Oil & Gas
PRODUCT NEWS

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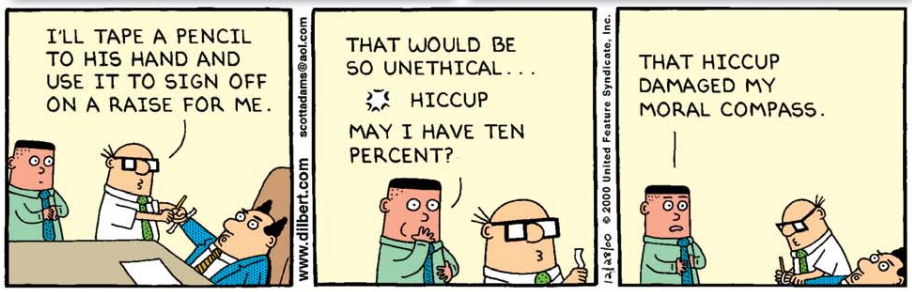

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On the cover: A driller looks up at an Atlas Copco rig equipped with the EDGE system. See page 14 for more.

upfront

FORECAST

2012 drilling forecast revised upwards

The PSAC 2012 Canadian Drilling Activity Forecast second quarter update, released today by the Petroleum Services Association of Canada (PSAC), forecasts a slight increase in Canadian drilling activity levels for the year. The revised Forecast for 2012 is a total of 13,150 wells drilled (rig released) across Canada representing a two percent increase in total wells drilled over 2011. The final tally for 2011 was 12,850 total wells drilled.

The 2012 revised Forecast represents only a slight decrease of 200 wells from PSAC's January update which pegged activity for the year at 13,350 wells drilled. The second quarter decrease is largely attributable to the decline in gas drilling due to record lows in gas pricing.

The overall decrease to the Forecast since November is attributable to declining gas prices, labour shortages, balmy weather at the outset of the year, and world economic conditions including the European debt crisis. PSAC is basing its updated 2012 forecast on average natural gas prices of CDN$1.90/mcf (AECO) and crude oil prices of US$100/barrel (WTI).

"There have been some conditions that have impacted expected drilling activity that were beyond our industry's control," said Mark Salkeld, PSAC President & CEO. "That said, productivity so far this year is high and activity is still on the uptick."

Salkeld added, "We have to bear in mind that the days of 20,000 plus wells are likely not to return any time soon, and that's largely due to the fact that we are drilling longer and more complex wells now that are accessing plays once thought unreachable or fully tapped. The first quarter of 2012 saw average well depth reach beyond 2,000 metres, and is a sure sign that our industry now operates very differently than even just five years ago when vertical wells were still the prominent well type and technology. We are forecasting horizontal wells to make up over half of all well types this year which is a marked increase from the horizontal well count of 2007 which levelled out at only 13 percent of total wells."

On a provincial basis for 2012, PSAC is forecasting 7,949 wells to be drilled in Alberta, a two percent decrease over final 2011 drilling numbers. PSAC anticipates gas prices to hit British Columbia the hardest, and is forecasting a five percent decline to 591wells drilled in that province. Saskatchewan and Manitoba are forecasted to post positive increases for 2012. PSAC is forecasting that Saskatchewan will experience a 13 percent increase to 3,962 wells drilled and Manitoba a six percent increase to 618 wells drilled this year.

GAS AND OIL RESERVES

Depleting oil reserves drive natural gas demand

With the reserves-production ratios of developed nations such as the United States and Canada reaching alarming levels, and Middle Eastern resources depleting rapidly, there is widespread concern over crude oil future fuel replacement, according to a new report by natural resources expert GBI Research.

The new report shows that while natural gas was not considered a utility in crude oil production's glory days, the depletion of conventional crude oil reserves and regulatory emissions charges have started shifting consumption towards cleaner and more plentiful natural gas. This will therefore create a steady increase in gas demand.

New advancements in technologies such as LNG infrastructure and processes such as the liquefaction and regasification of natural gas have expanded gas's possible uses, while the momentum of technological breakthroughs and efforts in this direction is being led by successes in exploration evidenced by an abundance of freshly-found reserves.

Difficulties associated with storage and transportation is currently inhibiting the growth of the natural gas market. Infrastructural limitations in logistics and transportation cause variations in natural gas prices across various regions. While an effective transportation infrastructure has been in place to transport crude oil for many years, this has not been the case with natural gas, which relies extensively upon liquefaction and regasification when faced with insufficient pipeline infrastructure. Pipelines also hold limitations in regards to terrain and distance. Offshore logistics via the LNG method provide a simpler and more efficient process while supporting cross-continental transport, but can be a cost-intensive operation owing to expensive logistics and tanker construction.

PRODUCTION

Well stimulation demand growth to be steady

U.S. demand for well stimulation materials is projected to increase more than 10 percent annually to nearly $12 billion in 2016. Growth will be sustained by continued advances in hydraulic fracturing technology designed to increase the productivity of both new and existing wells. Ongoing growth in horizontal drilling activity and development of shale resources will boost demand for proppants and the fluids used to deliver them into formation fractures. In the early portion of the forecast period, use in oil well drilling will provide most of the impetus for growth, as oil prices are high by historical standards and natural gas prices are not. However, shale gas development activity was strong in 2009, 2010, and 2011, despite low prices.

These and other trends are presented in Well Stimulation Materials, a new study from The Freedonia Group, Inc.

Through the forecast period, shale gas producers will continue to embrace innovations such as multiple-well drilling pad systems and advanced hydraulic fracturing materials in order to improve drilling efficiencies and increase per-well output.

Well stimulation technologies have had a commercial presence for more than 60 years, but for much of that time these techniques were used fairly selectively. A number of factors have combined to transform well stimulation from a niche technology used on a minority of wells drilled in the U.S. to one of the most common oilfield activities. Technological advances have improved well stimulation techniques to the point that their use – and cost – is nearly always justified by increased well productivity. Going forward, gains for well stimulation materials will remain strong, despite some deceleration in growth. A decade or two ago, most wells drilled in the U.S. were not fractured. That is no longer the case. Moreover, much of the recent growth in demand for well stimulation materials has been attributable to the emergence of horizontal drilling and multistage fracturing. Although it is expected that the number of stages per fracturing job will continue to grow, it is anticipated that this growth will be slower than the pace seen in the past several years.

letter from the editor

Educating the public can smooth the way

Hydraulic fracturing is a method of opening reserves of oil and gas that has been used since the 1940s. In recent years the technique has changed, making it more effective by using higher pressures, horizontal drilling, greater volumes of water and a variety of chemicals.

When those chemicals started to turn up in water tables, the public learned about hydraulic fracturing from the negative side, and media coverage has left proponents of the process trying to catch up with education and changes to try and make fracturing less potentially damaging to its surroundings.

In the process, the industry is learning that it must be proactive in educating the public about just how it works to bring oil and gas up out of the ground.

Extracting resources from nature is very noticeable – we have to dig, drill, or cut to recover ore, hydrocarbons, lumber and the many other materials that create the things we use to live. But these industries have also spent a lot of time and money to extract those raw materials in a clean, safe and environmentally friendly manner. That message, however, is often lost amid images of clearcut forests and open pit mines.

The public perception of resource industries is shaped by that imagery and the voices that have established themselves as the watchdogs of the resource field. It is important for resource companies and associations to provide their own perspective and educate the public on the methods being used to make resource extraction a safer and more environmentally friendly process.

Fracturing is an excellent example of where more public knowledge could be a benefit to the industry. The prevalence of the process on most wells on the continent is nearly unknown to most members of the public.

The development of the Marcellus Shale – in close proximity to a large portion of the U.S. population – has brought greater scrutiny, and many concerns. Education is important to explain what's going on and why, but in many cases the opportunity has been missed.

As Breitling Oil & Gas CEO Chris Faulkner told me, "The industry here is late to the party. People have already made up their minds; we have to convert those naysayers onto our side, but the reality is that will be very difficult." (For more on this topic, see pages 16-17.)

Another case in point might be the debate over the Keystone XL pipeline project. The media was quite deep into the concerns regarding the proposed line from Alberta to Texas before it was identified as an expansion of an already existing system. The fact that there are many pipelines already crossing the areas of concern in Nebraska was also slow to be presented.

In today's era of instant communication, social media and short news cycles, it's more important than ever to get the right message out in the right manner. Oil industry members and associations need to work to share as much information as they can about the work they do, through as many channels as possible, to help raise public knowledge.

Lee Toop, Editor

spotlight

Radar system reduces bird mortality

The Canadian Association of Petroleum Producers (CAPP) presented a Responsible Canadian Energy Award to Canadian Natural Resources Limited (CNRL) for its successful use of DeTect's MERLIN detect and deter bird control radar technology to protect birds at its Horizon Oil Sands facility in Fort McMurray, AB. CNRL installed the MERLIN system in 2009 to reduce bird mortality at the Horizon External Tailings Facility (ETF). The MERLIN system uses technology originally developed by DeTect for the US Air Force and NASA for bird-aircraft strike prevention and includes radar-controlled long-range acoustic devices (LRADs) from the LRAD Corporation and DeTect wildlife control lasers to automatically prevent bird landings 24-7 including at night and in poor visibility conditions. According to CNRL and CAAP, the MERLIN detect and deter system has been over 97.5 percent effective in deterring birds approaching the ETF with zero bird mortality for 2010 and 2011.

DeTect
LRAD Corporation

Critical remote tasks powered by wide-temperature battery

Falcon Electric, Inc.has added a ruggedized wide temperature (-30 degrees C to 63 degrees C) extended runtime battery bank option to its popular SSG and SSG-RP UPS products. The wide-temperature-rated batteries provide long back-up runtimes for protecting connected computers and instrumentation operating in harsh environments during a prolonged power outage. The new battery pack gives users over 10 times the battery runtime, compared to Falcon's standard 2U extended battery pack option.

The new battery bank carries a UL listing when powering Falcon's unique UL-listed SSG2.5KRP-1. UL is pending for the remaining models in the SSG and SSG-RP Series wide-temperature rated UPS product line. The SSGB-1S40-5U 40AH battery bank is a rugged battery option that consists of eight deep cycle, valve regulated lead-acid, maintenance-free 40 Amp Hour (AH) batteries and two internal one amp chargers. The batteries and chargers are housed in a sleek rack mount enclosure.

The battery banks may be interconnected or "daisy chained" to provide exceptionally long battery runtimes and can be easily added in the field.

Falcon Electric, Inc.

A better way to bed a pipeline

The PipePillo is an affordable structured pipeline pillow product that provides a new answer for secure in-trench pipe support. The PipePillo replaces foam pillows, sand bags and pad dirt.

PipePillo resists flotation and will never biodegrade and protects the pipe from a rocky trench bottom while promoting cathodic protection for the life of the pipeline. The PipePillo are injection-moulded and made from high-strength polypropylene resins, which are environmentally inert.

PipePillo prove quick and easy to install. Additionally the product supports larger diameter pipelines (16-inch OD plus) and are engineered to withstand extreme loads.

Comparing PipePillo with the other techniques for pipeline support, the PipePillo: maintains long-term pipe clearance above rocky trench bottoms; is lightweight for installation yet will not float out of position when groundwater is present; ensures the pipeline is centred in the trench, is stackable and easy to transport.

PipeSak Inc.

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Precision natural gas leak mapping

The Picarro Surveyor for natural gas leaks combines the world's highest precision methane analyzers with scalable cloud-based processing power to find, confirm and map natural gas leaks at speeds and levels of simplicity previously unimaginable. Picarro Surveyor for natural gas leaks will enable energy utilities to radically transform the frequency, quality, transparency and cost of leak surveys.

The Picarro Surveyor consists of instrument hardware mounted in a vehicle, and software that runs on P-Cubed, a cloud based processing platform that wirelessly receives, stores and analyzes all data gathered during surveys. The Surveyor allows operators to patrol at freeway speeds, and automatically maps and displays the results in real time in a web browser. The vehicle mounted solution combines ultra-trace methane concentration measurements in air with high resolution GPS location and a time stamp, and sends it to P-Cubed where the data are processed with patent pending algorithms. When the software suspects a natural gas leak it automatically determines the stable isotope signature of the methane to confirm a methane source as natural gas and rule out false positives as naturally occurring methane. The raw data, leak location, isotopic signature and the survey route are seamlessly uplifted, stored, processed and mapped in P-Cubed. All information are available in real-time to vehicle operators, supervisors, response teams, or anyone granted secured web access. Users can choose to view their information on a tablet, desktop, or even a mobile phone.

