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CLEANWELL®
SYSTEM
TECHNOLOGY

ENGINEERED SOLUTIONS TO IMPROVE COMPLETION EFFICIENCY
Improving Efficiency, Reducing Risk

Halliburton’s revolutionary CleanWell® system gives operators a wide range of high-value services designed to improve efficiency and reduce risk during well construction and completions. Thanks to cutting-edge technologies, innovative designs and integrated solutions, the CleanWell system can help operators reliably achieve higher profit margins with lower risks.

Safety and Service Quality are Fundamental to Halliburton

Halliburton believes safety is everyone’s business. That is why every person at every location worldwide makes safety awareness their number one priority. Every member of every Halliburton team is tasked with taking personal ownership of his or her own safety and the safety of others.

Service quality is embedded into each element of Halliburton’s delivery process. From the development of unique solutions to the manufacture and delivery of our products and services, service quality is a continuous focus of each member of the Halliburton team.

Best Opportunity to Manage Debris

Well cleaning operations represent a critical stage of well construction between drilling and completions. When designed properly, well cleaning is an operator’s best opportunity to manage debris before it becomes a critical issue. Debris problems that affect completion equipment can lead to several days of downtime and remediation. Halliburton’s CleanWell® system is specifically designed to help prepare the well for successful completion while saving time and reducing risks.

Saving Time with Single-Trip Operations

CleanWell tools are designed to work as a system to accomplish several well cleaning operations at once. By combining multiple tools on a single string, operators can reduce the need for dedicated trips, greatly reducing rig time and improving operational efficiency.

Tools Designed to Go Deep

CleanWell tools feature simple, robust designs that meet or exceed the torsion and tension limits of the workstring, allowing for reliable operation even at extreme depths and conditions. This helps to enable safe and effective well completion services in high-value projects without compromising efficiency.

Debris Removal from the Bottom Up

CleanWell bottomhole assembly (BHA) solutions are designed to reduce and normalize the size of debris in the wellbore. That makes it possible for other tools to mechanically or hydraulically remove debris that would otherwise be too large or heavy to deal with effectively.

Integrated Solutions

Like all Halliburton solutions, the CleanWell system benefits from a fully integrated portfolio of cross-disciplinary offerings. We work closely with Baroid to develop completion fluids for displacement and filtration services to improve pumping efficiency. Additionally, the polish mill assemblies are designed to dress and polish tools from our VersaFlex® expandable liner hanger to ensure a reliable internal seal.
No Motor Required for Rotary BHA
After a well is drilled and cemented, any excess cement must be drilled out and removed. The CleanWell system includes rotational tools with torsion and tension limits that meet or exceed the workstring. This allows the tools to be run as a rotary bottomhole assembly with no motor required for drilling out cement.

Ensure Tight Seal and Proper Drift
CleanWell tools effectively scrape and clean packer setting areas while restoring casing drift. This ensures that production packers will seal correctly and gives the operator confidence to run tight-tolerance completion equipment.

Reduce Time Needed for Negative Test
Before production begins, operators need to perform a negative inflow test on the liner, liner hanger and cement integrity. The Inflow Tech® test packer can be rotated, allowing it to be integrated in the single-trip system. This can potentially help eliminate a dedicated negative test trip and greatly reduce the time required to test the well.

Streamline Displacement Operations
Once the operator is ready to begin completions, the drilling mud must be displaced with completion brine. The Bristle Tech® tool uses brushes to remove traces of drilling fluid from the casing. The Vali Tech® filter can mechanically remove debris that is not circulated out in the mud.

APPLICATION
Wellbore Cleanup and Displacement
The most common application for the CleanWell system is wellbore cleanup and displacement operations.

APPLICATION
Drilling
Drilling applications are common in preparation for plug and abandonment, window mill cutting runs, and pre-liner-running cleanout trips.

Ensure Long-Term Reliability for P&A
When a well reaches the end of its useful life, plug and abandonment (P&A) operations help ensure that the well is safely sealed off. The Drill Tech® casing scraper can help remove debris from the wellbore, giving operators confidence that packers set during P&A runs seal correctly.

