

# ArmRdillo™ Wellbore Clean-Up System

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# Introducing the ArmRdillo™ Wellbore Clean Up System, an evolution of wellbore clean up technology

**The ArmRdillo™ Wellbore Cleanup System delivers benefits without compromise on wellbore cleaning efficiency and non-productive time. The system elements are modular and can be run individually or as a complete system for maximum well cleaning performance.**

## **BENEFITS**

### **Cost savings**

- Allows string rotation with reciprocation at the optimum rate to generate turbulent flow to clean the well faster
- High-flow circulation subs placed at strategic locations maximizes circulation rates to reduce chemical consumption and displacement time
- Combined trips such as drilling cement, inflow testing the liner and performing the wellbore clean-up in one operation

### **Increases Well Productivity**

- Properly executed wellbore clean-up removes fine debris which can block screens and pore throats reducing well productivity

### **Integrity**

- High strength tools are available with API or premium and high torque connections reducing the need for reduced strength crossovers

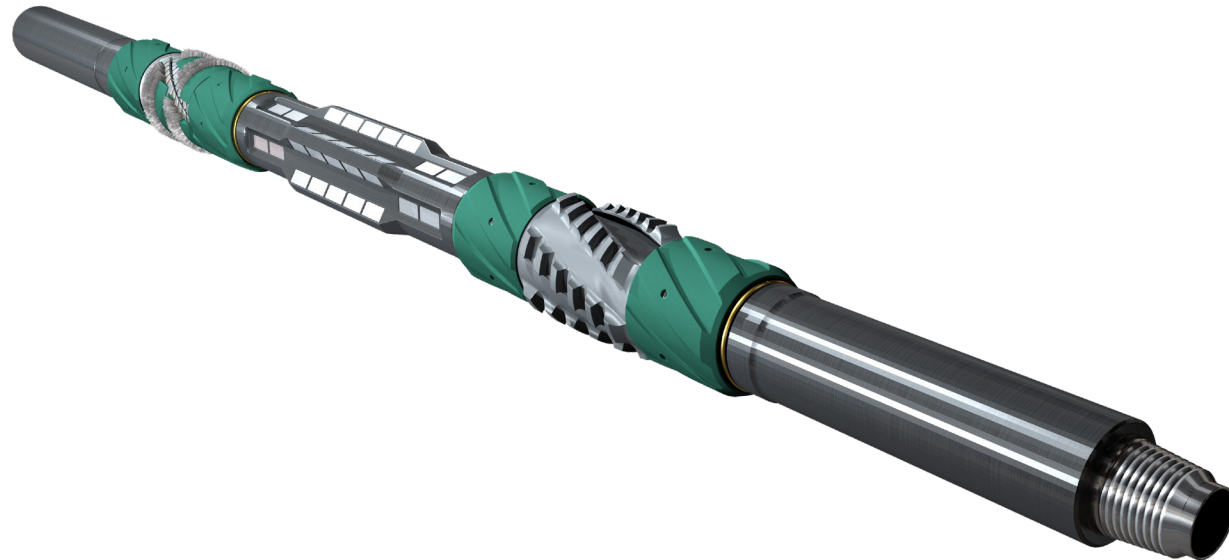
### **Reducing non-productive time during completion**

- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well
- Reduces premature failure of completion equipment by debris which can interfere with valves, electronics and other hardware

## **APPLICATIONS**

- Pre-completion wellbore clean-up operations to remove cement sheath, scale, mud solids, cuttings and other detritus from the wellbore
- Wellbore clean-up operations to remove ferrous debris including swarf, nuts, bolts, milled cuttings and perforation debris
- Extended reach or high angle wellbores using high torque or premium drill strings where the use of BHA's with lower strength API tool joints limits the maximum string torque
- Drilling casing cement plugs and cleaning the well in a single trip
- Remote locations where logistics are constrained and tool maintenance can be performed at the rig site

# CombRdillo™ Casing Scraper



The CombRdillo™, which incorporates Scraper, Magnet and Brush elements is a robust, full casing contact, free-rotating wellbore clean-up tool and can be run individually or modularly as part of the ArmRdillo Wellbore Clean-Up System.

## FEATURES

- Strong, self-sprung, single piece Scraper Broach machined from a single billet of steel with multiple rows of overlapping teeth
- Scraper Broach flexes to perfectly fit the casing ID, while being stiff enough to provide strong scraping force which ensures true 360° coverage where sprung pad scrapers cannot
- Multiple overlapping wire brush elements which provides 360° contact with the casing wall and generous fluid bypass area for circulation
- Magnetic ribs provide excellent bypass area and carrying capability, that can retain magnetic debris for retrieval to surface
- Four fluted Centralizer Rings provide centralization, bypass and protects the Functional elements
- Free rotating tool design with Internal Bearing Rings to prevent drill pipe, tool or casing wear
- No external bolts, clamps or fasteners that can come loose down hole
- Robust assembly method with multiple back-ups

## BENEFITS

### Cost Savings

- The ArmRdillo™ Wellbore Clean-Up System has incremental cost savings on logistics, deck space, inspection and maintenance and can also be serviced at the rig-site with basic hand tools, and reduces handling time on the drill floor.

### Increases Well Productivity

- A properly executed wellbore clean-up reduces fine debris which can block screens and pore throats reducing well productivity

### Integrity

- With a single piece mandrel the CombRdillo removes two connections, potential weak points in the string, that would be required when utilizing standalone tools.
- The ArmRdillo™ Wellbore Clean-Up System can be provided with any type of rig end connections including premium and high torque connections reducing the need for reduced strength crossovers

### Reducing NPT

- Reduced tripping time when pulling out of hole
- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well
- Reduces premature failure of completion equipment by debris which can interfere with valves, electronics and other hardware

## APPLICATIONS:

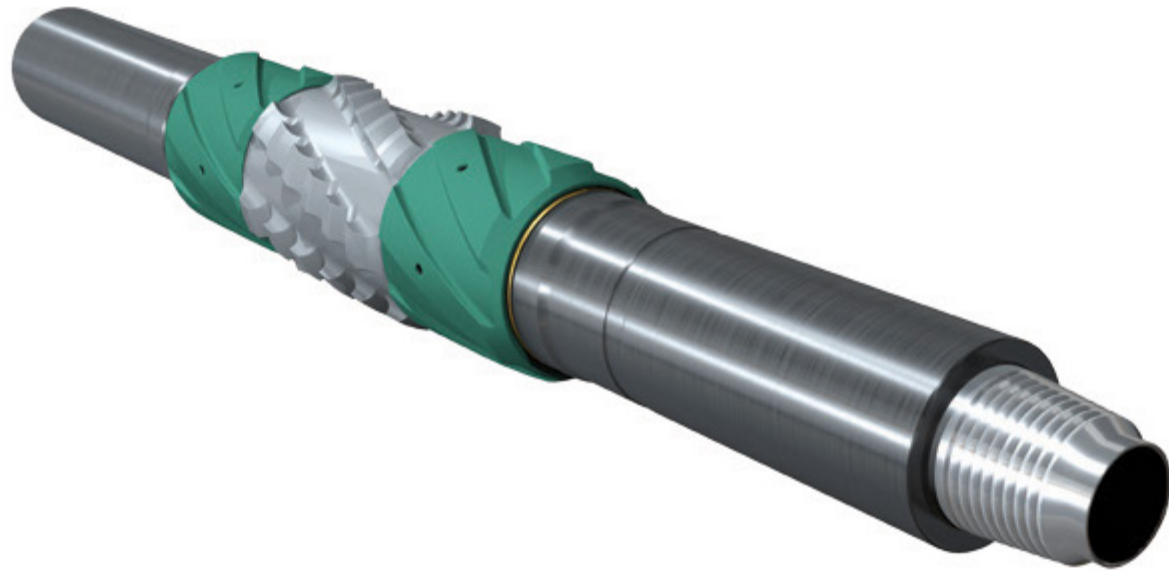
- Pre-completion wellbore clean-up operations to remove hardened cement sheath, scale, mud solids, cuttings and other detritus from the casing wall
- While tripping or circulating, the CombRdillo™ attracts ferrous debris from the wellbore and captures it for removal at surface
- Extended reach wells where high strength drill pipe connections are required
- Land wells with lower operating rig costs
- Remote locations where logistics are constrained and tool maintenance can be performed at the rig site
- Heavy duty milling operations, fishing and workovers can be performed with the CombRdillo in the string

## OPERATIONAL

- Running in hole, the teeth of the CombRdillo™ Scraper and Brush element simultaneously cleans the casing wall removing cement sheath whilst the Magnetic Elements attracts ferrous debris from the wellbore and captures it for removal at surface
- Cement plugs can be drilled inside the casing as required
- The CombRdillo™ is reciprocated across critical depths to remove hardened cement sheath and other debris
- During displacement the drill string can be rotated and reciprocated to improve hole cleaning without limitation



# RazRdillo™ Casing Scraper



The RazRdillo™ Casing Scraper is a robust, 360° contact, free-rotating wellbore clean-up tool and can be run individually or modularly as part of the ArmRdillo™ Wellbore Clean-Up System. The RazRdillo™ Casing Scraper can be adapted to suit any casing size and drill pipe combination.

## FEATURES

- Strong, self-sprung, single piece Scraper Broach machined from a single billet of steel with multiple rows of overlapping teeth
- Scraper Broach flexes to perfectly fit the casing ID, while stiff enough to provide strong scraping force which ensures true 360° coverage where sprung pad scrapers cannot
- Two fluted Centralizer Rings provide centralization, bypass and protects the Scraper Broach
- Free rotating tool design with Internal Bearing Rings to prevent drill pipe, tool or casing wear
- Can be quickly assembled redressed on location with simple hand tools
- No external bolts, clamps or fasteners that can come loose down hole
- Robust assembly method with multiple back-ups

## BENEFITS

### Cost saving

- The ArmRdillo™ Wellbore Clean-Up System has incremental cost savings on logistics, deck space, inspection and maintenance and can also be serviced at the rig-site with basic hand tools

### Increases Well Productivity

- A properly executed wellbore clean-up reduces fine debris which can block screens and pore throats reducing well productivity

### Integrity

- High strength mandrel with no internal connections for strength and reliability
- Available with any proprietary high strength connections eliminating the need for crossovers which reduce string integrity

### Reducing Non-Productive Time

- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well
- Reduces premature failure of completion equipment by debris which can interfere with valves, electronics and other hardware

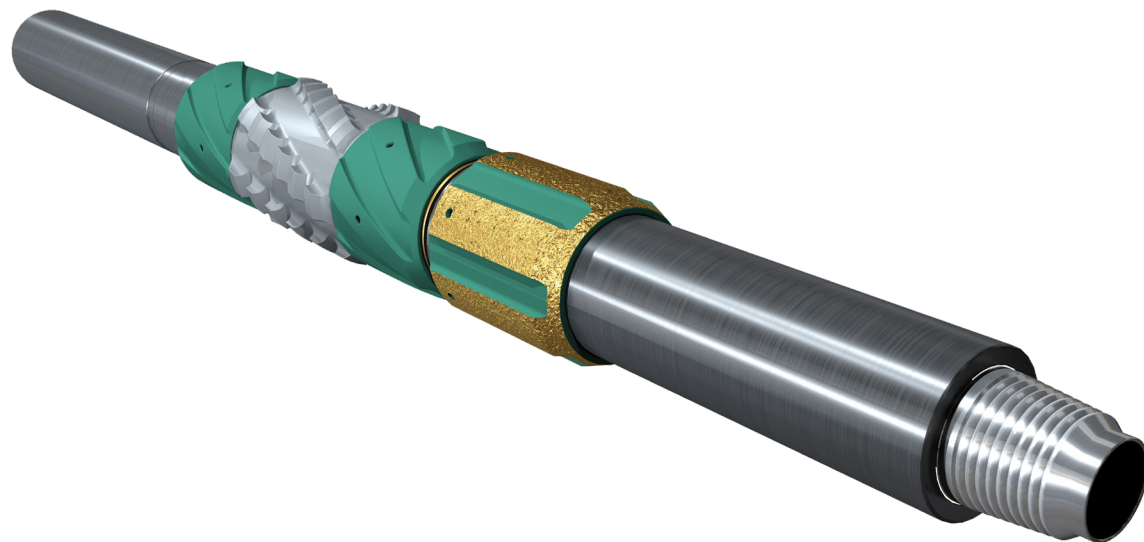
## APPLICATIONS

- Pre-completion wellbore clean-up operations to remove hardened cement sheath, scale, mud solids, cuttings and other detritus from the casing wall
- Typically run as a compliment to the ScourRdillo™ Casing Scraper for superior hole cleaning
- Drilling casing cement plugs in a single trip
- Extended reach wells where high strength drill pipe connections are required
- Remote locations where logistics are constrained and tool maintenance can be performed at the rig site
- Short tripping where multiple tools need to be run on the same string

## OPERATIONAL

- While running in hole, the teeth of the RazRdillo™ Scraper Broach scrapes the casing wall removing cement sheath and other debris
- Cement plugs can be drilled inside the casing as required
- The RazRdillo™ is reciprocated across critical depths to remove hardened cement sheath and other debris
- During displacement the drill string can be rotated and reciprocated to improve hole cleaning without

# MunchRdillo™ Scraper Milling Tool



MunchRdillo™ Scraper Milling Tool is a robust, 360° contact, free-rotating wellbore clean-up tool which incorporates an Heavy Duty Cement Mill securely attached to an Integral Tool Mandrel and can be run individually or modularly as part of the ArmRdillo™ Wellbore Clean-Up System. The MunchRdillo™ can be adapted to suit any casing size and drill pipe combination.

## FEATURES

- Strong, self-sprung, single piece Scraper Broach machined from a single billet of steel with multiple rows of overlapping teeth
- Scraper Broach flexes to fit the casing ID, while being stiff enough to provide strong scraping force which ensures true 360° coverage where sprung pad scrapers cannot
- Tungsten carbide cement mill is attached to the tool mandrel to mill cement and other debris
- Two fluted Centralizer Rings provide centralization and protects the Scraper Broach
- Free rotating tool design with Internal Bearing Rings to prevent mandrel, tool or casing wear
- Can be quickly assembled redressed on location or support base with simple hand tools
- No external bolts, clamps or fasteners that can come loose down hole
- Robust assembly method with multiple back-ups

## BENEFITS

### Cost saving

- Combines the functionality of the RazRdillo™ Casing Scraper with the ruggedness of an aggressive fixed blade string mill
- Milling of cement and scraping can be performed in a single trip saving rig time

### Integrity

- The ArmRdillo™ Wellbore Clean-Up System can be provided with any type of rig end connections including premium and high torque connections reducing the need for reduced strength crossovers
- Single piece mandrel with no internal connections for increased strength

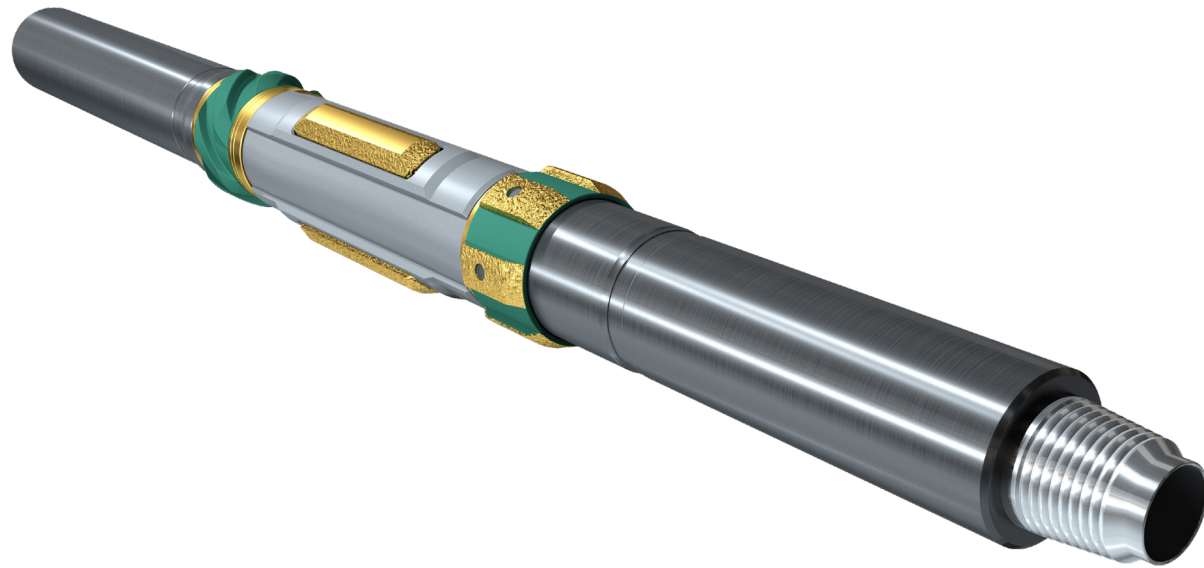
## APPLICATIONS

- Drilling hardened cement, and other accessories inside the wellbore in a single trip
- Pre-completion wellbore clean-up operations to remove hardened cement sheath, scale, mud solids, cuttings and other detritus from the casing wall
- Extended reach wells where high strength drill pipe connections are required
- Remote locations where logistics are constrained and tool maintenance can be performed at the rig site
- Short tripping where multiple tools need to be run on the same string

## OPERATIONAL

- While running in hole, the teeth of the MunchRdillo™ Scraper Broach scrapes the casing wall removing cement sheath and other debris
- Cement plugs and accessories can be drilled inside the casing as required following standard cement drilling practices and parameters
- The MunchRdillo™ mill breaks up any large cement pieces or debris that is carried past the tool into smaller more manageable pieces
- The MunchRdillo™ is reamed across the drilled out cement depths to remove any residual cement sheath in a single trip saving valuable rig time

# MillRdillo™ Deburring Tool



The MillRdillo Deburring Tool™ is a robust milling tool designed to safely mill hard inclusions on the casing inner diameter without causing damage. It can be run individually or modularly as part of the ArmRdillo Wellbore Clean-Up System.