Using the Picarro Surveyor is simple and intuitive. The operator starts the vehicle, turns on the equipment, and after a short warm-up time begins surveying simply by driving. No technical training is necessary. To verify that the instrument is performing properly P-Cubed continually monitors several key internal analyzer parameters. Should a problem emerge, Picarro's service organization can log into the instrument and provide rapid support and problem resolution. All instruments undergo rigorous military shock, vibration and environmental chamber testing prior to shipping. Calibration is not required, and the instruments are not affected by environmental temperature, barometric pressure or humidity.

Picarro

Wireless gas detection sensor

Detcon's new CXT wireless gas detection sensors are designed for use in heavy industrial environments and are especially suitable for mobile applications. These compact yet rugged field devices are equipped with one of two sensor technologies – electrochemical to monitor H_2S and a wide range of other toxic gases, and infrared to monitor combustible hydrocarbons. Each assembly includes a low power gas detection sensor and either a CXT-300 or CXT-320 transceiver, all packaged in a single stainless steel or aluminum enclosure.

Power to the sensor assembly is provided by a rechargeable Smart Battery Pack or disposable batteries. When powered by the Smart Battery Pack, the infrared sensor can work continuously for more than six months, and indefinitely with accompanying solar panels. The disposable battery version provides continuous operation for up two months.

CXT transceivers use an innovative "Self Healing Mesh Network" topology that allows each device in a network to act as a router or repeater for all other devices in the network. As a result, subscribers can "hop" through neighbouring devices to communicate. While both CXT transceivers have this capability, the CXT-300 is also equipped with the most advanced innovation in self-healing technology and network safety. Designed with Detcon's proprietary "Fault Tolerant Safety Network" technology, the CXT-300's processing power is shared among all network devices. This technology allows any device in the network take over as "master" should the designated master device fail. Consequently, the CXT-300 does not depend on a single controller to maintain network operation and ensure safety. Detcon's proprietary "Fault Tolerant Safety Network" guarantees no single point of failure.

Detcon

Benefits of on-site oil-in-water testing for hydraulic fracturing

by Sandra Rintoul

In Canada and the U.S., many view deep shale gas development critical to North America's energy needs and economic renewal. Others around the world are also eyeing this abundant resource to help diversify their energy supplies. Meanwhile, concerns of the potential negative impact on public health have hit the news with claims that groundwater, rivers and streams, and sources for drinking water for families and livestock, have been contaminated.

As freshwater supplies become scarcer, the amount of water used for hydraulic fracturing is also catching public attention. The EPA estimates that in the U.S. approximately 35,000 wells are fractured each year with an annual water usage of 70-100 billion gallons. In the Barnett shale the total use in 2010 was about 1.7 percent of the total freshwater demand for all users in this area.[1] With some estimating up to 5 million gallons of water used per well for hydraulic fracturing, what to do with the flowback and produced water is a key issue.

While this amount of water is arguably less than what is used in agriculture, public water supplies, industry or power generation, it is still a large amount of contaminated waste for disposal. On-site analysis procedures help ensure that little or no contamination reaches fresh water sources, as well as to help operators determine the most effective treatment procedures. Since one of the first steps in the water treatment process is hydrocarbon removal, testing the oil-in-water level prior to subsequent processing could help reduce problems for downstream procedures.

On the gas well production side, the first water coming out of a well after hydrofracking is "flowback water." Flowback water is a mix of the fluid used to fracture the shale and water from the formation that includes solids, metals, salts, chemical additives and trace amount of oil. Once the gas well is producing, naturally occurring water from the shale formation flows to the surface as "produced water."

This water has high levels of Total Dissolved Solids (TDS), minerals such as barium, calcium, iron and magnesium that are leached out of the shale along with dissolved hydrocarbons.[2]

There are a number of water management options that include removal to an off-site treatment facility, evaporation ponds, injection into disposal wells, recycle and reuse for fracturing and treatment for surface discharge. Each option has maximum levels of free or dissolved oil that will be accepted.

If flowback or produced water is going to be recycled and reused for hydrofracking, treatment will include removing petroleum hydrocarbons, the polymer additives, and inorganic scale forming compounds, as well as disinfection of bacteria and microorganisms that could sour the well.

Infrared oil-in-water analyzers are valuable for on-site testing.

The added step to remove TDS may be necessary especially if the disposal will be surface discharge. Desalination to lower TDS levels typically employs either membrane or thermal technologies. Membrane technologies require the removal of oil to prevent fouling of the membrane surfaces. Thermal evaporation and crystallization of the brine water could also benefit by reducing potential fouling agents such as free and dissolved oil.

Oil removal is also needed for frac water deposited into an evaporation pond as an oil sheen will reduce the evaporation efficiency. Public treatment plants accepting frac water also have limits for the amount of oil and grease their systems can handle.

An on-site analysis method is a valuable asset to ensure that the oil/water separator is removing the oil to the required limits. Infrared oil-in-water analyzers such as the Wilks InfraCal TOG/TPH Analyzer have been used in the oil industry for more than 40 years.

A portable infrared analyzer has the capability of quickly giving an on-site result allowing the operator to verify the oil/water separator has done its job in removing the oil to the specified level. Infrared analysis is currently in use worldwide primarily for measuring the amount of oil in produced water on off-shore and on-shore oil rigs. The same technology is ideal for testing the wastewater from hydraulic fracturing as the analysis can be done on-site in less than 15 minutes without having to incur the cost and delay of laboratory analysis. An added benefit is it does not require a laboratory technician to do the analysis.

The infrared analyzer can also be used for TPH in soil if a spill or pond leak occurs, to determine the extent of contamination. While the gas wells are typically drilled down 600 metres or more and much deeper than private wells, contamination could occur if there is a leak in the subsurface steel and cement casings that line the well.

Contaminated fluids could also leak into the soil or groundwater if surface containment pits or tanks that are used to store the frac water before treatment or transport off-site are damaged. Improper disposal is also a potential source for water or soil contamination.

A quick and simple on-site infrared oil and grease measurement gives operators at a well site a useful tool for optimizing treatment procedures, maximizing evaporation pond efficiency, complying with offsite disposal requirements, or for assessing contamination.

Sandra Rintoul is president of Wilks Enterprise, Inc.

Wilks Enterprise, Inc.

1. United States Environmental Protection Agency, Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources EPA/600/D-11/001/February 2011/www.epa.gov/research.

2. Shramko, Andrea; Palmgren, Tor; Gallo, Daniel; Dixit, Rahul; M-I SWCO, Analytical Characterization of Flowback Waters in the Field, 16th Annual Petroleum & Biofuels Environmental Conference (IPEC), Houston, Nov. 2009.

Emergency response package rental program

Clean Harbors now offers an Emergency Response Package Rental Program that provides mobile trailers or onsite containers that come preloaded with equipment and materials necessary to immediately contain and control releases in remote locations while outside responders are in route.

"Clean Harbors is the first company to offer a North America-wide Emergency Response Package Rental Program for remote drilling, pipeline and rail facilities," explained Scott Metzger, Clean Harbors Senior Vice President, Emergency Services.

"We provide the equipment and take responsibility for inspecting and replenishing the units to ensure a constant state of readiness."

Emergency Response Packages enable operators to quickly contain and control an initial release and recover lost material to minimize the environmental impact of a spill. This immediate response often reduces costs, while avoiding fines and minimizing future remediation requirements. The Emergency Response Package Rental Program also helps companies meet regulations and, since Clean Harbors is responsible for Emergency Response Package provisioning, remain compliant as new regulations are released.

Emergency Response Packages include containment, storage, recovery and diversion equipment – pumps, hoses and hand tools, Personal Protective Equipment, absorbent materials, along with other critical response tools. Customers can add equipment and supplies, including vehicles and specialized tools to meet particular corporate standards or specific site requirements.

Emergency Response Packages are equipped with satellite tracking devices so both Clean Harbors and site operators can monitor and quickly locate units. The units can also be fitted with door alarms that send entry notifications. Containers can easily be repositioned and can serve multiple proximate locations.

In addition to handling logistics and maintenance of the packages Clean Harbors also can provide training and other logistical services as required.

"We expect this to be a tremendously popular service," said Metzger. "It helps our customers efficiently provision remote locations with emergency response equipment, stay in compliance and quickly react to spills and accidental releases. When coupled with Clean Harbors' North American Emergency Response services network, customers create a seamless response process."

Clean Harbors

Tubular cell electrolyzer systems for water disinfection

New Osec B-Pak tubular cell electrolyzer systems have an enhanced, compact construction and a newly designed electrolyzer cell. The tubular cell electrolyzer systems from Siemens generate a 0.8 percent sodium hypochlorite solution from water and salt for disinfecting water.

The largest model, the OSEC B-Pak 260 system, can produce up to five kilograms of chlorine per hour or 120 kilograms of chlorine per day. Producing the sodium hypochlorite as-needed and on-site eliminates the dangers involved in storing and transporting chlorine gas or commercially available

sodium hypochlorite solution. As it is also cheaper to operate an OSEC B-Pak system than to buy sodium hypochlorite, the initial capital cost pays off quickly.

The newly developed systems are compact and mounted on a skid to save space, easy to operate, and designed for a long service life. The core component is a newly designed, especially robust electrolyzer cell in a clear acrylic enclosure that produces a stable disinfectant solution. The low-concentration solution minimizes corrosion and degradation – loss of available chlorine during storage – which occurs with highly concentrated solutions containing 10 to 15 percent sodium hypochlorite. Operational safety is enhanced thanks to the fully automated control system.

Siemens

Solving fracking wastewater issues

In recent years, contamination of aquifers and other geological issues have been attributed to deepwell injection, the most commonly used method for disposal of highly contaminated flowback water from hydraulic fracturing operations. Some gas extraction operations may have already been interrupted, as a result. The requirement for millions of gallons of fresh water for each site has also been questioned, as well as the transportation, handling and storage of flowback water and produced water from fracking processes. There are daily reports of investigations by regulatory agencies and the potential introduction of new regulations to address the fracturing issues.

An ideal solution to the above-cited problems would eliminate the use of deepwell injection for waste disposal; it would require significantly less fresh water; it would allow the operators to reinject treated flowback or produced water; and, it would dispose of the waste residue without impacting the environment. It might even reduce non-fracking pollution and reduce costs.

The need for deepwell injection can be eliminated by effective onsite treatment of the fracking wastewater streams. This would also eliminate the need for expensive transport and disposal of the contaminated water from the drill sites to the deepwell injection sites. But, fracking flowback water is generally "hard" – so hard that it cannot be processed by conventional means without scaling, and even disabling, the process equipment.

"Hardness" refers to the calcium, magnesium, strontium and barium content of the water; these are the principal active agents of scaling. Excessive levels of silica, typically associated with "hardness," can also contribute to scaling. Metals such as iron and manganese can cause severe fouling of process components. One of the traditional practices with conventional processes is to acidify the wastewater to keep more of the scalants in solution, so that it can be processed. That does not solve the problem; it merely prolongs the processing, because eventually the hardness must be dealt with. "Softening" the flowback water and removing metals that may cause deposits on process components can be very helpful, and in the case of extremely high levels of contaminants, key to effective onsite treatment.

Effective onsite treatment of the flowback water enables its reuse for further fracking operations, and, eventually, its return to the natural source for the water. "Softening" the flowback water removes scaling contaminants, and leaves non-scaling sodium and potassium salts in solution, which may not adversely affect the usefulness of the water for fracking operations.

This reuse of the treated flowback water could reduce the total water requirement for the fracking operation by approximately 20 percent. Eventually, when operation of the wells is ending, the concentrated salt stream, which principally contains sodium and potassium, can be removed from the water by conventional desalting means.

Samples of pre-treatment (left) and post-treatment (right) water.

Using pollutants to treat waste

Equipment powered by diesel engines is utilized at every fracking site, and although the exhaust is considered to be a pollutant when discharged into the atmosphere, it can be a useful resource for removing contaminants from flowback water. The exhaust from diesel engines contains carbon monoxide and dioxide, a good source for carbonate, which can be used to raise the pH in settling tanks to promote the coagulation and precipitation of "hardness" minerals. A side benefit is that the materials are free.

Similarly, another pollutant, the caustic waste from aluminum manufacturing plants, can be used to promote the coagulation and precipitation of "hardness" minerals. The plants would be pleased to reduce their disposal costs by making their waste available to fracking waste treatment sites. These materials are also free for use.

Depending upon the method utilized for softening, the contaminant waste that has been removed may contain varying degrees of water or moisture, which can be removed for ease of handling, storage and disposal. Dewatering can be accomplished with very conventional processes, such as with the filter press, dryer or evaporation pond. The resultant dry, solidified waste can then be easily and safely handled, stored or disposed of in landfills.

