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Outlook 2014

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INDUSTRY TECH TRENDS

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James McKinney
President IOGAWV
"For 2014, IOGAWV is focused on education outreach efforts to young people and the general community, as well as health, safety and the environment."
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of the wellbore to prevent issues with solids, wear and mechanical inefficiency. A packer is placed below the pump, which traps liquids above it to prevent them from falling down the well. As more liquids are added, they rise above and enter the pump intake and are lifted to the surface.

According to Mazzanti, the technology is designed to be installed when a well is on the tail end of the decline curve and after other methods of artificial lift have been used already. The system comes in two designs: one with a dual wellhead and dual-tubing arrangement that can be installed in wellbores with 7.0-inch and larger outside diameter production casing, and the other with a single wellhead and concentric tubing string arrangement in wellbores with 4.5-inch and larger production casing.

Mazzanti says he initially thought the technology's use would be limited to horizontal wells with large casing sizes. But he then came up with a slim-hole model for smaller sized casings that is applicable for modern horizontal wells and vertical wells with liquid-loading effects similar to those in horizontal wells.

Tangible equipment costs are the major component of the installation investment, according to Mazzanti, with costs varying depending on factors such as well depth, casing size and existing production equipment. For example, if a pumping unit is not already on location, one will have to be installed, which can be half the cost of the total installation, he notes.

"We will consider multiple deal structures to install the technology, including fee for service, revenue/risk sharing, well purchase and farm-outs. Since much of the cost is in the reusable tangible equipment, the risk to reward is robust. Early results in our first commercial installations speak for themselves," Mazzanti relates.

He says all wells are screened before installation to ensure that each well is a good candidate. "Basically, these are wells with depletion drive reservoirs that have casing sizes of 4½ inches or larger and cumulative production over approximately 75,000 barrels of oil equivalent. The wells also should have no obstructions and should show evidence of liquid loading in their decline curves," he details. "We believe the technology could be applied to tens of thousands of wells. It can recover more reserves than conventional methods, it has operating expenses comparable to a conventional pumping unit, and it has no known depth limitations."

GARP has been installed on only a handful of wells so far, but Mazzanti reports that all have been successful. For example, he says Austin Chalk wells in the Giddings Fields realized a sustained 10- to 20-fold increase in production with reserve increases of 15 to 50 percent of cumulative production.

"It will not make a bad well a good well, but it can make a good well a much better well," he concludes.

Corrosion Protection

Chemically bonded phosphate ceramics (CBPCs) may give operators the magic

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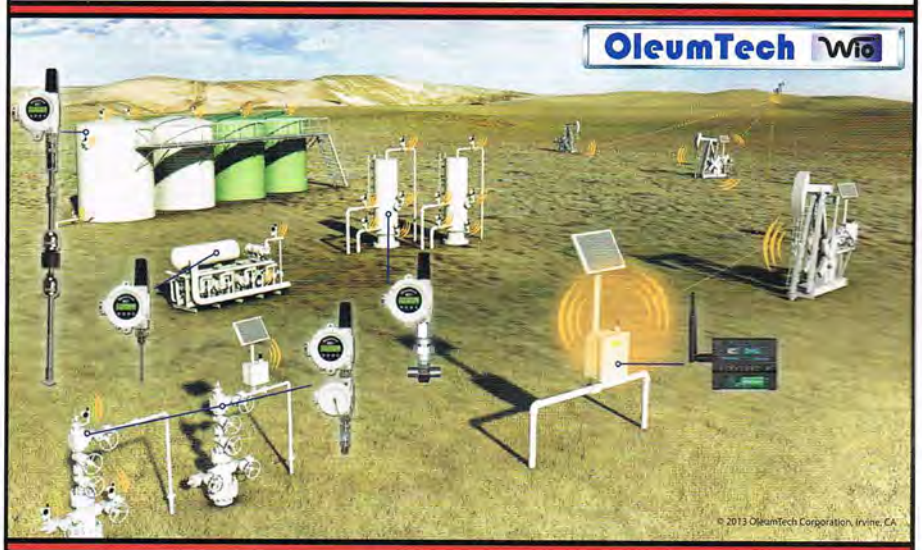

