

Novel, Refined Bit Designs *Offer Speed And Durability In Demanding Applications*

By Colter Cookson

The development of drill bit technology moves at a rapid pace, responding to the evolving needs of an industry focused on drilling deeper targets and longer laterals more efficiently and safely than ever. Every time oil and gas companies encounter a new operational challenge or seek to take drilling performance to a new level, bit designers hit the drawing board to engineer next-generation solutions for a diverse range of applications, from drilling 30,000-foot subsalt wells in the deepwater Gulf of Mexico to drilling out multistage fracture plugs in extended-reach horizontals in the hills of Appalachia.

Whatever the target reservoir, the success of any bit design can be measured in three words: steerability, durability and speed. By leveraging advances in modeling and simulation technology, designers are delivering these hallmarks of efficiency in some of the industry's most challenging applications.

In many cases, the effort to maximize efficiency involves pushing the performance of hybrid bits to new heights. Refined hybrids are setting benchmarks in demanding carbonate formations such as those in the Permian Basin, and in complex geologies such as those in California. Meanwhile, PDC bits are using novel cutting structures and tough materials to improve drilling speeds and distances across the United States.



Curve and Lateral Bit

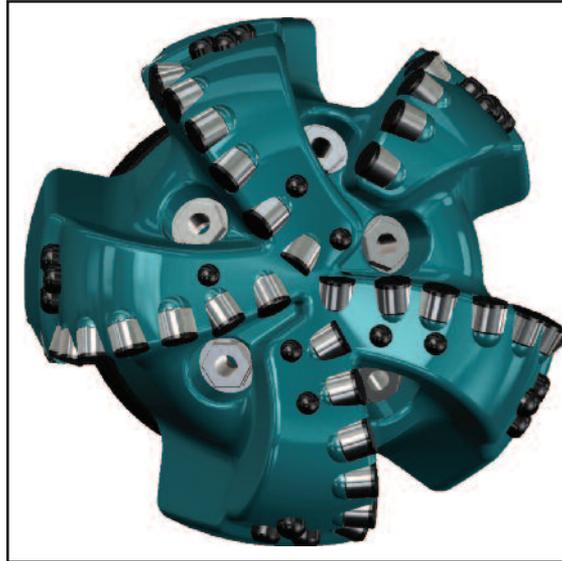
For drilling the curve and lateral sections in difficult curve applications, Ulterra offers the 8¾-inch OneShot™ U516M bit. In the Bakken/Three Forks, the bit has completed more than 200 runs with 99 percent reliability and set multiple rig records, reports Casey Dalla Betta, Ulterra's lead engineer for the western United States.

"We have consistently completed curves with only 6.5-6.8 hours on bottom," he adds. "On a rig-by-rig basis, we are saving operators several hours of drilling time per well."

The bit can deliver excellent build rates and tool-face control, Dalla Betta says, noting it has enabled directional drillers to execute tight 2-D curves and complex 3-D well plans. "We are getting great feedback from directional drillers," he relates. "For example, in a well for Kodiak Oil & Gas, the directional driller reported perfect build rates and managed to land the curve within an inch of the desired landing footage.

"The main feature that gives us smooth tool-face control is the CounterForce™ cutting structure, which provides a unique alignment of alternating side rakes on cutters that smoothes the action of shearing the rock by countering lateral vibration," Dalla Betta says.

Aron Deen, the company's senior innovation and downhole tool manager, adds that the company designed the bit with four



With its CounterForce™ cutter configuration, Ulterra's OneShot™ U516M provides such great tool face control that directional drillers in the Bakken and beyond can stay on target even while drilling at high speeds.

blades to center to keep diamond volume high in the cone, and employed load limiters to manage depth of cut. "All these design features work together to keep the bit from over-engaging and generating reactive torque spikes that negatively affect directional drilling performance," he states.

Because of its consistent success, Ulterra has awarded the bit OneShot™ designation for Bakken curves. "We reserve this designation for bits that satisfy all three customer goals of directional control, benchmark speed and proven reliability," Deen emphasizes. "Only one other bit has received that honor."

Although it was designed for the

Bakken, the 8¾-inch OneShot U516M has been used in the Mississippian Lime, Permian Basin, Eagle Ford, and Northwestern Shelf of New Mexico, as well as the San Juan, Powder River, and Piceance basins, Dalla Betta notes. He says it has made 500 runs without being pulled as a result of bit damage.

Deen reports the company is applying lessons learned from the 8¾-inch OneShot U516M to develop versions with different diameters, including an 8½-inch model for the Permian Basin. "The people in the field where these bits are being run are very, very excited, because the initial results have been impressive," he comments. □