The ultimate achievement of waste management is to have no waste at all, and that may be achievable for some fracking operations. The reduction may be achieved by putting the waste to commercial use. Purified flowback water could be sold for profit or returned safely to the environment, once fracking operations have been completed. The concentrated yet purified salt stream could be converted to crystalline form to be reused as road salt, or sold as a liquid salt stream which could be utilized to "kill" gas wells that are taken out of operation. And, the solidified contaminant "cake" could be sold for use in gypsum wallboard manufacture.

Zero liquid discharge concept

A new methodology (US patent 8,147,696, international patents pending) for treating wastewater makes an ideal solution possible. The new methodology, essentially a zero liquid discharge concept, purifies the water content of even the most highly contaminated wastewater, and precipitates the wastewater contaminants so that they can be stored and handled in a solid, dry form. The need for deepwell injection is eliminated.

In addition to its other benefits, the capital and operating costs of utilizing the new methodology are estimated to be significantly less than the costs of conventional processes. Lower costs result from the use of less equipment for fewer steps; use of less expensive materials in the absence of high pressure, heat, or acidification; lower use of energy; and elimination of the need to transport the highly concentrated flowback water to deepwell injection sites.

The inventor of the methodology is Ken Pandya, a Texas A&I Chemical Engineer (1972 and president of Advanced Water Treatment Services). He has more than 30 years of experience in water treatment and has been an independent consultant to the water treatment industry, utilities and refineries for the past 17 years.

Pandya developed his concept, known as High Efficiency Softening Process (HESP) after years of utilizing conventional approaches for wastewater treatment, and finding them inadequate for very high contamination levels. Conventional wastewater treatment equipment and methods are generally capable of dealing with hardness up to 1,500 mg per litre. Fracking wastewater can reach the 15,000 mg per litre hardness range.

Comparison to conventional approaches

Conventional wastewater technologies such as dissolved air flotation, electro-coagulation and filtration processes are typically geared towards removing suspended solids, metals and organics such as oil and grease. These processes typically do not remove significant levels of scale-forming inorganic minerals such as calcium, magnesium, barium, strontium and silica. Accordingly, effluent from such processes can cause scaling of piping, pumps, heat exchangers and other process components.

Alternatively, some of the conventional pretreatment systems utilize inorganic acids such as hydrochloric acid

or sulphuric acid to suppress pH as well as lower what is commonly known in the water treatment industry as the Langelier Saturation Index (LSI), a measurement of scaling tendency. Such treatment with aggressive acids, particularly in the presence of high levels of sodium, chlorides and salinity, can accelerate the rate of corrosion of most commonly used steel and lower grade stainless steel materials. For this reason, post-treatment equipment, such as evaporators and crystallizers, are generally constructed with expensive advanced alloy materials. The use of such corrosive chemicals can increase the risk of perforating carbon steel well casings and promote deterioration of the concrete casing of the well itself. As a consequence, wastewater could migrate through injection wells into the formation or even water table, thus raising serious environmental concerns.

Processes such as Reverse Osmosis and evaporators are basically concentration processes where a portion of the stream which is supersaturated with scale-forming inorganic minerals, in some cases four to 10 times the initial concentration in the flow back stream,

> The need for deepwell injection can be eliminated by effective onsite treatment of the fracking wastewater streams.

has to be discharged to deepwell injection. Deepwell injection sites may be quite distant from the gas well drilling sites, and the only way to transport such highly concentrated waste streams is by trucking to the deepwell sites. The total cost of collecting water, transporting waste water to permitted deep well injection sites, pumping the wastewater to several thousand feet underground and permit costs can be significant.

Pandya's High Efficiency Softening Process (HESP) is based on collecting and equalizing waste water from several sites, then raising the pH of the wastewater to the optimum level and coagulating and precipitating the contaminants, resulting in purified water which can be either reused in the fracking operation, or further purified for return to the environment. Precipitated solids are collected, filtered out and solidified as dry material.

According to the patent documents, the process starts with a quantity of water stream containing contaminants for treatment. These are analyzed for composition and amount, then a calculated amount of either carbonate or bicarbonate (potentially recovered from diesel exhaust) are added equivalent to the contaminants. The pH is adjusted with sodium hydroxide or potassium hydroxide, then suspended solids are separated using a mechanical separator device such as a rotary drum vacuum filter, filter press, media filter, cartridge filter, membrane filter, ultra-filter or micro-filter system. Finally, the water stream is recovered containing reduced contaminant content. Neither heating nor pressurization is required, and so, the only energy requirements are for mixing and operation of transfer pumps.

The advantages to this system are numerous. It can remove up to 99.9 percent of hardness, metals and suspended solids, as well as up to 85 percent of silica and organics and 95 percent of oil and grease. CO and CO_2 from diesel engines, as well as other waste materials from various industries, can be used for pH adjustment. Treated water can be commingled with groundwater for further use in fracking operations. The process minimizes or eliminates the need for scale inhibiting chemicals.

PARAMETER	FRAC WATER INLET	HESP OUTLET	% REDUCTION
Calcium + Magnesium (Hardness), Mg/L	10,500	<1.0	99.99
Barium	12	0.4	96.7
Strontium	382	16.9	95.6
Silica	61	8.6	85.9
Total Organic Carbon	30	4.7	84.3
Oil and Grease	21	<1.0	95.2
Iron	27	2.7	90
Copper	4.9	0.01	99.8
Zinc	2.76	0.01	99.6

Chart of pilot results.

Effluent from the HESP process can be desalted with conventional post-treatment concentration process. Precipitated solids can be dried and sold, while final concentrated salts can be used to kill gas wells or sent to a dryer for salt crystal recovery. Most importantly, there is no need for deepwell injection.

Syd Chaden consults on contractual matters for AWTS.

Advanced Water Treatment Services

Testing for fracking contaminants in drinking water

Many links between hydraulic fracturing or "fracking" to contamination of groundwater and drinking water supplies have recently been discovered. There are a number of chemicals that are used in fracking – some of them are relatively non-toxic while others are highly toxic. The composition of fracking fluid is also widely variable but all fracking fluids have some components in common. Many of these constituents were detected in all tested produced water (i.e., underground water brought to the surface during drilling and then often used for fracking). Some of these constituents occur naturally in groundwater but may be found at far higher and thus toxic concentration levels in water that has been contaminated by fracking.

Water analyses performed by commercial contract laboratories are expensive and require trained chemists.

The Forston Labs Fracking Kit easily measures increased concentrations of barium ion, chloride ion, nickel ion, sulphate ion, bromide ion, potassium ion, turbidity and changes in acidity.

There are no messy, complicated procedures to follow and no toxic chemicals to be disposed.

The Fracking Kit consists of a LabNavigator (required for all measurements), a full-range heavy-duty pH Sensor, a Turbidity Sensor, a Conductivity Sensor and a clear-language informative user's guide for the non-chemist. It works by simply connecting one or more of the sensors to the LabNavigator, ensuring the accuracy by using one of the included non-toxic standards, dipping the sensor into a sample of well water and pressing a button which stores the test results for future use.

Forston Labs

Fully automated engineered filtration

The new Engineered Filtration System (EFS) includes ceramic flat sheet membranes, pre-assembled filtration components and fully automated controls. The compact frame mounted system is installer friendly, and provides quick connections from membrane towers to filtration components.

The Engineered Filtration System (EFS) design is fully automated and includes the option for remote monitoring and can be used in applications including; Membrane Bio Reactor (MBR), tertiary treatment (such as wastewater polishing), industrial process wastewater treatment, pre-filtration to Reverse Osmosis (RO), groundwater treatment, landfill leachate, oil/gas produced water and many other filtration applications.

SJE-Rhombus provides one of the most complete tubular and flat sheet ceramic membrane and control solutions product line in North America. In comparison to polymeric membranes, competitively priced ceramic membranes offer a longer membrane life, higher filtration rate and higher recovery rate.

SJE-Rhombus

Energy generated from oil field waste water

ElectraTherm has released a comprehensive report on its demonstration project in Laurel, Mississippi to generate renewable energy from hot waste water at an oil field.

In 2011, ElectraTherm's Green Machine completed its six-month demonstration to generate additional power from the hot water that oil and gas producers consider a nuisance.

This is the first small-scale (<200kWe) application to generate fuel-free, emission free power at an oil well.

ElectraTherm's waste heat generator uses produced water to create "green" electricity usable onsite for field operations or for export to the grid.

The six month demonstration successfully concluded in November with 1,136 total runtime hours, and provided excellent insight for future installations. ElectraTherm overcame previous industry discouragement over generating electricity from co-produced fluids by eliminating individual hurdles, each detailed in the report. It is currently not recognized or ignored that low temperature co-produced fluids can be the fuel for emission free power production at wellheads all across the country.

ElectraTherm is currently using this demonstration data for a project with the Department of Energy at a geothermal well in Nevada.

ElectraTherm

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Approaches to produced-water treatment evolving

Canadian manufacturer's success in California reflecting advanced approach

Heavy-oil fields throughout North America are now fully engaged in utilizing produced water as boiler feed for thermal extraction – a more reliable, environmentally friendly approach compared to using fresh water. However, the methods for treating produced water are swiftly evolving in interesting ways, presenting operators in the U.S. and Canada with a greater range of options that are safer, more efficient, and able to significantly cut down on many operational costs, compared to conventional counterparts.

In California, a Canadian company's higher-performing micro-media filtration and ion-exchange softening reflect such a progressive approach. Eco-Tec, Inc. has provided seven heavy-oil operations in California with new treatment systems in a span of just over two years – softening water at a total capacity of about 81,500 barrels/day (13,000 m^3/day).

The most recent produced-water treatment project for an operator in Placerita Canyon, California, at a flow rate of 35,000 BPD, represents the largest in terms of capacity to be built by the company and, compared to previous systems by Eco-Tec, will handle water with the highest level of hardness (2,600 ppm as $CaCO_3$) so far. "The water the new Eco-Tec system will be treating is very high in hardness for the California area, and treating it at this larger capacity is serving as a benchmark for the entire region and Western Canada as well," says Mehdi Surury, Regional Sales Manager for Western Canada.

Just as in Alberta, water-conservation measures and environmentally responsible practices among oil producers are moving forward quickly in California, especially following a period of severe drought that struck the state in 2008. The drought compounded the difficulty of securing freshwater sources from which to generate high-quality steam that thermal-extraction methods require (SAGD – Steam Assisted Gravity Drainage, CSS – Cyclic Steam Stimulation). In an effort to manage the crisis, then-Gov. Arnold Schwarzenegger proclaimed a state of emergency and enacted widespread water-conservation measures.

Much like Alberta, the large amount of agriculture throughout California puts pressure on fresh-water reserves needed for farming. As a result of severe shortages in 2008-2009, oil producers were denied fresh aqueduct water from regional water districts and, instead, had to resort to purchasing its supply from farmers in the area.

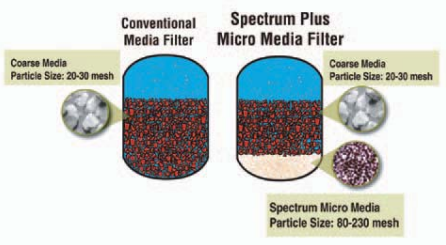
Lasting impact

The drought officially lasted until March 2011, but has left a lasting impact on many heavy-oil fields in the state that once relied on affordable fresh water to feed boilers. While many shift to using produced water, some tread cautiously since it is of a much higher hardness and salinity in California; it can cause serious problems for operators engaged in thermal heavy oil applications due to the increased tendency toward scaling and corrosion in equipment. Operators remain cautious, as well, as problematic issues continue to crop up while using conventional treatment systems, namely:

- Safety and costs related to handling acid and caustic often used for regeneration of produced water softeners
- High chemical (salt, acid and caustic) consumption due to the limitations of conventional ion-exchange softener designs, especially when treating produced water with high hardness or TDS
- Large waste volumes produced during regeneration, requiring disposal
- Large equipment, which requires considerable space and site assembly.

For many operators, among the most important concerns is the need to avoid the use of hydrochloric acid (HCl) followed by caustic soda (sodium hydroxide, NaOH), which is typically used to regenerate the resins in weak-acid-exchange (WAC) softeners. The handling of these products adds substantial costs, safety hazards, greater regulatory requirements, and the need for corrosion-resistant alloys in construction of the processing equipment, which requires considerable space and site assembly.