Quickly Capture Debris from Window Mill Cutting
Window mill cutting runs generate a large volume of metallic debris. The PowerMag® magnet tool has proven capable of recovering more than 250 pounds of ferrous debris in a single run. This allows the operator to recover as much debris as possible during the milling operation, preventing most debris from reaching the blowout preventer (BOP) and surface system while reducing the need for additional cleanout trips.

Prepare Liner Hanger Setting Area for Secure Seal
Before deploying liners, operators need to ensure that the setting area is clean so the liner hanger can seal correctly. The Drill Tech® scrapers and Mag Tech® magnet tools are run along with a Spiral Mill to create a single-trip solution for preparing the wellbore for liner hanger operations.

SUCCESS STORY
Single-Trip CleanWell System Saves Days of Rig Time for Two Operators
A deepwater operator saved two days of rig time worth at least $1.5 million USD using the CleanWell system technology to perform a single-trip drill out and well displacement. The mechanical debris removal recovered more than 280 pounds of debris – more than four times what conventional systems typically recover. In another deepwater well, Halliburton used the Inflow Tech negative test packer along with other CleanWell tools to perform a wellbore cleanout and negative test in a single run, saving approximately $1.6 million USD in rig time and fluids.

SUCCESS STORY
PowerMag Tools Recover More Than 470 Pounds of Debris During Milling
An operator milling out a window at more than 13,000 ft. included two PowerMag magnet tools on the workstring to recover debris. During the two window milling runs, the PowerMag tools retrieved more than 470 pounds of metal debris. An additional 91 pounds of debris was recovered in a separate BOP flush run. Running PowerMag tools during the window milling instead of waiting to run debris extraction tools after the window is milled can save an entire cleanout run and represent a step change in efficiency for window milling operations.
Increase the Chance of Equipment Recovery
Many CleanWell tools, including Mag Tech® magnets and Vali Tech® junk baskets, can be run alongside conventional fishing tools. The enhanced strength and capacity of these tools can increase the chance of recovery and reduce the need for subsequent fishing runs.

Efficiently Retrieve Larger Debris
The Vac Tech® system is often used in conjunction with reverse circulation baskets. The faster flow loop and larger lifting force allow operators to efficiently retrieve larger debris than would be possible with reverse circulation alone.

Remove Debris and Retrieve Packer Plugs in a Single Run
The Vac Tech® system can efficiently remove sand, cement, cuttings and other perforation debris that settles on top of packer plugs. Because the Vac Tech system is designed to be run in conjunction with other plug retrieval tools, operators have the ability to remove debris and retrieve packers in a single run.

Protect Fragile Completion Equipment
The Drill Tech® deburr mill uses the same proven design as the Drill Tech scraper, but includes customized scrapes blades and smooth OD tungsten carbide stabilizer sleeves. This allows packers and other relatively fragile completion equipment to be safely run through perforation zones.

Quickly Remove Perforation Debris
PowerMag® magnets are used to recover ferrous debris from perforated casing or from the perforating guns themselves. This allows the operator to improve the reliability of packers by clearing the area after perforation.

APPLICATION
Fishing
Many CleanWell tools are ideal for fishing applications, when efficient removal of debris is needed before operations can continue.

SUCCESS STORY
Mag Tech Magnets Outperform Competitors’ Tools
An operator had an incident where five packer slips were lost down hole. Before beginning fishing operations, the operator ran a test with several competitors’ string magnets and Halliburton’s Mag Tech magnet. The same slips that had been lost down hole were placed in a piece of casing, and each magnet tool was run to test the ability to retrieve the slips. The results showed that the Mag Tech magnet was the only tool capable of capturing and retrieving the lost slips. During the actual fishing operation, three slips were recovered on the first run and the remaining two were recovered on the second run.

