

ProMILL

Trip-saving milling and underreaming system

APPLICATIONS

- Plug-and-abandonment (P&A) operations requiring rock-to-rock isolation
- Remediation of annulus cement to remove microannuli, channeling, and other potential barrier failure modes
- Extended-length section mill window
- High-ratio opening underreaming

BENEFITS

- Saves rig time by setting a bridge plug, milling, and underreaming in one trip
- Ensures full-gauge boreholes per P&A program requirements
- Enhances operational efficiency and safety by eliminating barrier failure modes
- Provides better swarf quality, cleaning the hole faster and enabling higher ROP

FEATURES

- Integral bridge plug assembly enables setting a mechanical plug
- Section mill dressed with high-performance milling inserts with unique ridged profile provides better swarf quality
- Ball-drop activation system ensures that the high-ratio underreamer remains closed at all times during milling operations

The ProMILL* trip-saving milling and underreaming system combines a bridge plug assembly, section mill, and high-ratio underreamer in one single-trip solution, achieving rock-to-rock zonal isolation and preparing the foundation for an abandonment cement barrier. Performing operations in the same trip not only saves rig time but ensures a more predictable performance.

Compared with perf-and-squeeze methods, the ProMILL system eradicates all potential leak paths—including channeling, microannuli, and mudcake—from the abandonment barrier, enhancing annular remediation.

Efficient section milling with rock-to-rock isolation

Because a bridge plug assembly is integrated into the ProMILL system, a bridge plug can be set to isolate the lower part of the wellbore prior to the milling operation. A combination of right-hand rotation and overpull is applied to position this mechanical barrier at the desired depth.

The ProMILL system section mill is ideal for milling casing to set rock-to-rock well abandonment cement plugs. All cutter arms are dressed with high-performance ridged milling elements. The high-performance ridged insert enables high-quality milling performance. This unique insert geometry, designed with a concave pattern and a narrow leading edge, improves durability and stabilization, resulting in superior hole cleaning and swarf quality.

As pump pressure is applied, three cutter arms expand and begin the cutout. When the lead arms are partially open, three additional cutter arms automatically expand into the milling position using a cam and ramp interface. The shorter lead arm opens slightly ahead of the longer follow arms, providing maximum force for the cutout. When all the arms are fully expanded, they are locked in position as long as a minimum pressure drop across the tool is maintained. All six cutting surfaces are then squarely seated on top of the casing for optimal milling.



ProMILL system.

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Effective borehole enlargement fully controlled from surface

The ProMILL system high-ratio underreamer is specially designed to provide well abandonment integrity. The high-ratio underreamer features ball-drop activation, which ensures that the underreamer remains closed during the entire milling operation.

Once the window is milled, the BHA is repositioned with the underreamer at the top of the window. Then, a ball is dropped from surface to activate the tool. The section can then be underreamed completing the operation.

Circulating and mud conditioning

Operations are further enhanced with a ball-activated drilling circulating valve, which helps boost circulation to remove cuttings at strategic points in the drillstring. It enables conditioning or displacing wellbore fluids at high flow rates and bypasses sensitive bypassing sensitive downhole BHA tools with lost-circulation or wellbore-strengthening treatments and a simple, single-ball open-close functionality.

Specifications	Tool Series 5500	Tool Series 8000	Tool Series 11700
Casing sizes, in	7, 6 ⁵ / ₈	10 ³ / ₄ , 9 ⁵ / ₈ , 8 ⁷ / ₈	14, 13 ³ / ₈
Underreaming opening sizes, in	13 ¹ / ₂ , 9 ³ / ₄	20, 15, 13 ¹ / ₂	22, 20
Underreamer casing scraper arm sizes, in	8 ¹ / ₂	12 ¹ / ₄	na

na = not applicable