

Cerebro Force™ In-Bit Sensing

ACHIEVING OPTIMAL DRILLING PERFORMANCE

OVERVIEW

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

CEREBRO FORCE SOLUTION — 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 (MSE), 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 vs. surface weight and torque measurements.

You can also request Halliburton to perform advanced analyses, such as:

- » Parameter analysis heat maps
- » Sensor frequency spectrograms
- » Customized plots of Cerebro™ data merged with available measurement-while-drilling (MWD) data

FEATURES

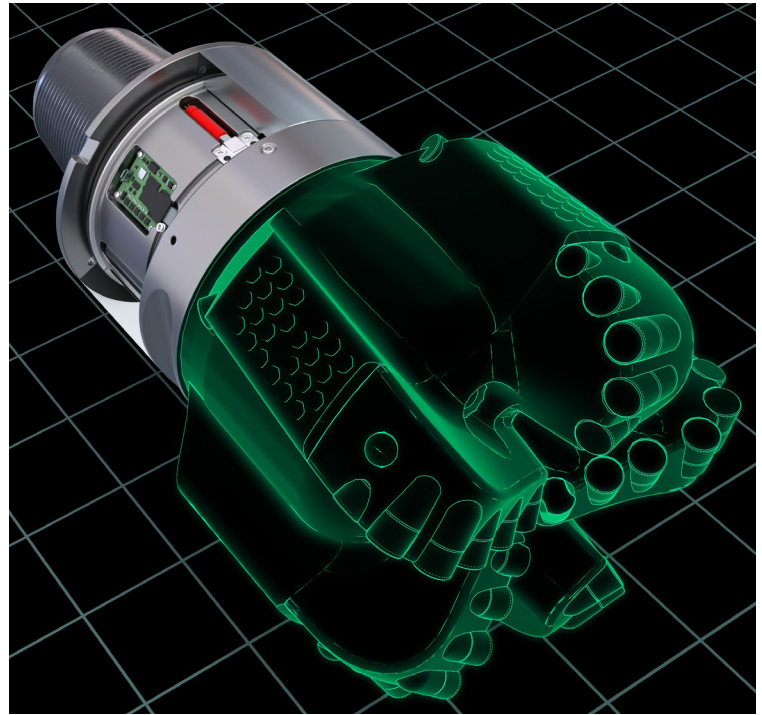
- » Weight on bit (WOB), torque on bit (TOB), and bending on bit (BOB) can be measured at the rock interface
- » Compatible with all BHA equipment
- » Available in fixed cutter bit sizes, utilizing API 4½-inch Regular connections

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, MWD system, or logging-while-drilling (LWD) system

Cerebro Force™ Product Measurements and Specifications

Measurements		
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	+/- 333 rpm
	Accuracy	+/- 0.5 rpm
Strain	Axes	WOB/TOB/BOB
	Range	100 klb/20 kft-lb/20 kft-lb
Pressure	Location	Internal/External
	Range	20 kpsi/20 kpsi
Specifications		
	Run Time	100 hr
	Sample Rate	1,000 Hz
	Max. Temp	266°F (130°C)
	Max. Pressure	20 kps
	Shank Size	7-inch OD
	ID Restriction	None



The Cerebro Force™ solution offers new in-bit sensing technology for more accurate downhole measurements.

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

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