## FEATURES

- 3 spring loaded milling blades dressed with tungsten carbide inserts
- The milling elements are fully disengaged from the main tool body to allow the workstring to be rotated without damaging the casing.
- Simple and reliable deactivation method using a dropped ball with double shear
- Free-rotating fluted Centralizer Ring provide centralization, bypass and prevents casing wear

## BENEFITS

### Cost Savings

- Allows dressing perforation burrs while performing the wellbore clean-up saving an additional trip in hole

### Increases Well Productivity

- Prevents damage to zonal isolation packers and production screens when running in hole

### Integrity

- Can be provided with any type of rig end connections including premium and high torque connections reducing the need for reduced strength crossovers

### Reducing NPT

- Mitigates premature lower completion failure

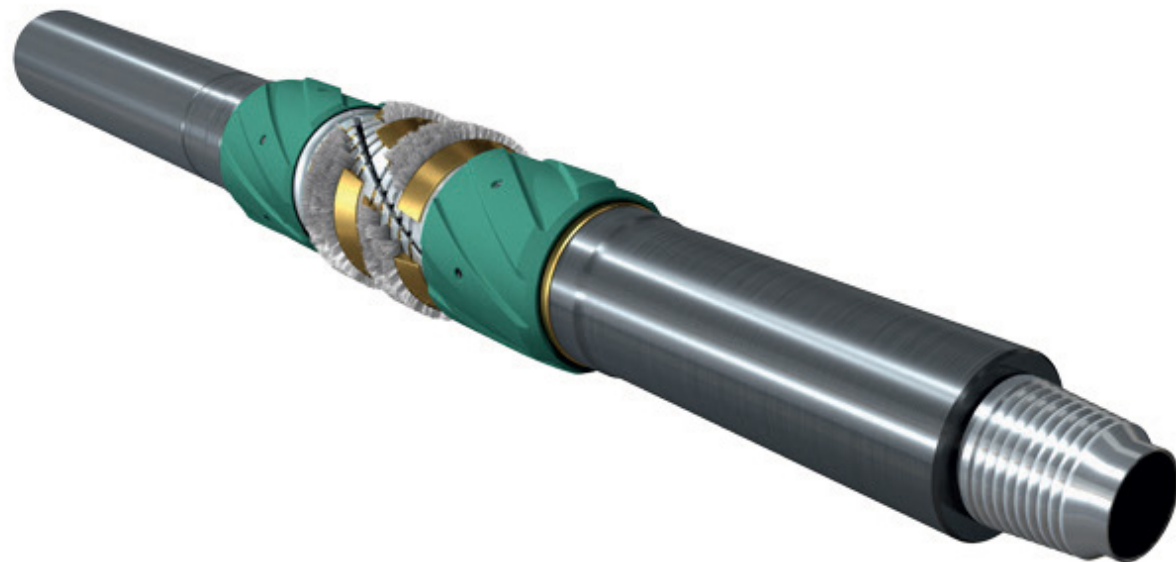
## APPLICATIONS:

- Features spring loaded milling blades which can be disengaged when required
- Designed to remove perforation burrs, milled out float equipment and other items which may not be removed normally by casing scrapers.
- Pre-completion wellbore clean-up operations where there is a requirement to remove perforation burrs such as
- Cased hole gravel packs
- Multi-stage fracs
- Zonal isolation
- Cleaning drilled out shoe tracks or cement equipment

## OPERATIONAL

- While running in hole, the milling element of the MillRdillo™ are locked rotationally to the tool body and can be rotated with the rest of the workstring
- Run in hole to the area of interest and ream the MillRdillo™ over the interval several times to remove any imperfections on the casing/liner wall
- Once the milling operation is complete drop the activation ball to disengage the milling blades
- The milling blades will no longer rotate with the workstring and the well can be cleaned up and displaced while rotating and reciprocating the string without damaging the casing.

# ScourRdillo™ Casing Brush



The ScourRdillo™ Casing Brush is a robust, 360° contact, free-rotating wellbore clean-up tool and can be run individually or modularly as part of the ArmRdillo™ Wellbore Clean-Up System. The ScourRdillo™ Casing Brush can be adapted to suit any casing size and drill pipe combination.

## FEATURES

- Multiple overlapping wire brush elements which provides 360° contact with the casing wall and generous fluid bypass area for circulation
- Two fluted Centralizer Rings provide centralization, bypass and protects the brush elements
- Free rotating tool design with Internal Bearing Rings to prevent drill pipe, tool or casing wear
- Can be quickly assembled redressed on location or support base with simple hand tools
- No external bolts, clamps or fasteners that can come loose down hole
- Robust assembly method with multiple back-ups

## BENEFITS

### Cost saving

- The ArmRdillo™ Wellbore Clean-Up System has incremental cost savings on logistics, deck space, inspection and maintenance and can also be serviced at the rig-site with basic hand tools

### Increases Well Productivity

- A properly executed wellbore clean-up reduces fine debris which can block screens and pore throats reducing well productivity

### Integrity

- The ArmRdillo™ Wellbore Clean-Up System can be provided with any type of rig end connections including premium and high torque connections reducing the need for reduced strength crossovers
- Single piece mandrel with no internal connections for increased strength

### Reducing Non-Productive Time

- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well
- Reduces premature failure of completion equipment by debris which can interfere with valves, electronics and other hardware

## APPLICATIONS

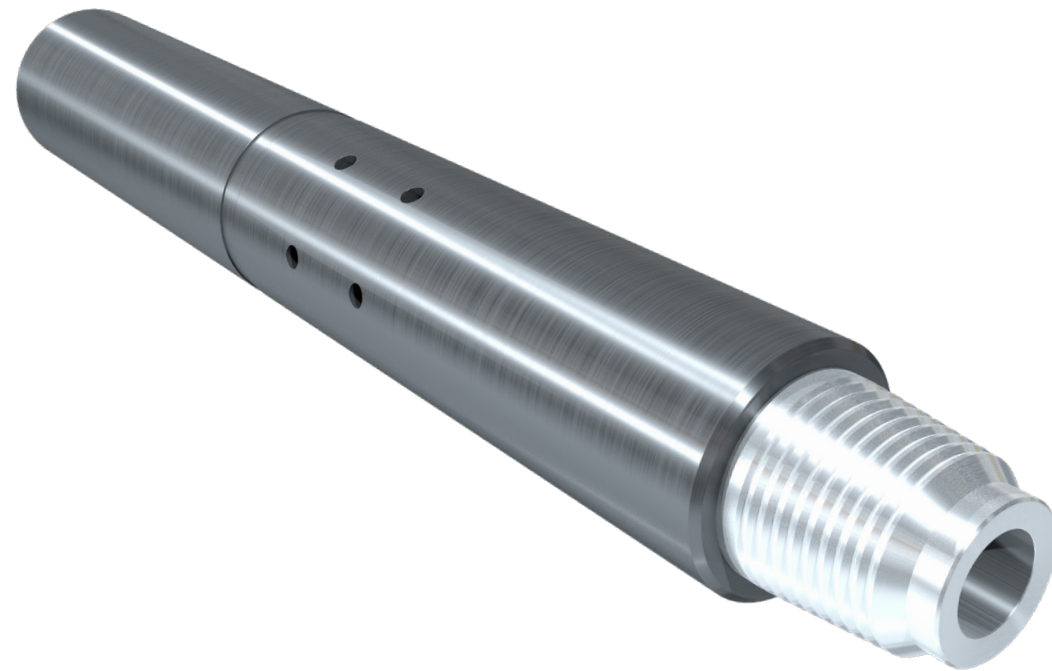
- Pre-completion wellbore clean-up operations to remove hardened cement sheath, scale, mud solids, cuttings and other detritus from the casing wall
- Typically run as a compliment to the ScourRdillo™ Casing Scraper for superior hole cleaning
- Drilling casing cement plugs in a single trip
- Extended reach wells where high strength drill pipe connections are required
- Remote locations where logistics are constrained and tool maintenance can be performed at the rig site
- Short tripping where multiple tools need to be run on the same string

## OPERATIONAL

- While running in hole, the Brush Elements of the ScourRdillo™ scour the casing wall removing cement sheath, scale and other debris
- Cement plugs can be drilled inside the casing as required
- The ScourRdillo™ is reciprocated across critical depths to remove cement sheath and other debris
- During displacement the drill string can be rotated and reciprocated to improve hole cleaning without fear of damage or wear of the casing, drill pipe or of the ArmRdillo™ Wellbore Clean-Up System



# Emergency By-Pass Sub



The Emergency By-Pass Sub is a robust and simple circulation tool that allows communication path from the drillstring to the annulus. Typically run as part of an ArmRdillo™ Wellbore Clean-Up System it is placed above filtration tools as an emergency bypass in the event of the filter tool plugging.

## FEATURES

- Single piece body with no internal connections
- Drop ball activated to open ports and prevent flow to the bit
- Shear rating can be changed to suit well conditions
- Large port TFA to allow high surface flowrates

## BENEFITS

### Cost Savings

- Allows communication between the drillstring and annulus in the event of swabbing, due to filter tool below, thereby protecting the well and prevent any fishing jobs in the event of a stuck string

### Increases Well Productivity

- A properly executed wellbore clean-up removes fine debris which can block screens and pore throats reducing well productivity

### Integrity

- Available with high torque connections to reduce the need for additional crossovers

### Reducing Non-Productive Time

- Prevents having to pump out of the well in the event of swabbing

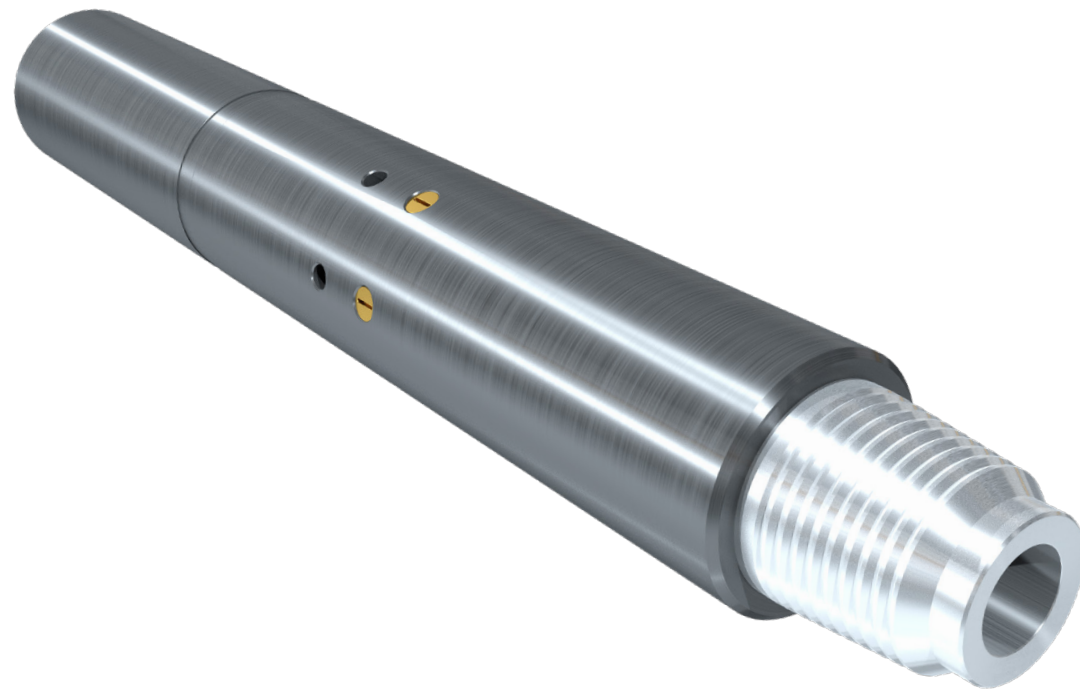
## APPLICATIONS:

- Run above the **XTractR™** WellBore Filter Tool during pre-completion displacement operations
- BOP & Wellhead Jetting whilst POOH with main cleanup string

## OPERATIONAL

- The Emergency By-Pass Sub is run as part of the main cleanup & displacement string
- If required to open a communication path between the string and the annulus drop the activation ball to the tool
- Pressure up on the ball to open the ports
- The tool ports will open to allow high circulation rates

# Packer Circulating Tool



The Packer Circulating Tool is run with open circulation ports to allow circulation above a packer and to auto-fill the string whilst RIH. When desired the ports can be closed to allow setting of the packer.

## FEATURES

- Single piece body with no internal connections
- Drop ball activated to close the ports
- Shear rating can be changed to suit well conditions
- Large port TFA to allow high surface flowrates

## BENEFITS

### Cost Savings

- Allows circulation between the drillstring and annulus whilst RIH with a packer to depth
- Auto-filling of the workstring reduces RIH time

### Increases Well Productivity

- Allows the well to be circulated whilst RIH to ensure first time deployment of the packer
- Allows effective displacement of debris that can hinder the deployment of the completion

### Integrity

- Available with high torque connections to reduce the need for additional crossovers

### Reducing Non-Productive Time

- Allows the lower completion / packer to be RIH first time
- Prevents premature setting of the packer

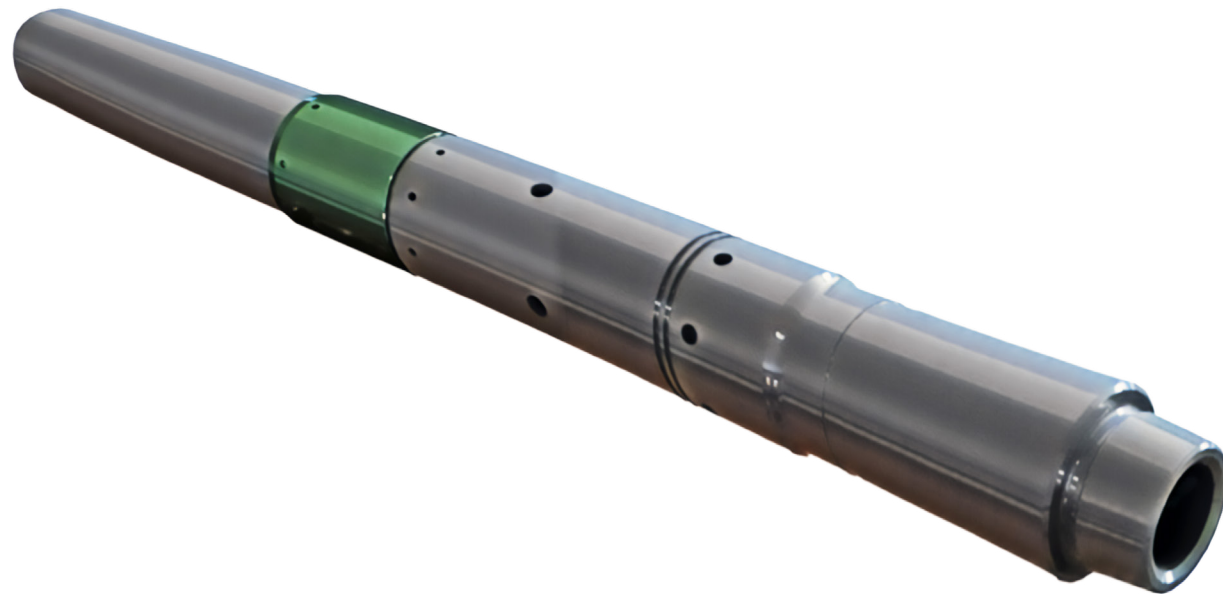
## APPLICATIONS:

- Allows fluid to exit the string above a Packer or other similar type tool
- Jetting, Circulating, Tripping Dry Pipe

## OPERATIONAL

- The **Packer Circulating Tool** is RIH as part of the packer landing string, with ports open
- When required to set the packer drop a ball to the tool
- Pressure up on the ball to close the tool ports
- Carry out the packer setting operations

# Single Opening Displacement Sub



The Single Opening Displacement Sub is a simple and effective tool designed to open communication ports between the drill pipe and the annulus to allow displacement of the well, then to reclose the ports to re-establish communication to the bit.