Operators can employ Strong-acid-cation (SAC) ion-exchange processes, which require only brine regeneration (i.e., no acid or caustic), and are much simpler and less expensive than WAC processes. Yet the SAC process is normally restricted to low-TDS waters (usually less than 3,000 mg/L, and sometimes up to 5,000 mg/L). Instead, WAC resins are typically used for softening high-TDS produced water, such as what the various heavy-oil fields in the California region, and parts of Alberta, must contend with.



A comparison between conventional media filters and micro media filters.

Eliminating the need for acid/caustic

What is driving adoption of the Eco-Tec systems in California is the use of a patented ion exchange process, known as Recoflo, that allows the use of either SAC or WAC resin to soften produced water at TDS levels up to 12,000 mg/L, to levels of residual hardness less than 0.1 mg/L – without the need for acid and caustic, even for regeneration of WAC resins. The technology can also provide a 40 to 80 percent reduction in salt and waste from regeneration compared with conventional softeners.

Eliminating the need for acid and caustic for regeneration was a critical factor for Seneca Resources' heavy-oil operation in Lost Hills, California, which was the first operator in the state to purchase an Eco-Tec system in 2009. To this date, the produced water treatment system installed there, handling a flowrate of about 7,000 bpd (1,090 m^3/day), continues to maintain the desired water hardness level of less than 1 mg/L (as $CaCO_3$).

"What was new about the Eco-Tec project was using a SAC/WAC system that didn't require hydrochloric acid and caustic in the regeneration process. We didn't want the safety concerns in handling those; that was one of the reasons we chose the Eco-Tec technology," said Keith Jones, Senior Technical Advisor for Seneca Resources.

The Eco-Tec Recoflo technology eliminates this through highly efficient features, not found in typical ion-exchange equipment, such as short bed heights (6 to 24 inches/15 to 61 cm in depth) and small resin volume (only up to 15 percent of the resin volume required of conventional ion exchange systems); low resin exchange loading (less than 15 percent of the total exchange capacity of the resin compared to conventional ion exchange processes that use resin to near exhaustion); fine mesh resin with a diameter of one-quarter the size of resin used by conventional systems; compressed resin beds that are at a state of compression at all times, with no freeboard; and counter-current regeneration to ensure that the cleanest, most effective resin is at the bottom of the bed after

Produced water treatment system in Maricopa, California, with Spectrum Plus Micro-Media Filters and RecoPur SAC/ WAC Ion Exchange Softeners.

regeneration.

The highly efficient regeneration and resin rinsing of compressed bed systems result in reduced water and chemical consumption – thus, the elimination of acid and caustic. The equipment also has a smaller footprint than competing systems, is fully automated for simple operation, features easy adjustment to variable feed water conditions and, if needed, effective in-situ resin cleaning.

Two-layer depth filtration

Another issue among heavy-oil producers in the area concerns the use of nutshell media pre-filtration commonly used in advance of softening equipment. Nutshell filtrate typically contains residual oil and suspended solids that can result in downstream operational problems. If allowed to accumulate, these solids can adversely impact water and regenerant chemical distribution, will ultimately increase pressure drop, and degrade water quality and quantity. Furthermore, longer term fouling by solids and residual oil can make subsequent resin cleaning much more difficult, if not impossible.

It's especially true when dealing with today's ion exchange technologies, which require TSS (total suspended solids) of 0.1-0.5 mg/L and turbidities of 0.1-1 NTU (nephelometric turbidity units). Most suppliers of ion exchange resin would advise removal of suspended solids to at least 1 mg/l or better through some form of pretreatment and that some, but not all, of the residual solids that accumulate within resin beds be removed by periodic backwashing of the resin.

Among the reasons operators throughout California have looked to the Eco-Tec treatment system is the advanced micro-media pre-filtration, known as Spectrum, which features a unique two-layer depth media configuration that departs from conventional design. It maintains a coarse media (either anthracite or nutshells) upper layer, a fine micro-media lower layer, and high service flow rates. It can remove virtually all particles > 2 micron while significantly reducing particles < 2 micron, while conventional nutshell filtrate typically contains significant particles in the 0-10 micron size range.

Throughout California, Spectrum micro-media is filtering produced water at a total capacity of 117,894 bpd (18,743 m^3/day), ranging from about 6,000 bpd (1,000 m^3/day) in Lost Hills to about 32,000 bpd (5,000 m^3/day) in Placerita Canyon.

The filters are also handling TSS as high as 25 mg/L in Bakersfield, California. Worldwide, this micro-media technology is filtering 208,460 BPD (33,143 m^3/day).

Since commissioning in Dec. 2009 for Seneca Resources in Lost Hills, softener resin cleaning, as a response to resin fouling by oil and suspended solids, has not been needed in the more than two years since the system has started up – reflecting the efficiency of Spectrum.

The lower, fine micro-media layer of the Spectrum filter is the key feature compared to conventional designs. While dual media filters typically employ silica sand with an effective size of about 0.35 mm, the Spectrum filter uses a lower layer of high density media with an effective size of less than 0.1 mm.

The flow channels through the micro media are extremely small and the tortuous path of fine channels provides excellent retention of solids. It is much heavier in density than coarse media which ensures that it re-classifies (resettles below the coarse media after backwashing) and is virtually impossible to backwash out of the filter vessel.

The top layer consists of coarse nutshells – similar to, but somewhat finer than that used in conventional dual media filters – and provides the bulk of the solids retention and therefore defines the run length.

Eco-Tec, Inc.

Edge on the market

Stay on top by seeing the bit at the bottom

Technology is a strange thing. We talk about it, and the world benefits from it most of the time, but personal acceptance doesn't always move at the same speed. We often want to wait and see the benefits of something, or someone else's failures, before we jump aboard. One company has chosen to make a jump into new technology and has found success in the process.

Noah Horn Drilling Company is a multi-rig gas drilling company operating in the Appalachian Mountains of the eastern United States. They are headquartered out of Vansant, Virginia. For nearly 30 years they have been focused on hard-rock, coal bed methane and conventional gas drilling.

Vice President of Field Operations, Leon Boyd said in the mid-1980s they were drilling CBM wells to flare off the gas to make coal mining safer. Now CBM is a major and growing industry globally.

Horn Drilling put the first Atlas Copco RD20 to work and was the driving force to make it a Range III class rig. The company continues to follow the philosophy of its founder, Noah Horn, who died in 2006: Don't shy away from new technology that could make you more successful.

After three months of using the new Atlas Copco Secoroc EDGE system for precision down-the-hole hammer drilling, Horn's drillers are giving it high praise.

What is EDGE?

EDGE's functionality for drillers is compared to that of aviation's flight instrument navigation technology. Just as pilots can precisely navigate their planes in the clouds, drillers can precisely adjust weight on bit and rotation by watching graphic and numeric portrayals of conditions affecting the hammer at the bottom of the hole.

EDGE is available as a rental package from Atlas Copco Customer Centres and authorized dealers and is relatively easy to install. In total, it takes just a couple hours away from production and involves mounting a sensor on the rotary head that collects vibration signals generated by the hammer that are transmitted through the drill pipe. The sensor is connected to a processor unit, which is then connected to a 7-inch computer display mounted at the operator's console.

The display portrays the EDGE program's interpretation of the bit/hammer vibrations, which travel up the string. The resulting signal is the equivalent of having eyes right at the bottom of the hole, seeing the effects on the hammer caused by different geological formations, the presence of water, or flushing problems. The built-in signal filters recognize and eliminate unwanted noise from other sources before displaying the information for the driller.

In practice

On this job, Horn is installing surface casing to 3,000 feet (914 metres). A conventional rig will follow them, drilling to a kick point at about 8,000 feet (2,438 metres). They start with 17-inch bore for 16-inch conductor casing to 350 feet (106 metres). Then they set 13 3/8-inch casing in a 15 3/8-inch bore to 1,000 feet (304 metres). Finally, they'll set 7-inch casing in an 8 7/8-inch hole to 3,000 feet. They cement and then re-drill through it to 3,100 feet with a 6 1/2-inch bit, which ensures a smooth start when the conventional rig sets up.

Driller Jerry Stiltner said the difficulty of the formation here in Tennessee is a new experience for some of the crew. Stiltner said, "Back home we set up on a hole; three days later we're done with it. But this is really hard stuff here."

For an example, driller Michael Street said, "There's a spot 120 to 140 feet thick of pure sandstone. Looks like regular play sand when it's coming out." The rest of the drilling alternates quickly from shale to sandstone, sometimes within a matter of inches, in a highly fractured formation.

Street said, "EDGE helps you a whole lot on a new formation. You can watch it. Put a little adjustment on it. If you hit a hard spot or go from hard to soft, you speed up, slow down. You get into the soft stuff with so much air going, you'll about blow right through the shale, so you have to put a little weight on it. EDGE tells you when.

"Even when I'm starting out and am not watching it, I'll see or hear something different and make adjustments, like always. But now I look up at EDGE to make sure I'm right."

Street said it used to take a half a rod, minimum, to dial in his drill. "Now it takes less than five feet to get it right." With EDGE, drillers don't need years of experience and a built-up sixth sense to drill right and troubleshoot. When Street let a new hand working with him drill, the novice used the EDGE. "The new kid's already getting it right, tuning it good within seven, eight, maybe nine feet."

Better than they've ever been

Boyd's drillers praise the system and what it has done for their drilling ability. "If it had been new guys," he said, "I wouldn't have thought so much about it. But these are my older guys who are converting. It's changing the way they drill." Boyd added that traditional drillers "have to learn all this electronic over hydraulic anyway. EDGE is just another tool to help them."

Boyd agreed that no two drillers are the same: "The hammer is not going to act any different. But drillers judge by air

> In my opinion, the EDGE is a tool that we have needed for a long time and should be on every rig that is drilling with DTH hammers.
>
> Tony Funk

pressure or feel, which varies. Plus, today's hammers have advanced so much, drillers can't keep up with them. With EDGE everyone can see the exact same thing. When you tell them, here's what's happening, there is no argument."

Boyd said he was aware that there are some drillers in the industry who describe EDGE as "tattletale technology." He said these are usually weak drillers to begin with, afraid this technology will prove they are not using the equipment well.

"But I have good guys, and they like it. It only makes them better than they've ever been."

Bit life

Boyd said, "Everyone is tightening their belts, looking for better ways to do things." That's when Tony Funk of Keystone Drill Services brought down the EDGE.

Funk said he did initial testing on the EDGE with three different rigs in Tennessee, Virginia and Kentucky to determine its value to his customers.

"All of the drillers on the rigs we tested the EDGE with were able to look at the display and understand it immediately," Funk said. "This allowed the drillers to dial in the hammers to their maximum performance levels by adjusting the weight on bit (WOB) and rpm within a few seconds of tagging bottom. After the drillers were able to adjust their drilling by using the EDGE, the drillers were able to see much smoother drilling with less variance in their torque."

When Funk became convinced of the EDGE advantages, he brought it to Noah Horn. "We wanted to get it on someone's rig where we knew they covered a good range of varied geography and had a productive mindset. Noah Horn Drilling Company had both. This company keeps some of the best equipment and people in the southern region and are well known for doing top-rated work."

Funk added, "In my opinion, the EDGE is a tool that we have needed for a long time and should be on every rig that is drilling with DTH hammers."

Boyd said, "The biggest thing that attracted us was that we were losing bits, constantly losing bits. We weren't able to continue holes on just one bit. Tony thought this would help us."

Stiltner said, "When we started this project down here, we couldn't get more than six, eight hundred feet out of a bit. Then we'd put another one in. Get maybe the same from it. Finally, we'd wind up using rotary bits to finish the hole."

With EDGE they are now consistently getting 2,500 feet (762 metres) on a single bit, allowing them to finish a hole without tripping out to change bits.

"Our last hole that we finished up, the bit had 2,700 feet on the bit, and I wouldn't be scared to put it in another hole. The bit looked new."

Boyd spoke about what finishing a hole on one bit means for their bottom line. "Look at just what we save on those two to three bits per hole. Those bits cost up to $10,000 apiece. A rig drills 30, 40 holes a year. That's a lot of the savings."

Time is money

There are several ways Noah Drilling saves time and its associated costs. "Before, we were getting 30 feet (9 metres) in 30 minutes," Stiltner said. They were using the QL 80 with an 8 7/8-inch bit. "With EDGE we cut that by half, by at least half." Stiltner said he likes all Atlas Copco hammers, "They've always done a fine job."

There are fewer trips, which saves time. Changing out the bit after each trip in itself consumed what would have been valuable time in the hole.