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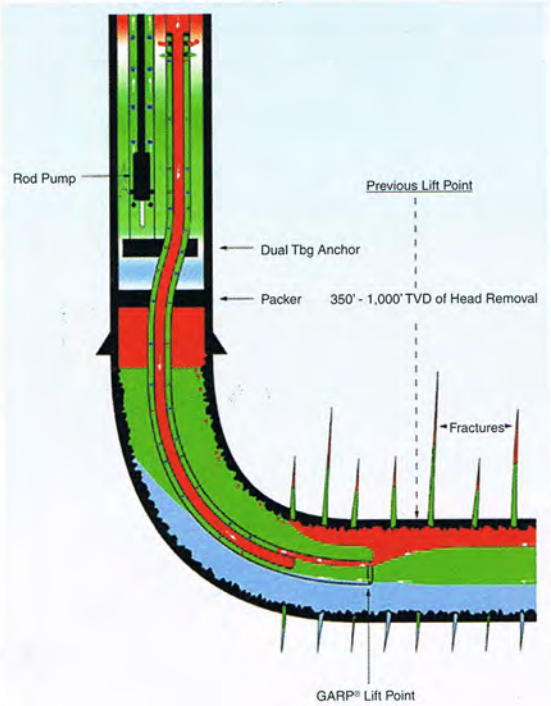


Gas Assisted Rod Pump® technology from GARP Services LLC combines a downhole pump with gas lift to lift the liquids that have dropped below the pump intake to above the downhole pump, allowing fluids to be recovered in wells in which declining reservoir pressures have caused liquid levels to drop below downhole artificial lift equipment.

bullet in the fight against corrosion, according to Tony Collins, chief executive officer of EonCoat.

"Within two to three decades, we believe all steel will have some version of this technology, and rust will cease to be a prevalent issue, similar to how polio was once a huge problem that is now mostly solved and you rarely hear about it anymore," he states.

Corrosion accounts for more than 25 percent of failures in the oil and gas industry, according to a report from the National Association of Corrosion Engineers International. NACE estimates corroded pipe repair or replacement costs the industry some $7 billion a year, and that amount doubles when lost revenue and productivity are added.

Traditional corrosion protection has relied mostly on short-lived, physically-bonded coverings of substrate surfaces such as tapes, multiple-part coating systems, and cathodic protection. Still, these methods merely lengthen the time before a steel asset inevitably begins to rust. But CBPCs can prevent corrosion, extend equipment life, and minimize the cost and production downtime required to recoat, repair or replace corroded equipment, and the upfront costs are lower than traditional corrosion prevention options, Collins claims.

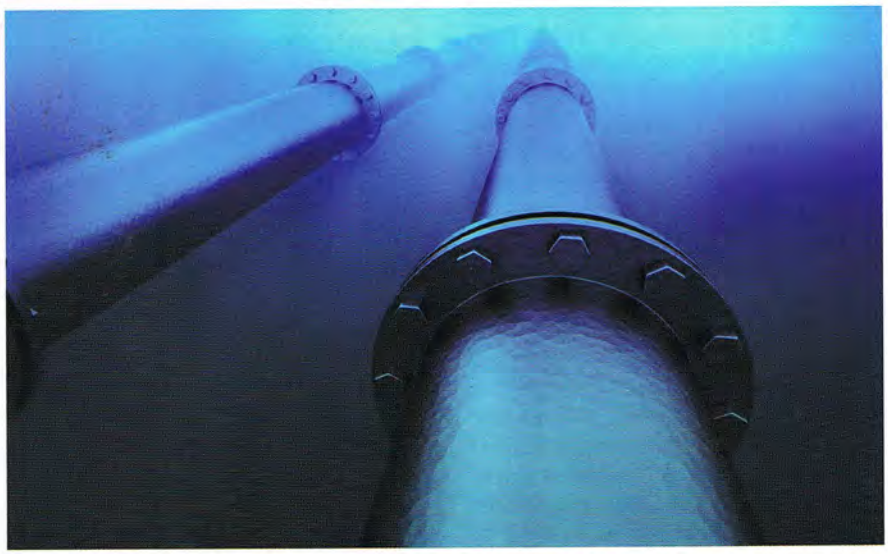
Scott Justice is tank division operations manager of Bolin Enterprises Inc., a Casey, Il.-based pipeline and tank maintenance contractor. "What caught my eye about CBPC was its adhesion and chemical properties," he relates. "Whether its coating is aged, beaten or banged around, it still protects the surface. If you remove the outer ceramic shell, the chemical bond with the substrate still stops corrosion at the surface to provide corrosion protection where traditional coatings do not."

