

K-Master

Section mill

APPLICATIONS

- Milling poorly cemented or corroded casing
- P&A operations requiring rock-to-rock isolation

ADVANTAGES

- Single-trip milling when combined with high-ratio underreamer
- High-performance ROP and hole cleaning during milling operations
- Integration with Schlumberger underreamer systems for virgin formation exposure
- Engineered milling technology based on lab analyses comparing cutter performance with casing metallurgy
- Downhole modeling using i-DRILL* engineered drilling system design to obtain a dynamic BHA analysis
- Optional titanium-based blade treatment for section milling of chrome alloy tubulars

Economical milling, sidetracking, and single-string pipe cutting

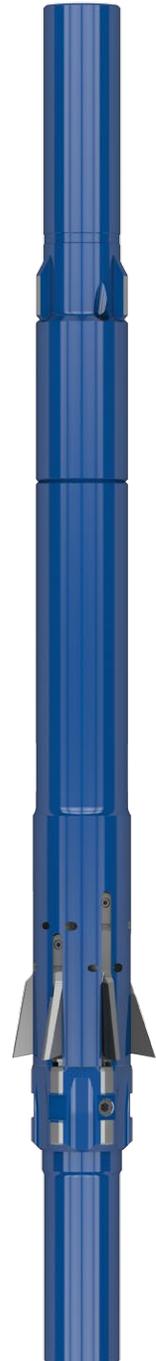
The K-Master section mill is a hydraulic downhole tool ideal for milling casing to set rock-to-rock well abandonment cement plugs. All cutter arms are dressed with tungsten carbide inserts that, along with the multiblade design, provide maximum footage and high ROP. When combined with the high-ratio underreamer, the K-Master mill provides a single-trip milling system to ensure that rock-to-rock isolation is attainable.

Multiple cutter arms for optimal milling performance

As pump pressure is applied, three cutter arms expand and begin the cutout. When the cutout arms are fully 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, the cam reaches a flat interface, locking the knives open as long as a minimum pressure drop across the tool is maintained. All six cutting surfaces are then squarely sealed on top of the casing for optimum milling performance.

Each cutter knife incorporates chip-breaker ridges, and the continuous chip-breaker design generates steel cuttings with a size and shape that will not accumulate and block flow. These cuttings can easily be circulated out of hole, requiring a minimum of specialized mud conditioning. Designed using the IDEAS* design platform, the milled casing shavings are engineered to minimize the size for optimal hydraulics without sacrificing milling speed.

As part of the IDEAS platform, a database of casing material catalogs the cutter performance and casing metallurgy to provide a clearer understanding of optimal milling performance and parameters. The IDEAS platform results are used to calibrate the i-DRILL system design, a dynamic simulation analysis tool.



Three cutter arms automatically expand into the milling position when the K-Master mill cutout arms are fully open.

K-Master

Cutter position indicator

The K-Master mill is equipped with a Flo-Tel* downhole mechanical position indicator that provides a surface signal to notify the operator when the cutout is completed. This signal indicates that the cutting arms have extended to full sweep to ensure that the mill is not skimming the pipe. Section milling can then begin for the required interval.

Integrated components

Section mills require a guide mill that is run below the tool. An integral bladed stabilizer is also run below the mill to further enhance stabilization. The guide mill and stabilizer are usually sized at the nearest 1/8 in under the drift diameter of the casing.

A float valve is recommended to run above the section mill. The float valve prevents cuttings from entering the section mill and blocking the piston orifice while making a connection or when the pumps have to be shut down.

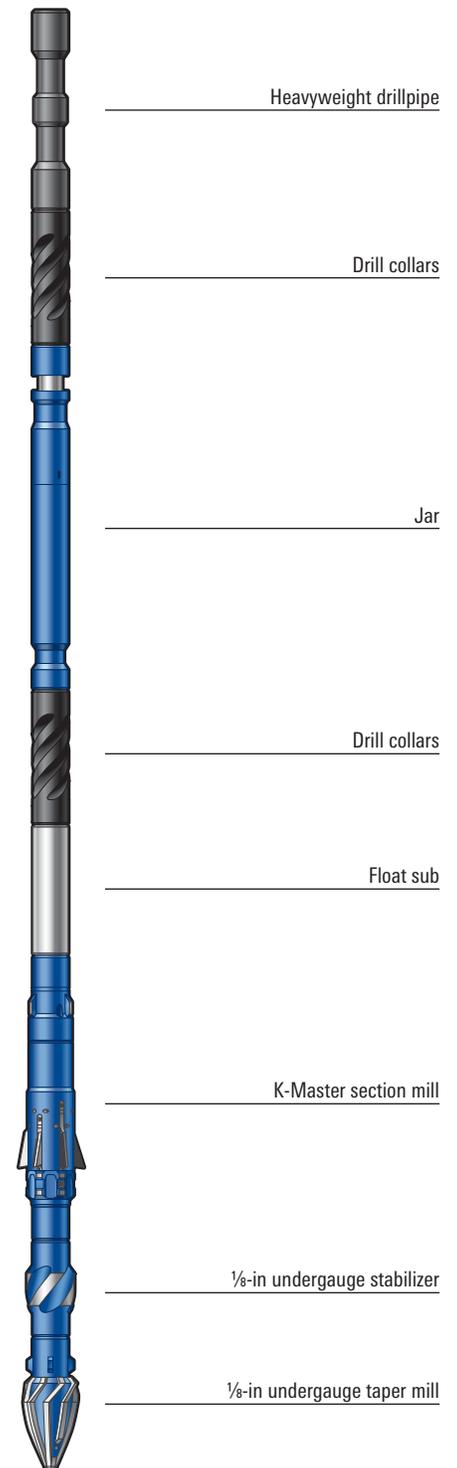
Shock tools, which are recommended for longer section milling intervals, help prolong the life of the section mill knife.

An optimized milling fluid from M-I SWACO, a Schlumberger company, provides maximum hole-cleaning performance.

K-Master Specifications

Tool Series	Casing Sizes, in	System No.
Section Mill System 3600	4½	80027292
Section Mill System 4500	5½	80029847
Section Mill System 5500	7, 7¾	80029848
Section Mill System 8200	9¾	80027276
Section Mill System 11700	13¾, 16	80029849

Note: Standard and API regular pipe connections. Other connections are available upon request.



BHA incorporating K-Master section mill, taper mill, and stabilizer.

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Schlumberger