

## **DrillDOC Drilling Downhole Optimization Collar for Real-Time measurements of weight, torque and bending on bit in the Azeri, Chirag and Guneshli wells, which were drilled in the Khazarian-Caspian Sea of the Azerbaijan Republic**

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Sperry Drilling services' DrillDOC tool provides real-time measurements of weight, torque and bending on bit measurements to minimize shocks, vibrations (this enabling Sperry Drilling to optimize parameters on the rig) and characterize the transfer of energy from surface to the bit. These measurements help optimize drilling parameters, maximize performance and minimize wasted energy transfer and vibration. The DrillDOC tool contains multiple sensors which provide the weight, torque and bending moment values and has a vibration sensor that delivers a full suite of vibration measurements. The DrillDOC tool is a downhole tool can also be used to measure the tension and compression of the BHA during the drilling and tripping in/out process. In addition an azimuthal measurement is applied to the sensor in order to assign a direction to the bending moment. The azimuthal measurement is provided by the magnetometers that are present on the DrillDOC tool. Drillstring vibration is a major contributor to downhole tools failure. It may also cause wellbore damage and increase the need for more frequent rig repair. Timely detection and mitigation of downhole vibration is key to avoiding non-productive time (NPT) and preventing equipment damage. DrillDOC Tool is especially beneficial while drilling complex directional, horizontal and extended reach wells. The new DrillDOC collars provided the measurements necessary to fully understand and analyze downhole drilling dynamics of wells in the Khazarian-Caspian region. Directly measuring torsion, weight, bending and vibration we properly identified the actual drilling parameters which were applied to the bottom hole assembly and the bit. These measurements gave greater insight into the wellbore to reduce uncertainty, minimize unplanned events, optimize the drilling performance via captured measurements that help reduce cost and mitigate risk through the data analysis, which listed below:

1. Improving performance by mitigating risk associated with critical operations
2. Improving drilling performance/reducing operating cost by optimizing directional drilling performance
3. Improving drilling performance by measuring wellbore quality
4. Improving drilling performance/reducing operating cost by optimizing rate of penetration (ROP)

The DrillDOC WOB and TOB downhole data allowed the Sperry Drilling team to interpret the information and make the correct drilling adjustments to maintain the planned wellbore trajectory. Sperry Drilling successfully performed TD of several wells by using DrillDOC Tool and as a result exceeded the operator expectations. After the success of these wells, the operator is utilizing the DrillDOC service on current wells and plans to use this service on future wells. With full knowledge of downhole dynamics conditions, effective changes to the drilling parameters of weight-on-bit, rotary speed and flow rate we mitigated harmful vibrations, optimized drilling parameters and eventually maximized drilling performance. So many ACG wells were drilled successfully without NPT, faster, safely and on a target in the Khazarian-Caspian Sea of the Azerbaijan Republic.