Hazard reduction

Today's drilling contractors are also looking for increased safety. Boyd said EDGE gives them this, too, indirectly. "Not tripping out of the hole as often, that's where EDGE has made drilling safer. Hazards occur where you have drill steel and casings moving around your crew. Keeping the steel in the hole drilling makes us safer."

Then Boyd summed it up: "You take that extra trip time out of the way, you're saving trip time, you're saving money on bits, and you're increasing your safety factor.

"You know, Noah formed a really good company. We have a lot of really good competitors here. Once they see this system, they're going to want EDGE as well. Some of them have already tried it and are liking it."

Atlas Copco Secoroc

What is the future of fracturing?

Concerns around hydraulic fracturing are being answered

by Lee Toop, Editor

One of the key debates in the oil and gas industry across North America is centred on the practice of hydraulic fracturing. This long-established well stimulation technique has drawn attention from the public and media as its ongoing development has brought it into closer contact with populated areas. Concerns regarding contaminated aquifers and increased fresh water use have driven much of the discussion, and governments on both sides of the border are taking a hard look at the practice.

As nearly every oil and gas well drilled today is fractured in some manner, it has become an important tool for operators. With greater scrutiny and regulations being considered or introduced in many jurisdictions, companies using hydraulic fracturing are finding it necessary to look towards more environmentally friendly methods of stimulating wells.

While the core technique isn't likely to change too much, its components could look quite different moving forward thanks to new developments.

Long-time stimulation tool

While hydraulic fracturing (or 'fracking') has only been on the public radar for the past few years, it has been an established practice on oil projects since the 1940s. Mike Dawson, president of the Canadian Society for Unconventional Resources (CSUR), said that the principles of fracking remain similar on today's well sites.

"The concept was to see what we could do downhole to improve communication, or provide better roadways, from the wellbore into the formation," Dawson said. "Some formations that have very good reservoir properties don't need much stimulation at all, but expanding our exploration area, we find that other rocks contain oil and gas but need a bit of a kickstart to get it flowing."

Hydraulic fracturing is a simple process at its core: once the wellbore is drilled to the required depth and resource-bearing formations identified, small explosive devices are used to blast openings into the rock of the formation. Fracturing fluid, a mixture of chemicals and proppant (usually sand), is pumped down the hole at extremely high pressure, forcing the formation to crack and creating an easier route for oil or gas to flow into the well.

The oil industry has used fracturing more and more over time as exploration has turned up tighter deposits of hydrocarbons.

"The low-hanging fruit of those very easy reservoirs where stimulations weren't necessary have gone by," Dawson said. "If you plotted the production from conventional wells versus unconventional wells, you'd see a very significant trend – as conventional decreased, you will see an increase in hydraulic fracturing."

Fracturing trucks and equipment have improved dramatically in recent years. *(Photo courtesy Trican Lab Services and CSUR.)*

As the industry has matured and more unconventional reserves have been tapped, fracking has seen changes in its technology. Pumping equipment has increased in its size and effectiveness, frac fluid has evolved, and – perhaps the biggest change – downhole work has improved with the development of horizontal drilling and borehole isolation allowing multi-stage fracturing operations.

"As companies have changed their technology more towards horizontal drilling, we've seen fracturing change as well to be more effective in terms of stimulation of these horizontal wells," Dawson said.

Multi-stage fracturing is integral to the use of horizontal drilling, he noted. While a vertical well might bore through a 15-metre segment of hydrocarbon-bearing sandstone, a horizontal well can extend hundreds or thousands of metres through the formation. Borehole isolation techniques that allow short segments of the well to be fractured at a time are ideal for taking advantage of that long segment of pay well.

Downhole monitoring is also a greatly improved sector, Dawson noted. Instead of earlier fracturing methods that revolved around pushing fluid down the hole and hoping for the best, today's fracturing operations have a far greater view of what's happening in the formation.

"With advanced technology, operators can design a frac job and modify it on the fly," he said. "They can measure what's going on downhole in terms of pressure and microseismic events, tailor and adjust it as they go along. In some cases, that can even be done from head office."

Refinements in all areas

Drilling companies themselves are constantly working to improve their fracturing operations, keeping public concerns in mind as they move forward. The work is a combination of improving the existing techniques and educating the public about how those improvements change the process for the better.

"I talk to people every single day who think I'm lying saying that fracking is safe, that it's not something we invented two years ago," explained Chris Faulkner, CEO of Breitling Oil & Gas. "They believe what they read, and what they read is inaccurate. There's a lot more to clearing that up than just saying 'you're wrong and we're right'."

Breitling has a substantial portfolio of fracking operations, and much like many companies is searching for answers to public concerns.

Water use and protection is one of the key concerns expressed by the public, so recycling and closed loop fracturing are important steps for his company, Faulkner said.

"Water acquisition is the big argument in the U.S.… we're not where we want to be yet and still have to reintroduce fresh water, but we are recycling our chemicals and we're reducing our environmental impact using pad drilling," he said. "There are a lot of up-front costs... but once you get past those, if you're doing pad drilling and not moving your rigs around, having everything already there

makes the most sense."

Pad drilling – using horizontal drilling to bore multiple wells from the same location – and on-site recycling are slowly growing in popularity among the industry, Faulkner said. They also open the doors to more opportunities such as closed loop fracking.

"On-site, we have a blender in which we mix sand, chemical and water, and that's pushed down the hole. When it comes back up, we capture that fluid, and instead of putting it into a reserve pit we flow it into a steel frac tank," he said. "We capture the fluid and use a filtration process to remove partially dissolved solids, which are disposed of in a wastewater treatment facility safely. Then we reinject water into the fluid and reuse it in the fracturing process."

Closed loop fracturing means less water is used, there is far less likelihood of fluids leaching down into the aquifer – Faulkner noted that most fracturing operations are done far below the aquifer, so water leaching down from the surface is the most likely potential contamination source – and there is less traffic in terms of trucks moving in and out of the site with fluid and chemical.

Future changes

The future holds changes to fracturing fluids to reduce the potential hazards to the water table. Breitling has been working to develop a frac fluid using food-safe fluids rather than harsh chemicals, and is currently testing their new cocktail in tight gas wells.

"We'll remove those harmful chemicals within 12 months, we'll recycle water within 36 months, and I think perhaps sooner than that we'll have some sort of waterless fracking system that works with most geologies," Faulkner noted.

While companies and associations are working to answer public concerns, regulators are also giving the technique a look. In Canada, the Quebec government has instituted a moratorium on fracturing as studies are performed, and other provinces have instituted opt-in registration systems for frac fluid chemicals. The Canadian Association of Petroleum Producers has instituted a set of guidelines for companies drilling and fracking gas wells.

The United States has seen more focused regulatory activity. On May 4, the Department of the Interior introduced a proposal requiring companies to publicly disclose the chemicals used in their frac fluid. The rule also requires companies to improve their assurances that wellbore integrity is such that fluids are not able to escape during fracturing operations, and to confirm that a water management plan is in place for flowback fluids.

While environmental concerns are being addressed, the jury is still out on a final issue surrounding hydraulic fracturing – whether there is a link between the practice and increased earthquakes. Two studies released recently in the U.S. and UK suggested that deep-well injection of treated water may have been associated with small earthquakes.

"Induced earthquakes have been known of for about 100 years and are very common around underground mining operations, including here in Canada," noted Kevin Heffernan, CSUR vice-president. "The fact that breaking rocks with hydraulic fracturing creates measurable seismic events shouldn't surprise anybody."

Issues such as earthquakes and incidents of damaged aquifers near fracturing operations get higher visibility than the industry's protective efforts, Faulkner noted. Public education is important for breaking those negative perceptions.

"The industry is late to the party. People have already made up their minds, and we have to convert those naysayers to our side. The reality is that will be very difficult, as their concerns are clearly set forth," he said. "But, if we're going to continue to freely access the reserves that are deep within the earth that need fracturing to unlock, we have to be able to do it."

Collapsible frac tanks reduce transport costs

Since most hydraulic fracturing jobs require millions of gallons of water that is typically delivered by trucks making hundreds of trips, the carbon footprint and cost of transportation can be prohibitive.

In addition, large, heavy, expensive steel storage tanks are often used which, in turn, can damage the ground they sit on and be as costly to remove as they were to purchase. Steel tanks can also have a long wait time – from purchase to delivery – depending on the inventory available which can hold up well site exploration and development.

Collapsible tanks ensure complete isolation from surface soil and water and significantly reduce truck traffic to and from the site (and its related carbon footprint). In fact, one semi-truck can transport 24 tanks with a combined storage capacity of an astounding 1,200,000 USG (28,800 BBLs (US) or 4560 m^3). It would take 57 trucks to transport the same storage

capacity in standard 500 BBL steel tanks.

SEI Industries offers a collapsible pillow-style FRAC Tank designed specifically for oil and gas industry that is easy to set-up and can be used immediately with almost no site preparation required. The tanks are lightweight, fully collapsible, environmentally-friendly and don't damage the ground beneath them. One individual FRAC Tank can store 50,000 USG (1,200 BBL (US) or 190 m^3). In a day, using a manifold system, multiple tanks can be set-up to provide whatever volume of storage is required. SEI's FRAC Tank can be acquired in half the time it takes to get a steel tank.

SEI's FRAC tanks are constructed from a proprietary industrial fabric that is high-strength and high abrasion and chemical-resistant. Coloured in high-visibility safety orange, it's ideal for use in winter temperatures as low as -50 degrees C where it can be folded and unfolded in extreme cold. The FRAC Tank can also be used constantly with heated fluids up to +72 degrees C (with limited exposure to +82 degrees C liquids). In addition, the tank's low profile design helps to maintain its fluid temperatures better compared to vertical steel tanks. Another feature of this unique fabric is its high resistance to abrasion – an important aspect when tanks are continually moved from site to site. Common tank fabrics have abrasion resistance of 6,000 to 13,000 cycles while SEI's FRAC tank fabric has a 73,000 cycle abrasion resistance to handle the wear and tear of continual movements. Recently, SEI also launched its optional mechanized Frac Tank Deployment System (FTDS) which allows the quick unroll and roll-up of tanks while also significantly reducing the staff required.

SEI Industries

Transmission and engine package for fracturing truck

SJ Petroleum is one of China's largest manufacturers of petroleum drilling and production equipment. Caterpillar will be supplying 3512C HD engines and TH55 transmission packages to serve as the power modules for the company's Model 2500 fracturing trucks for well service applications.

The Cat 3512C HD petroleum engine for hydraulic fracturing, rated from 1678 bkW (2250 bhp) to 1864 bkW (2500 bhp) at 1900 rpm, offers customers proven reliability and durability. Its robust diesel strength prolongs life and lowers owning and operating costs. The 3512C HD features Caterpillar's ADEM control system provides precise engine-to-transmission communication for integrated drive system performance and system protection and monitoring. Featuring input power of 3000 bhp (2237 bkW) and input torque of 9148 lb.-ft. (12403 Nm), the TH55 transmission is optimized for petroleum pumping applications. Its evenly spaced gear ratios provide smooth shifting for pumping, providing for a much broader range of pumping speeds than the competition. Its deep first gear ratio creates application flexibility, and allows pumping at lower flow rates and pressure.

Caterpillar Inc.

Horizontal shale drilling performance

Stabil Drill has developed the Stabil Drill Ghost Reamer for application in horizontal shale drilling. The Ghost Reamer, an eight-bladed Polycrystalline Diamond Compact (PDC) reamer, allows the wellbore to be cleaned and cleared either by back reaming on rigs that have top-drive

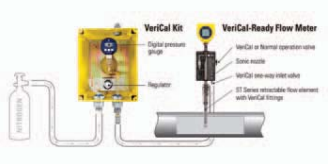
or, for rigs without top-drive, by pulling out to the top of the curve and then rotating forward until reaching total depth. This flexible solution eliminates wiper trips, saving time and money.

Within the past few months the Ghost Reamer has been used in more than 100 shale applications with positive results.

Stabil Drill

Flow meter with verification system

The breakthrough ST100 Series Thermal Mass Flow Meter from Fluid Components International (FCI) is now available with FCI's VeriCal In-Situ Calibration Verification System, combining advanced



measurement capability with the convenience of in-situ calibration verification to lower operating costs in flare gas applications. With the VeriCal In-Situ Calibration System, validating flow meter calibration is no longer labour intensive, costly or challenging. The system allows for the verification of flow meter calibration in minutes without removing the meter from the pipe or process and makes it easy to meet process validation more effectively.

The ST100 Series Flow Meter offers feature-rich and function-rich electronics. Its superior flow sensing performance delivers adaptability and value to meet plant gas flow measurement applications for today and tomorrow.

