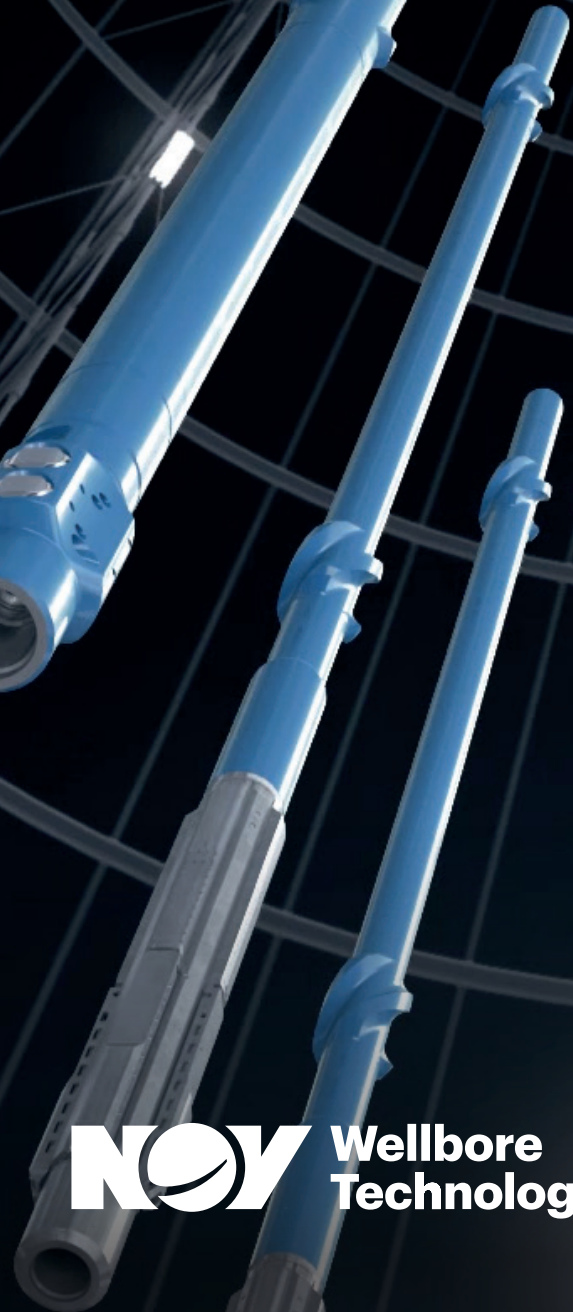
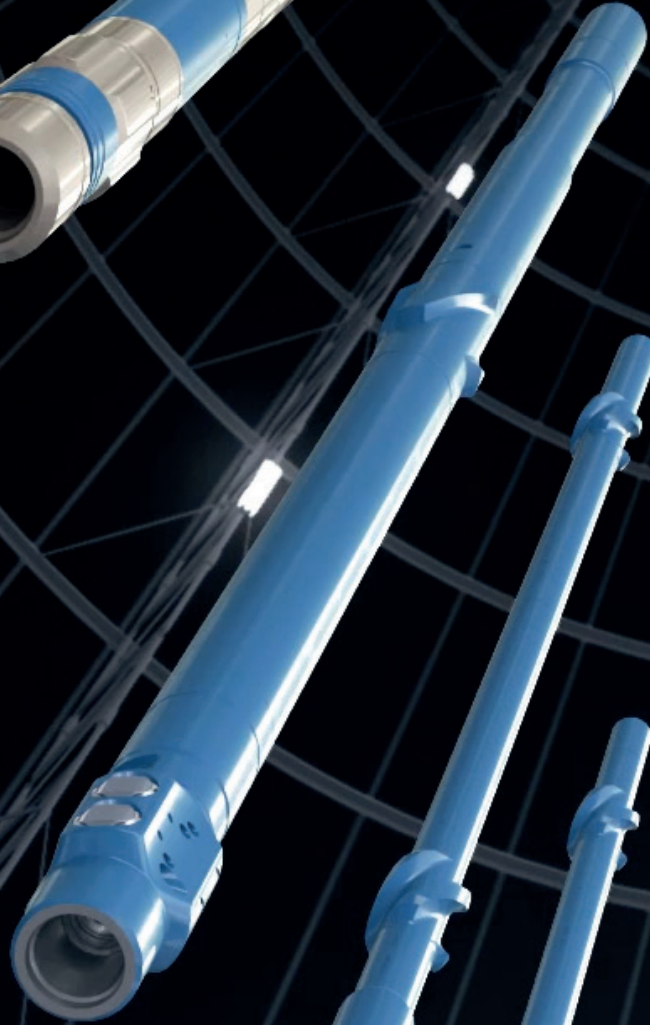
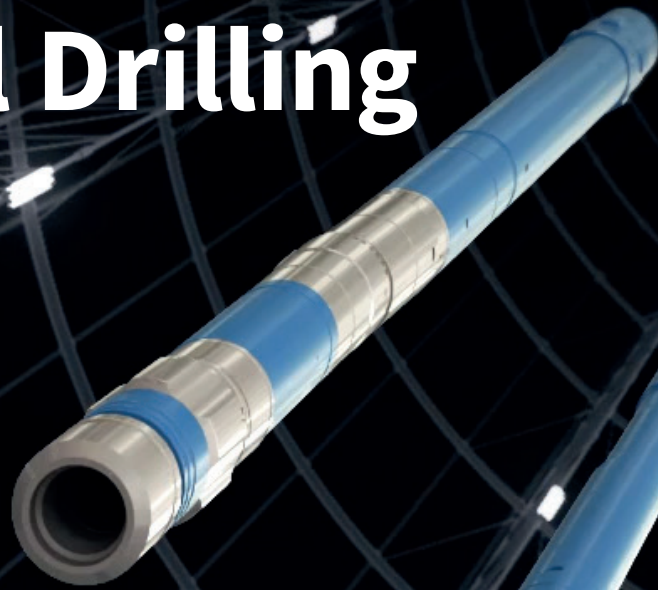


