

# ONGC Reaches Total Depth in Hard and Abrasive Formation 32 Days Ahead of Plan

## SPERRY DRILLING SETS NEW DRILLING RECORD WITH TURBOPOWER™ TURBODRILLS AND MATCHED CUSTOM BIT ENGINEERED SOLUTION

VINDHYAN FIELD, INDIA

### CHALLENGES

- » Improve drilling efficiency in hard and abrasive formation
- » Minimize bit failure and number of trips downhole

### SOLUTION

Collaborative engineered solution between Sperry Drilling and Halliburton Drill Bits and Services bit experts, using:

- » Turbopower™ turbodrill, with customized IQ Series™ diamond-impregnated bits, to drill through siltstone/ limestone and sandstone
- » SPARTA™ drilling optimization software to conduct rock strength analysis

### RESULTS

- » Saved 32 days of rig time, valued at approximately USD 650,000 in rig day rates
- » Tripled the previous ROP – from 3 feet/hour (1 meter/hour) to 10 feet/hour (3 meters/hour)
- » Reduced the number of bit trips from six to three

### OVERVIEW

In a remote location near a jungle in central India, Oil and Natural Gas Corporation Ltd. (ONGC) was exploring the hydrocarbon potential of the Vindhyan field. Its primary objective was to drill a 3,680-foot (1,122-meter) directional profile well through an extremely hard siltstone/ limestone and abrasive sandstone formations that were causing drilling performance issues.

The operator also needed to hit all the geological targets within the target radius and to complete the 8½-inch section within a preapproved 65-day time frame.

This lengthy time estimate was based on ONGC's past experience with offset wells, where the average rate of penetration (ROP) was only 3 feet/hour (1 meter/hour) and a minimum of six bit trips was required. Seeking more drilling-efficient operations, ONGC called upon Sperry Drilling to engineer a drilling solution that would help eliminate bit failure and extra trips while improving ROP and drilling performance.

### DRILLING THROUGH HARD, ABRASIVE FORMATION

Hard and abrasive formations tend to cause high vibrations, low ROPs, and abnormal wear to the bit. Typically, conventional motor and rotary assemblies using polycrystalline diamond compact (PDC) bits do not provide adequate ROP or sufficient run lengths in such harsh conditions. As a result, excess rig days and bit trips were required to reach the final total depth (TD). ONGC had experienced low drilling performance with rotary assemblies in this same field and decided to bring in Sperry Drilling for its turbine drilling expertise.

### ENGINEERED DRILLING SOLUTION MAXIMIZES ONGC'S ASSET VALUE

Sperry Drilling technical experts collaborated with ONGC engineers over the course of several meetings to fully understand the challenges of the Vindhyan field. Applying global experience, reservoir insight, and lessons learned from previous jobs in the area with similar formations, the Sperry Drilling team engineered a drilling solution suited for this hostile environment.

To provide steerability, lower vibration, and improved ROP, Sperry Drilling advised ONGC to deploy the Turbopower™ turbodrills, along with the IQ Series™ customized diamond-impregnated bit from Halliburton Drill Bits and Services. Even in the most difficult drilling conditions, this turbodrill technology has the right combination of speed, power, and reliability to maximize drilling performance, minimize bit trips, and lower cost per foot drilled.



“ All the objectives of the well were successfully met, with full safety during the operations. Against a plan of 65 days for the 8½-inch phase, the well was completed in 33 days.”

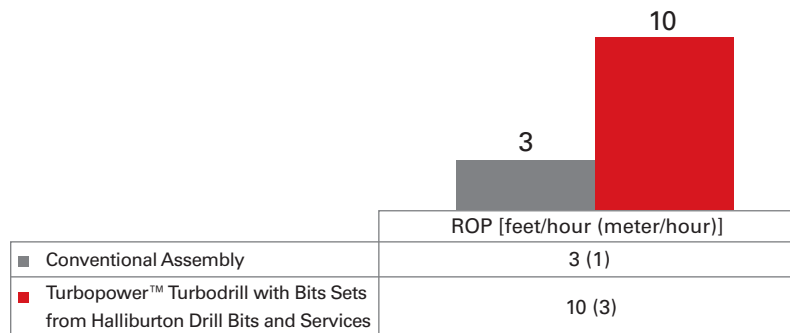
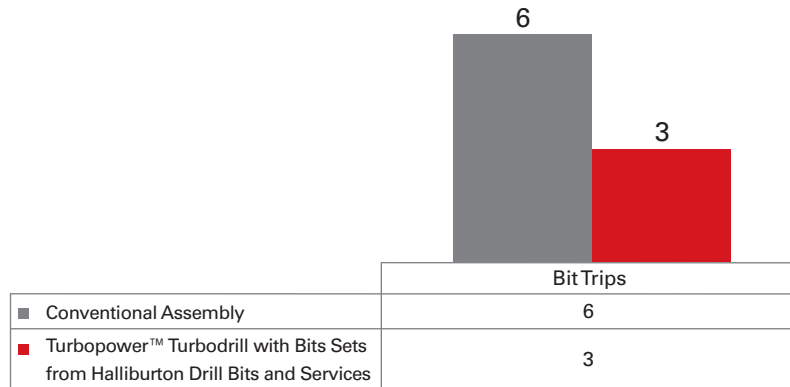
– T.R.K. Sherwani, Deputy General Manager and Location Manager, Drilling Services, ONGC

Based on the results of a rock strength analysis using the Halliburton SPARTA™ drilling optimization software, bit engineers proposed a diamond-impregnated drill bit to be matched with the steerable Turbopower turbodrill assembly. An IQ Series IQ516D 16-blade diamond-impregnated bit with heavy-sleeve reinforcement was used to drill the abrasive sandstone and siltstone, while the more aggressive I210 and IQ610 10-blade bits were used to drill the shale with lower rock strength.

**ENGINEERED SOLUTION DRILLS TO PRODUCE & REDUCES WELL TIME**

After a successful kickoff to the north, Sperry Drilling drilled down from 3,872 feet (1,180 meters) to 7,552 feet (2,302 meters) TD following the well plan, and successfully hit all targets within 6.6 feet (2 meters) of the target radius. The TD was reached in only three runs, without incurring any nonproductive time (NPT) or requiring additional bit trips. A new record was set for the Vindhyan field by saving 32 days of rig time, valued at approximately USD 650,000. Furthermore, the Turbopower turbodrills with three different customized IQ Series diamond-impregnated drill bits enabled the entire 3,680 feet (1,122 meters) of the 8½-inch section to be drilled to produce in 371 hours, at an average ROP of 10 feet/hour (3 meters/hour) – three times the ROP of previous operations.

The job was completed without compromising the well trajectory or service quality, and was performed without any health, safety, or environmental (HSE) issues. The improved drilling performance delivered by the Sperry Drilling and the Halliburton Drill Bits and Services teams significantly reduced well time and cost, exceeding ONGC’s expectations and maximizing its asset value.



*This engineered solution, which included a Turbopower™ turbodrill with customized bit sets from Halliburton Drill Bits and Services, not only reduced the number of trips by half, but also tripled the ROP in the hard and abrasive formation.*

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