Unlike typical paint polymer coatings on top of the substrate, Collins says the anti-corrosion coating bonds through a chemical reaction with the substrate, and slight surface oxidation actually improves the reaction. This makes it impossible for corrosion promoters such as oxygen and humidity to get behind the coating. The corrosion barrier is covered by a true ceramic shell, which resists corrosion, fire, water, abrasion, chemicals and temperatures to 1,000 degrees Fahrenheit.

"Damage to the ceramic-coated substrate will not allow moisture or oxygen to migrate under the coating to promote corrosion and blistering because the steel is essentially alloyed. Its surface oxides have been converted into an inert, electrochemically stable metal incapable of supporting oxidation," Collins says.

Noting that CBPC has undergone more than 10,000 hours with no corrosion in a salt spray ASTM B117 test, Justice says, "If the coating works as well as we hope, it could help stop or minimize corrosion and extend the longevity of a range of oil and gas assets," adds Justice.

CBPCs are completely inorganic, so



Chemically bonded phosphate ceramics (CBPCs) prevent corrosion, extend equipment life, and minimize the cost and production downtime required to recoat, repair or replace corroded equipment, and the upfront costs are lower than traditional corrosion prevention options. As shown on this subsea pipeline, EonCoat's CBPCs bond through a chemical reaction with the substrate, creating a ceramic shell that resists corrosion, fire, water, abrasion, chemicals, and temperatures to 1,000 degrees Fahrenheit.

they are inhospitable to mold and bacteria. That helps control corrosion issues related to mold growth on the external surfaces of water storage or elevated tanks, particularly when new oxygenated fuels are involved, Justice says.

Collins explains that the ceramic coatings consist of two nonhazardous ingredients that do not interact until applied by a spray gun such as those used to apply polyurethane foam or polyurea coatings. CBPC can be applied to surfaces at temperatures ranging 40 to 150 degrees F in up to 95 percent humidity. Thanks to simplified surface preparation and expedited curing time, he adds that it can be applied in a fraction of the time as other protective coatings, with only a single layer of ceramic coating required for full protection and almost no curing time.

Gas Lift System

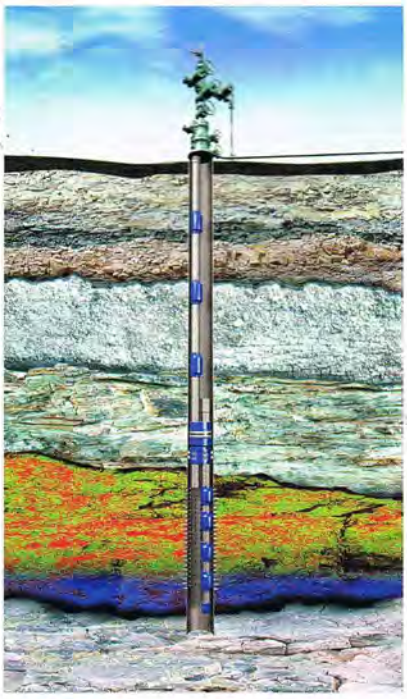
For operators seeking an economic liquids removal solution in gas-lifted oil wells and liquid-loaded gas wells, the Schlumberger PerfLift™ perforated-zone gas lift system can provide reduced operating costs and increased production with a lower initial capital cost, according to Jason Jones, North American gas lift regional manager, Schlumberger.