## FEATURES

- Single piece body with no internal connections
- Ball drop activated
- Shearing pressure can be controlled by adding or removing shear stock
- Generous circulation ports

## BENEFITS

### Cost Savings

- Reduces displacement times by opening flow paths at desired points in the wellbore

### Increases Well Productivity

- A properly executed wellbore clean-up reduces fine debris which can block screens and pore throats reducing well productivity

### Integrity

- Available with high torque connections reducing the need for reduced strength crossovers
- Single piece mandrel with no internal connections for increased strength

### Reducing Non-Productive Time

- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well
- Can be used to prevent the need to pump out of hole in the event of swabbing

## APPLICATIONS:

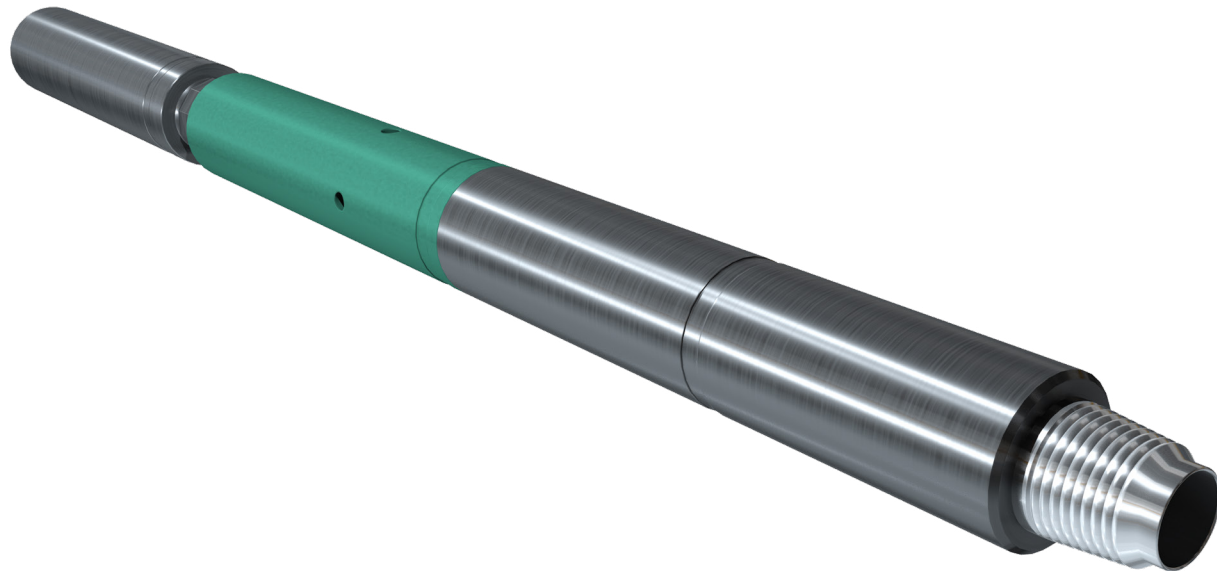
- BOP Jetting
- Running above Well bore Filter Tools
- Running above mud motors

## OPERATIONAL

- When required to be operated, a ball is pumped down to the SODS Single Opening Displacement Sub in a controlled manner
- Once on seat pressure is applied to shear the tool and open the external bypass
- 100% of the flow is now diverted through the ports to allow jetting or circulating
- To close the ports and re-establish circulation to the bit, a second operating ball is pumped down to the Single Opening Displacement Sub to shear the tool closed



# Weight Set Circulating Tool



The Weight Set Circulating Tool is a robust and simple circulating tool which can be opened and closed by string manipulation. It is typically run above a Liner Top to allow circulation of the casing above the liner. The Weight Set Circulating Tool is available to suit common casing and liner combinations.

## FEATURES

- Functioned by manipulating string weight without the use of darts or balls
- Can be opened and closed multiple times without limitation
- Shear ring is available with several shear ratings to suit requirements
- Can be used when milling or drilling before activation
- Robust splined drive system for torque transmittal
- Robust assembly method with back-ups
- Compatible with other ArmRdillo™ wellbore clean-up tools

## BENEFITS

### Cost savings

- The Weight Set Circulating Tool significantly reduces the time to displace wells by allowing the large casing above a liner to be displaced separately
- Reduces chemical consumption and brine filtration when used in combination with a well-engineered chemical displacement
- The WCT- Weight Set Circulating Tool can be opened and closed at exactly the right moment to accurately spot pills reducing waste volumes

### Increases Well Productivity

- A properly executed wellbore clean-up reduces fine debris which can block screens and pore throats reducing well productivity

### Reducing Non-Productive Time

- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well

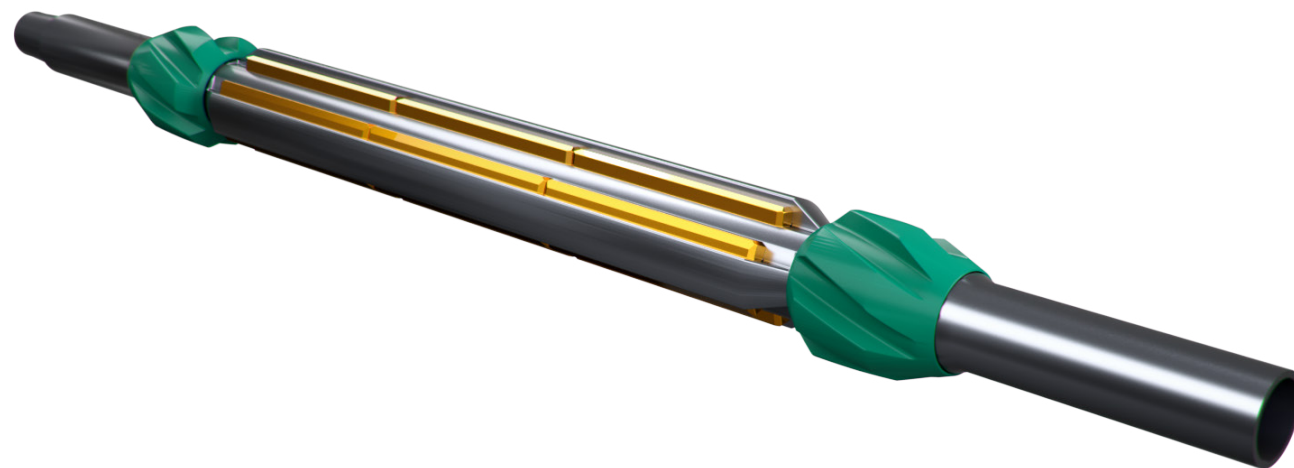
## APPLICATIONS

- Pre-completion wellbore clean-up operations which include a larger diameter casing and a smaller diameter liner

## OPERATIONAL

- The Weight Set Circulating Tool can be run independently or as part of a comprehensive wellbore clean-up string
- The Weight Set Circulating Tool is typically spaced out with a Liner Landing Sub or Top Dress Mill below it which engages a Liner Top in the wellbore. A smaller diameter drill string hangs below the tool which extends close to the bottom of the well
- While running in the hole, the string can be reciprocated and circulated to allow the scrapers and other tools to clean the critical depths
- When required the tool is sheared open by applying and maintaining string weight to allow circulation of the casing
- Chemical pills can be pumped to displace the liner and casing separately and more accurately than using conventional ball activated tools

# UltraMag™ HD Casing Magnet



The UltraMag™ HD Casing Magnet is a highly robust, high-capacity casing magnet with free-rotating upper and lower centralisers. It can be run individually or modularly as part of the OTL Wellbore Clean-Up System and can suit any casing size and drill pipe combination.

## FEATURES

- Three longitudinal ribs housing rows of high-strength and temperature resistant Rare Earth magnets
- Excellent bypass area and debris retrieval capability
- Debris is securely kept within the longitudinal ribs for retrieval at the surface
- Optional non-rotating Upper & Lower Centralizers providing centralisation and minimise casing and tool wear while improving magnet efficiency

## BENEFITS

### Cost savings

- UltraMag™ offers superior debris retrieval with fewer runs to clean your wellbore due to the design and increased length of the tool

### Increases Well Productivity

- A well-executed wellbore clean-up removes ferrous debris, which can block screens or interfere with sensitive downhole completions

### Integrity

- High-strength mandrel with no internal connections for strength and reliability
- Available with any proprietary high-strength connections eliminating the need for crossovers which reduce string integrity

### Reducing Non-Productive Time

- High-performance magnets are recognised for helping to reduce non-productive time during the completion of the well
- Reduces premature failure of completion equipment caused by debris which can interfere with valves, electronics and other downhole equipment

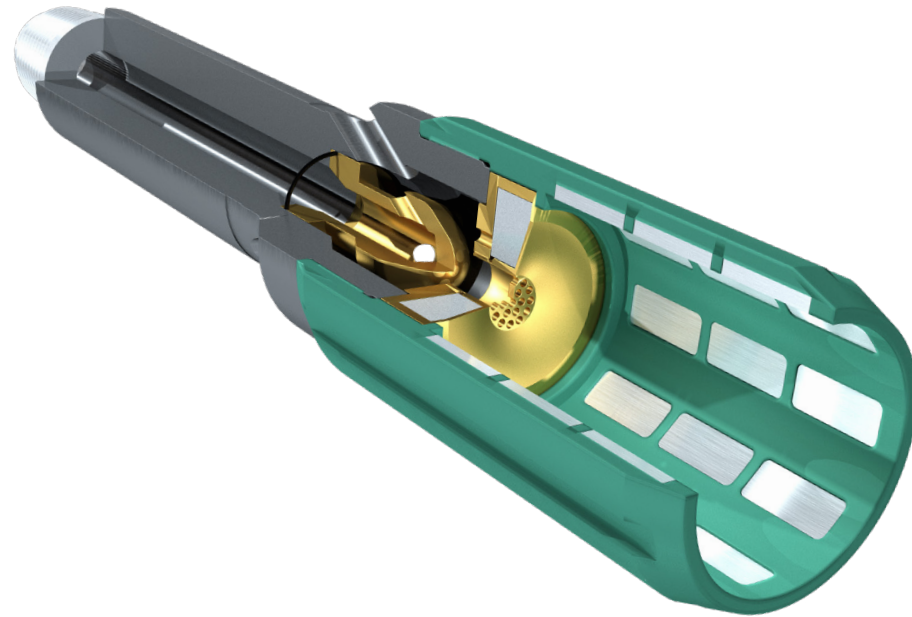
## APPLICATIONS

- While tripping or circulating, the UltraMag™ HD Casing Magnet attracts ferrous debris from the wellbore and captures it for removal at surface
- Heavy-duty milling/drilling operations, fishing and workovers can be performed utilising the UltraMag HD Casing Magnet in the string.

## OPERATIONAL

- The UltraMag™ HD Casing Magnet can be deployed immediately below the wellhead when jetting BOPs to capture any dislodged ferrous debris
- During displacement, the drill string can be rotated and reciprocated to improve hole cleaning without fear of damage or wear of the casing, drill pipe or UltraMag™HD Casing Magnet

# MAGVac Fishing Magnet



The MAGVac Fishing Magnet is a robust magnetic junk retrieval tool with reverse circulating technology that sucks junk into a magnetic overshoot for safe retrieval to surface.

## FEATURES

- Powerful rare earth magnetic arrangement
- Available 11.1/2", 8.1/2" & 5.3/4" OD sizes
- Integral venturi sucks debris into the magnet overshoot

## BENEFITS

### Cost Savings

- Novel magnetic overshoot increases the chances of successful junk catching to reduce trips, and return to the critical path

### Increases Well Productivity

- Allows effective capture of metallic debris that can hinder the operation of completion equipment

### Integrity

- Standard pin up connections compatible with standard bit subs with no need for additional cross overs

### Reducing Non-Productive Time

- Simple system that can be RIH on existing drillpipe to capture metallic debris that could hinder operation of completion equipment
- Reduces premature failure of completion equipment by debris which can interfere with valves, electronics and other hardware

## APPLICATIONS

- Retrieval of dropped objects, completions clamps or metallic debris
- Workovers to remove milled packers and plug debris

## OPERATIONAL

- The **MAGVac Fishing Magnet** is RIH on the end of conventional drillpipe to the area of interest with other ArmRdillo™ Wellbore Clean-Up tools above
- Once spaced out above the area of interest circulation is established to create the Venturi effect. The operator then slacks off slowly while pumping. Metallic debris is sucked into the magnet chamber and retained within the tool
- Once the area has been cleaned, if desired a circulation sub can be opened to allow high rate circulation above the tool to perform a displacement or chemical cleanup
- The **MAGVac Fishing Magnet** can be quickly emptied at surface to inspect contents and can be redeployed quickly if necessary



# MAXGrip High Strength Fishing Magnet



Introducing MAXGrip—Odfjell Technology's latest innovation designed to revolutionize wellbore debris retrieval and ensure smooth operations.

MAXGrip features a true flat bottom magnet equipped with high-strength magnets that guarantee complete contact with the fish, making debris retrieval from the wellbore effortless and highly effective.

## FEATURES

- Powerful rare earth magnetic arrangement
- Available 5.75", 8.3" and 12.10" OD sizes
- Excellent magnetic strength
- High-temperature resistance
- Large bypass ports are designed to facilitate the washing down over fish, helping with debris recovery
- Design supports complete disassembly, ensuring that all the parts can be maintained, inspected, and replaced to ensure 100% compatibility with all inspection criteria.

## BENEFITS

### Cost Savings

- A true flat-bottom magnet increases the likelihood of successfully retrieving debris and junk from the wellbore, reducing rig time and allowing a return to the critical path

### Increases Well Productivity

- This technology efficiently captures metallic debris that could disrupt drilling and completion operations.

### Completion

- Standard pin-up connections compatible with standard bit subs with no need for additional crossovers
- Design supports complete disassembly, ensuring that all the parts can be maintained, inspected, and replaced to ensure 100% compatibility with all inspection criteria.

### Reducing Non-Productive Time

- Simple system that can be RIH on existing drill pipe to capture metallic debris that could hinder the operation of completion equipment.
- Reduces premature equipment failure due to debris that can interfere with valves, electronics, and other downhole equipment

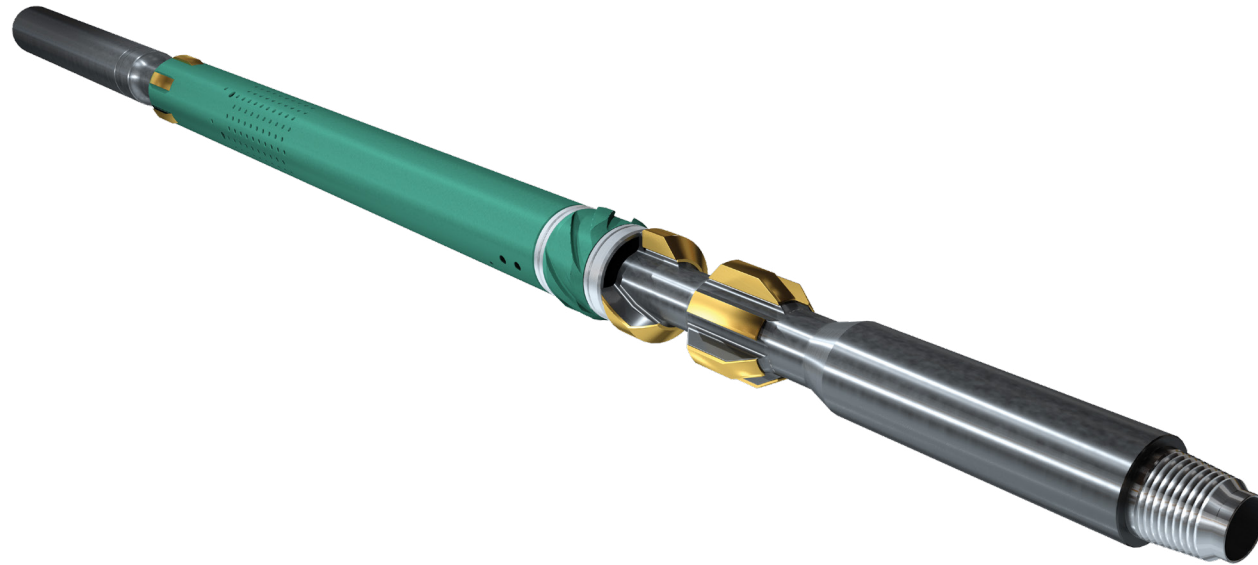
## APPLICATIONS

Crafted with precision and engineered to withstand the harsh drilling environment, MAXGrip exemplifies robustness and longevity, ensuring consistent, reliable performance across multiple operations.

