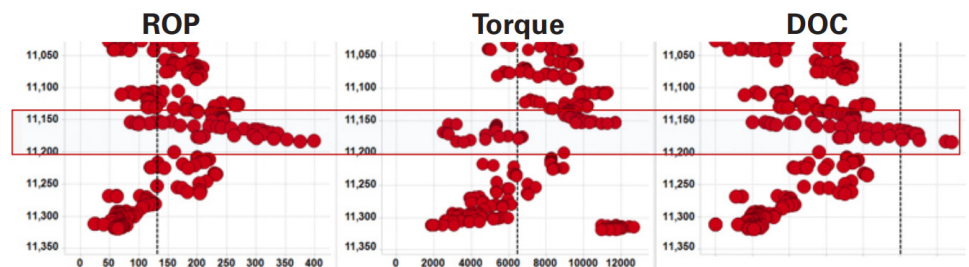
Cerebro intelligent bit technology provided the operator with high frequency sampling (1,000 samples/second), and measurement of vibration and motion on three axes. The red box shows a ~50 foot interval where the cruzer elements are actively engaged as a depth-of-cut control element. As the Cruzer elements engage, torque is minimized and ROP increases which indicates more efficient drilling.

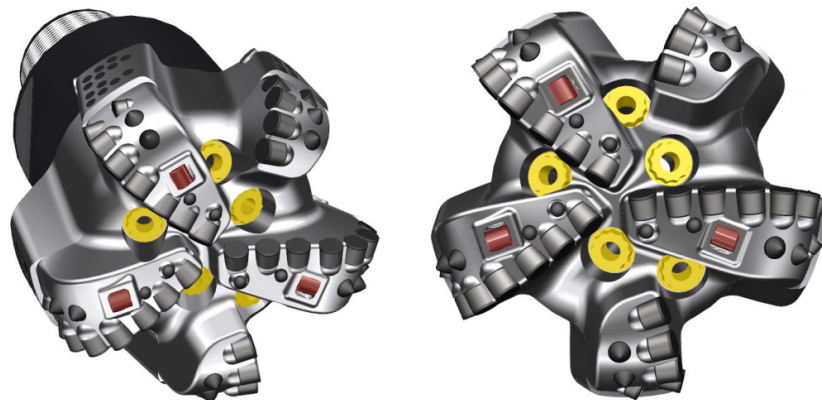**HALLIBURTON** | Drill Bits & Services

Bar graph showing top 12 curve runs by this operator since November 2018. Data indicates the highest average ROP was achieved by the Geo-Tech GTD55RMU Cerebro-enabled drill bit design, at the greatest measure depths.

TECHNOLOGY ADVANTAGES

The Cerebro intelligent bit technology provides the following advantages in tough drilling environments:

» Continuously captures downhole vibration and motion data
» Captures data as close to the cutting structure as possible
» Increases drilling efficiency and reduces well time
» Achieves higher drilling speeds without vibration limitations

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