DrillVibe

Real-Time Vibration and Stick-Slip Monitoring to Improve Drilling Performance

GEOLOG's **DrillVibe** provides continuous real-time analysis of torsional vibrations at bit and along the drill-string without the need for downhole LWD. GEOLOG specialists use sophisticated software to monitor and interpret high frequency drilling data to highlight when changes to drilling parameters, such as RPM and Weight on Bit (WOB) need to be adjusted to minimize vibrations. These vibrations reduce drilling efficiency and, if left unchecked, can result in early failure of bit or BHA components, excessive pipe and connection fatigue, washouts or twist-off, and therefore need to be closely and constantly monitored to optimise drilling performance.

Benefits

- Automatic alert of dangerous vibration levels
- Optimize drilling parameters to maintain efficient drilling
- Reduce NPT, risk of bit, BHA and drill pipe damage due to severe vibrations
- Real-Time vibration characterization (severity, duration, and frequency)
- Reduce well AFE by minimising tool repair and lost-in-hole (LIH) costs
- Optimize bit selection and BHA design

Challenges and Solutions

Vibration while drilling is often indicative of inefficient drilling and if excessive can quickly have a potentially disastrous impact on bit life, damage to LWD and motors, and over-torqueing of pipe connections. The dramatic NPT costs arising from premature bit or BHA failure, washout, twist-off and LIH, or out-of-spec maintenance and repair can be avoided by simple vibration monitoring in real-time.

The key in continuous vibration analysis is having high frequency surface drilling data available in real-time. Without this, or waiting on measured mud-pulse data from downhole, one cannot take the necessary immediate action required to improve drilling performance or prevent catastrophic failures downhole.

The solution to these challenges lies in utilizing surface measurements of Torque, RPM, Hook-Load and Stand Pipe Pressure for vibration monitoring along the entire drill string. DrillVibe provides a continuous real-time solution to mitigate risks and improve drilling performance in any drilling environment.

Applications

DrillVibe can be applied in any drilling environment, both offshore and onshore regardless of underbalanced or overbalanced conditions. As a surface solution requiring no additional hardware it can be applied to wells of any profile, as well as high pressure and temperature environments (HPHT) with no operational risk.

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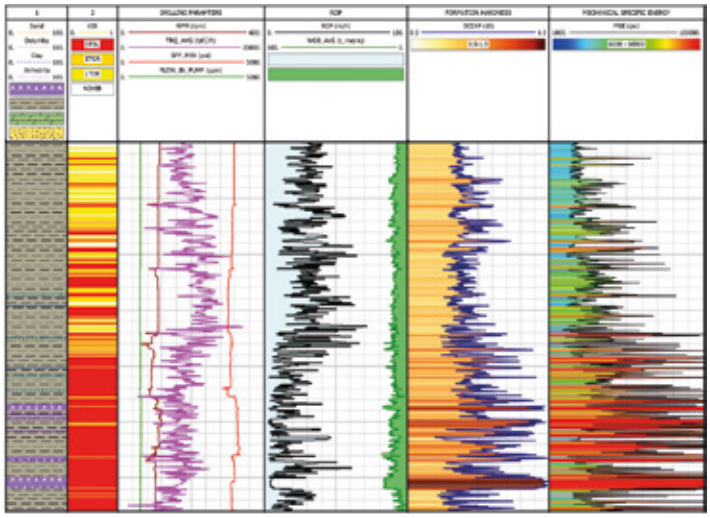
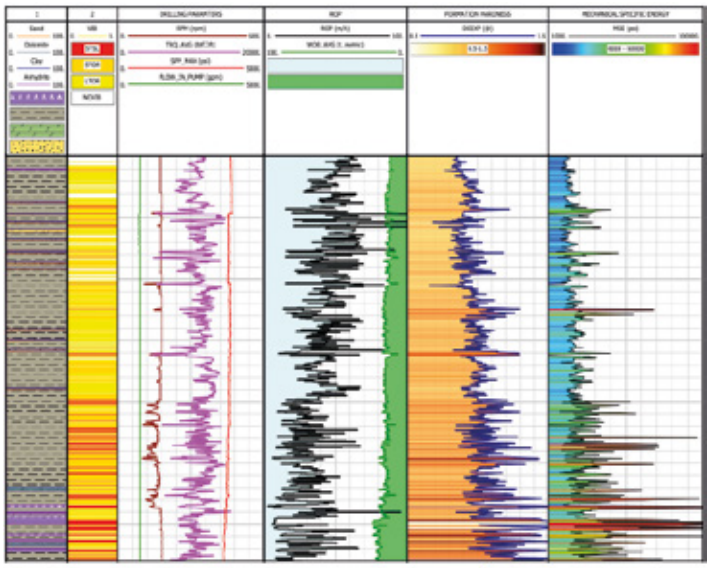
Case History

$138,000 USD saved using DrillVibe service





Well #1

DrillVibe service was utilized during a multi-well drilling campaign in North Africa. While drilling the first well severe stick-slip was identified and reported to company personnel. The red and yellow flags in track 2 highlight the severity of the events from stick-slip and torsional vibration (red being severe). The high MSE readings in track 6 correlate to stick-slip severity, demonstrating inefficient drilling.

Changes to drilling parameters to mitigate these effects were unsuccessful. As a result Well #2 (not shown) was not able to show significant improvement.

Well #3

DrillVibe analysis of the previous two wells demonstrated the bit used was not optimal for the lower cretaceous shale, causing severe stick and slip.

Changes to the bit and stabilizer placement were implemented based on the DrillVibe analysis from Well #1 and #2.

As a consequence of drilling with optimal parameters, Well #3 was drilled more efficiently with less torsional vibration, a decrease in mechanical specific energy (MSE) and an increase in ROP. The bit was found to be less worn than on the previous two wells. The result was a significant savings of 19 hours of on bottom time with an estimated savings of $138,000 USD.

Well	12 ¼" Section Length (m)	12 ¼" Section On Bottom Hours	Average ROP m/hr
1	2107	61	34.5
3	2136	42	50.8

Specifications

Analysis Channels	10
Continuous Acquisition Rate	50 Hz
Frequency Analysis	Fast Fourier Transform
Detection Resolution	1 second
Data Storage	Time and Depth

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