PREDICTIVE VIBRATION MAPPING

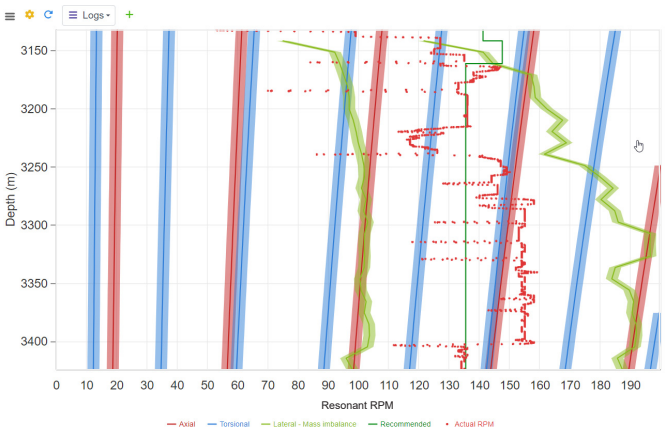
ENHANCE SET POINT MANAGEMENT WORKFLOWS & MITIGATE EXCESS VIBRATION AT NATURAL RESONANT FREQUENCIES

Today, Drillers and Drilling Engineers are faced with significant challenges in effectively managing drilling parameters and mitigating risks associated with drilling dysfunction. An underlying risk that should be considered in any drilling program is the presence of excessive vibration in the BHA, especially those that coincide with the natural resonant frequencies of the drillstring.

Excitation sources in drillstring, such as bits, reamers, stabilizers, mass imbalance, or mud motor nutation, can be compared to striking a guitar string: the excitation source induces vibrations that are amplified at critical rotation speeds that correlate to natural resonant frequencies of the drillstring. These intensified vibrations can manifest as drilling dysfunction in the form of bit-bounce (axial vibration), stick-slip (torsional vibration), and whirling (lateral vibration). Prolonged exposure to excess vibrations downhole at resonant RPMs can adversely affect penetration rate and elevate the risk of premature tool failure, twist-offs, and unplanned trips.

IDENTIFY RESONANT RPM. REDUCE DOWNHOLE VIBRATION. DRIVE PERFORMANCE.

Empowered by DrillScan® physics-based modeling software, Predictive Vibration Mapping is a swift methodology for informing the driller's roadmaps of resonant RPMs, mitigating downhole vibration and improving overall drilling performance. The physics-based analysis allows multiple-step computations to identify axial and torsional vibration through the entire drillstring length, while providing visibility to lateral vibration for the effective length between the bit and the first point of contact in the wellbore. Incorporating Predictive Vibration Mapping results can **significantly enhance set point management workflows** during planning, in real-time and road mapping by providing rapid and precise modeling results to predict critical RPM ranges for various types of bottomhole assemblies (BHAs).



WANT TO KNOW WHERE TO DRILL MORE EFFICIENTLY WITH THE LEAST VIBRATIONS?

BOOST YOUR WORKFLOWS:

- **MSE Heatmapping**
- **Forced Vibrations**
- **Digital Roadmap℠ technology**

DIGITAL ROADMAP

50% REDUCTION IN DOWNHOLE RPM FLUCTUATIONS & A SUBSTANTIAL DECREASE OF UP TO 40% IN LATERAL SHOCK

THE CHALLENGE

An operator was looking to advance performance by proactively addressing potential failures and equipping the team in the field with enhanced decision-making tools for selecting critical parameters.