MAXGrip is not just a tool; it is a revolutionary solution that greatly improves the retrieval of wellbore debris. Its innovative design, supported by high-strength magnets and unwavering reliability, makes it an essential asset in any fishing operation that requires debris retrieval.

Embrace the future of wellbore cleanup with MAXGrip. Experience smoother and more efficient debris retrieval, ensuring a cleaner, more productive wellbore environment. Elevate your operations with MAXGrip by Odfjell Technology.

# PiRanha™ Junk XTractR™



The PiRanha™ Junk XTractR™ is a robust, free-rotating wellbore clean-up tool and can be run individually or modularly as part of the ArmRdillo™ Wellbore Clean-Up System. The PiRanha™ Junk XTractR™ is designed to mill up and remove junk from the wellbore which could damage downhole equipment.

## FEATURES

- Robust Single Piece Mandrel
- Fluted free-rotating Centralizer Rings provide centralization and prevents casing wear
- Fixed bladed mill and junk scoop with tungsten carbide inserts and large single entry
- Large capacity junk barrel
- Secondary boot basket capture debris in the annulus above the tool
- Free rotating tool design to prevent drill pipe, tool or casing wear
- Can be quickly assembled redressed on location with simple hand tools
- No external bolts, clamps or fasteners that can come loose down hole

## BENEFITS

### Cost savings

- Field serviceable at the rig-site with basic hand tools
- Removes harmful junk preventing premature failures

### Integrity

- Available with high torque connections reducing the need for reduced strength crossovers
- Single piece mandrel with no internal connections for increased strength

### Reducing Non-Productive Time

- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well
- Reduces failure of completion equipment by debris which can interfere with valves, electronics and other hardware

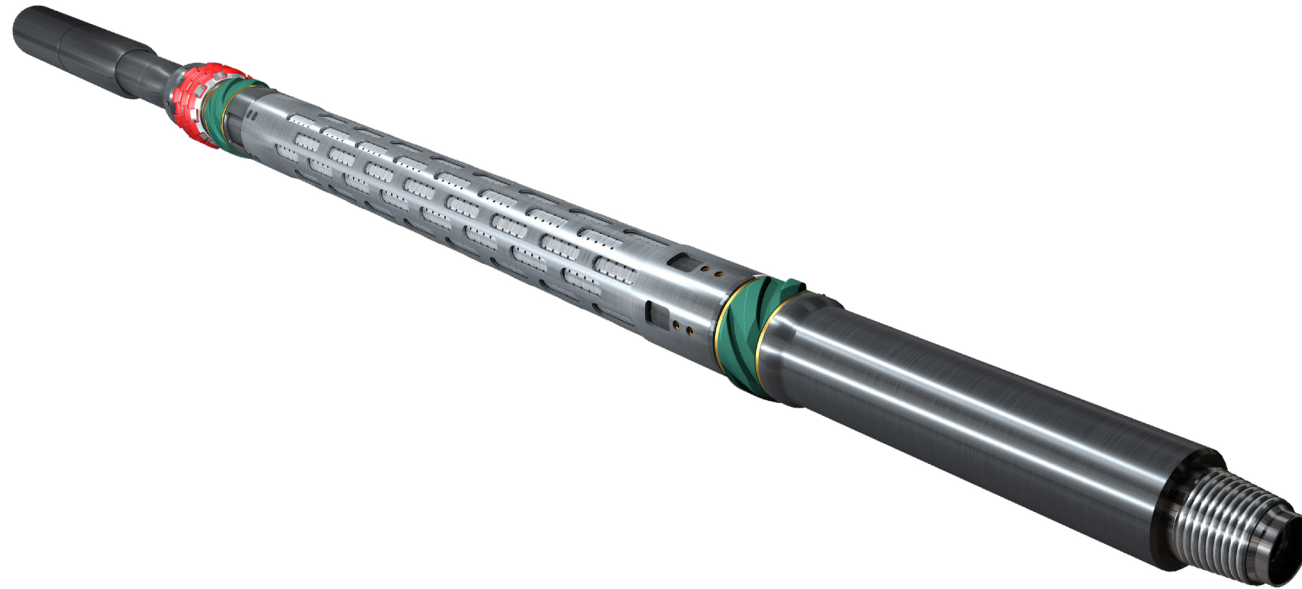
## APPLICATIONS

- Pre-completion wellbore clean-up operations when junk is known to be present in the wellbore
- Milling or heavy workover operations to remove junk and debris
- Cement and accessory milling

## OPERATIONAL

- The PiRanha™ Junk XTractR™ can be run as part of junk milling assembly or part of the pre-completion wellbore cleanup when junk known to be present in the wellbore
- The PiRanha™ Junk XTractR™ can be placed above a MunchRdillo™ Scraper Milling Tool and UltraMag™ HD Casing magnet.
- While running in hole or circulating fluid enters the large single entry port or bypasses around the outside of the tool
- While rotating the fixed blade carbide mill breaks up any junk and the junk scoop introduces the junk into the junk barrel
- Junk which is circulated past the outside of the tool can be caught in the regular boot basket located at the top end of the junk barrel
- The drill string can be rotated and reciprocated without fear of damage or wear of the casing, drill pipe or of the XTractR™ Wellbore Filter
- While pulling out of hole, the junk barrel boot basket captures additional debris from the wellbore
- The PiRanha™ Junk XTractR™ can be quickly emptied at surface to inspect contents and can be redeployed quickly if necessary

# XTractR™ WellBore Filter Tool



The XTractR™ Wellbore Filter is a robust, free-rotating wellbore clean-up tool and can be run individually or modularly as part of the ArmRdillo™ Wellbore Clean-Up System. The XTractR™ Wellbore Filter can be adapted to most common casing sizes and any drill pipe combination.

## FEATURES

- The Wiper Petal Element allows fluid to bypass whilst RIH and diverting all fluid through the filter when POOH
- Pop-off style Emergency Valve to prevent swabbing
- Quick Drain Ports allow fast emptying on the rig floor
- Shrouded Filter Screen can be customized with various mesh sizes
- Free rotating tool design to prevent tool or casing wear
- No external bolts, clamps or fasteners that can come loose down hole

## BENEFITS

### Cost Savings

- The ArmRdillo™ Wellbore Clean-Up System can be emptied at the rig-site with basic hand tools

### Increases Well Productivity

- The filter screen captures sands, junk and debris which can block pore throats, reducing well productivity

### Integrity

- Available with high torque connections
- Integral Emergency Valve provides anti-swabbing protection
- Validates the Wellbore Clean-Up

### Reducing NPT

- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well.
- Reduces premature failure of completion equipment by debris which can interfere with valves, electronics and other hardware

## APPLICATIONS

- Pre-completion wellbore clean-up operations to remove debris from the wellbore
- Wiping the casing to remove mud solids, pipe dope and other detritus from the casing wall
- Verify the condition of the wellbore after displacement
- Robust Mandrel with optional Integral Pup Joint

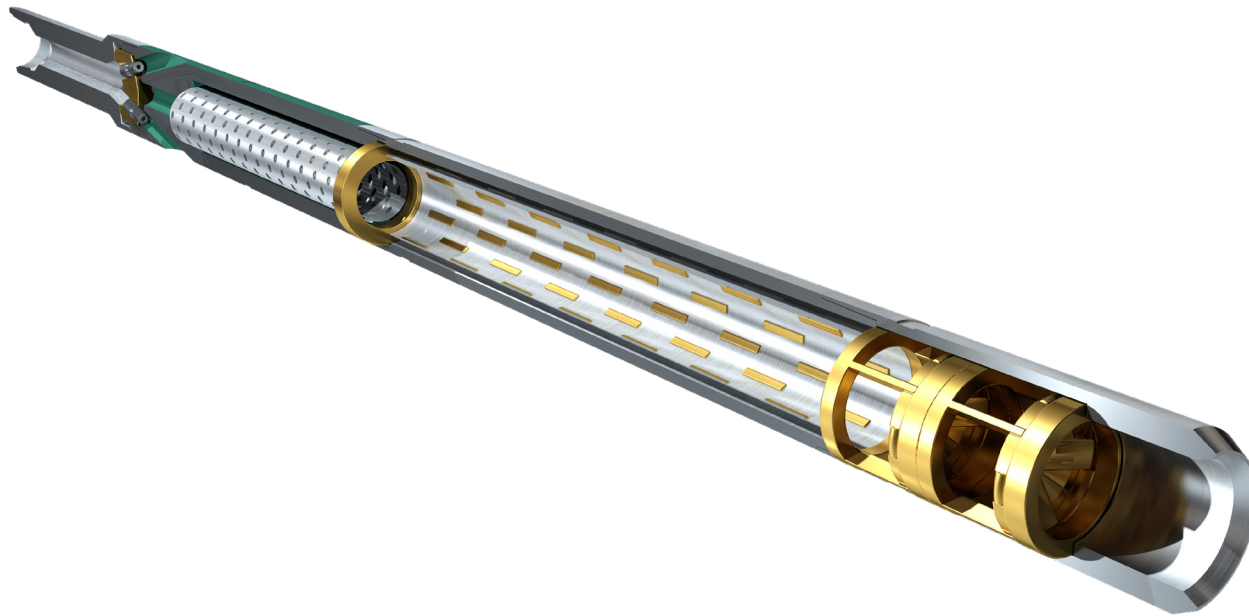
- Free-rotating Centralizer Rings provide centralization and prevent casing wear
- BOP Jetting to capture debris which would otherwise fall down hole

## OPERATIONAL

- The XTractR™ Wellbore Filter is placed above the scraper, brush and magnet tools
- While RIH or circulating, the Wiper Petal Element allows fluid to flow bypass the tool.
- The drill string can be rotated and reciprocated to improve hole cleaning without damage or wear of the casing or the XTractR™ Wellbore Filter
- When the the tool is POOH the Wiper Petal Element then diverts all fluid through the filter section to capture any debris
- In case the tool fills completely, the Emergency Valve opens to prevent swabbing
- With the XTractR™ Wellbore Filter below the wellhead, the BOP can be jetted and debris will be trapped inside the tool and can be retrieved at surface
- The XTractR™ Wellbore Filter can be quickly emptied at surface to inspect contents and can be redeployed quickly if necessary



# ARdVAC™ Venturi XTRactR™ Tool



The ARdVAC™ Venturi XTRactR™ Tool is a robust, Venturi type debris extraction tool which vacuums debris and junk from the wellbore. It can be deployed in most common casing or hole sizes and can be adapted to clean inside packer bores. It can be run individually or modularly as part of the ArmRdillo™ Wellbore Clean-Up System.

## FEATURES

- Available in 8-1/8" and 5-1/2" OD configurations with standard API connections
- Ant-eater extension tubes available in 3-1/2" and 2-7/8" OD
- Debris chambers can be easily extended for large cleanout jobs
- Dual flapper non-return valve safely retains debris
- Internal magnet sleeve captures ferrous debris
- Changeable jetting nozzles for high and low circulation options

## BENEFITS

### Cost Savings

- The ARdVAC™ Venturi XTRactR™ Tool efficiently removes junk and debris from the wellbore to quickly allow operations to resume
- Adaptable with standard wash pipe connections to reduce mobilization and inventory cost

### Increases Well Productivity

- A properly executed wellbore clean-up reduces fine debris which can block screens and pore throats reducing well productivity
- The filter screen captures sands, junk and debris which can block pore throats

### Reducing NPT

- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well
- Reduces premature failure of completion equipment by debris which can interfere with valves, electronics and other hardware

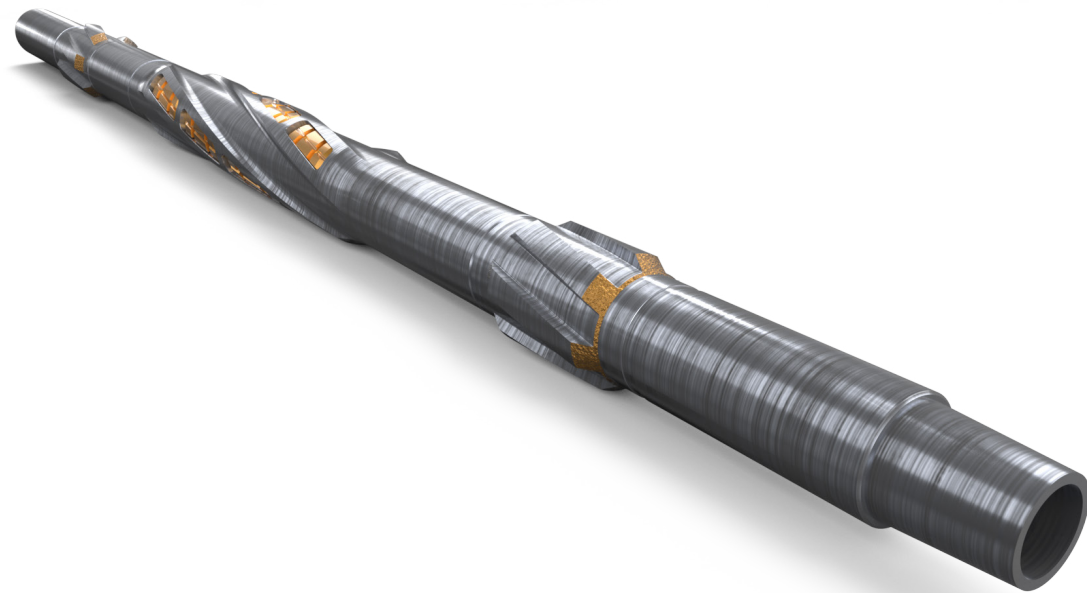
## APPLICATIONS:

- Pre-completion wellbore clean-up operations to remove debris from the wellbore which cannot be circulated out or removed by other methods
- Workovers to remove milled packers and plugs
- Removing sand and infill from production zones
- Cleaning inside packer bores and above FIV's
- BOP cleaning
- Fishing

## OPERATIONAL

- The ARdVAC™ Venturi XTRactR™ Tool can be run separately or as part of a comprehensive wellbore clean-up string including a circulation sub, scraper, brush or magnet tools
- Once spaced out above the area of interest circulation is established to create the Venturi effect. The operator then slacks off slowly while pumping. Debris is sucked into the debris chamber and retained within the tool.
- Once the area of interest has been clean, a circulation port can be opened if desired to allow a displacement or chemical cleanup to be carried out above the tool.
- The ARdVAC™ Venturi XTRactR™ can be emptied at surface, to inspect the contents, and if required redeployed quickly.

# DrillRdillo – Dormant Casing Scraper (DRD)



With full 360° coverage, the DrillRdillo™ Dormant Casing Scraper (DRD) blades are retracted within the single-piece body during drilling or pre-completion operations. When the time comes to activate the DRD, drop the ball and pressure up to release the scraper blades; then, either using string rotation or reciprocation, scrape the casing wall whilst pulling out of the well.

