

# Oil & Gas

PRODUCT NEWS

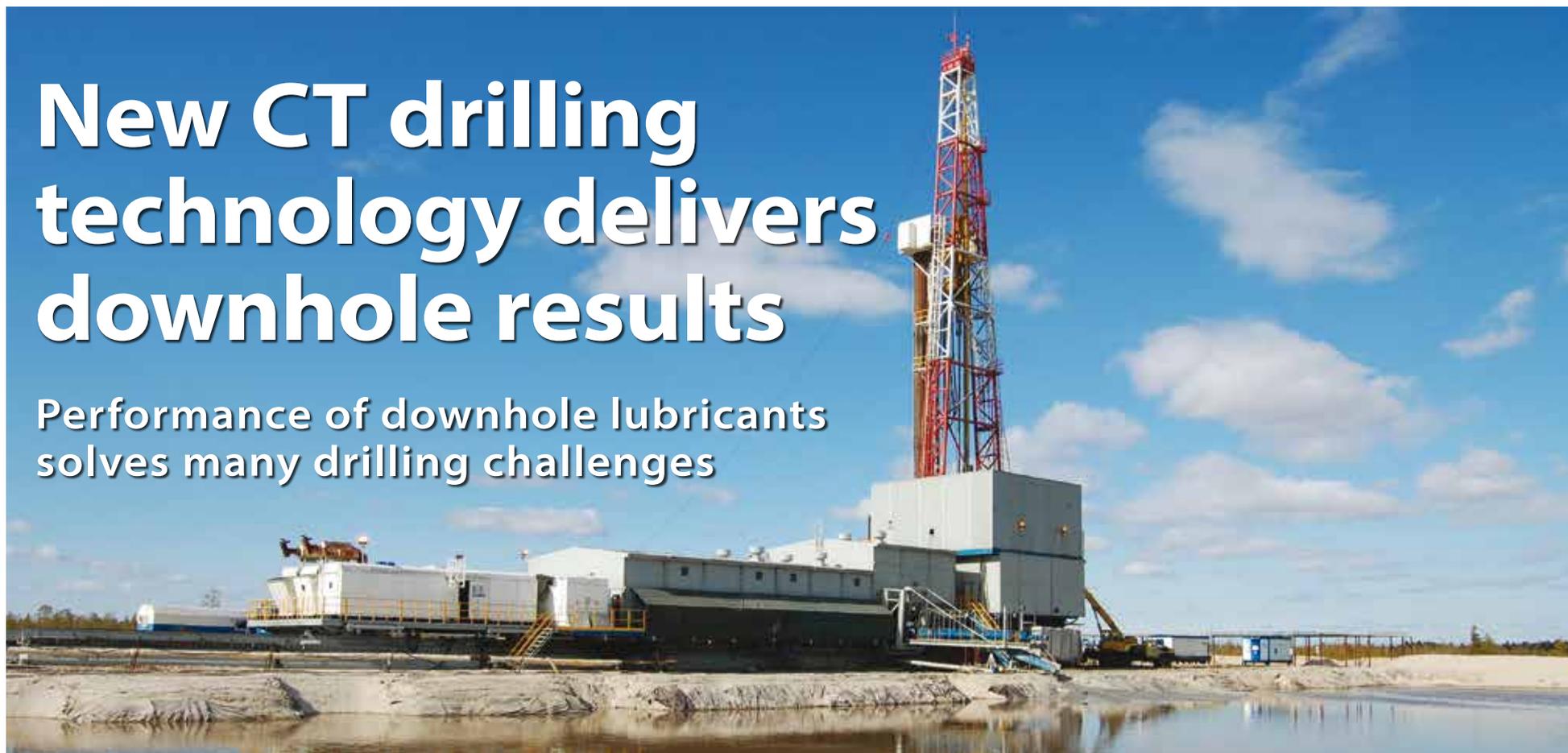
## DOWNHOLE DRILLING PERFORMANCE

**New lubricant technology  
boosts coiled tubing  
production results**

**Harnessing satellite technology  
Wireless data collection  
Automated drill rig in design**

# New CT drilling technology delivers downhole results

## Performance of downhole lubricants solves many drilling challenges



by Jim Farr

For oil and gas operators worldwide, friction has been the major nemesis of downhole drilling since the industry's inception. Yet, despite the industry's ongoing innovative technology as a whole, friction is the one problem that experienced no real breakthrough solution until scientists in a California laboratory developed a unique lubricant. That technology, after proving it could improve downhole drilling, became the building block for spin-off technologies including one for the increasingly popular coiled tubing (CT) drilling.

