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Uptick in activity spurs development of new bit technologies

Increased drilling activity associated with improving commodity prices is driving drill bit manufacturers to develop more efficient hydraulics for cuttings evacuation in softer formations, in addition to technologies designed to improve one-run success rates in challenging directional applications, and in hard/abrasive formations.

CRAIG FLEMING, Technical Editor

With continuing advances in PCD cutter technology and improved bit body stability, PDC bits have become the dominant force in the worldwide drilling theater, practically replacing the venerable roller cone product. Their high ROP potential and unparalleled durability make PDC bits the tool of choice in both high- and low-cost environments. Even in the toughest applications traditionally reserved for roller cones, PDCs have virtually eliminated the situations where operators are forced to fall back on these types of bits. Today's PDC bit technologies will positively impact performance and drive down the real cost/ft.

IMPROVED CUTTINGS EVACUATION

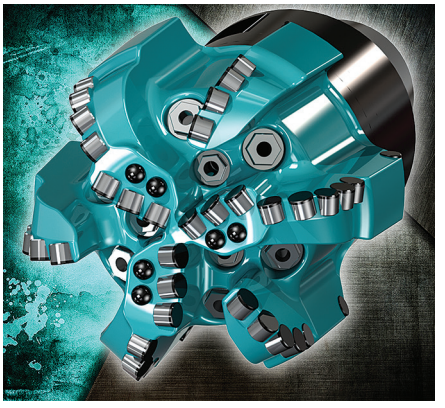
Ulterra Drilling Technologies' latest innovation is the patent-pending SplitBlade PDC bit (Fig. 4) that is increasing ROP and reducing drilling time with reconfigured cuttings evacuation, cutter cleaning, and bit cooling.

Typically, with most PDC technology, recirculated rock cuttings become trapped at the toolface, and the build-up clogs the junk slots. Trying to recut old cuttings that should have been evacuated quickly wastes energy, in addition to degrading the bit.

The company's research team examined the physical restraints of a basic PDC drill bit. The engineers proposed a new pattern that would maintain the cutters in a cleaner, cooler state. The improved thermal management of the bit face would support the goal of extending bit durability and lead to higher performance.

Using CFD, the team created a distinctive bit body, with new blade geometry, nozzle placement, and cutter layout. By splitting the shape of the primary blades with an angular offset, designers created designated flow channels for the fluid and cuttings. Two nozzles are positioned to support the cutters in the critical area to capitalize on this advancement in bit body construction and hydraulic control. While drilling, cuttings from SplitBlade technology can be evacuated up to seven times faster, compared with conventional designs.

Fig. 4. A SplitBlade bit, with two nozzles orientated precisely to create dedicated flow channels for improved hydraulics and maximized ROP potential.



Case studies. In the LaSalle County portion of the Eagle Ford shale in South Texas, an operator was experiencing poor cuttings removal and plugged nozzles. To solve the issues, an 8½-in. SplitBlade PDC was run, and it drilled the curve 27% faster than offsets. This run set a company formation footage record of nearly 14,000 ft, MD, for the curve and lateral. The ROP of more than 150 ft/hr was 8% faster than the offset average in wells over 10,000 ft.

In the eastern Eagle Ford, another operator wanted to reduce the instances of nozzle plugging to improve ROP, and selected an 8½-in. SplitBlade bit. The plan was to improve lateral and overall ROP with better directional control and cuttings removal. The bit was run, and it set a rig footage and ROP record, drilling the lateral at 400 ft/hr instantaneously and, overall, just less than 12,000 ft in under 68 hr. The average ROP of 172 ft/hr was 56% faster than the average run on this rig.. WO