## FEATURES

- Available in 7", 9-5/8", 10-3/4" and 13-3/8" sizes
- Various mill type configurations available, depending on the application
- Steel ball drop application
- Vibration and shock tested blade retention system
- Jar tested the activation system to 300gn
- High torque connections available

## PARTS

- Upper and lower Carbide mills
- Brick Carbide faced mills
  - Reduces torque
  - Provides centralisation
  - Drift ID
  - Tungsten Carbide mills
  - Robust mills for drilling/milling
- 12 robust scraping blocks arranged to provide 360° coverage of the casing wall
- Blades are retained within the body until activated
- High torque connections

## APPLICATIONS

### Drilling

- Run in the drilling BHA; the DRD scrapes/ cleans the casing & packer setting depths before tripping out of the hole

### Completion

- Run as an integral part of the lower completion assembly, the DRD scrapes/ cleans the casing packer setting depth before tripping out

### Remedial/Decommissioning

- Run in conjunction with the milling assembly. Multiple DRDs can be run in a single BHA to scrape/mill multiple casing sizes

## VALUE CREATION / KEY BENEFITS / OPERATIONAL OPTIMIZATIONS

- Eliminates the need for a dedicated scraper run by allowing the client to combine the drilling & wellbore clean-up BHA
- Reduces rig time between the drilling and completion phase providing faster well delivery
- Mitigates premature lower completion failure
- Potential to create rig spread cost savings of USD \$200k per well for shallow water and more than USD \$500k for deep water
- Delivered client savings in excess of USD \$33M since launch in 2018

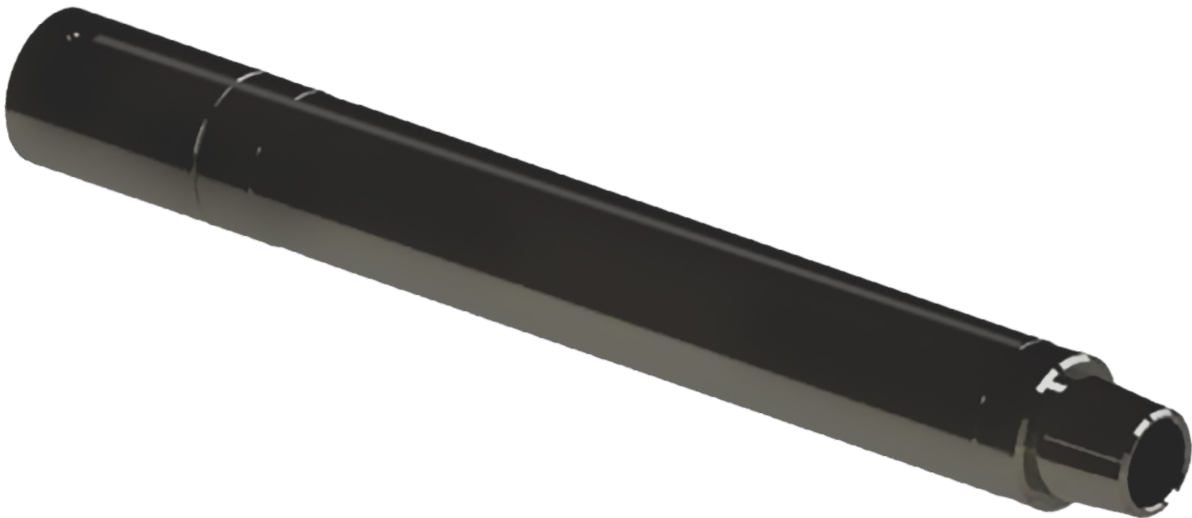
## SPE / INDUSTRIAL TECHNICAL PAPERS / CASE HISTORY

Covered in SPE paper ref; "SPE-193036-MS SPE – Advanced ERD Lower Completions: Delivering Accelerated Production and Enhanced Performance" (2018)

Presented case study at COMSTEC Malaysia 2020, demonstrating operational optimizations delivered to Repsol Malaysia

350+ successful runs globally

# UltraGuard Heavy-Duty Ball-Operated Release Tool



The Ultra Guard is a robust tool that provides a quick and reliable method for disconnecting the lower BHA in the event of Stuck Pipe, Wellbore instability or adverse wellbore geometry and conditions.

The tool utilises a simple and reliable drop ball activation method to release the lower BHA when required leaving a dedicated known external and internal fishing profile that is vital for planning further downhole operations.

FEATURES AND BENEFITS

In the event of pack-off or loss of circulation, the tool is also fitted with a rupture disc to allow flow through the tool to enable communication to the annulus.

- Simplistic design
- Robust construction
- Available with hard banding
- Other tool dimensions available

APPLICATIONS

Stuck Pipe

- Stuck pipe situations arise when the drill string becomes immobilised or trapped for various reasons, such as differential sticking wellbore instability or mechanical failures.

Wellbore Instability

- Unstable formations can pose significant challenges during drilling operations. If the wellbore collapses or sloughs off, it can lead to the loss of the BHA. The unstable formation may cave in, trapping the BHA or causing it to become dislodged.

Drilling Safety Joint

- The safety joint allows for the disconnection of the drill string above it, protecting the more expensive and critical components of the drilling equipment from potential damage. It is an important safety feature that helps prevent costly accidents and ensures the wellbore integrity during drilling operations.

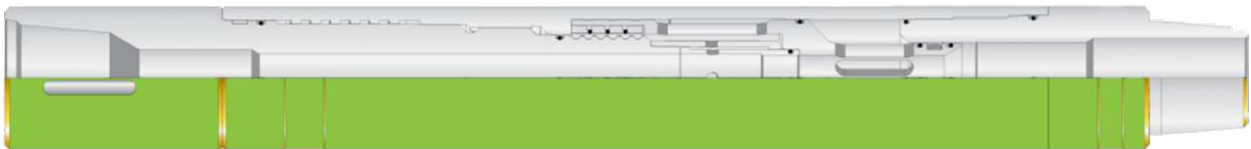
SPECIFICATIONS

Outer Diameter	4-3/4"	7-1/2"	9-5/8"
Make-up Length	34.2"	80.9"	88.6"
Max Temperature*	302F/150°C	302F/150°C	302F/150°C
Max Working Pressure	5KSI	5KSI	5KSI
Connection**	NC38	NC50/GPDS50	6-5/8"API REG

All specifications are based on 110KSI material.

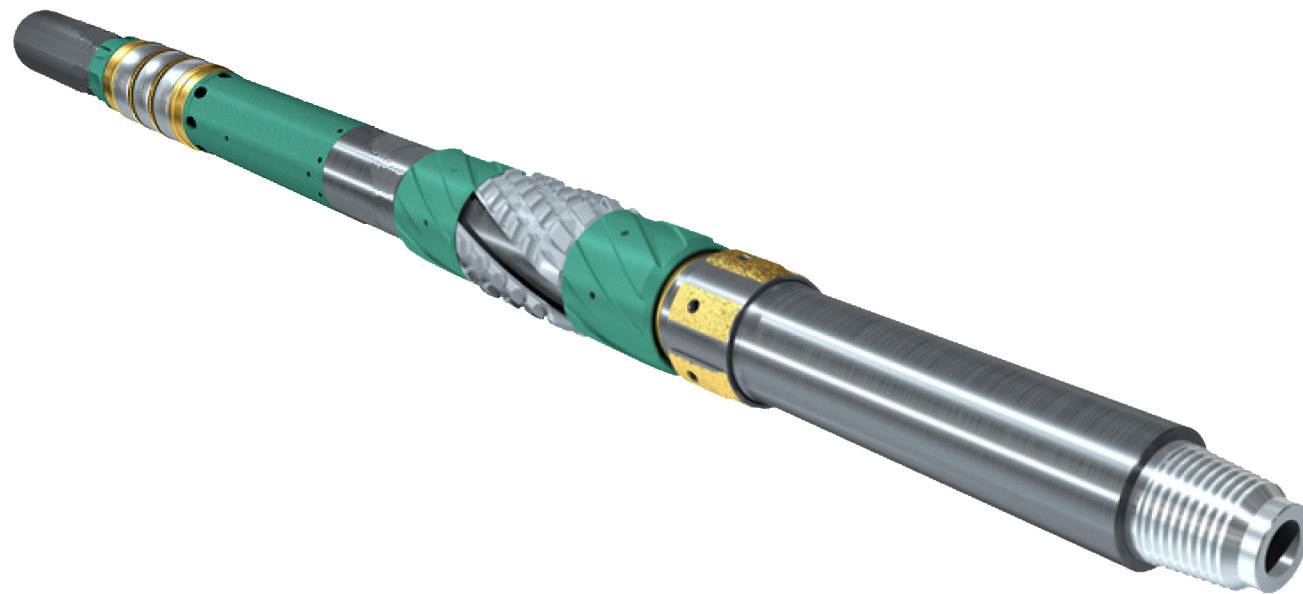
\*Temperature rating can be modified to suit clients' requirements.

\*\* Various connections are available on request





# DtectR™ Inflow Test Packer



The DtectR™ Inflow Test Packer is a simple but effective well integrity testing device which performs a negative pressure test on a liner top. The design of the tool allows the test to be performed during wellbore cleaning operations, eliminating the need for a separate trip in hole.

## FEATURES

- Generous internal bypass allows prevents damage to the packing element while circulating at high rates required for wellbore cleaning
- Internal shear ring can be customized to suit requirements
- Set by string compression applied through the tool joints
- Compression spring returns tool to unset position after release
- Robust assembly method with back-ups
- Compatible with other OTL ArmRdillo™ wellbore clean-up tools

## BENEFITS

### Cost saving

- The DtectR™ Inflow Test Packer saves the need for a separate trip in hole to inflow test the liner

### Integrity

- Tests the integrity of the liner in a safe manner before the well is displaced

### Reducing Non-Productive Time

- Discovering a leaking liner after the completion has been installed may result in a costly workover

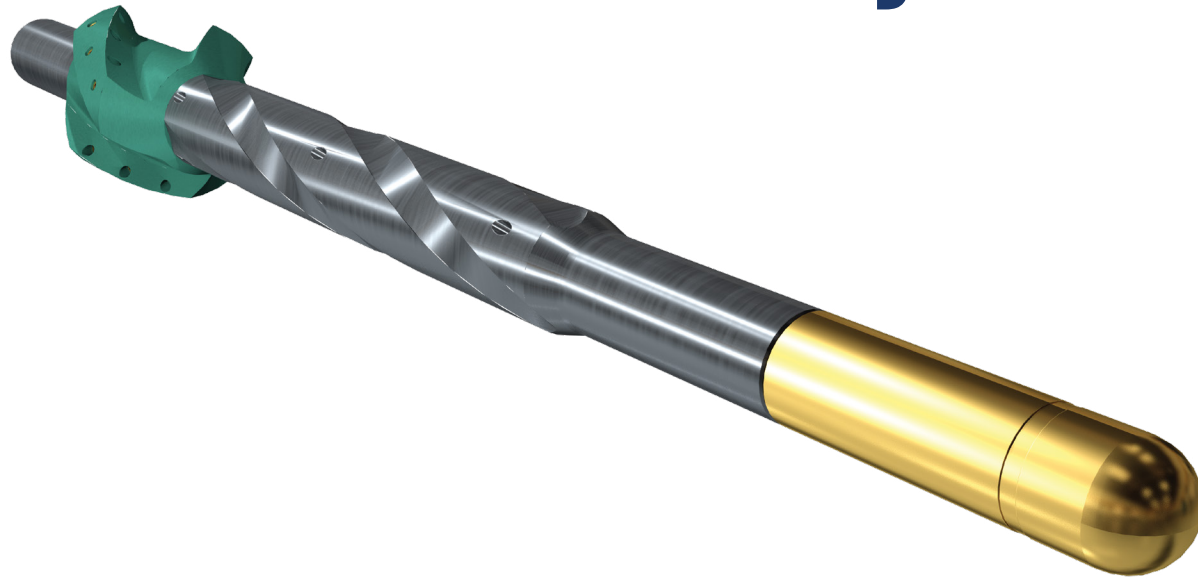
## APPLICATIONS

- Pre-completion wellbore clean-ups for where negative testing of a liner is necessary

## OPERATIONAL

- The DtectR™ Inflow Test Packer can be run independently or as part of a comprehensive wellbore clean-up string
- The DtectR™ Inflow Test Packer is typically spaced out with a Liner Landing Sub or Top Dress Mill below it, which engages a Liner Top in the wellbore. A smaller diameter drill string hangs below the tool which extends close to the bottom of the well
- While running in the hole, the string can be reciprocated and circulated to allow the scrapers and other tools to clean the critical depths
- The tool is set by applying compressive force which shears a ring and allows the tool to stroke and set the packing element
- Picking up weight will relax the tool and unset the packing element
- When required to inflow test, a predetermined volume of under-balancing fluid is pumped into the string and the packer is set
- By bleeding the work string pressure the liner integrity is tested and any leaks will be identified
- After testing is complete the under-balancing fluid can be reversed out and the wellbore clean-up can continue
- The OTL Weight Set Circulating Tool can also be run above the DtectR™ Inflow Test Packer if high rate circulation is required. When sheared it will open a circulation path above the DtectR™ Inflow Test Packer

# Hydraflow™ Advanced Wellbore Cleaning System



The Hydraflow™ Advanced Wellbore Cleaning System (HAWCS) utilizes a high flow rate combined with lower pump pressure to optimize Riser & BOP cleaning efficiency.

## FEATURES

- The 16" OD High-Flow Sleeve features 12 offset large TFA ports designed to clean the riser wall and effectively penetrate the BOP cavities to clear and flush out debris.
- Nine upward-angled large TFA ports are arranged along the body to help reintroduce debris into the flow path, allowing it to be carried upward to the surface.
- An optional integral pup joint is available for easier handling.
- An optional Lower Bull Nose or Pin Down connection to accommodate various applications.

## BENEFITS

### Cost savings

- Maximizing Riser & BOP cleaning efficiency to reduce operating time has a huge impact on operating costs on expensive semi-submersibles
- No field maintenance required

### Integrity

- Available with high torque connections reducing the need for reduced strength crossovers
- Single piece mandrel with no internal connections for increased strength

### Reducing Non-Productive Time

- Reduces premature failure of completion equipment by debris which can interfere or damage valves, electronics and other hardware

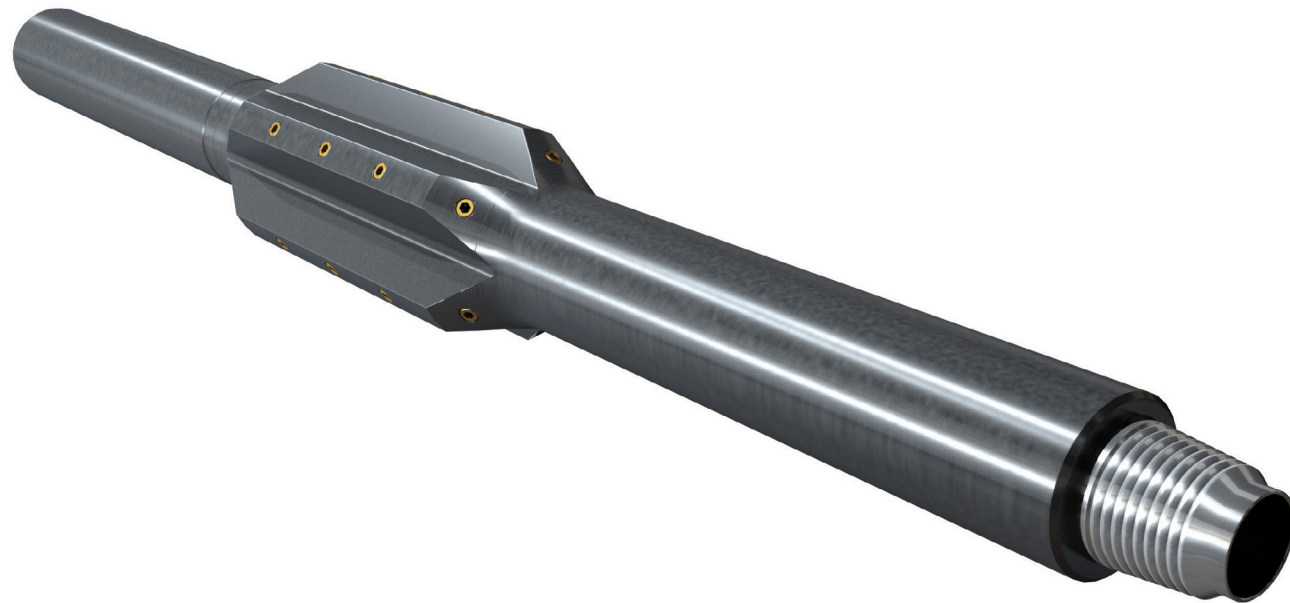
## APPLICATIONS

- Deep water pre-completion wellbore clean-ups from semi-submersible drilling units
- Riser cleaning during displacement to sea water before disconnection or moving from location

## OPERATIONAL

- The Hydraflow™ Advanced Wellbore Cleaning System (HAWCS) is typically run in conjunction with the Riser Cleaning Tool and XTractR™ BOP Junk Catcher or as a standalone tool.
- The 16" OD High-Flow Sleeve features 12 offset large TFA ports designed to clean the riser wall and effectively penetrate the BOP cavities to clear and flush out debris.
- Best practice recommends to function the rams and annular to help dislodge debris before jetting the BOP stack at 35 BPM while rotating slowly, making 3 passes.
- The upward angled nozzles assist in carrying debris to surface through inducement of turbulent flow.
- HAWCS can also be run with a wear bushing retrieval tool below.
- The high-flow sleeve is available in various sizes, 16" OD or 12.750" OD.

