

PRIME Cleanout

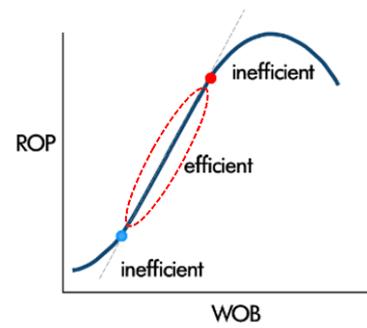
Part of the PRIME digital electro-hydraulic intervention technology platform.



Critical to optimizing rotational based wellbore cleanout operations is the ability to provide the required parameters of torque, weight on bit (WOB) and RPM combined with a specifically designed bit and auger system, in turn delivering optimized rate of penetration (ROP) throughout the task at hand.



Also critical is the ability to monitor, control and adjust these parameters throughout the rotational based debris dislodge and debris collection exercise, to handle the often confronted variations in debris material type (e.g. scales, produced sands, asphaltenes, waxes, drilling muds - in solid, viscous slurry form) and deposition (e.g. partial or full bore, compacted or loose). With debris often accumulating in highly deviated sections of a wellbore, such parameter control is also required in this circumstance.



The PRIME Direct Drive Rotation (DDR) is a highly instrumented, high torque rotational device with real-time in-well monitoring, control, and adjustment capability.

	PRIME DDR 212	PRIME DDR 318
Tool body OD	2.5 in (63.5 mm)	3.307 in (84.00 mm)
Length	7.78 ft (2.37 m)	7.64 ft (2.33 m)
Pressure rating	15,000 psi (1,034 bar)	
Temperature rating	177 °C (350 °F)	

Built on a common tool architecture, the PRIME DDR is seamlessly integrated with the **PowerTrac**® PRIME Tractor which, in addition to providing efficient conveyance of the cleanout toolstring to task depth, also provides the required rotational anchor and the controlled WOB for bit advancement into the debris column in deviated wells.

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Further efficiency gains and risk reduction come from the back-reaming capability, enabled by on-demand switching between free-wheeling pullback and tractor-driven forward mode. This coupled with active stall control recovery allows highly efficient depth gain to target, minimising in-hole execution time. This is crucial when effectively “drilling” into a debris column while simultaneously accumulating the debris in collection chambers for removal from the wellbore.

Free-rolling Anchor



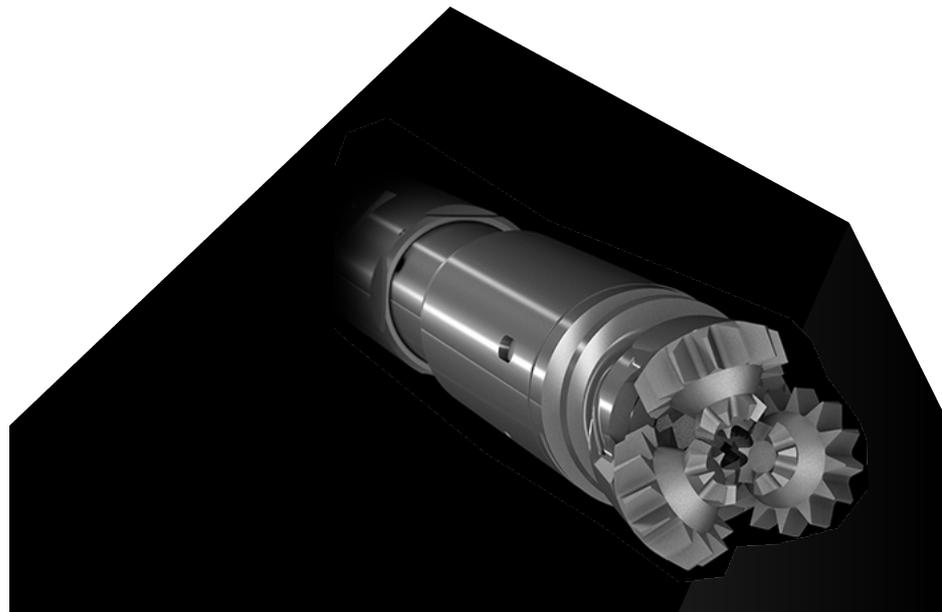
All Drive Section arms extended; wheels disengaged
– to provide rotational anchor for Milling service support

Driven Anchor



All Drive Section Arms extended; only lower wheels engaged
– to provide rotational anchor with driving force for Milling WOB

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The **PrecisionCollector** is a robust, full system cleanout technology that can remove a wide range of debris types in varying well conditions. It mills, agitates and dislodges the debris downhole, collecting and retaining it in debris chambers for transportation out of hole. It is run in combination with **PowerTrac**[®] for anchoring and providing weight on bit, coupled with a Direct Drive Rotation (DDR) device to generate the required rotational force.

