

## Williston Basin Operator Increases Drilling Efficiency Via Intelligent Bit Technology

### CEREBRO™ IN-BIT SENSOR PACKAGE DRIVES CRUZER™ RDOCC AND SHYFTER™ R2 TO DELIVER OUTSTANDING CURVE PERFORMANCE

NORTH DAKOTA, UNITED STATES

#### CHALLENGE

To design a high-performance bit for efficient drilling of an unconventional well in the Rockies.

#### SOLUTION

Use GTD55RMU Cerebro-enabled bit design – to optimize engagement of the Cruiser RDOCC and Shyfter R2 (passive and active depth-of-cut control elements, respectively).

#### RESULTS

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

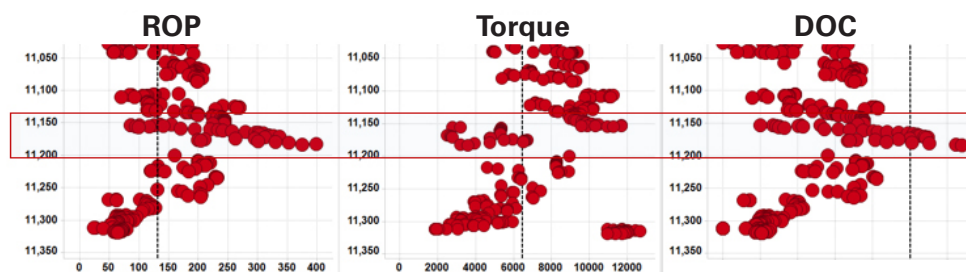
#### OVERVIEW

Historically, drill bit design primarily relied on data capture at the surface. The introduction of Cerebro intelligent bit technology gives Halliburton Drill Bits & 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 8¾-inch GTD55RMU Cerebro-enabled bit design, an operator in the Williston Basin (northern U.S. Rockies) achieved optimal engagement of the Cruiser™ Depth-of-Cut Rolling Element through the curve, without sacrificing efficiency. The Shyfter R2 provided required durability while improving lateral efficiency to achieve the required build-rates for the interval.

#### IMPROVED DRILLING PERFORMANCE

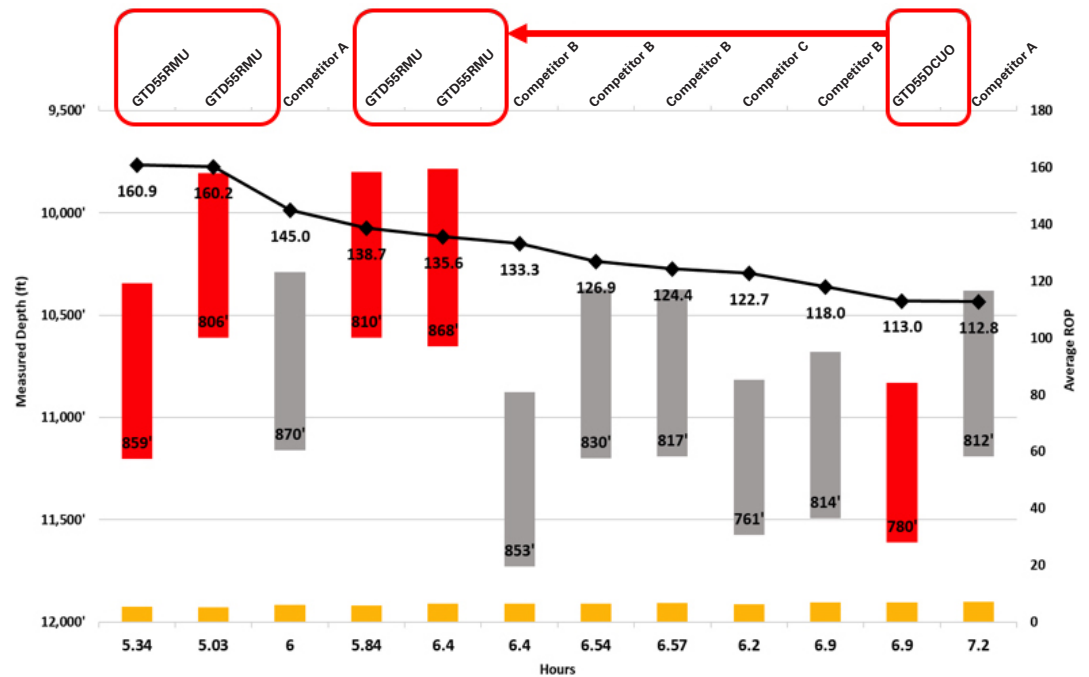
Initial Cerebro tests were conducted, collecting data directly from the tool, which showed that when Cruzers were engaging, the fastest rate of penetration (ROP) was reached, while also minimizing torque. However, the Cruzers were only engaging small percentages of the run. The GTD55RMU Cerebro-enabled bit design incorporated these findings by changing the engagement of the Cruiser. After decreasing the depth of cut (DOC) at which the Cruiser 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 cruiser elements are actively engaged as a depth of cut control element. As the cruiser elements engage, torque is minimized and ROP increases which indicates more efficient drilling.

“Tool face locked in from the start, the fastest curve bit I’ve run.”

– Directional Driller

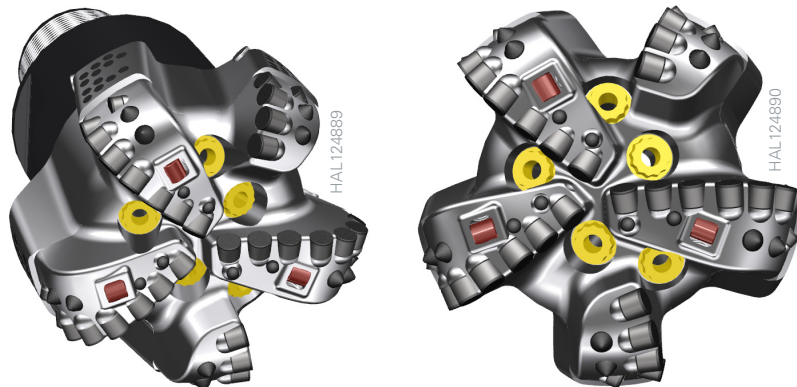


Bar graph showing top 12 curve runs by this operator since November 2018. Data indicates the highest average ROP was achieved by the GTD55RMU Cerebro-enabled bit design, at the greatest measure depths.

## TECHNOLOGY ADVANTAGES

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

- » 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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