

New Drill Bits Boost Efficiency, Safety

By Colter Cookson

From novel cutter geometries that reduce vibration to advanced cutters for ultratough formations, PDC bit manufacturers continue to demonstrate a knack for coming up with new twists on old ideas. Their efforts have paid off. The latest drill bits are setting penetration rate records in all types of formations, and are completing jobs in single runs that once required three or four bits.

Meanwhile, new hybrids are bringing roller cone-quality steerability and respectable speed to applications traditionally dominated by PDC bits. And thanks to more robust seals and bearings, roller cone bits continue to redefine performance benchmarks in tough, abrasive formations and large-diameter holes.

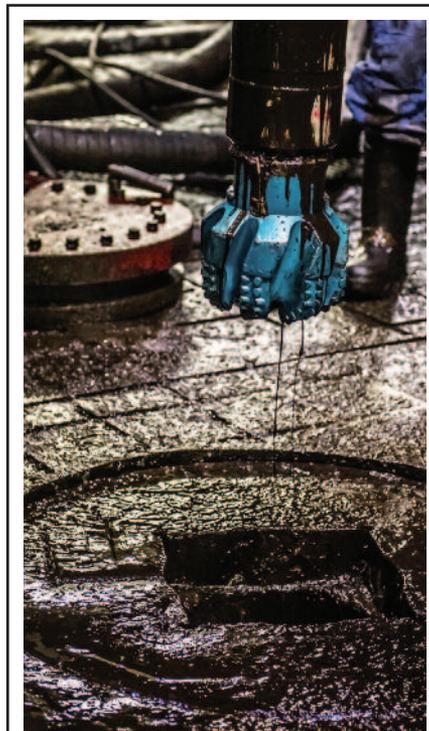
Although they express pride in their technologies, bit manufacturers say it takes more than a great bit to drill efficiently while staying on target. They say the record-setting performances being achieved are the result of working closely with customers to deliver bits that are a perfect fit for each job.

"In both the United States and Canada, the focus on each job has increased," observes Aron Deen, innovation manager for Ulterra. "Engineers who used to oversee three or four rigs now have one, and in some cases, that rig may have other engineers assigned to it as well. These engineers have time to get into details, so it is more important than ever for bit manufacturers to be partners that help find ways to drill faster and stay in the hole longer."

Deen stresses that Ulterra also works with the companies that provide other drill string components. "We have had great success partnering with rotary steer-

able companies to match our bits to their tools," he illustrates.

Point-the-bit rotary steerable tools have a nonrotating sleeve on the outside, so in order to steer the bit while the drill string is rotating, the driller needs a way to determine tool orientation and direction, Deen notes. "If lateral vibration gets to the point of bit whirl, the tool will cycle around the hole and the driller may lose track of which direction it is pointed," he



Ulterra's CounterForce™ bits feature cutter geometries that leverage normally detrimental lateral vibration to improve rock cutting efficiency. The technology is one of many techniques the company is using to tailor its bits for specific rotary steerable systems.

says. "To prevent that, most of the tools are designed with certain bit characteristics in mind, particularly gauge configurations.

"In addition to following the rotary steerable system (RSS) providers' specifications, we have been working with them to give them input into the bit design from the ground floor so we can build not just a good bit and a good RSS, but a system that will work extremely well for the operator," Deen outlines. "In the process, we can apply techniques that are unique to Ulterra to solve problems for the RSS companies, and ultimately, the operators."

Working With RSS

Ulterra-specific tools include CounterForce™ bits, which Deen says orient and place cutters to redirect otherwise damaging lateral vibration into the formation, providing energy to cut the rock while reducing troublesome vibration.

Levi Sasser, Ulterra's district manager for South Texas, says the company's willingness to partner with RSS makers has contributed to great runs. "After working with Weatherford to design an Eagle Ford bit tailored to Weatherford's Revolution® RSS, we have seen a huge difference in vibration and torque, which has drastically reduced the chance of tool failure," he reports. "At the same time, the bit is increasing ROP, setting distance records and coming out of the hole in pristine condition.

"In a run in Live Oak County, Tx., the bit set two global footage records for the Revolution RSS by drilling 16,234 feet," Sasser relates. "The extended-reach well had a total depth of 22,700 feet. Reaching out that far is a big challenge, and doing it with one bottom-hole assembly is un-



heard of, but by staying on bottom for 192 hours, we managed.”

The lessons learned in the Eagle Ford have been applied to improve penetration rates in the Marcellus with the slim-hole version of the same RSS, Deen reports. He adds that the company has designed successful intermediate 12¼-inch bits to work with RSS tools such as Schlumberger’s PowerV RSS and Scout Downhole’s Vertical Scout®, as well as lateral

bits designed to work with PowerDrive and Gyrodata Inc.’s Well-Guide RSS™ tools.

In the Permian Basin, Deen reports a new Ulterra 12¼-inch U616M, which was designed to work with the 8-inch PowerDrive 900X5 RSS, enabled Occidental Petroleum Corp. to eliminate multiple trips and save 44 hours compared with its best performing well through the same interval.

“In the Elk Hills Field in California, bits geared to work with Baker Hughes’ AutoTrak™ system were able to increase ROP more than 50 percent,” Deen continues. “In the deepwater Gulf of Mexico, with bits ranging from 8½ to 18½ inches in diameter, adding CounterForce to customized RSS bit designs reduced drilling vibrations and increased ROP on both PowerDrive and AutoTrak systems.” □