Applications

- Removal and collection of a wide range of wellbore debris:
 - Unconsolidated (e.g. proppants, sand)
 - Consolidated (settled barites, hard scale)
 - Vicious (asphaltenes, waxes)
- Effective in wells where circulation for cleanout is not recommended or not possible
- Can be used in vertical to horizontal wellbores

Features

- Highest solids recovery content per collected volume of debris
- Archimedes mechanical collection mechanism – no pump or circulation required
- Mechanical interaction and friction separates debris from fluid, rather than filtration
- Customisable bottom hole assembly (BHA) with operational flexibility depending on debris in well
- Real-time monitoring of key milling parameters; weight on bit (WOB), bit speed, vibration

Benefits

- Provides loosening, collection and recovery of debris to surface in one run
- Best technology option if debris composition and consistency is unknown or varying
- Operates in wet and dry environments
- Precise, cost effective and low risk wellbore cleanout service
- Light on logistics, footprint, personnel and time

	PrecisionCollector 250	PrecisionCollector 350	PrecisionCollector 380	PrecisionCollector 450
Tool body OD¹	2.50 in (63.5 mm)	3.50 in (88.9 mm)	3.8 in (96.5 mm)	4.5 in (114.3 mm)
Typical bit types used	PrecisionRockBit			
Recommended minimum bit size OD	≥ 2.625 in	≥ 3.625 in	≥ 3.925 in	≥ 4.625 in
Capacity per collection chamber OD	2.36 litres (0.62 gallons)	5.16 litres (1.36 gallons)	5.8 litres (1.53 gallons)	9.4 litres (2.48 gallons)
Makeup length single collection chamber	3.6 ft (1.10m)	3.9 ft (1.19m)	3.9 ft (1.19m)	3.9 ft (1.19m)
"Example" configuration capacity^{2,3}	11.8 litres (3.12 gallons)	25.8 litres (6.82 gallons)	29.0 litres (7.66 gallons)	47.0 litres (12.42 gallons)
"Example" configuration total makeup length^{2,4}	19.4 ft (5.91 m)	21.8 ft (6.65 m)	21.8 ft (6.65 m)	21.8 ft (6.64 m)
System pressure rating	15,000 psi (1,034bar)			
System temperature rating	177 °C (350 °F)			

¹ Tool OD only (not PrecisionRockBit OD).

² The data is for an example configuration of 5 collection chambers. Max. chamber quantity is limited by wellsite rig-up height.

³ Excludes volume in bottom section for all sizes and top section for 350, 380 and 450.

⁴ Length includes collection chambers. Does not include length of PrecisionRockBit, Direct Drive Rotation, **PowerTrac**[®] and accessories.

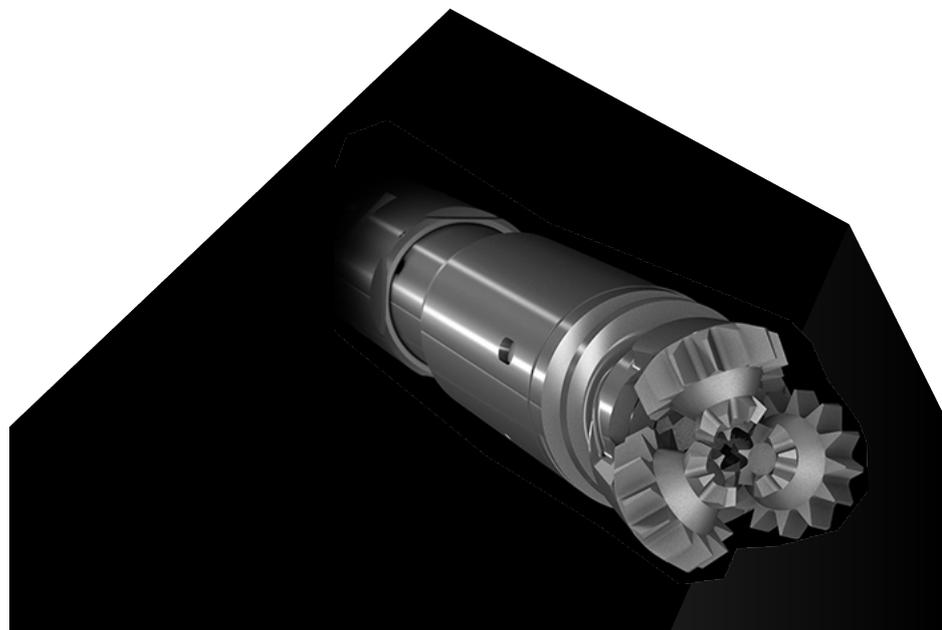
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An additional capability offered by PRIME platform's instrumentation communication bus embedded within the toolstring infrastructure is the addition of a connected fill indicator device. Integrated into the fluid exit sub of the top debris collection chamber, this device provides real-time indication of when the collection chamber string is full of debris. This elevates the operational certainty and efficiency gains to the PrecisionCollector's debris collection process, eliminating unnecessary collection time and pulling out of hole with a partially full chamber string. In addition to the obvious time savings, this feature minimizes the well exposure time of the debris collection phase, and in doing so considerably reduces the risk of the collection string getting stuck in the well.