SUCCESS STORY
Vac Tech System Removes Debris and Retrieves Packer Plug
An operator had cement and sand left on top of the packer plug after perforating. When conventional and competitor tools were unable to remove the debris above the packer plug due to the depth of the operation, Halliburton recommended the Vac Tech system. This successfully removed more than 100 pounds of cement and sand, and allowed the operator to retrieve the plug on the same run.

APPLICATION
Post-Perforation Runs
After perforation takes place, CleanWell tools are frequently used to help ensure reliable well operation and reduce the risk of damage to other equipment.

SUCCESS STORY
Mag Tech Magnets Outperform Competitors’ Tools
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CleanWell casing cleaning tools enable efficient removal of solid materials and debris that may be present in the casing. This also allows for cleaning the casing walls and restoring drift prior to displacement or intervention.

These tools rotate with the workstring and feature an adaptable component design that allows them to be built to suit specific applications. Additionally, they can be run either as a standalone tool or in combination with other tools as part of a single-trip system.

- **Drill Tech® Casing Scraper** is a premium casing scraper that features stabilizer sleeves that fit tight to the casing drift and casing-friendly spring-loaded blades that move independently for superior radial contact to the casing ID. The spring-loaded blades ensure consistent force is applied throughout the cleanout run.

- **Bristle Tech® Brush** features a similar design to the Drill Tech casing scraper but incorporates short, twisted wire brush inserts in each blade. The short bristle design ensures maximum contact between the edge of the bristles and the casing ID.

- **Combo Tech® Scraper/Brush** combines brush and scraper inserts to further improve cleaning efficiency and debris removal.

Debris extraction tools remove particles and solids from the well. They feature a wide variety of debris removal methods and benefits, and can be combined to maximize operational efficiency. Like many CleanWell solutions, these tools are built to rotate with the workstring.

- **Mag Tech® Casing Magnet** features an extremely simple, non-rotational magnet sleeve and strong, high-energy bar magnets. The Mag Tech magnet is designed to be run in conjunction with other tools, such as the Drill Tech® casing scraper, Bristle Tech® brush or Vali Tech® downhole filter during a wellbore cleanout.

- **PowerMag® Magnet** is designed for large debris recoveries. The magnetic faces provide 2,800 square inches of collection area. This allows it to safely collect and retain more than 250 pounds of material from the wellbore.

- **Vac Tech® Downhole Eductor System** utilizes a proprietary eductor energy system that works off of convergent and divergent flow for extremely efficient fluid dynamics. This allows it to lift and capture debris from depths three times greater than competing tools, ideal for unusually deep wells. The tool can be run with different quantities of collection chambers depending on the expected amount of debris.

- **Vali Tech® Downhole Mechanical Filter** provides a mechanical alternative to collect solids from the wellbore. It uses a fluid interrupter sleeve that allows flow past the tool while tripping in, then shifts closed while tripping out to force all fluid into the filter tube, collecting debris from the wellbore. This tool is ideal for highly deviated wells where solids tend to settle on one side.

- **Vor Tech® Casing Junk Basket** shares its design with the Vor Tech riser junk basket. It is designed to handle large debris and dense solids that cannot be circulated out of the wellbore. It creates a vortex that causes solids to drop out of circulation into the collection throat.
Jetting and Bypass Tools

Most jetting and bypass tools on the market require shutting down pumps, dropping multiple ball sizes or eliminating string rotation. CleanWell jetting and bypass tools do not have these limitations. Thanks to simple and reliable activation sequences, these tools greatly improve efficiency and functionality. These rotational tools are designed to rotate with the workstring.

- **Jet Sub** is equipped with a series of phased and nozzled ports to help jet and flush surface blowout preventer (BOP) cavities.

- **Jet Tech® Valve** is activated and deactivated with wireline-retrievable steel darts. It has a 16-inch outer diameter to ensure optimal jet impact and effective cavity flushing in subsea BOPs.

- **Jet Tech® Slimline Valve** has a smaller outer diameter to help eliminate spacer concerns when deploying single-trip mechanical displacements. The tool can be fully cycled open and closed at a single time, allowing the BOP jetting operations to take place at the most convenient time during displacement operations.