Fluid Components International

Smart barrel pressure transmitters

United Electric Controls (UE) introduces the TX200H, a HART smart pressure transmitter for shale oil and gas applications. The TX200H provides a very small footprint to fit the tight confines necessary for these applications, and utilizing the latest HART 7 specifications, reliably communicate asset management data while providing simplified field adjustment. A flexible 10:1 turndown on the pressure ranges from 0 to 15 psi (0 to 1 bar) up to 0 to 25,000 psi (0 to 1724 bar) allow the TX200H transmitters to be ranged as needed to meet customer requirements.

The TX200H is constructed of 316 stainless steel, welded and hermetically sealed to meet enclosure type 4X and IP66 requirements.

United Electric Controls

Overlayed clamp joint hubs

In late 2008, BlueSky received reports from three SAGD plants on the premature leakage of clamp connectors. One major producer opted to perform their own failure analysis and shared the results. The results of the analyses demonstrated that two factors contributed to premature leakage. The first was movement between the seal ring and the hub, which may be due to incomplete assembly of the clamp connector. The second is due to precipitate build up at the seal ring/hub interface, causing localized corrosion. Below are brief summaries of observations and conclusions at three separate sites. All three sites have switched to Inconel 625 Overlayed BlueLock hubs with dramatically improved performance.

The first SAGD plant reported that it has two identically designed steam generators constructed by the same company using the same feed-water and operating at the same pressure and temperature. Both steam generators were supplied with BlueSky BlueLock clamp connectors. One steam generator has not had any leakage issue during more than two years of continuous operation, whereas the other is experiencing premature leakage. Although it is difficult to verify, the only possible explanation as to what is happening here is that the pipes have more inherent misalignment that is preventing the joint from being fully assembled.

A second SAGD plant reported premature failure and sent product for analysis in late 2008. Shortly after that, they tried different seal ring materials. They reported that these trials had little to no effect and they were still experiencing premature failures. This site admitted to having severe misalignment and that fully assembling the clamp connectors was problematic. This producer is paying more attention to the assembly of the clamp connectors and has switched to BlueLock Inconel 625 Overlayed hubs.

Additionally, at this plant's request, BlueSky has developed an all-metal seal misalignment compact flange, which is currently on trial.

A third plant reported a three to six month span between failures of the clamp connectors. At this point BlueSky recommended they install Inconel Overlayed hubs in their OTSG. This client was the first site to install this solution in February 2010 and has reported that 20 months later the hubs were in the "as new" condition. They have purchased Inconel Overlayed BlueLock hubs for their next phase.

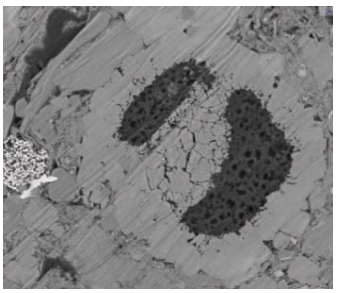
Although the pipe material selected and corrosion allowance calculated is acceptable for the safe performance of the OTSG units for their life expetctancy, the corrosion allowance for metal seated clamp connectors, such as the BlueLock, is zero. The high mineral content and brackish water used in steam generation combined with the increased practice of recycling the feedwater will continue to cause corrosion problems in non-overlayed clamp connectors. This low-cost solution has been proven and is readily available.

BlueSky Process

Imaging workflow ideal in shale gas

FEI's Natural Resources Business Unit offers a "core-to-pore" petrography workflow for core analysis of unconventional gas reservoirs in the oil and gas industry. The workflow includes a new automated, large-scale, high-resolution imaging method for viewing and analyzing petrographic data sets with length scales ranging from centimetres to nanometers. Access to information at both ends of the scale is critically important to drilling and production companies working in shale gas reservoirs.

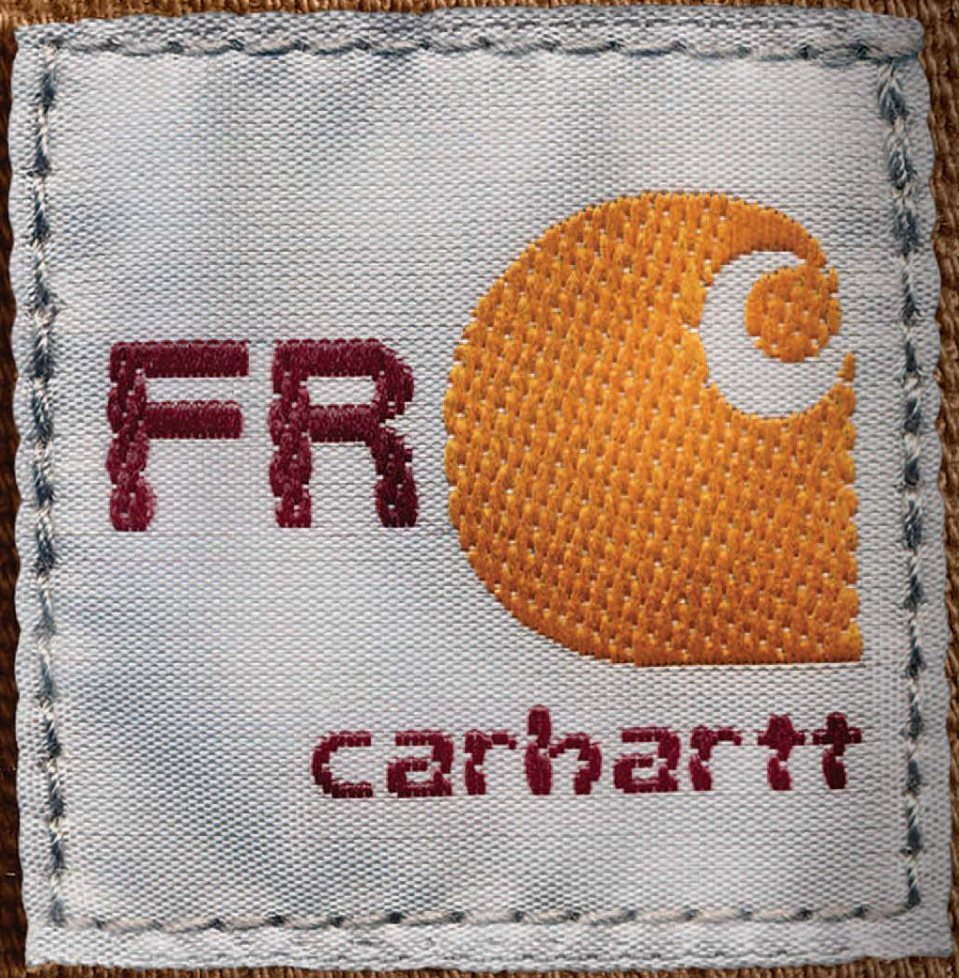
In order to optimize completion of unconventional reservoirs, like Marcellus



and Barnett, geologists need to relate the fracture network observed in core samples to the nanometer-scale distribution of pores, their hydrocarbon content and permeability, and the connectiveness of the pore networks allowing it to flow to the nearest fracture for production. This is "core-to-pore" analysis.

The new core-to-pore workflow solution can be implemented on a variety of FEI scanning electron microscope systems by adding MAPS (Modular Automated Processing System) imaging software, a QEMSCAN petrographic analyzer, and a specific sample preparation method. The workflow automatically acquires a grid of high-resolution electron microscope images covering the entire sample surface, and stitches them together in a coherent and correlated image data set. The software also includes a viewer for quick navigation through the data set.

FEI



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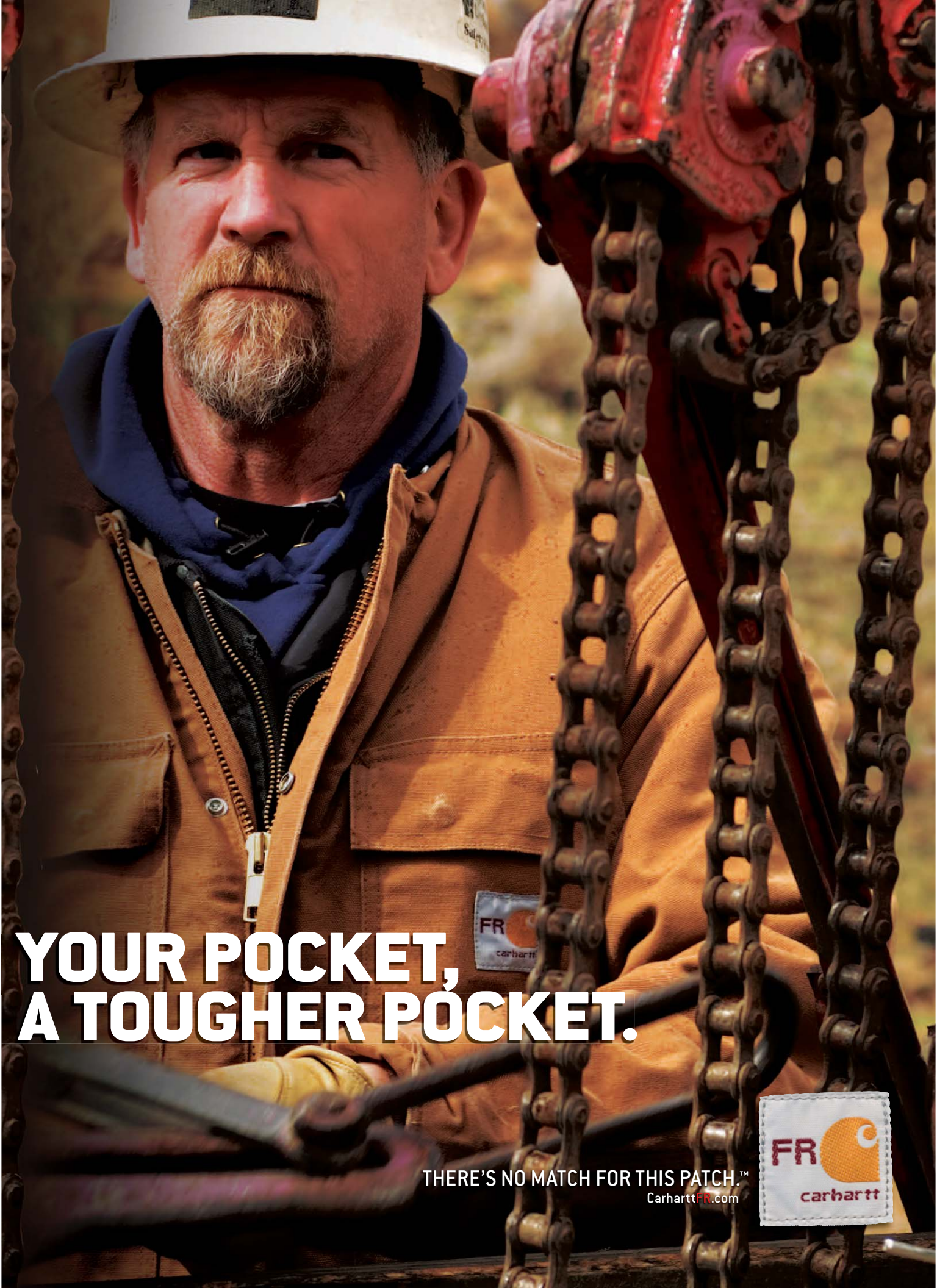
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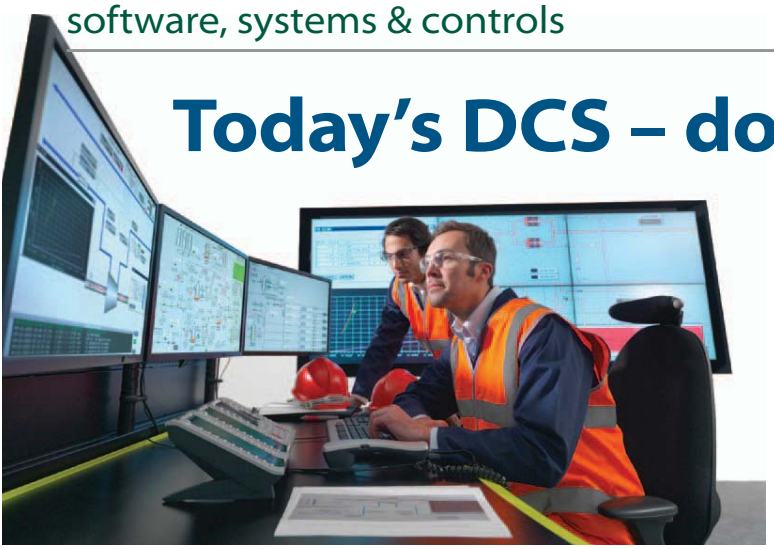


by Tim Sweet

The industry debate over the virtues of distributed control systems (DCS) versus programmable logic controllers (PLCs) has been ongoing for well over the past four decades. As the functionality differences narrow and price points align, however, the arguments for and against each system have become increasingly murky.