OUR SOLUTION

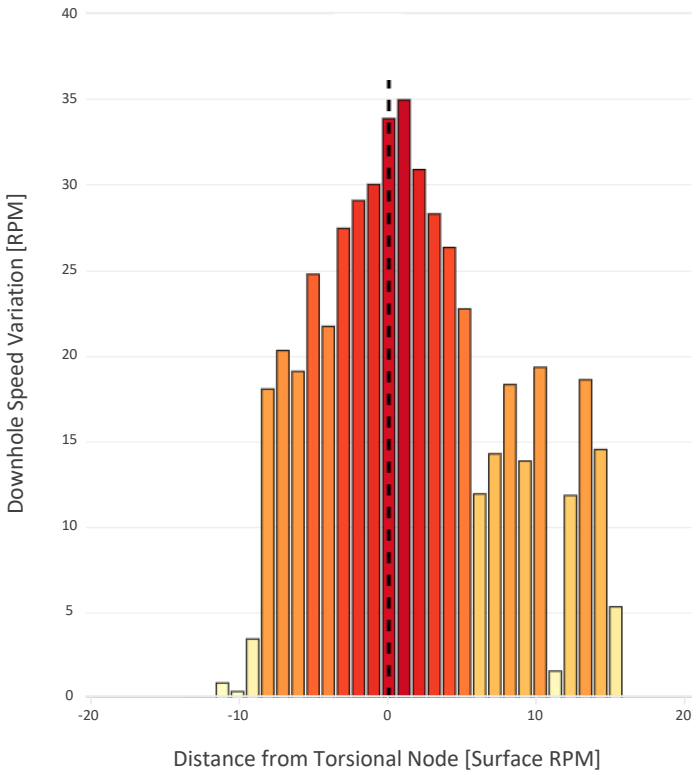
H&P's Advanced Well Engineering (AWE) team conducted a comprehensive post-analysis leveraging downhole data to identify potential strategies for mitigating failures. Their investigation revealed a correlation between observed vibrations and DrillScan® software's modeled resonant RPM. This model presents a predictive tool capable of forecasting surface RPM levels that might trigger vibration and drilling inefficiencies.

OPERATOR OUTCOME

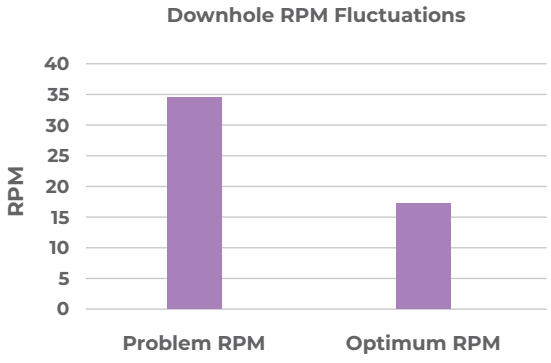
At the customer's request, DrillScan Predictive Vibration Mapping technology was initiated for a trial deployment. The outcome yielded a dynamic, real-time model that was seamlessly accessible from both the operator's monitoring center and the rig site, empowering informed decision-making regarding surface RPM parameters.

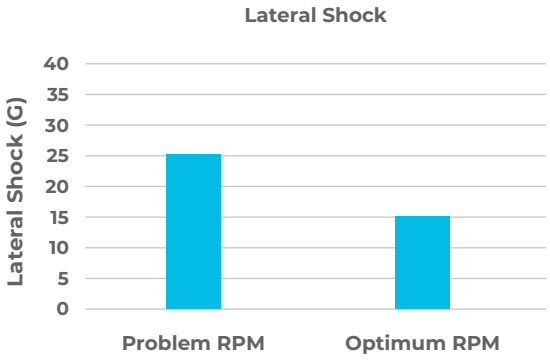
WHAT HAPPENED NEXT?

Subsequent data analysis from the trial demonstrated that adhering to the model's suggested surface RPM adjustments led to a notable reduction of up to 50% in downhole RPM fluctuations and a substantial decrease of up to 40% in lateral shock.



Model Inputs: Length, ID/OD of elements, Density and Modulus of elasticity of elements, Mud density, Buoyancy, WOB (weight on bit), Hole size, inclination, curvature, Flow Rate and rotor/stator #





CONTACT US

For more information on Predictive Vibration Mapping from H&P Advanced Well Engineering or to schedule a demo, contact us at: **helmerichpayne.com/contact.**

It's time to follow through on your drilling performance potential.