The **PowerTrac**® PRIME Tractor and PRIME DDR's advanced power management, instrumentation, and real-time interaction takes eline deployed wellbore cleanout into a new performance envelope, while enabling more efficient and effective cleanout of large volumes of wellbore debris. The rotational torque and RPM of the DDR as well as tractor force and speed can be monitored and controlled simultaneously, in real-time, allowing parameter adjustments according to encountered conditions. Specifically, this means that the system can be operated either in (a) cleanout priority mode (similar to downhole drilling) in regions of significant debris deposits, or in (b) depth gain priority mode once a debris pocket has been passed, allowing fast forward movement of toolstring to target with active rotation. If new pockets of debris/debris bridges are encountered, the user can switch back to cleanout priority mode for debris removal, without accidentally forcing the bit into new debris in the well trajectory. Active stall control and seamless back-reaming capability allow easy wiper tripping while always maintaining rotation of the bit and auger.

The bits that make up the **PrecisionCollector** front end are of a tricone rock bit design. This bit design interacts well with the debris to loosen, crush, chop and grind it down, as required, allowing the material to be transported to the front auger and up into the collection chambers. Several key features of the bit design enables optimum interaction across the range of wellbore debris encountered, with minimal debris/bit contact area resulting in low bit interaction torque demand when dealing with hard debris. These bits are available in a number of sizes to complement the range collectors and standard completion types and dimensions within which the cleanout operation is to be carried out, but can also be custom built to specific wellbore requirements as needed.

Critical to an multi-run eline deployed wellbore cleanout operation is the orderly emptying of debris from the collection chambers once they have been brought to surface, plus the containment of that debris for final controlled disposal – this from an operational efficiency, safety and environmental perspective. With PRIME technology enabling increased chamber quantities deployed per run, and increased debris volume recovery per operation, surface handling becomes even more relevant. For that, a purpose built wellsite washout system is available.



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PRIME Release Sub System – The Release Sub System (RSS) has been developed to enable controlled release of stuck toolstrings. Multiple RSS's can be utilized, placed at the top of the toolstring or at relevant positions along its length enabling partial retrieval. The PRIME RSS has integrated PRIME node electronics, enabling full PRIME communication and in-well functionality to PRIME tools positioned below, and in-hole configurability for release parameters. It also provides real-time release status based on sensor reading and battery life measurement.

RSS release is activated by telemetry commands, voltage variation or memory timer mode, enabling controlled release even with damaged cable.

Applications

- Logging toolstrings in cased and open hole
- Tractor conveyance and Powered Mechanical Applications

Features

- Release energized through wireline or battery
- Extended battery life
- High torque design enabling usage with milling applications
- Real-time in-well configuration to adapt for changes in work scope

Benefits

- Can release even if cable is damaged
- QHSE; reduces personnel exposure to cable breakage at surface due to high overpull
- Improved operational efficiency; less runs, increased measurements per run
- More efficient retrieval/fishing due to clean fishing neck after release

	RSS 218	PRIME RSS 212	RSS 318
Tool body OD	2.125 in (54.00 mm)	2.5 in (63.50 mm)	3.125 in (79.38 mm)
Length	3.41 ft (1.04 m)	3.63 ft (1.10 m)	3.9 ft (1.19 m)
Min restriction ID	2.5 in (63.50 mm)	2.625 in (66.68 mm)	3.25 in (82.55 mm)
Pressure rating	15,000 psi (1,034 bar)		
Temperature rating	177 °C (350 °F)		
Fishing neck	1.38 in (35.1 mm)	1.75 in (44.5 mm)	1.75 in (44.5 mm)