Directional Drilling Packages



Directional drilling packages



Whether you're a contractor or a directional driller, our directional packages can help develop your role as a technical leader while efficiently managing your inventory and working capital in the directional drilling market.

- Drill bits
- Downhole motors
- Downhole adjustable motors
- Borehole conditioning
- Friction reduction technology
- Rotary steerables
- MWD/LWD
- Vertical monitoring tools
- Wired drill pipe
- High-speed MWD
- Digital oilfield



More than
17,000 horizontal wells,
7,000 vertical wells, and
1,000 directional wells were drilled
in North America during the past year.
At an average cost of **\$50,000**
to **\$100,000** USD per trip

NOV-sourced, integrated directional products and technologies reduce unplanned trips and improve performance

More than 17,000 horizontal wells, 7,000 vertical wells, and 1,000 directional wells were drilled in North America during the past year. At an average cost of \$50,000 to \$100,000 USD per trip, you or your client cannot deliver a truly successful project when poor performance or unplanned trips occur. To help mitigate these costly operational setbacks, NOV Wellbore Technologies offers a selection of bottomhole assembly (BHA) products that are focused on delivering reliable, cost-effective performance in your directional drilling applications.

We've aligned across our organization to determine the appropriate technologies and services that solve your directional drilling challenges, and we're taking a holistic approach to how we deliver those products to you. Our solution addresses the entire BHA, giving directional drillers around the world a unique opportunity to be a technical leader while efficiently managing their inventory and working capital.

Since your directional drilling campaigns include challenges such as complex geometries, high temperatures, and extended-reach unconventional, our modular approach allows significant flexibility to configure the tools you need for a wide variety of applications. Our directional drilling technologies are available through a variety of commercial models, which enables you to maintain the tools, ensure they are cost effectively deployed, and successfully deliver your wells on plan.

As a leading directional drilling technology provider, our experienced personnel and innovative R&D facilities are solely focused on designing, manufacturing, and supporting your directional drilling projects with the tools you need to compete globally.