"PerfLift represents the next step in gas lift and offers a long-term solution that allows the operator to lift down deeper," he says.

Conventional gas lift systems only provide lift down to the production packer. But PerfLift includes a ported or dual-bore production packer with a cross-flow assembly that allows gas to be injected inside the tubing below the packer. Gas lift valves placed below the packer lift the fluid column across the perforated zone, Jones explains.

"Operators can go into the perforated interval below the packer to whatever depth is needed. The main application is wells with long perforation intervals," he says. "The system works in a variety of perforated intervals, from 500 to 3,000 feet."

The system can be used down to a midpoint in the perforated interval, or lift all the way down to the bottom of the well to maximize drawdown on the reservoir. "It gives the producer the ability to improve production, whether an oil well with low reservoir drive or a gas well that the company is trying to dewater," Jones relates.



The Schlumberger PerfLift™ system has the proven capability to lift below the packer to the perforated depth of the well, providing an economic liquids removal solution in gas-lifted oil wells and liquid-loaded gas wells.

To date, Jones says Schlumberger has installed the system in wells in Texas, Louisiana, Oklahoma, New Mexico, Wyoming, West Virginia and Argentina. As an example of cost-effective applications of the technology, Jones says production from a liquids-loaded gas well in Texas with 2,300 feet of perforated interval jumped from 110 Mcf to 273 Mcf a day after installing PerfLift. In an Oklahoma oil well with 2,200 feet of perforated interval, installing the system boosted daily production from two barrels of oil and 45 Mcf of gas to 40 barrels of oil and 110 Mcf of gas.

Oil Recovery System

With U.S. oil wells averaging between eight and nine barrels of water for every barrel of oil produced, Mark Wolf, product line manager for process technology at National Oilwell Varco, says produced water remains a major issue for most oil and gas operators.

Enter the WaterWolf™ dynamic oil recovery system, which he says is designed to help operators handle produced water more efficiently. The system recovers the oil and removes suspended solids from produced water in a single stage of treatment without using chemicals.

The enclosed system uses two hydrocyclones, Wolf explains. One hydrocyclone removes oil from the water, while the other removes suspended solids without requiring filters or chemicals. "Two streams come out of the system. The oil that comes out can go right back into the tank for recovery," he says. "The solids come out in a separate stream. The desanding hydrocyclone simply drops solids into an accumulator, which the operator can empty from time to time by opening a valve and draining it. They are oil free and nonhazardous, so it is an easy-to-deal-with solid waste stream."

The WaterWolf removes the drawbacks associated with using traditional skim tanks and flotation cells to separate oil and sediment from produced water, Wolf details. The system combines the proven effectiveness of hydrocyclones with a progressive cavity pump in one small skid. All associated instrumentation, controls, valves and piping are contained on the skid.

"There is nothing that needs to be interconnected or wired on site. The system literally can be dropped on the site ready to go," Wolf comments. "It is plug and play. The system can be set up in a day. We bring the dirty water line in, the clean water line out, hook power to it, and it is ready to go."

The system is also energy efficient, he adds. The skid package includes an energy recovery pump that takes pressure energy and returns it to the system. "The result is a reduction in the overall cost of power it takes to drive the system. The estimated power cost is less than half a cent per barrel of fluid," Wolf concludes, noting that models are available with daily capacities to 16,000 bbl/d, and a 50,000 bbl/d model will be introduced in 2014. ❐

Coming In February

The drilling plans of top Permian Basin operators, tools to optimize long-lateral drilling, and key technologies to increase recoveries in liquid-rich shales.