- **Turbo Tech® Multi-Activation Bypass Valve** is a compression-set activated bypass tool designed for uphole boosting above liner tops during displacement or cleanout interventions. Unlike alternative tools, it allows circulation when activating the tool, which is critical during a displacement operation.

Riser Cleaning Tools

Riser cleaning tools are designed to remove solids and debris from the riser while protecting it from damage. They operate on a bearing system and do not rotate with the workstring while meeting the cleaning objective. These tools can be used in offline operations or integrated with a displacement or intervention run.

- **Mag Tech® Riser Magnet** collects ferrous material using high-energy bar magnets. The lower annular velocities inside the riser make it an ideal place for magnets during circulation, ensuring small metal fines do not fall back into the wellbore after circulation is stopped.

- **Riser Bristle Tech® Brush** is similar to the brush system used for casing cleaning. It uses an innovative design that directs fluid flow across the brush to automatically clean bristles to ensure reliable operation. Large flow areas underneath the brush allow high flow rates past the tool and prevent issues with surge/swab.

- **Vor Tech® Riser Junk Bucket** is designed to handle large debris and dense solids that cannot be circulated out of the wellbore. It creates a vortex that causes solids to drop out of circulation into the collection throat.
**Specialty Tools**

The CleanWell system is a comprehensive toolbox of well cleaning solutions. It includes a wide variety of specialty tools that address specific concerns and can help to improve operation efficiency and safety.

- **Inflow Tech® Test Packer** is a versatile negative test packer that can be run in a displacement tool string. It is capable of rotation when it is required to address debris and the design allows it to be placed anywhere in the tool string. The test packer features a generous bypass area designed to improve trip speeds and flow past the tool.

- **StimTech® Long-Stroke Slick Joint** allows slow tripping with the annular preventer closed while protecting it from stripping damage. It is ideal for use during fracturing, gravel pack, or tubing conveyed perforating operations.

- **Tru-Drift® Mill Sleeve** provides a 360-degree downhole drift simulation. It uses water-coursed stabilizers to allow the sleeve to be rotated and to mechanically assist in tight spots or restrictions.

- **ReversePro® Mandrel** assists in reverse-circulation operations. The annular preventer is closed around the tool while a high-pressure seal system allows rotation and a full joint of reciprocation.

- **Pressure Tech™ Test Sub** allows drillpipe to be flexed and shocked to assist with cement sheath, scale or debris removal. It can also be used to pressure test the drillpipe before critical operations.

- **TurboDrive® Smart Clutch** helps operators reduce torque on workstrings inside small casing liners. It allows pipe rotation below the tool until a pre-set torque limit is reached, at which point the clutch disengages. The upper string will continue to rotate, while the string below the tool will remain stationary.

**Specialty Mills**

CleanWell specialty mills use an integral, casing-friendly design and can be run on dedicated pipe trips or along with other cleanout or intervention runs.

- **Polish Mill Assembly** is designed to integrate with Halliburton’s VersaFlex® expandable liner hangers. The assembly is a modular design consisting of a top dress mill, polish mill, extension sub to properly place the polish mill in the polish bore receptacle (PBR), and an optional cement drag bit.

- **Spiral Wrap String Mill** can restore casing drift and reduce the size of debris generated during milling and drilling operations. Innovative features, such as a 360-degree overlap and water-coursed gaps between the blades help improve performance and reliability. The spiral wrap string mill is ideal either as a standalone device or with other wellbore cleaning tools.

- **Integral Stabilized Bladed Mill** delivers aggressive milling or drillout performance and debris management. Available in four- or five-bladed variants, the mills feature a unique stabilization system to mitigate unwanted walking or wobbling while drilling.

**Tools**

- **Polish Mill Assembly**
- **Spiral Wrap String Mill**
- **Integral Stabilized Bladed Mill**
## Selecting the Best Tool for the Job

The CleanWell system includes many tools for many different applications. The chart below helps determine which tools are appropriate to meet your well cleaning challenges.

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To learn more about how Halliburton can help meet your completion goals, email us at completions@halliburton.com.