Directional BHA Components

Drill Bits

Our ReedHycalog™ drill bits can be tailored and optimized to fit any directional drilling application. Featuring advanced bit body geometry and the latest generation PDC technology, our bits can be matched to perform in tandem with the dynamics of your directional BHA, increasing your ROP and minimizing NPT while delivering reliable, cost-effective performance.

Downhole Motors

Our ERT power sections matched with our shorter bit-to-bend Vector™ Series 50 platform provide a robust, high-torque motor that aids in better directional control versus the longer length power sections and motors that are available in the market.

Downhole Adjustable Motors

The SelectShift™ downhole adjustable motor offers downhole adjustment of the motor bend setting, saving time and money by eliminating trips and optimizing critical drilling parameters. In the straight setting, the motor limits hole tortuosity, aids in hole cleaning, and allows for higher drillstring rotation. The bend setting allows for directional steer and when faster correction is needed.

Borehole Conditioning

Complex directional profiles result in high drilling torque and difficult trips. Our Dog Leg Reamer borehole conditioning tool improves wellbore quality by eliminating ledges and microtortuosity, resulting in less string torque and reduced trip times.

Friction Reduction Technology

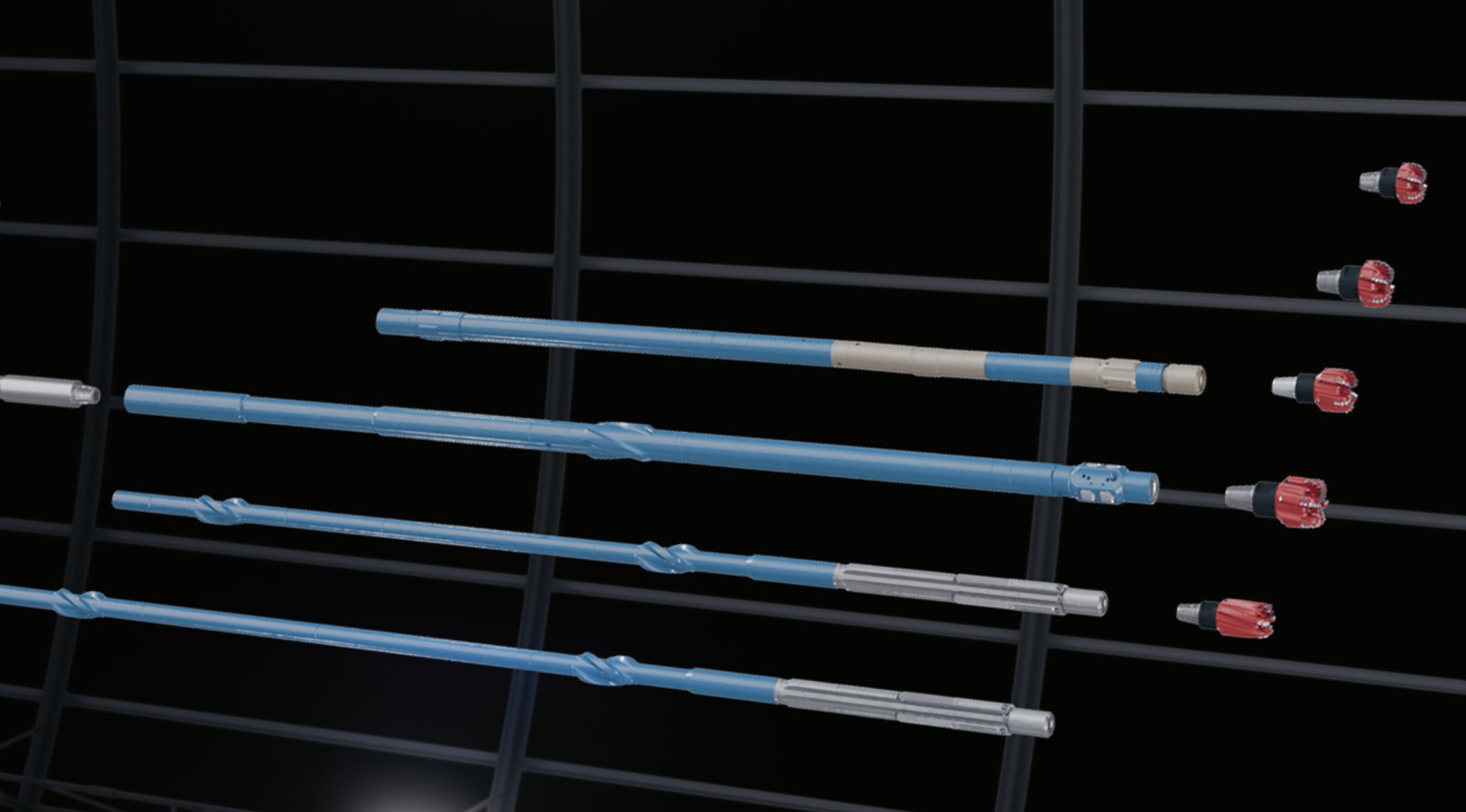
The Agitator™ System is 100% compatible with all drive-type systems, including motors and rotary steerable systems (RSS), as well as all measurement-while-drilling/logging-while-drilling (MWD/LWD) systems. The Agitator system is the most efficient technology to reduce downhole vibration, deliver consistent differential to the bit, and increase drilling performance. Directional drillers and rig personnel continuously report the Agitator's friction-breaking energy improves weight transfer and directional control with both motor BHAs as well as RSS BHAs.

