DATA SHEET

HALLIBURTON

Fixed Cutter Drill Bits

Cerebro Force™ in-bit sensing

Providing direct in-bit measurements of weight, torque, bending, vibration, and rotational speed

FEATURES

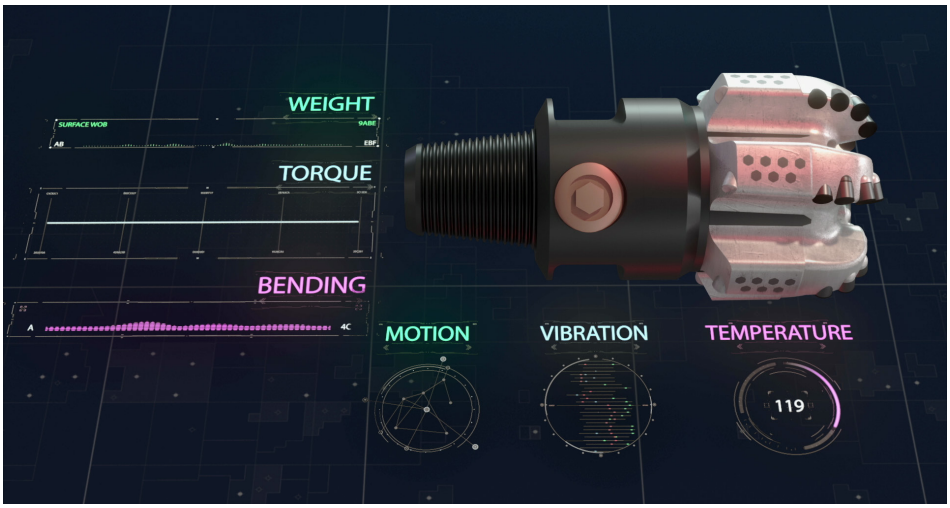
- Weight on bit, torque on bit, and bending on bit can be measured at the rock interface
- Compatible with all BHA equipment
- Available in all fixed cutter bits larger than 5-7/8 in. diameter

BENEFITS

- Eliminates surface measurement uncertainty, provides a better understanding of downhole environments, and enables more accurate calibrations of drilling torque and drag models
- Does not significantly affect bit-to-bend or bit-to-pad distances for directional performance
- Offers choice of running any motor, rotary steerable system, measurement-while-drilling (MWD) system, or logging-while-drilling (LWD) system advanced analysis

ADVANCED ANALYSIS

- Parameter analysis heat maps
- Sensor frequency spectrograms
- Customized plots of Cerebro® data merged with available surface and MWD data



Overview

Achieving optimal drilling performance requires efficient conversion of mechanical energy into rock cutting and evacuation. Built on the success of Cerebro® in-bit sensing technology, Cerebro Force™ provides direct, in-bit measurements of weight, torque, bending, vibration, and rotational speed. Utilizing these measurements, along with the Design at the Customer Interface (DatCI™) process, helps reduce or eliminate inefficiencies due to bit design, bottom hole assembly (BHA), and parameter selection. Improved drilling efficiency will increase rate of penetration (ROP) and run length, ultimately lowering overall well construction costs.

How it works

Traditionally, operators have had to rely on measurement data from the surface, lacking a clear depiction of the downhole drilling environment. Although some downhole weight, torque, and bending measurements are typically available, these measurements have certain drawbacks, such as a high lost-in-hole (LIH) risk, no direct data regarding forces at the bit, and being too costly for most applications. The Cerebro Force in-bit sensing solution solves these problems by providing the most critical drilling performance measurements at the optimal location within the BHA itself – with zero compromise to the BHA design and with low LIH risk.

Calculated outputs include at-bit mechanical specific energy, whirl radius and frequency, stick slip severity, and torsional vibration. Included with each Cerebro Force run is a run summary report – complete with histograms of drilling dysfunctions, plots of each dysfunction by depth, and a chart of downhole measurements versus surface weight and torque measurements.

Cerebro Force sensor specifications

Vibration	Axes	3
	Range	+/- 8 g
	Accuracy	+/- 40 mg
Shock	Axes	3
	Range	+/- 200 g
	Accuracy	+/- 500 mg
Magnetometer	Axes	3
	Range	+/- 16 gauss
Accel/Mag RPM	Axes	3
	Range	0 to 1,200 rpm
	Accuracy	+/- 7 rpm
Gyro RPM	Axes	3
	Range	+/- 667 rpm
	Accuracy	+/- 0.5 rpm
Strain	Axes	Weight-Torque-Bending
	Range	Connection Limited
Specifications	Run Time	75-350 hr*
	Max. Sample Rate	1,024 Hz
	Max. Temp	280°F (140°C)
	Max. Pressure	25 kpsi
	ID Restriction	None

* Maximum run time is dependent on sample rate.

Available connection sizes

3-1/2" Regular
NC35
NC40
4-1/2" Regular
6-5/8" Regular
7-5/8" Regular

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

halliburton.com/drillbits

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