### Seeking better solutions

As operators are aware, CT looks just like its name implies (long metal tubing delivered as a spooled product) and offers versatile applications in the oilfield. For example, it can be employed as a less expensive approach to workovers, for well interventions, for circulation or deliquification, as production tubing or even for debris clean-out on wells, to name a few.

As a result of this versatility, analyst forecasts show the CT market growing from just over \$3 billion now to approximately \$4.5 billion in the next five years. Although North America is the primary market, largely as a result of shale oil and gas extraction, other oil and gas producing regions such as Asia Pacific, China and the Middle East are also projected to grow the CT market. As could be expected, service companies are active suppliers of CT and in North America (within the continental U.S. generally), ProOne's CoilPro CT product has already been utilized in the Bakken with excellent results.

For all the unique flexibility that CT provides, its bendable characteristic simultaneously creates a variety of potential problems which may be encountered with downhole deviations. CoilPro lubricant was specifically developed as a pipe-on-pipe technology to make the CT drilling process function more smoothly.

When Tribologists at ProOne Inc. originally developed XPL+ lubricant, the enthusiasm about beginning production and shipping barrels to sites was huge. Performance expectations were rewarded, with one operator after another confirming that the technology did work as sales data indicated that it would.

### Advancing the technology

But, since downhole lubricants are certainly not a new development, what makes this new technology different?

The answer is centered on having a positively-charged molecular structure with a strong positive charge. That effectively translates into a lubricant which, over and above its other attributes, migrates toward extreme heat and pressure instead of away from it and it bonds to all metal downhole without exception.

A quick summary for operators is that the lubricant is the time-proven solution to more than a dozen major drilling challenges. These include dramatically reducing wear on pumps, allowing for straighter vertical with less corkscrewing, casing can be set faster, personnel can slide liner faster, it increases rate of penetration (ROP), curve can be drilled in about one-half the typical time, torque can be greatly reduced and hook load is significantly reduced, to name a few key capabilities.

These capabilities continue generating typical savings for operators – up to \$100,000 by saving drill bits and mud motors, up to \$500,000 by increasing ROP and saving trip costs and up to \$1 million by minimizing twist-off risk, helping free stuck pipe and finishing the well. Tested and proven in more than 700 wells in North America, lubricant sales expanded to international distribution in 2015 at more than 300 locations.

### Field application example

In North Dakota, an operator was experiencing problems with getting CT to the end of 20,000-foot laterals. Following its usage of CoilPro the company achieved, and continues to have, a perfect record in getting coil to the end of the well and has also set a record in drilling frac plugs to depth of 21,600 feet.

These accomplishments were made possible by the way this lubricant works. It bonds with metal at the literal point of friction, allowing considerably more weight to be exerted at the end of the CT. While precise figures are unavailable since weight on bit (WOB) cannot be measured in CT operations, downhole drilling results with this lubricant have clearly demonstrated that friction reduction is considerable.

Yet, another performance attribute was what particularly got the customer's attention: the pipe-on-pipe treatment helps mill all plugs, not just some, which adds up to notable savings. This customer drills frac bridge plugs in the following manner: a combination of initially drilling without CoilPro and then with the lubricant. In a 20,000-foot well they drilled out plugs without using lubricant until drilling reached a 14-15,000-foot depth. At that point, they pulled out with a wiper trip and conditioned the hole with the pipe-on-pipe treatment.

Upon resuming drilling, rig personnel added the lubri-

cant to the mud at a rate of 1/2-gallon for each 10-barrel tub, up to 1-1/4-gallons per barrel tub when working with difficult or badly deviated holes. A 2-inch tapered drill string was run with agitator in 4-1/2 inch casing and they also utilized a friction reducer to continue pumping pressures under 5,600 psi. Standard usage is 1 gallon of the treatment for every 1,000 gallons and for deviated wells, usage is 2 gallons for each 1,000 gallons. Well personnel observed that the treatment was easily dispersed, whether choosing to add it through pre-mixing or through a hopper right into the active system.

Overall on its wells the customer reports that the changed results speak for themselves. Before using CoilPro on its wells, the customer said rig personnel typically left up to four plugs in the hole at least half the time. Now, with this new pipe-on-pipe treatment they drill every single plug on every single well – no exceptions. Their most recent well, according to the company, is a very timely example. First the drill string locked up at 15,200 feet. The treatment was applied, they broke loose and subsequently they were able to drill all plugs to a 21,000-foot depth.