Rotary Steerables

RSS has become standard equipment in many directional drilling operations, and we ensure that directional drillers around the world have access to this critical technology. We offer three different systems that use industry-preferred, push-the-bit steering: VectorEXAKT™ precise vertical control for large diameter sections; VectorZIEL™ premium, 3D RSS with integrated MWD/LWD; and our reliable, cost-effective VectorEDGE™ NXT tool for unconventional applications.

MWD/LWD

The Tolteq™ iSeries product line, which is our probe-based, mud-pulse MWD portfolio, is a modular platform that provides directional drillers with significant flexibility. Offered in both a legacy retrievable design with a bottom-mount pulser or in a fixed, top-mount pulser configuration, our Tolteq iSeries kits include everything required to run an MWD job.



We also offer LWD measurements that include azimuthal gamma and resistivity. Using the Tolteq MWD platform, these tools provide the formation data in real time as well as in memory, allowing directional drillers to expand their capabilities and offerings into new and higher tier markets.

Vertical Monitoring Tools

We offer the broadest range of fit-for-purpose vertical monitoring and survey-on-connection tools in the industry. Our Teledrift™ and FloTools™ product lines provide a cost-effective alternative to conventional MWD or wireline-deployed survey tools when drilling vertical sections. Known worldwide for their simplicity and reliability, our tools can be run without dedicated rigsite supervision with remote access to survey data available.

Wired Drill Pipe

Our IntelliServ high-speed, bi-directional data network provides instantaneous transfer of real-time data from the BHA and along-string measurement tools to surface, enabling continuous control of downhole tools. The increased speed and high-quality data transmission allow for better real-time directional understanding and control, improved borehole placement, increased ROP (by eliminating ROP limiters), and reduced drilling time per well.

High-Speed MWD

M/D Totco's™ BlackStream™ MWD tool combines its enhanced measurement system (EMS) tool with a direction and inclination probe as well as a gamma sensor to provide real-time measurements of both drilling dynamics and wellbore position. The combination of our BlackStream MWD tool and IntelliServ wired drill pipe provides real-time, high-frequency downhole data at rates up to 80 Hz, allowing you to monitor the BHA's dynamic state and delivers with no lost time when compared to traditional surveys.

Digital Oilfield

M/D Totco's industry-leading RigSense™ electronic drilling recorder provides surface data acquisition, software analysis capabilities, and visualization functions to support directional performance. Additionally, our DrillLink™ automated control system generates command sequences for downlinking to RSS and other downhole tools, eliminating the need for the directional driller to constantly monitor a stopwatch while giving verbal instructions to the driller.

Please contact your local NOV representative to learn how you can build directional BHAs that deliver the performance you expect from NOV.

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