

Smooth operator



New digitally-controlled motors help to drill wells deeper and through harder rock. But the drills are often kilometres-long, making it tough to hold the drill bits steady. Now engineers can make even the longest, most powerful drills turn smoothly as they work to unlock more resources. They can also drill faster and more affordably.



John Runia, Shell Global Wells Implementation Manager, works to make drilling more efficient

Supplies of easy-to-reach oil and gas are becoming scarce. To access new resources companies must drill ever-deeper wells stretching up to thousands of metres underground. A major challenge is to keep such long drills turning at the same rate from top to bottom. Failure can mean damage to equipment and delays in drilling.

“A drill bit can stall while the motor keeps turning,” says John Runia, Shell Global Wells Implementation Manager. “Once freed the bit turns up to five times faster to catch up, winding and unwinding the drill like a rubber band.” The vibrations slow down drilling and damage equipment.

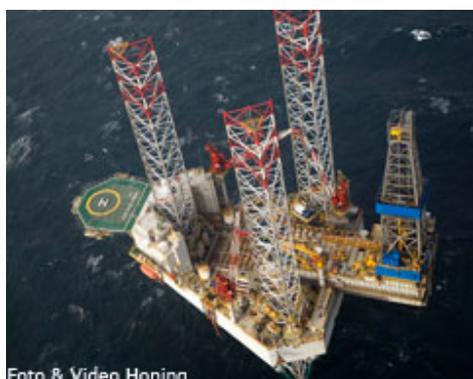
All in a twist

For decades operators had to stop drilling at frequent intervals to replace damaged drill bits without knowing the cause. Then in the early 1990s engineers installed sensors in drill pipes to measure vibrations and drill rotations. They discovered these big differences in rotation speed above and below the surface.

A team of Shell researchers developed a software programme to help. The software – known as soft torque – uses information on the drill, the rotation speed of drilling and build-up of tension in the drill to calculate adjustments to the motor speed. It then communicates these to the motor's computer through electronic signals.

“Thanks to the software the drill turns as one,” says John. “We can drill up to 40% faster and there is less equipment damage, saving up to 15% on the cost of a well.”

Speedier signals



The Noble Drilling platform off the UK coast uses new software for smoother drilling

Drill motors developed more recently are more powerful and can drill faster. But the soft torque software was not compatible with their more advanced controls and more complex circuits. The signals took longer to travel through the circuits, causing delays in adjustments to the motor so the drill did not turn as one.

John and colleagues from Shell and drilling firm Noble refined the software programme and integrated it with the motor's computer to avoid time delays.

“Fifteen drills around the world already use the new system,” says John. “It is helping us to unlock new resources including from hard rock and far underground.”