Central to understanding the argument between DCS and PLC is grasping the fundamental differences between the two control platforms. For instance, the DCS architecture is focused on distributing control on a network so that staff can monitor and interact with the entire scope of the asset. As such, the classic DCS originated from an overall system approach. Coordination, synchronization and integrity of process data over a high-performance and deterministic network are at the core of the DCS architecture.

In oil and gas assets in particular, recent practices driven by standards such as the America Petroleum Institute's RP14C and ISO 61508 have increasingly reshaped the control system architecture to the point that often 60 percent of I/O points in the control system are now delivered in the safety system. Increasingly, the integration and commonality of the DCS and the safety integrated system (SIS) technology is highly desirable.

PLC architectures, on the other hand, focus on very flexible and fast local control, and recent advancements in PLC technology have added process control features. When PLCs and HMI software packages are integrated the result looks a lot like a DCS, but is still very much a "do-it-yourself" (DIY) approach, meaning engineers must oversee the assembly of their system from the ground up. While this is a flexible approach to control, the DIY option comes with increased technical risks in networking and performance as well as added costs that are not always immediately apparent.

In the past, a DCS was typically more expensive to purchase than PLC-based systems and many assets had lower demands in terms of production rates, yield, waste, safety and regulatory compliance than what they experience today. Thus, PLC-based systems were appealing because they offered a lower capital investment and, from a functional point of view, performed adequately. But times have changed. As a result, many control system engineers, maintenance and plant managers are taking a fresh look at the trade-offs between a DCS and a PLC-based control system architecture as they plan their automation capital expenditures.

Network performance

Good network performance starts with proper network planning, which can only be done with an intimate knowledge of the communication behaviour of each network node and the protocol used to carry network messages. Major process automation suppliers have taken care of this requirement. They provide best practice information so the user starts with a sound network design. Contrast this to the "DIY world" where the application engineer is the first to put a particular network topology together.

Once the network planning and installation are complete, the next step is gauging how the network performs. The same network topology can be subjected to a wide variation in communication traffic based upon the amount of data acquisition, alarm reporting, historization, peer-to-peer messages and backup tasks that are on-going, which can be taken care of through comprehensive maximum topology testing.

Assuming the network is designed and installed and the asset has reached its maximum production capacity, and everything is working as expected, a common challenge is maintaining that smooth network operation.

One solution is to first implement a redundant industrial ethernet network with built in fault tolerance and comprehensive diagnostics. Second, the asset must qualify the functionality and performance of service packs and hot fixes before they are loaded into the production system.

Control performance

Good process control is built upon reliable and repeatable execution of the control strategy. The process controllers that are a part of the classic DCS architecture have fundamentally different operating philosophies than found in a PLC. While the PLC runs relatively quicker, the process controller favours repeatability. This means that the control strategy runs on fixed clock cycles – running faster or running slower are not tolerated.

Clock cycles are not the only secret. Other system services are also designed to give priority to solving the controller configuration. For instance, controller-generated alarms can be throttled if they are interfering with control and recovered later when process disturbances slow down. This can only be effectively managed by tightly coordinating the control generating the alarms, as well as the alarm and event subsystems that collect, store and report those alarms. Again, a system approach from the onset is central to the operation of a DCS.

> Maintenance and plant managers are taking a fresh look at the trade-offs between a DCS and a PLC-based control system architecture.

Suppliers of HMI software packages typically boast about how easy it is to design graphics for the operator. But designing graphics, no matter how impressive, is not how a plant makes money. Imagine a process control environment where one doesn't need to build graphics, which instead come pre-built.

With a system where the control and operator environments are designed and built together, often 90 percent of what is needed to run a process plant can be made standard.

Object-oriented function blocks are used primarily to specify the properties of any given user function. By creating function blocks with a complete set of parameter-based functions, the user can develop and fine tune control strategies without designing control functions, while ensuring that all necessary functions are available and documented as configurable selections. The application engineer simply assembles the blocks into the desired control configuration with minimal effort. A self-documenting, programming-free controller configuration is what makes the DCS architecture efficient to engineer and troubleshoot.

As an example, let's look at a commonly used process control function – the PID block. Using a DCS-style global data model, all aspects of the PID function are contained in a single tabbed configuration screen. Various algorithms that have proven the test of time are available for easy selection. Parameters used for alarming, trending, and history in the HMI are configured here. It's no longer necessary to configure these parameters to populate the HMI configuration.

In the world of DIY, it's possible to find all of the applications needed to run a plant merely by looking through catalogues from PLC and HMI vendors and placing an order. Licenses, DVDs, downloads and other usable content will begin to arrive shortly after that, providing an array of materials. However, it's easier to order one model number and receive everything needed at once via the same content.

Data management

When the DIY DCS is pieced together, multiple data models can spawn multiple data elements representing the same piece of information. And when piece parts are brought together to form a system, the various data models must be synchronized and maintained.

In the world of the DCS architecture, the entire data model has been conceived to cover all parts of the system. (Note the HMI alarming and history parameters set in the PID example above). Hence, one data owner can provide a piece of information to any application or service anywhere in the system. The issue here isn't the number of databases. The key is having a single data model so, no matter where a data element resides, it can be used by any element of the architecture and that particular data element is never duplicated.

With safety detection and shutdown systems now accounting for around 60 percent of the automation footprint by I/O count in oil and gas assets, it is important to consider the main trends and requirements. The inclusion of an SIS will redefine the DCS as an integrated controls and safety system (ICSS). A typical large asset will need at least a process shutdown system (PSD) and emergency shutdown system (ESD) with a safety integrity level (SIL) 2 or SIL 3 rating. On onshore integrated assets, however, it may be possible to not require SIL-rated SISs at the wellhead and gathering systems due to the lower risks enabled by the DCS remote controlling the wells and gathering network.

Modular construction methods mean that much of the plant equipment is delivered with either packaged controls or with remote I/O installed that can be connected to the main DCS and ESD. Some vendors, in fact, supply universal remote I/O, which simplifies the architecture such that only one type of module is required in the field to cover most I/O requirements. Increasingly, intelligence is being placed in the remote I/O module so that it can tolerate dropouts in communications to the main controllers, while still being able to independently execute safety shutdowns and control algorithms.

Leading ICSS architectures have moved away from PLC-like Modbus integration with the SIS controllers and have implemented deeper DCS integration. With that in mind, comprehensive intelligent remote I/O and DCS-style integration should be considered in ICSS projects.

Rarely are today's oil and gas assets run by a single brand of controller. That's why the classic DCS architecture also serves to bring third-party devices into the same data model employed by the DCS. This incorporation of existing controllers means that operators can view information from various brand controllers in a consistent fashion.

It is also important to choose the control solution that will allow a seamless addition of enterprise solutions onto the control layer. Because information-rich applications will most likely be expected right around the corner, it is important to consider elements like operations management systems, equipment asset management, reporting packages, well testing, downtime tracking or a variety of other enterprise layer solutions.

Control strategies need a thorough examination before they are deployed to control an actual process. Because process control is so focused on repeatability, it is necessary for a simulation environment to run the control strategy without alteration. Timing is essential in process control and a simulator must replicate the process execution timing in a faithful manner. With that in mind, DCS suppliers offer advanced simulator technology to support improved performance throughout the lifecycle of a plant.

Plants each have unique requirements when it comes to automation and control and neither a DCS nor PLC will be a catch-all solution for every facility. Ultimately, specific applications and operational needs must be taken into careful consideration when determining which technology is most appropriate for process control. There is a growing case to be made, though, for the value of a DCS, even in smaller applications.

Tim Sweet is with Honeywell Process Solutions.

Honeywell

New generation surge protectors bring benefits for I/O systems

Vulnerability from lightning damage for measurement and control instrumentation in industries such as petro-chemicals, water and wastewater is a major concern to plant managers. Direct strikes, which cause damage to control systems, are relatively rare through the use of mechanical protection, such as ground rods, which act as an effective first line of defense. However, product damage and signal disturbances are much more frequently caused by transient surges as the result of remote strikes and cloud-to-cloud strikes.

This problem is aggravated with the increased number of sensitive microprocessor-based electronics in field instrumentation and the growing use of fieldbus signalling. When the damage reaches through to the DCS I/O system, it can result in partial or complete plant shutdown.

This makes the value of I/O surge protection of the upmost importance.

There are two primary surge formats – one with pluggable arrestors, the second in compact terminal format.

The compact terminal format is ideal for process instrumentation installations. They include options and features, which improve the choice and breadth of applications and ensure high quality, ongoing protection through monitoring options and easy replacement.

Following the direction of the latest IEC installation standard, both types automatically provide status indication or alarming to alert for needed arrestor replacement.

V-Test unit offers simple and easy testing of VSPC pluggable surge protectors.

Progress in performance

In this latest generation of signalling surge protection devices (SPDs) some of the trusted basics are still in place. Common mode, (conductor protected to ground), remains the primary protection, and series mode, (conductor to conductor), is widely featured as well. The familiar voltage limiting components, Gas Discharge Tubes (GDTs), Metal Oxide Varistors (MOVs) and Avalanche Diodes (TAZs), usually in combination, are still the heart of the SPD.

Now, these arrestors are faster in operation (switching on), better insulators, and discharge higher transient currents. Two in combination is more effective than the previous combination of three.

Also, the maximum surge discharge capability (Imax) is 20kA (8/20µs), even for the compact, terminal-sized SPD, compared with 5-10kA in the past. This doesn't mean we expect it to discharge higher surges, although it can. It does mean the SPD will last longer i.e., will withstand many more 1kA or 2kA transients.

In addition to this, protection for floating or grounded signal lines is offered, recognizing that many DCS I/O signals, especially analogue, are floating (not ground referenced).

Continued protection

Once fitted, maintaining good ongoing surge protection has been a labour-intensive activity and, for this reason, a less reliable one. The issue is that the arrestors, or voltage limiting components, gradually wear out. The more transients they suppress, or current surges they discharge, the less efficient they become until they degenerate into an interfering additional load in the loop to which they are fitted.

If failed SPDs in I/O systems are not recognized and replaced, users at best should expect measurement errors and poor control. It is therefore critical for the user to regularly monitor the SPD status, so the worn-out arrestors can be replaced in a timely fashion.

The manual testing procedure has been a hassle however, and until recently, the SPD had to be disconnected from the measurement or control circuit while electrical checks were made to assess its condition.

Large process plants can have thousands of analogue and digital I/O loops to be checked. The involvement of the shift manager, coordination with the control room, generation of work permits, and switching to manual control for critical loops, all mean that SPD monitoring is a complex maintenance function.

Recent innovations have simplified the maintenance of surge protectors in a variety of ways, based on the ability to automatically detect the degrading condition of a MOV, GDT or TAZ. The thermal disconnect (or trip), using a

technology already well proven in power surge protection, is the key component that takes the arrestor out of the circuit when it degrades.

The arrestor's increased leakage current, as it becomes a less efficient insulator, increases the heat generated until the thermal trip operates. Whereas in power applications the trip would disconnect, opening the arrestor circuit to prevent high current flowing from the live conductor to the ground. In signalling applications the trip shorts the protected circuit to ground, and/or between conductors. This action is the subject of a recent mandate in IEC 62305, the international standard for the installation of signalling surge protectors.

The goal of making the short circuit is to create a condition which will be noticed by the DCS as a "signal out of range," generating a system alarm and thereby initiating a job request for a circuit check by a technician, who would then replace the arrestor. The additional benefit of the short circuit is to protect downstream equipment from further transient surges by providing a ready path of low resistance to ground.

Finding and fixing

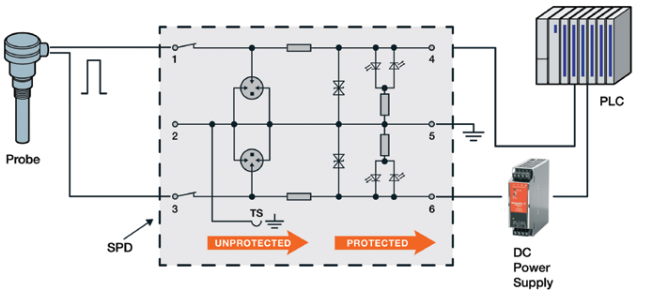
When the technician arrives at the control panel, knowing which loop needs to be checked because the DCS has identified it, the arrestor-replacement job is simple. Coloured markers on the SPD will verify the nominal circuit voltage of the device. Worst-case scenario, the technician will need to disconnect a few cables, test the SPD and re-connect. The SPDs fitted may have pluggable arrestors that confirm which item is to be replaced via their local LED display. Otherwise, with high-density, non-pluggable types the technician may look at the array of surge protectors and see their integral LEDs lit to show positive loop status. If any SPDs are found with LEDs fitted, but not lit, the technician may wish to test the loops. Lever disconnects on the SPD will make testing easy (again, without removing cables) by enabling a test voltage to be applied, which will turn on the LED if the arrestor is in good condition.