# Short Time Jetting Tool



The Short Time Jetting Tool is a simple and robust wellbore clean-up tool and can be run individually or modularly as part of the ArmRdillo™ Wellbore Clean-Up System. The Short Time Jetting Tool is designed to jet the BOP cavities to dislodge debris during wellbore clean-up operations

## FEATURES

- Single piece Mandrel
- Available with slick OD, solid bladed Ribs, or removable Jetting Sleeve
- Available in various OD's to suit onshore, platform or sub-sea BOP stacks
- Can be configured as a magnet jetting tool (refer to MAGStar Jetting Tool datasheet)
- Available with standard and high torque drill pipe connections
- Typically open ported design with optional BHA shut-off
- Adjustable jetting ports can be configured to select direction and total flow area
- Can be quickly assembled redressed on location with simple hand tools

## BENEFITS

### Cost savings

- Simple BHA shut-off, does not require the use of the TIW valve or bull nose

### Integrity

- Available with high torque connections reducing the need for reduced strength crossovers
- Single piece mandrel with no internal connections for increased strength

### Reducing Non-Productive Time

- BOP cavities are known to collect debris and junk Jetting before installing the completion can prevent premature failures

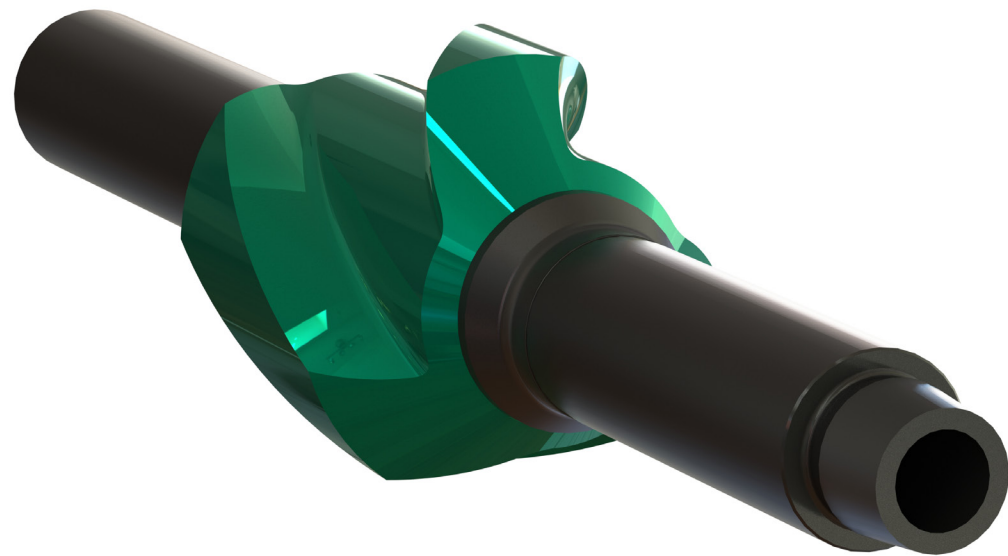
## APPLICATIONS

- Pre-completion wellbore clean-up operations before running in the hole, when pulling out of hole, or both
- After milling operations to remove swarf which can damage the BOP rams and annular

## OPERATIONAL

- The Short Time Jetting Tool is typically deployed immediately above the XTractR™ Wellbore Filter Tool or other types of gravity junk baskets during BOP jetting to capture dislodged debris
- It is also recommended to run a dedicated magnet below the Short Time Jetting Tool to capture additional debris, particularly after milling operations
- Best practice recommends to function the rams and annular to help dislodge debris before jetting the BOP stack at 10 BPM while rotating slowly, making 3 passes
- It is also recommended to reduce jetting to 5 BPM while passing the annular
- The Short Time Jetting Tool can also be used to jet behind the wear bushing after it has been removed

# Advanced Jetting Riser Displacement Sub



The Advanced Jetting Riser Displacement Sub is an effective tool that opens communication ports between the drill pipe and the annulus. This allows for the cleaning of the Riser and BOPs. After cleaning, the ports can be closed again to reestablish communication with the drill bit.

## FEATURES

- Single-piece Mandrel with no internal connections.
- 16" OD Jetting Sleeve with 12 offset jetting ports for optimum jetting action.
- 12.750" OD Jetting Sleeve with 12 offset jetting ports for optimum jetting action.
- Simple drop ball(s) to shear mechanism with no reliance on darts etc.
- Tool can be dressed with various types of O-ring elastomers to suit variances in temperature, chemical resistance or pressures.

## BENEFITS

### Cost savings

- Maximizing riser cleaning efficiency to reduce operating time has a huge impact on operating costs on expensive semi-submersibles
- No field maintenance required

### Integrity

- Available with high torque connections reducing the need for reduced strength crossovers
- Single piece mandrel with no internal connections for increased strength

### Reducing Non-Productive Time

- Reduces premature failure of completion equipment by debris which can interfere or damage valves, electronics and other hardware

## APPLICATIONS

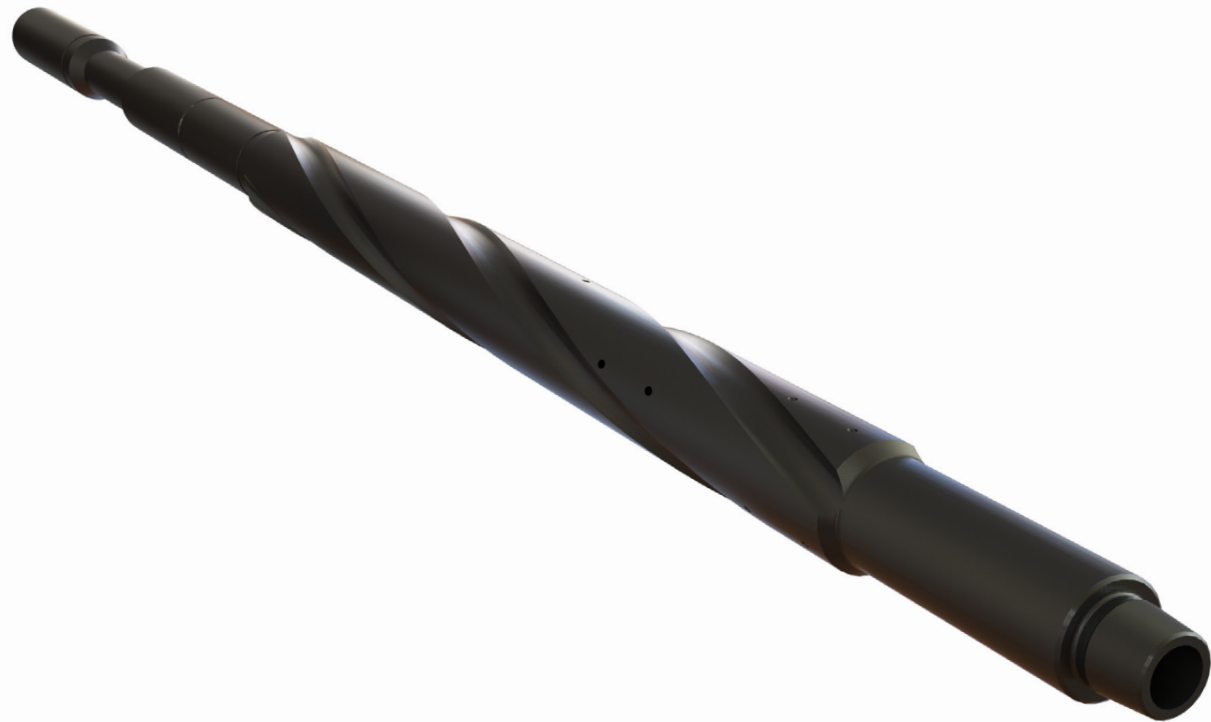
- Cleaning Risers, BOPs, Wellhead Area
- Pumping cement or executing a displacement through the tool to TD

## OPERATIONAL

- With the offset nozzle arrangement, you can achieve 360-degree coverage without the need for rotation.
- The tool can be utilised with the RizeRdillo Riser Cleaning Tool, MalstromXT Wellhead & BOP Jetting Tool and BOP Junk XTractR to fully optimise Riser /BOP cleaning operations.
- To allow fluid to flow into the annulus, a ball is dropped to open the tool flow ports when needed. To resume circulation through the whole drill string, a second ball can be dropped to close the ports, completing one full opening and closing cycle.



# MalstrømXT Wellhead & BOP Jetting



Introducing the MalstrømXT Wellhead & BOP Jetting Tool (WJT), the leading solution in Wellhead and BOP cleaning technology. Designed for exceptional performance, it utilizes powerful features to provide a comprehensive and efficient cleaning experience.

## FEATURES

- Featuring its innovative multi-flow offset port arrangement and both upward and downward-facing directional ports, the MalstrømXT offers exceptional precision and penetration.
- Large TFA ports are engineered to facilitate a high flow rate while maintaining low pump pressure. This configuration is effective in dislodging debris and circulating it to the surface by utilizing the high flow dynamics.
- The tool has been designed to allow for storage in the derrick, which speeds up transitions, minimises downtime, and reduces manual handling to keep your operations running efficiently.

## BENEFITS

### 360-Degree Cleaning Radius

- With the state-of-the-art multi-flow directional port design, the tool ensures complete coverage of the wellhead and BOPs to maximize cleaning efficiency.

### High-Pressure Jetting System

- Utilizes high-velocity flow to break down and wash away obstructions, debris and residues.

### Increased Efficiency

- The 8" OD tool has been designed to allow for storage in the derrick, which speeds up transitions, minimizes downtime, and reduces manual handling to keep your operations running efficiently.

### Minimal Maintenance

- The robust and efficient tool design allows for minimal maintenance, enabling longer tool activity and reducing running costs.

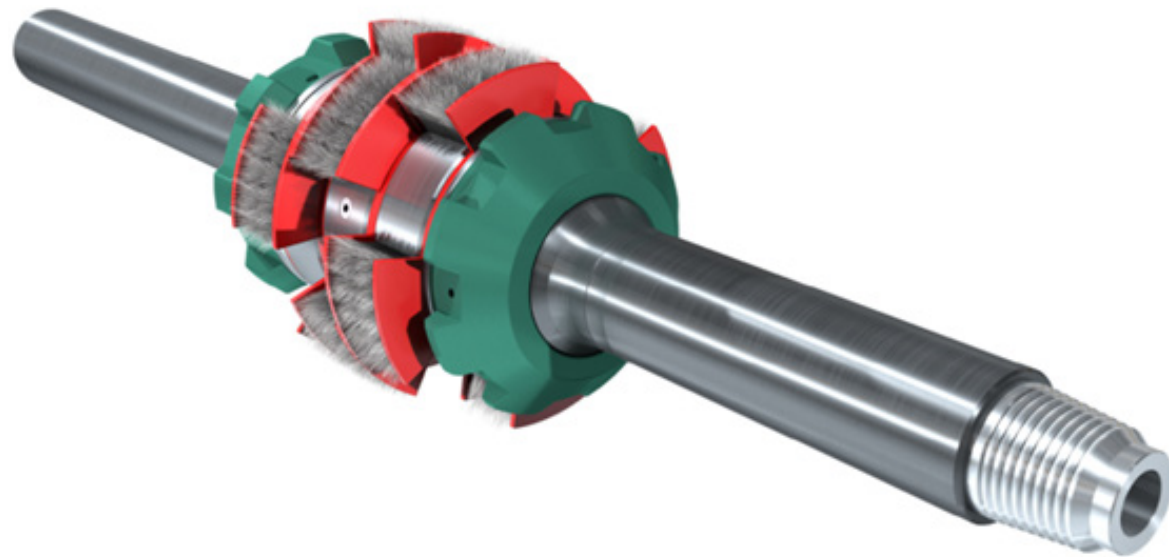
## APPLICATIONS

- Jetting BOPs, Wellheads and Tubing Hangers

## OPERATIONAL

- The MalstrømXT Wellhead & BOP Jetting Tool is typically deployed immediately above the XTractR™ Wellbore Filter Tool or other types of gravity junk baskets during BOP jetting to capture dislodged debris.
- It is also recommended to run a dedicated magnet below the The MalstrømXT Wellhead & BOP Jetting Tool to capture additional debris, particularly after milling operations.
- While jetting the top of the wellhead to dislodge any debris with the six downward-facing ports, the 6 ports below clean the casing and circulate any debris that may fall below the wellhead.
- The 10 The upward angled Jetting Nozzles assist in carrying debris to the surface through the inducement of turbulent flow.
- Best practice recommends using the rams and annular to help dislodge debris before jetting the BOP stack in three passes.

# RizeRdillo™ Riser Brush



The RizeRdillo™ Riser Brush is a robust, free-rotating 360° contact composite wiper brush, designed to clean mud residue & contaminants from the riser.

## FEATURES

- Composite brush & rubber wiper elements provide full 360° contact with the ID of the riser
- Generous fluid bypass allows large debris to be circulated out of the well
- Free rotating brush design with internal bearings to prevent tool or riser wear
- No external bolts, clamps or fasteners that can come loose downhole
- Compatible with all ArmRdillo™ wellbore cleanup tools

## BENEFITS

### Cost Savings

- Maximizing riser cleaning efficiency to reduce operating time has a huge impact on operating costs on expensive semi-submersibles

### Increases Well Productivity

- A properly executed wellbore clean-up reduces finedebris which can block screens and pore throats reducing well productivity

### Integrity

- Single Piece Mandrel
- The RizeRdillo™ Riser Brush can be provided with any type of rig end connections including premium and high torque connections reducing the need for reduced strength crossovers

### Reducing Non-Productive Time

- Installation of subsea casing & tubing hangers incident free
- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well
- Reduces premature failure of drilling equipment by debris which can interfere with valves, electronics and other hardware

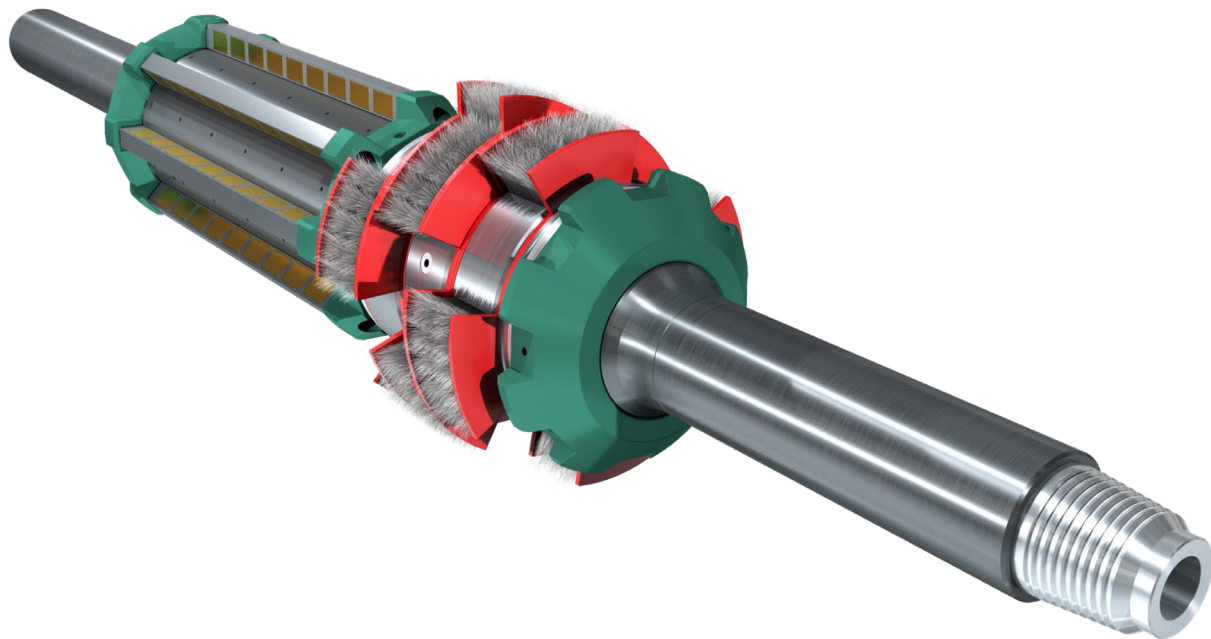
## APPLICATIONS

- Deep water pre-completion wellbore clean-ups from semi-submersible drilling units
- Riser cleaning during displacement to seawater before disconnection or moving from location
- Jetting BOP's
- Post milling cleaning ups

## OPERATIONAL

- The RizeRdillo™ Riser Brush is typically run in conjunction with the RizeRdillo™ Advanced Jetting Tool and XTractR™ BOP Junk Catcher or can be run as part of a pre-completion wellbore clean-up string
- The riser can be displaced and the RizeRdillo™ Riser Brush can be reciprocated to assist in the cleaning action to remove any mud residue or contaminants adhered to the riser wall

# RizeRdillo™ Riser Combi (RRC)



The RizeRdillo™ Riser Combi Tool combines brushing, wiping and debris extraction technology on a robust mandrel to effectively clean subsea drilling risers

## FEATURES

- Rows of overlapping brushes to scour the riser wall to remove debris
- High density magnets to capture ferrous material
- Heavy duty elastomeric wiper rings to wipe mud cake
- Large fluid bypass area to circulate debris to surface
- High capacity gravity junk basket to capture debris for retrieval at surface
- Soft blade stabilizers to prevent riser wear
- Can be quickly emptied for re-run
- Brushes and wipers can be redressed quickly onsite if required
- No external bolts, clamps or fasteners that can come loose down hole

## BENEFITS

### Cost Savings

- Maximizing riser cleaning efficiency to reduce operating time has a huge impact on operating costs on expensive semi-submersibles
- Field serviceable at the rig with basic hand tools