That was accomplished by delivering pipe-on-pipe extreme pressure reduction and rheological stability at the customer's well site, helping ensure optimal drilling efficiency as well as lowering well costs. Lower operating costs are not limited by the type of well, but instead apply to vertical, deviated or horizontal wellbores.

As a side benefit for the customer when drilling bridge plugs, these are brought up the wellbore and carried out of the hole as what could be called chunks in layman's terms. If these large fragments are not lubricated they can cause wear on the pipe. By lowering the coefficient of friction, that potential problem is eliminated. In fact, this treatment not only lubricates the entire casing and CT bottom hole assembly (BHA), it coats the CT itself and during the downhole drilling process increases lateral reach as a result.

### Significant well operations improvement

As use of this lubricant expands in field applications on a global basis, positive reports from CT operators continue to emerge. For those who had just become aware of the key properties in the original technology incorporated into CoilPro, they are most surprised that the old saying "a lube is a lube is a lube" is simply not accurate anymore.

And the advantages become readily apparent when the product goes downhole, including the lubricant's attraction to hot spots, withstanding high heat, reduc-

## Detectable tracer technology for sand stimulated completions

Carbo Ceramics Inc. announces the introduction of CARBONRT ULTRA, a new, easily detectable inert tracer technology for sand stimulated completions in vertical and horizontal wells.

CARBONRT ULTRA enables the detection and evaluation of near-wellbore proppant location and quantity. This evaluation provides an accurate measurement of perforation cluster efficiency and near-wellbore connectivity to maximize ultimate recovery. Understanding proppant placement also supports the optimization of stage placement and proppant diversion.

Information gathered from these diagnostics enables operators to reduce costs and ultimately improve their completions efficiency.

This proppant technology is detectable with a standard neutron logging tool. The tracer does not dissolve or wash away and is permanently identifiable, providing operators the flexibility to conduct post-fracture logging months or years after fracturing. It is blended at an engineered ratio with sand prior to or during pumping operations.

“CARBONRT ULTRA inert tracer technology represents another CARBO product commercialization designed to help operators intelligently complete their wells and reduce their finding and development costs,” said John Lassek, director of production enhancement. “Perforation clusters which have not been treated or have been overflushed during the completion results in lower EURs,” said Don Conkle, vice president sales and marketing. “CARBONRT ULTRA provides visibility to this and helps to support more cost effective completions which increase recovery factors.”

**CARBO Ceramics Inc.**

*Continued from previous page.*

ing pipe-on-pipe friction, exhibiting film strength exceeding 200,000 psi, reducing pinholes, helping increase WOB, functioning as a rheological stabilizer and increasing ROP – plus the most-talked about feature of milling all bridge plugs, not just some. CT drilling has become a more streamlined operation with fewer aggravations involving deviated wells and doglegs.

At the same time, operators are realizing that other benefits apart from enhanced drilling operations and cost savings are appealing, too. For example, the product offers minimal disposability problems since the lubricant is formulated for easy disposability and meets rigid standards for biodegradability.

On the subject of on-site chemical spills, this treatment is not even classified as a reportable event because it is plant-based and ultimately 100 percent biodegradable.

Its enviro-friendly qualities also mean that it is safe for human contact or, in this context, rig personnel, in terms of minimal inhalation, skin contact or ingestion problems.

After the issue of “mean time between failure” (MTBF) of critical parts on a well had persisted for entirely too long, Tribologists at ProOne got the epiphany that maybe the solution did not require rocket science. Since virtually every major downhole drilling problem could be traced to friction, maybe the answer was to engineer friction reduction more radically than ever.

Initially applied in the industrial sector to lubricate and protect parts, ProOne developers built on that success to the next logical market: downhole drilling. And that has changed the cost picture forever where profitability is often a delicate balancing act.

*Jim Farr is with ProOne Inc.*  
**ProOne Inc.**

## Deep leach cutters give directional drillers an edge

Directional drillers have a new edge for developing deep, long bores of unconventional oil and gas wells. Atlas Copco Secoroc PDC bits feature deep leach cutters created with MegaDiamond’s proprietary, patented deep leaching technology.

Internal lab testing has been confirmed by field tests in such demanding areas as the North Dakota oilfields. Curtis Larson, Atlas Copco Applications Engineer – Oil & Gas, said, “We have been seeing good results from many of our customers after multiple runs in deep drilling applications.”

In a “Williston drill-out” between a bit with MegaDiamond cutters and another, the MegaDiamond cutter sharpness outlasted the non-MegaDiamond bit 2 to 1.

The MegaDiamond cutters have also shown similar results in West Texas, South Texas and Oklahoma through additional competitive runs, often outperforming standard deep leach cutters.

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