

CuBIC® 3G

DRILLING DYNAMICS RECORDERS

CHALLENGES - DOWNHOLE DRILLING DYNAMICS MEASUREMENTS

The pace of drilling exploration and development in shale markets is faster than it has ever been due to the efficiencies required to deliver these wells on budget and with good margins. Downhole dynamics measurements are crucial for maximizing drilling efficiencies, creating smoother wellbores, and evaluating downhole dysfunctions. Historically drilling dynamics were only taken from the MWD system, and then later sensors were mounted within carrier subs. Both have their technical limitations.

Typical probe-type MWD systems used in North America Land are not well secured inside the collar. The downhole dynamics measurements will show what the MWD is exposed to—but not necessarily what the BHA/collars are exposed to. Placement of MWD is typically above the motor or Rotary Steerable System (RSS). Measurements captured at the bit provide the greatest understanding of downhole dynamics.

With carrier subs, the additional length between the motor and bit (or RSS and bit) negatively affect directional and dynamic response. Also, because of the additional length and connections, there is an increased risk of mechanical failure.

The three most important factors to ensure reliable drilling dynamics data are:

1. The technology used to measure and record dynamics measurements
2. The sampling rates
3. The sensor placement

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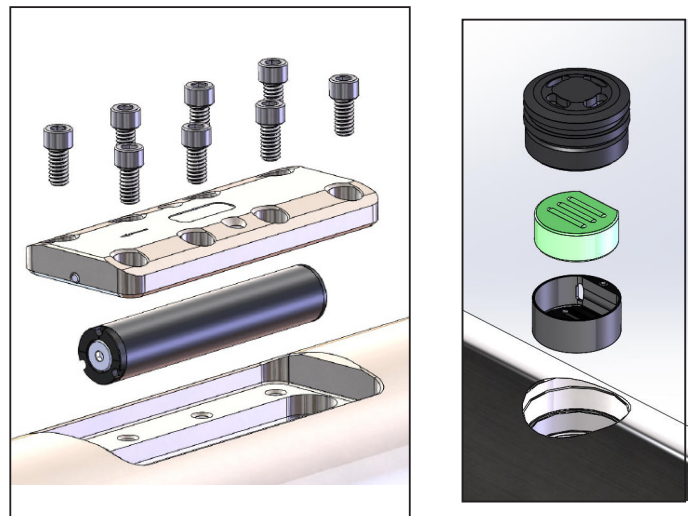
Sanvean Technologies has designed CuBIC® 3G, an innovative rugged small/compact sensor that can be embedded at any point within the BHA to provide shock, vibration, RPM and temperature measurements without adding additional length or connections. Our CuBIC® sensors are currently being embedded into the following:

- All Scout Downhole drilling products
- Shank of multiple vendors drill bits (including slim-hole)
- Near bit and string carrier tools
- Coring tools from Canamera coring

The CuBIC® sensor was designed and developed with North America Land drilling operations in mind. The provision of only drilling dynamics (RPM, shock, vibration, and temperature), and not drilling mechanics (WOB, TOB, and BM), was to allow the sensor to be cost-effective for use on every BHA, delivering only the necessary measurements to evaluate downhole drilling conditions.

With multiple wells now being drilled from one pad, and multiple pads in close proximity, the data gathered from CuBIC® embedded drilling dynamics sensors can be used for optimizing drilling parameters, BHAs, and bits through various formations. Merged downhole and surface measurements enhance the post-run decision making process by giving an actual account of downhole drilling conditions (these downhole drilling dynamic conditions cannot be precisely evaluated and quantified from surface measurements only).

This information can lead to the generation of precise road maps to allow the operator a full understanding of the drilling dynamics being experienced downhole. The level of detail recorded at the embedded sensor is far superior than the drill string feedback measured at surface from the rig acquisition system. Additionally, drilling dynamics sensor data can be used for “mapping” the field, condition-based monitoring of downhole equipment, and post-mortem analysis of downhole failures.



Exploded View of CuBIC

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FEATURES

- Compact and rugged design
- 3-Axis lateral, axis and torsional vibration measurements
- Provides at-point measurements at the point-of-interest within BHA and bit (i.e. at-bit and above motor power section) in all hole sizes, including slim-hole
- Mounted on outside diameter of equipment to measure actual accelerations that can influence drilling efficiency and equipment damages
- Simple and easy-to-read data output report allows for quick decisions on parameters or BHA changes
- High- temperature version (175°C/347°F) available

BENEFITS

- Cost effective for use in every bit and BHA
- No additional BHA length or BHA connections.
- No added risks
- Can be embedded into existing BHA tools and bits
- Automatic trigger on/off with RPM on/off – no additional personnel required
- Fast memory download for rapid data delivery and turn-around times
- Aids in the generation of precise parameter road maps to improve drilling efficiencies and reduce well costs

GAMECHANGER®

The time to download, merge EDR data, and deliver to the client is extremely important due to the fast pace in which rigs drill and walk to the next well on a pad. GameChanger, from Sanvean Technologies, is the software platform designed for merging and displaying downhole drilling dynamics data, and surface EDR Data. The GameChanger viewer is used by our clients who run CuBIC drilling dynamics sensors. Unlike traditional .pdf logs, GameChanger viewer allows the operator to zoom in on regions of interest to clearly see signal patterns and sensor response. Spectral images of sensors are output as standard from GameChanger viewer, to identify key frequencies at the bit and BHA. Multiple data sets can be over-laid on depth for well to well and pad to pad comparison.

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