### Integrity

- Available with high torque connections reducing the need for reduced strength crossovers
- Single piece mandrel with no internal connections for increased strength

### Reducing Non-Productive Time

- Reduces premature failure of completion equipment by debris which can interfere or damage valves, electronics and other hardware

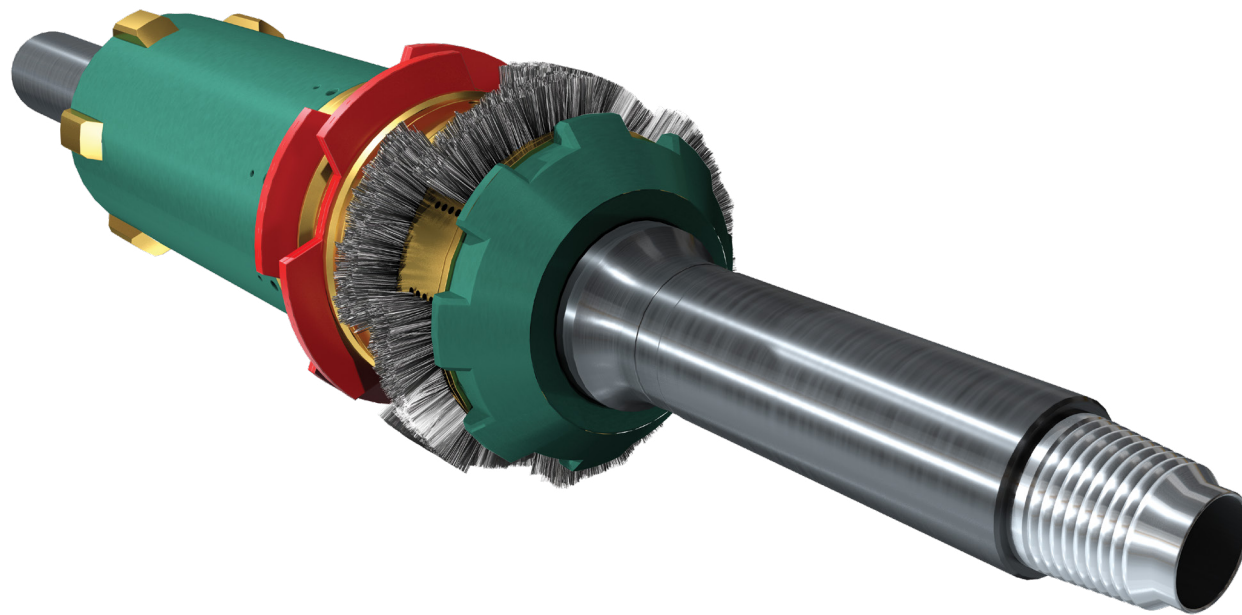
## APPLICATIONS

- Deep water pre-completion wellbore clean-ups from semi-submersible drilling units
- Riser cleaning during displacement to sea water before disconnection or moving from location

## OPERATIONAL

- The RizeRdillo™ Riser Combi Tool is typically run in conjunction with the RizeRdillo™ Advanced Jetting Tool and XTractR™ BOP Junk Catcher or can be run as part of a pre-completion wellbore clean-up string
- The RizeRdillo™ Riser Combi Tool brushes and wipes the riser wall while running in the hole to remove debris
- The riser can be displaced and the RizeRdillo™ Riser Combi Tool can be rotated and reciprocated to assist in the cleaning action
- The Gravity Junk Bucket collects debris which cannot be circulated out of the riser for retrieval at surface

# RizeRdillo™ Riser Cleaning Tool



The RizeRdillo™ Riser Cleaning Tool combines brushing, wiping and debris extraction technology on a robust mandrel to effectively clean subsea drilling risers.

## FEATURES

- Rows of overlapping brushes to scour the riser wall to remove debris
- Heavy duty elastomeric wiper rings to wipe mud cake
- Large fluid bypass area to circulate debris to surface
- High capacity gravity junk basket to capture debris for retrieval at surface
- Soft blade stabilizers to prevent riser wear
- Can be quickly emptied for re-run
- Brushes and wipers can be redressed quickly onsite if required
- No external bolts, clamps or fasteners that can come loose down hole

## BENEFITS

### Cost Savings

- Maximizing riser cleaning efficiency to reduce operating time has a huge impact on operating costs on expensive semi-submersibles
- Field serviceable at the rig with basic hand tools

### Integrity

- Available with high torque connections reducing the need for reduced strength crossovers
- Single piece mandrel with no internal connections for increased strength

### Reducing Non-Productive Time

- Reduces premature failure of completion equipment by debris which can interfere or damage valves, electronics and other hardware

## APPLICATIONS

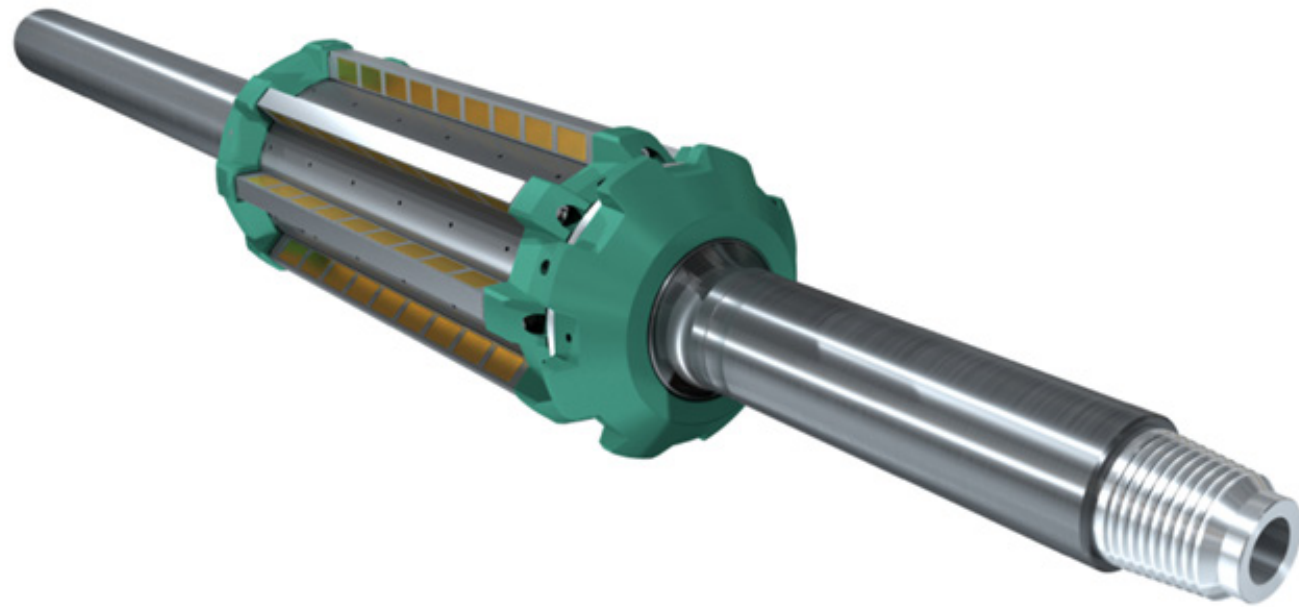
- Deep water pre-completion wellbore clean-ups from semi-submersible drilling units
- Riser cleaning during displacement to sea water before disconnection or moving from location

## OPERATIONAL

- The RizeRdillo™ Riser Cleaning Tool is typically run in conjunction with the RizeRdillo™ Advanced Jetting Tool and XTractR™ BOP Junk Catcher or can be run as part of a pre-completion wellbore clean-up string
- The RizeRdillo™ Riser Cleaning Tool brushes and wipes the riser wall while running in the hole to remove debris
- The riser can be displaced and the RizeRdillo™ Riser Cleaning Tool can be rotated and reciprocated to assist in the cleaning action
- The Gravity Junk Bucket collects debris which cannot be circulated out of the riser for retrieval at surface



# RizeRdillo™ Riser Magnet



The RizeRdillo™ Riser Magnet is a large capacity junk basket with magnetic ribs, to capture ferrous and non-ferrous debris from the riser.

## FEATURES

- Large fluid bypass area to circulate debris to surface
- Large capacity gravity junk basket to capture debris for retrieval at surface
- High density magnets to capture ferrous material
- Can be quickly emptied and re-run
- No external bolts, clamps or fasteners that can come loose downhole
- Compatible with all ArmRdillo™ wellbore cleanup tools

## BENEFITS

### Cost Savings

- Maximizing riser cleaning efficiency to reduce operating time has a huge impact on operating costs on expensive semi-submersibles

### Increases Well Productivity

- A properly executed wellbore clean-up reduces finedebris which can block screens and pore throats reducing well productivity

### Integrity

- Single Piece Mandrel
- The RizeRdillo™ Riser Magnet can be provided with any type of rig end connections including premium and high torque connections reducing the need for reduced strength crossovers

### Reducing Non-Productive Time

- Installation of subsea casing & tubing hangers incident free
- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well
- Reduces premature failure of drilling equipment by debris which can interfere with valves, electronics and other hardware

## APPLICATIONS

- Deep water pre-completion wellbore clean-ups from semi-submersible drilling units
- Riser cleaning during displacement to seawater before disconnection or moving from location
- Jetting BOP's
- Post milling cleaning ups

## OPERATIONAL

- The RizeRdillo™ Riser Magnet is typically run in conjunction with the Hydraflow Advanced Wellbore Cleaning System (HAWCS) and XTractR™ BOP Junk Catcher or can be run as part of a pre-completion wellbore clean-up string
- The riser can be displaced and the RizeRdillo™ Riser Magnet Tool can be rotated and reciprocated to assist in the cleaning action
- The gravity junk basket collects debris which cannot be circulated out of the riser for retrieval at surface
- A specially design hand tool can clean the outside of the bucket to remove any ferrous material safely and quickly

# XTractR™ BOP Junk Catcher



The XTractR™ BOP Junk Catcher is a robust, wellbore clean-up tool and can be run individually or modularly as part of the ArmRdillo™ Wellbore Clean-Up System. The XTractR™ BOP Junk Catcher can be adapted to most common casing sizes and any drill pipe combination

## FEATURES

- Robust Mandrel with optional Integral Pup Joint
- Quick Drain Ports allow fast emptying on the rig floor to inspect contents
- Robust, free-rotating Wiper Cup catches debris which has been jetted from the BOP and Wellhead
- Shrouded Filter Screen can be customized with various mesh sizes to suit varying applications
- Can be quickly assembled redressed on location with simple hand tools
- No external bolts, clamps or fasteners that can come loose down hole

## BENEFITS

### Cost savings

- The ArmRdillo™ Wellbore Clean-Up System integral pup joint reduces rig handling time
- Field serviceable at the rig-site with basic hand tools

### Increases Well Productivity

- A properly executed wellbore clean-up reduces fine debris which can block screens and pore throats reducing well productivity
- The filter screen captures sands, junk and debris which can block pore throats

### Integrity

- Available with high torque connections reducing the need for reduced strength crossovers

### Reducing Non-Productive Time

- A robust wellbore clean-up is proven to reduce non-productive time during the completion of the well
- Reduces premature failure of completion equipment by debris which can interfere with valves, electronics and other hardware

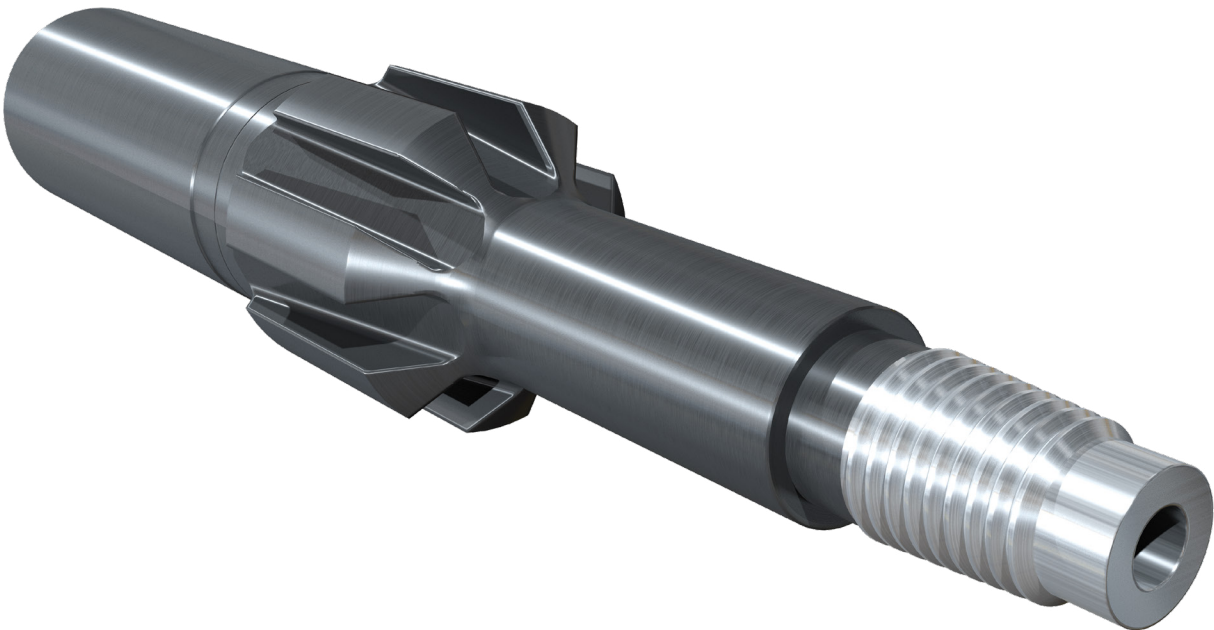
## APPLICATIONS

- BOP Jetting Operations during pre-completion wellbore clean-up operations where it is run in tandem with a Short Time Jetting Tool or other similar tool to capture any dislodged debris which can otherwise fall downhole
- Can be run below a Wear Brushing Retrieval Tool or during wellhead cleaning operations
- Can be run during riser clean-up operations to prevent debris from falling downhole

## OPERATIONAL

- The BOP Junk Catcher is typically placed at the end of the BOP Jetting string
- A Short Time Jetting Tool or MAGStar Jetting Tool is spaced around 1 stand above the XTractR™ BOP Junk Catcher
- With the XTractR™ BOP Junk Catcher below the wellhead, the BOP can be jetted and any debris which is dislodged will be trapped inside the tool and can be retrieved at surface
- The XTractR™ BOP Junk Catcher can be quickly emptied at surface to inspect contents and can be redeployed quickly if necessary

# Liner Landing Sub



The Liner Landing Sub is a simple but effective means of engaging a Liner Top PBR or other profile in the wellbore to activate any type of weight set tool.

FEATURES

- Single piece mandrel
- Large bypass slots to maximize Features
- Fluid bypass
- Tapered non-damaging lead shoulder

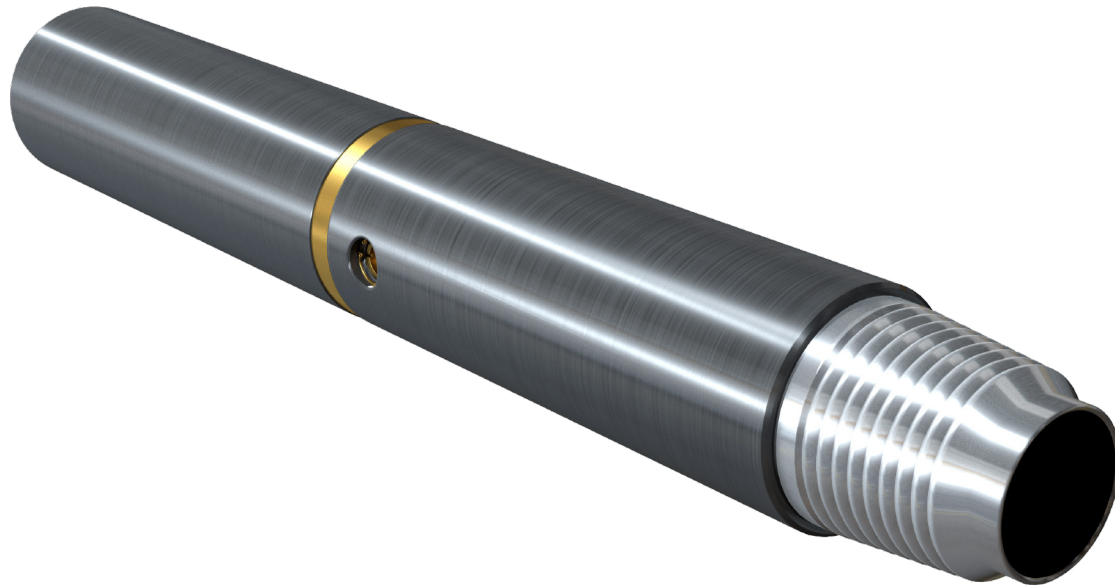
APPLICATIONS

- Run as part of a wellbore cleaning assembly which requires weight activation to function a wellbore clean-up tool
- Available with all common connection sizes and to fit all casing sizes

OPERATIONAL

- Select the appropriate tool based on the drill string connections and required strengths
- Place the tool at the crossover between the Upper and Lower tapered strings spaced out at appropriate depth to engage the Liner Top ensuring the string does not bottom out at TD
- The weight activated tools will be deployed above the Liner Landing Sub
- Weight can be applied directly to the Liner Top PBR to function the tools

# Rupture Disc Sub



The Rupture Disc Sub is a tool activated by applying pressure from surface to burst a rupture disc to allow communication between the workstring and the annulus at a predetermined pressure. The tool has two calibrated rupture discs to provide redundancy.

