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Rhino RHE

Dual-reamer rathole elimination system

APPLICATIONS

- Deepwater wells
- Rathole enlargement at TD

ADVANTAGES

- Provides on-demand activation of enlargement system with surface confirmation
- Eliminates the need for dedicated rathole elimination runs, reducing well construction time

Hole enlargement while drilling in deep water

Hole enlargement while drilling, which is common in deepwater wells, typically results in a rathole of more than 100 ft at TD and adds one or more days to the well construction timeline. The Rhino RHE* dual-reamer rathole elimination system is an integrated dual-reamer drilling system that enlarges the borehole while drilling. A passive near-bit reamer is activated at TD, and after reaching TD, the rathole is enlarged while drilling to avoid adding extra time to well construction.

Elimination of rathole cleanout run

In deepwater drilling, the reamer is positioned above the long, complex LWD string so that the enlarged borehole will not degrade the accuracy of formation evaluation measurements. To open the long rathole to the larger borehole size, the drilling BHA is usually tripped back to surface, and a dedicated cleanout run is performed. The Rhino RH system eliminates the extra rathole cleanout run.

Dual hydraulically actuated reamers, RSS, and PDC drill bit

The Rhino RHE dual-reamer system comprises a Rhino XS* hydraulically expandable reamer for hole enlargement while drilling, a near-bit Rhino XC* on-demand hydraulically actuated reamer, and a PowerDrive* rotary steerable system (RSS) paired with a customized PDC bit from Smith Bits, a Schlumberger company.

The Rhino XC on-demand reamer, which is operated in passive mode during the drilling phase, has cement cleanout cutter blocks with a minimum number of cutters on the gauge surface that are passive when retracted during normal drilling mode.

The Rhino RHE dual-reamer system comprises a Rhino XS reamer, a near-bit Rhino XC on-demand reamer, and a PowerDrive RSS paired with a customized PDC bit.

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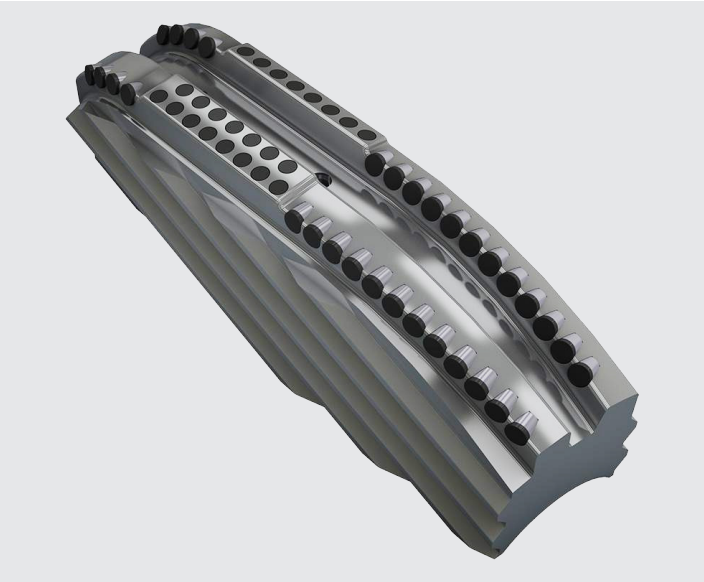

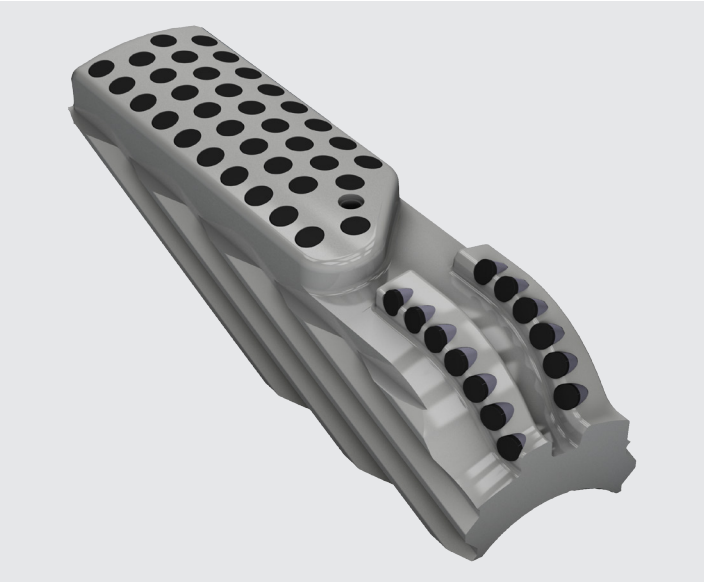

The Predator cutter block (left), which is positioned on the upper Rhino XS reamer, features an active gauge cutting structure, while the near-bit Rhino XC cement cleanout block (right) features a passive gauge cutting structure.*

Upon reaching TD, the BHA is tripped back to the depth where the Rhino XC reamer would be above the pilot hole that was enlarged by the Rhino XS reamer. The pumps are cycled to activate the Rhino XC passive reamer blocks, and then the rathole enlargement while drilling process starts.

Modeling for optimized rathole enlargement

The i-DRILL* engineered drilling system design models the drilling system to determine optimal reamer placement and surface operating parameters. The directional response of the PowerDrive RSS is also modeled to ensure that placement of the Rhino XC reamer does not interfere with the directional capabilities of the RSS.

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