## FEATURES

- Single piece body with no internal connections
- Large bore, nearly slick, inner diameter for slickline access
- No balls or darts required to burst the discs – pressure up on the drillstring to activate
- Tool can be dressed with various calibrated pressure and temperature discs

## BENEFITS

### Cost Savings

- Allows communication to the annulus when POOH, allowing the pipe to self-drain

### Integrity

- Available with high torque connections reducing the need for reduced strength crossovers
- No internal parts; simple activation process of pressuring up on the drillpipe to burst the discs
- Rupture discs are tested and calibrated to suit any pressure and temperature

### Reducing NPT

- Instantaneous operation waiting for; No balls, darts or slickline intervention.
- Reduced tripping time when pulling out of hole
- If a bit is plugged the tool can be opened to carry out remedial actions, and allow the string to be pulled out 'dry'

## APPLICATIONS:

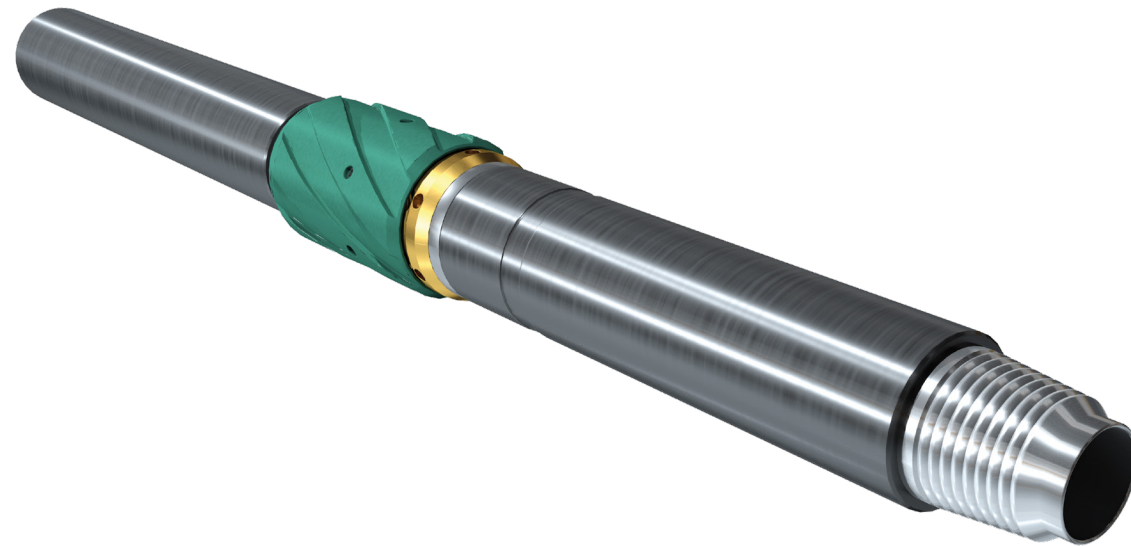
- Allows circulation above a Packer or other similar type tool
- Allows circulation above a packed off Wellbore Filter Tool
- Jetting, Circulating, Tripping Dry Pipe
- Drillstring BHA relief valve if bit gets plugged

## OPERATIONAL

- The Burst Disc Sub is typically run above a packer, as part of the landing string, or as an emergency relief valve, above a drilling BHA in the event that the BHA may get packed off.
- Activation balls, darts are dropped to the packer to set the packer hydraulically. Once set simply pressure up the drillpipe to rupture the discs and open ports on the Rupture Disc Sub.
- High flowrates can be utilised to circulate through the fluid.



# VeRidrift™ Casing Drift



The VeRidrift™ Casing Drift is a robust, 360° contact, free-rotating wellbore clean-up tool and can be run individually or modularly as part of the ArmRdillo™ Wellbore Clean-Up System.

The VeRidrift™ Casing Drift can be adapted to suit any casing size and drill pipe combination.

## FEATURES

- Fluted Centralizer Drift is available with any OD to suit any requirements
- Fluted Centralizer Drift provides centralization, bypass while drifting the casing
- Free rotating tool design with Internal Bearing Rings to prevent drill pipe, tool or casing wear
- Can be quickly assembled/redressed on location with simple hand tools
- No external bolts, clamps or fasteners that can come loose down hole
- Robust assembly method with multiple back-ups

## BENEFITS

### Cost savings

- Drift casing to ensure the completion can be deployed without hanging up, saving Non-Productive Time

### Integrity

- Ensures the casing conforms to the minimum drift requirements of API or special drift requirements of the operator
- Single piece mandrel with no internal connections for increased strength

### Reducing Non-Productive Time

- Assurance the completion packers and other components can be deployed safely

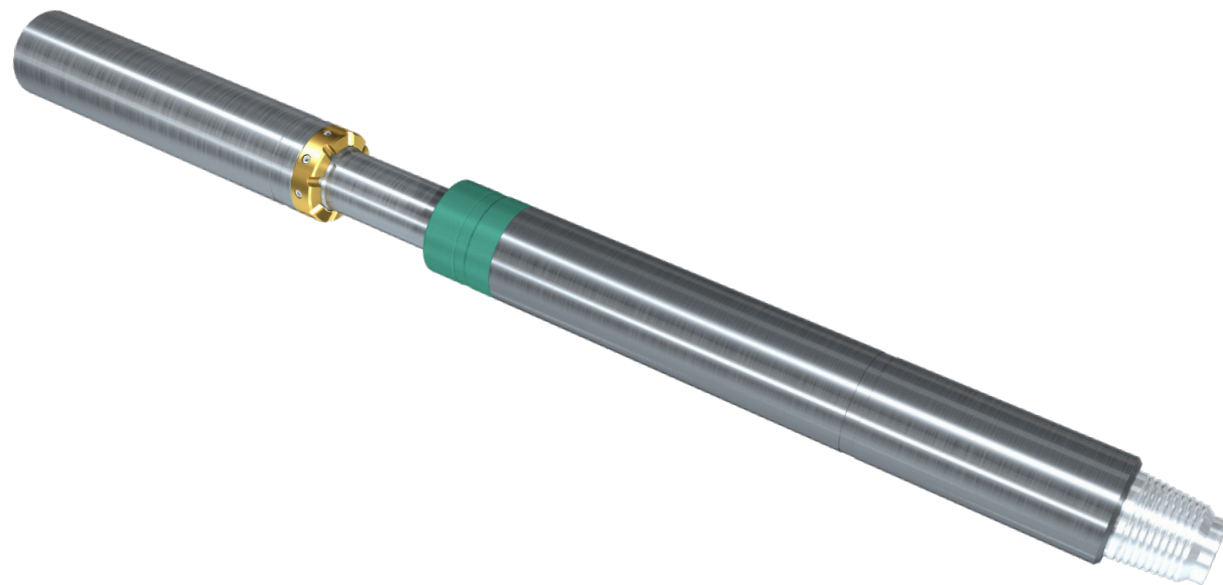
## APPLICATIONS

- Pre-completion wellbore clean-up operations to ensure the scraper, brushes and mills have removed any hardened cement
- Non-rotating stabilizer to run above or below weight set tools
- Drifting perforated sections prior to running screens

## OPERATIONAL

- The VeRidrift™ Casing Drift is typically run above the RazRdillo™ Casing Scraper assembly to ensure that the casing wall is free of cement sheath and other debris
- Cement plugs can be drilled inside the casing as required
- During displacement the drill string can be rotated and reciprocated to improve hole cleaning without fear of damage or wear of the casing, drill pipe or of the ArmRdillo™ Wellbore Clean-Up System

# Weight Set Swivel Tool



The Weight Set Swivel Tool is a robust and simple swivel that is functioned by string manipulation. Typically run on a tapered string to the Liner top, as part of an ArmRdillo™ Wellbore Clean-Up System, it allows independent rotation of the upper and lower strings.

## FEATURES

- Can be used in drilling or milling activities prior to functioning
- Robust spline drive to transmit torque to lower string
- Utilises string manipulation to function, without the use of darts or balls
- Interchangeable shear ring to suit specific well requirements
- Swivel can be disengaged and reengaged multiple times with no restriction

## BENEFITS

### Cost savings

- Allows the upper string to be rotated whilst simultaneously protecting the lower string from high torque for effective hole cleaning during the displacement

### Increases Well Productivity

- A properly executed wellbore clean-up removes fine debris which can block screens and pore throats reducing well productivity

### Integrity

Prevents accidental twist-off of the lower string

### Reducing Non-Productive Time

- Prevents unnecessary fishing jobs

## APPLICATIONS

- Pre completion wellbore cleanup operations where high surface torque is anticipated
- Extended reach wells where high torque at the liner may be seen

## OPERATIONAL

- The Weight Set Swivel tool can be run with a landing sub or top dress mill, or as part of comprehensive wellbore cleanup string
- Run string in hole until the landing sub or top dress mill engages the polished bore receptacle
- Apply surface weight to shear the shear ring
- Maintain weight on the liner top to disengage the Swivel from the Drive Spline and rotate the upper string only
- Pick up the string to reengage the Swivel on the Drive Spline to rotate the entire string
- If required land back down on the liner top to disengage the Swivel from the Drive Spline again. Repeat as necessary



# UltraWash Heavy-duty Degreaser



Get rid of tough grease and grime with ease using UltraWash, a non-toxic solution and heavy-duty cleaner for your drilling equipment.

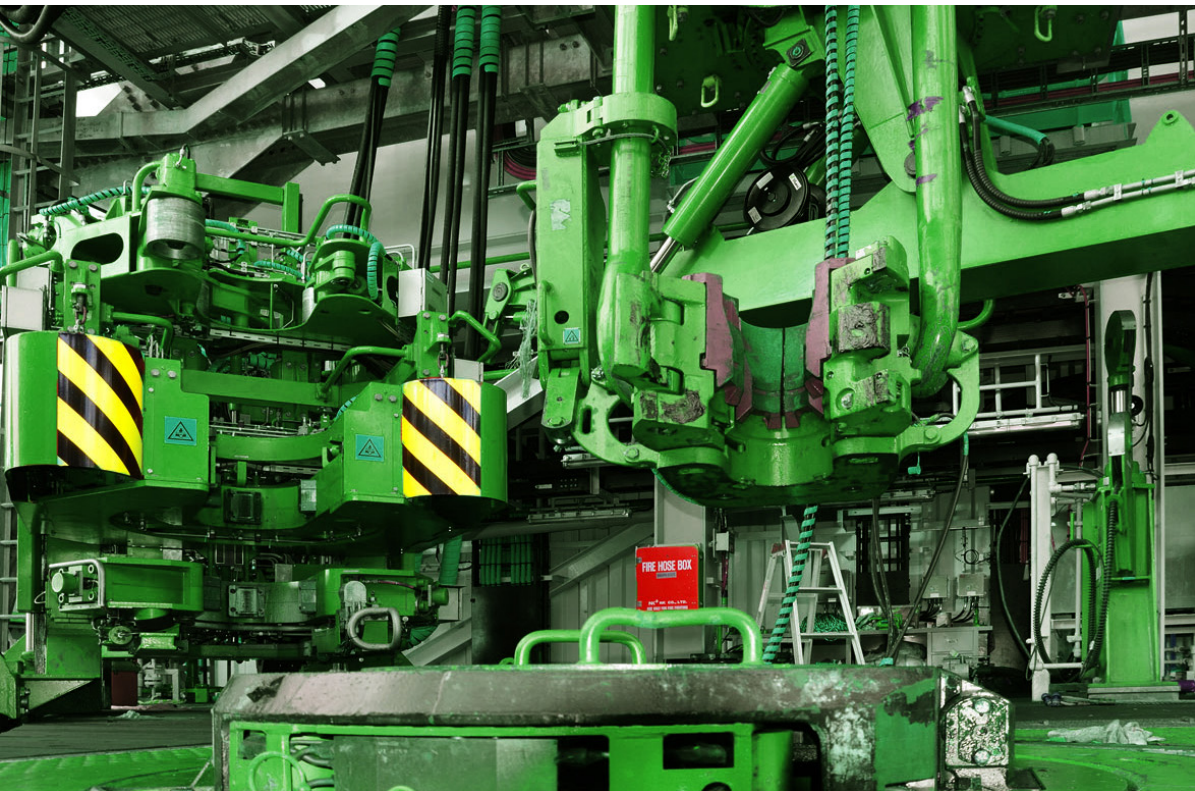
UltraWash is a water-based heavy-duty cleaner and degreaser that easily cuts through heavy oils, grease, and drill muds.

The non-flammable, non-abrasive, and non-caustic formula eliminates built-up grime and residue on drilling rigs, pumps and equipment.

## Power through the toughest grime

### PROPERTIES

Appearance	Clear colourless liquid
Density 20°C	0.86 - 1.05 g/cm³
Flash Point	Non-flammable
Shelf Life:	24 months



### ENVIRONMENT

- Dispose of chemicals in accordance with local environmental legislation Local environment registrations.
- UltraWash is listed with CEFAS with a Gold rating.

### HANDLING

- Normal precautions should be taken for handling chemicals. Protective clothing, eye protection and gloves should be worn.
- Please refer to the Material Safety Data Sheet (MSDS) for further details.

### DILUTIONS

- Dilutions are given as a guide only and depend on many factors such as temperature, type of contamination, degree of soiling, type of mud system being applied, and the type and area where hydrocarbons are being drilled.
- The following dilutions are suggested as guidance only:
  - Heavy Duty Cleaning 2 to 5 to 1
  - General Cleaning 10 to 1
  - Light Degreasing 10 to 20 to 1

### AVAILABLE IN THE FOLLOWING CONTAINERS





# Ultra-Max Chemical Cleaner



Ultra-Max is a high-performance product and chemical designed to quickly and efficiently remove hydrocarbon residues from downhole tubulars, equipment, and casing. Designed as a single package using high-performance solvents and surfactants to form an effective cleaning solution for drilling fluid removal and detergency. Surfaces are left water-wet, with solids and drilling-fluid deposits removed from the wellbore.

## Single-use, High-Performance, No Compromise.

### APPLICATION

- Ultra-Max can be diluted in fresh water, seawater, or brine, depending on the degree of soiling or contamination, and pumped as a spacer to remove oil or synthetic-based drilling fluids, leaving surfaces water wet before the start of completion operations.
- Ultra-Max can be pumped independently or as part of a spacer train, including a high-viscosity sweep with a base oil sweep. Sufficient volume should be used and pumped to remove drilling-fluid residues to ensure a water-wet clean finish.

### BENEFITS

- One product delivers separation, dispersal and water wetting for transition and push pills
- Can be diluted in freshwater, seawater, or brine
- Supplied as one product in 200-L drum or 1000-L IBC to reduce inventory and storage space requirements
- Very effective at breaking the brine in oil emulsion of the mud system and changing the surface wettability of barite and drill solids to water-wet for good dispersion and mobilisation out of the wellbore
- Casing, tubulars and downhole equipment are left water wet prior to pumping completion fluid

### PROPERTIES

Appearance:	Clear colourless liquid
Specific Gravity at 20°C:	0.93-0.98
Flash Point (PCCM):	>95°C
Odour:	Slight solvent
Shelf Life:	24 months

### HANDLING

- Normal precautions should be taken for handling chemicals. Protective clothing, eye protection and gloves should be worn. Please refer to the Material Safety Data Sheet (MSDS) for further details
- environmental
- Ultra-Max has been classified as a GOLD chemical with CEFAS for completion and workover applications in the UK sector of the North Sea
- Dispose of chemicals by local environmental legislation

### ENVIRONMENTAL

- Ultra-Max has been classified as a GOLD chemical with CEFAS for completion and workover applications in the UK sector of the North Sea
- Dispose of chemicals by local environmental legislation

### DILUTIONS

- The product is designed to be used at between 5 and 20% dilution in fresh water, seawater, or brine
- Minimal mixing is required to disperse the cleaning solution. Gentle agitation of the spacer fluid will ensure good homogeneity





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