A valuable option with pluggable-arrestors is remote status signalling, where the SPD itself generates the call for the technician. This has been long used in power protection and only recently introduced to signalling protection. When the thermal trip is activated it operates the integral indicator and a switch to send a remote signal either into the DCS, the technician's workshop, or both. To minimize the alarm cabling involved, the pluggable SPDs can be grouped up to 10 in series, and connect to a single relay to initiate the remote alert.

Another new timesaving tool and an essential accessory for pluggable SPDs is the dedicated portable test unit. This device, developed to help fulfil the requirements of IEC 62305-3, which calls for periodic inspections for surge protectors, can be used for pluggable signal or power arrestors. The ultimate simplicity of unplugging the installed arrestor from its base, inserting it into the test unit, and reading the "OK/NOT OK" display makes the job a potential favourite for the technician – meaning of course that the job stands a good chance of being done.

Despite the additional protection these new SPDs offer, their lifetime is finite and hence protection is never complete. The number of transients occurring over a period of time, and their severity, are usually unknown, and therefore the condition of the arrestors are also unknown. Thus the best method, to effectively protect equipment in applications where lightning is a regular occurrence, is for plant managers to 1) fit suitable SPDs designed for easy testing and 2) test them regularly.

Weidmuller



Typical status loop surge protection with input from a conductivity probe. Transient surges may be discharged to the ground via the DIN mounting rail or via the SPD's terminals.

When paper kills: the perils of reactive EHS management

by Paul Leavoy

We often hear that there is no such thing as reactive environment, health and safety (EHS) management in the oil and gas sector. While there certainly should be no such thing as reactive management, and while most companies in the sector make staggering investments in EHS leadership, the opposite is sometimes true.

Oil and gas companies tend to lead the curve in EHS management since they face an array of substantial threats and hazards on a daily basis, simply as a result of doing business. Incidents on rigs, spills, and other releases can precipitate significant environmental damage and publicity nightmares. Notices of violation from regulatory infractions can net enormous fines and even put a company out of business. And compromised health and safety programs can result in lost time, employee injuries, and even death.

Given the stakes, it is hard to grasp why some businesses in oil and gas still rely on archaic systems for EHS management. Such systems typically leverage paper, spreadsheets, and other isolated, disparate software systems. But these approaches cultivate reactive processes and impair a business' capacity to mitigate environmental impacts, improve occupational health and safety conditions, and save lives.

As an illustration, imagine a company with offshore oil platforms as well as drilling rigs and other sites across western Canada. Field inspectors will regularly visit exploration fields and tank batteries, and even venture out to the platforms to ensure all sites are meeting corporate or regulatory EHS requirements. In addition to evaluating people, procedures, and preventive measures, they'll also look for opportunities for improvement and provide recommendations based on their findings.

The method sounds reasonable in principle, but from a real-world perspective, where the elements of process vulnerability and human fallibility set in, it is anything but.

Consider that the beginnings of the process are rooted in a paper-based approach. Field inspectors and auditors will generally enter their initial findings on paper forms, especially at a site such as an oil platform where connectivity and computers are rarely at hand but pens and paper are always within reach. Whatever paper forms are filled on occasions like this form the basis of the audit checklists and recommendations the auditor submits – a very weak foundation for a system that ought to bolster regulatory compliance and ensure the integrity of a business-critical EHS program.

In scenarios like this, once the inspection results are compiled, conventionally the paper reports are stapled and placed in manila folders which are then tucked away into a file cabinet. The data contained within these reports – information that could be leveraged to proactively avert catastrophes and improve EHS performance – is suddenly rendered inert.

Once audit results have to be approved or implemented, sometimes weeks or months after the audit has been conducted, a stack of folders will be placed

on an appropriate employee's desk to be reviewed and entered into a spreadsheet program. Again, besides the fact it involves data that could have been acted on weeks earlier, this process sounds reasonable on paper, but the reality is a different matter. While many of us would like to think employees would responsibly deal with the file in a timely manner, in actuality these tasks are often delayed. When a stack of work on an employee's desk grows, the human inclination is not to make the stack smaller, but instead to get it out of sight and out of mind. Like any process that is executed by humans, on paper, these processes have dead ends and redundant work that invariably cripple opportunities for informed, proactive decision-making that can save a company from future headaches, from both a compliance perspective and in terms of hard dollars.

As a result of all this, audit results and recommendations are either lost or put into a system long after this valuable business intelligence had been made available to the company. This runs entirely contrary to the notion that both environmental management and safety programs in oil and gas have to be preventive and proactive. When audit details aren't immediately visible, there is no way to tell what the action items are, what has been completed, and what needs to be done. Further, when a system relies on paper-based, site-specific metrics that are manually entered into a spreadsheet, which is then manually rolled up into a higher level spreadsheet containing regional or companywide metrics, the result is substantial time and efficiency losses, duplication of effort, and ultimately compromised EHS performance.

Contrast this with the alternative: streamlined, web-based EHS management system software, which is available to oil and gas companies around the world. A leading electronic EHS management system will eliminate the weaknesses inherent in a paper- and spreadsheet-based system. Let's revisit the scenario described above from the perspective of a company leveraging streamlined EHS management software: Auditors visit offshore platforms, drilling rigs, tank bat-

teries and other sites to execute audits. If the site does not feature internet connectivity, then the beginnings of the process are still rooted in paper, as the inspector evaluates the site. However, rather than placing these findings in a folder and handing them off to an employee to enter in a spreadsheet at a later date, once online system access became available, a person responsible would enter the data directly into an auditing form through a web browser. The constitutes the sole point of entry of the audit data into the system, and once it is inputted into the system, the data can already be translated into meaningful corrective and preventive actions by any other responsible party with access to the system.

If the site does feature Internet connectivity, it's a different story. The auditor would be able to directly access the system's audit checklists on a tablet computer as the audit was executed, entirely eliminating the need for paper. Alternatively, the auditor or another responsible party could enter the data into the system on a connected, onsite kiosk computer immediately after the audit is completed.

In either scenario, the power of the raw data is unleashed virtually instantly. For example, let's say the auditor had identified a number of safety hazards while evaluating the site. If the company is leveraging a robust EHS management system, details of the safety hazards as well as corrective and preventive action instructions would be automatically submitted to responsible parties within the organization through automated email notifications. These notifications would ascend the organizational hierarchy at predefined time intervals if the associated tasks were not completed and logged into the system, thereby ensuring fast response times and complete accountability. Data also feeds directly into high-level management dashboards with charts and graphs as well as one-click instant reporting tools, both of which help inform corporate decision making and, ultimately, a safer, more environmentally responsible business.

> Oil and gas companies tend to lead the curve in EHS management since they face an array of substantial threats and hazards on a daily basis, simply as a result of doing business.

Further, from a day-to-day perspective, EHS data is captured far more regularly, far more consistently and with much greater ease compared to the paper-based alternative since frontline employees are more inclined to enter near-miss, hazard and incident data into the system through a user-friendly web form. Finally, the time and efficiency savings realized will have a direct and positive impact on the company's bottom line.

In light of the enormous stakes associated with EHS management for businesses in the oil and gas sector, compounded with the ROI generated by streamlined EHS software, it makes sense for companies that are still reliant on a paper-based framework to step into the 21st century by adopting a robust EHS management system that minimizes environmental impacts, reduces employee injuries and saves lives.

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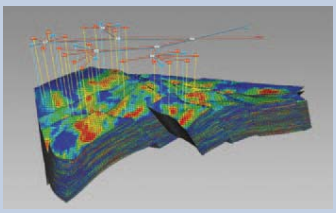
Intelex Technologies, Inc.

Integrated petroleum engineering software



Optimization Petroleum Technologies (OPT) has announced the selection and license sale of the company's PEOffice suite of software by Niger Delta Exploration & Production, PLC (NDEP) for overall reservoir and production analysis. The license sale to Niger Delta Petroleum is OPT's first to an oil & gas producer on the African continent.

PEOffice, OPT's integrated product suite, is an easy-to-use, petroleum engineering software application providing advanced visualization of oil and gas reservoirs production analysis and well design.

In addition to the software suite, OPT also provides: PEOffice-related implementation and training services, custom software development, petroleum engineering outsourcing and traditional petroleum engineering consulting that includes integrated field studies, field development scheme adjustment and reservoir simulations.

"Acquiring and using PEOffice will allow us to up our game in this ever challenging and increasingly complex arena of the digital oil field", said Edirin Abamwa, Chief Engineer for Niger Delta E&P.

"Independent producers worldwide are hungry for affordable reservoir or production engineering software applications that are easy-to-use," said Jacoby Garcia, Vice President of Worldwide Sales for Optimization Petroleum Technologies (US).

Optimization Petroleum Technologies

iPad-deployed ticketing software

Spira Data Corp, whose electronic field ticketing software solution gives field service companies control of their operational field data, has launched a new iPad-based application that extends the functionality of their existing mobile laptop software. The new iPad application, Spira FT, brings an ease of use to the mobile field ticketing experience.

Both Spira FT and the laptop-based Spira Mobile applications are able to operate in a disconnected state and only need a connection for submitting field tickets or updating data on the device when new job information is dispatched. Billing, Payroll, AP, PO and inventory data are recorded in the field where the transactions occur and sent back to the main office after they have been approved by the customer in the field. If the customer approver is not on site, the field ticket can be saved to a PDF and emailed to the customer for approval.

Spira Command, Spira's core office application, is a Windows-based software that acts as the field data collection hub where billings, payroll, accounts payable and inventory field data are processed and analyzed through reports and enhanced data grid functionality. Spira Command allows office users to process field ticket data through their billing, payroll or accounts payable work flow and then export the information in any format.

Spira Data Corp.

Added functionality and convenience

HARTING has given Han-Yellock, its multiple-award-winning, heavy duty industrial connector series, added functionality and convenience with new configuration options – including a universal hood and socket housings to fit both sizes of this self-contained interface. Designed for easy assembly, Han-Yellock boasts unique features like an integral locking system with patented push button technology that makes it easy to install while reducing the risk of unauthorized access.

The universal hood is designed to make cable layout even more flexible, providing enough space for a range of cable entry combinations. The drillings can be used for layouts ranging from 3x M20, 2x M25, 2x M32 to 1x M50 cable glands. Individual cables can be fed in, fitted with separate, even standard cable connections. This range of cable entry options is particularly important for use with modular insulators. The Han-Yellock socket housings offer one- and two-cable inputs, available in metric thread sizes M25, M32 and M40. These aluminum connection boxes have lateral functional surfaces that also can be used for cable input.

HARTING

Connect remote equipment through cellular networks

Xenon announces the T925 Wireless Cellular Controller for connecting remote sites with central control and monitoring stations through cellular networks. A T925 remote communications network eliminates the need to make hardwired Ethernet connections to the Internet or to an intranet at each remote site and at the central control and monitoring station, and the network operates from any location worldwide with cellular coverage.

This system allows end users, machine and skid builder OEMs, RTU and SCADA OEMs, security monitoring system OEMs and other firms to monitor and control their automation and monitoring systems through the cellular network at sites thousands of miles away. Typical applications include pipelines, pump stations and electrical substations.

A T925 remote communication network is usually configured with a T925 at each site. Up to 250 T925s can simultaneously communicate through the cellular network with a VPN router installed at a central control and monitoring station. Each T925 is custom-configured by Xenon.

Xenon

Workstations for harsh conditions

Pepperl+Fuchs introduces VisuNet Industrial 900 Series Operator Workstations. Built to withstand even the harshest oilfield operating conditions, including high shock and vibration, these 15 inch or 19 inch monitors are encased in a thin but rugged NEMA 4/4x Stainless or painted steel slim housing suitable Class I, Division 2 hazardous area installation. The robust enclosure design mitigates heat without the need for venting or cooling fans. They feature a glove-friendly touchscreen, and are available in transflective models for clear outdoor viewing.

These industrial workstations can be ordered to meet the existing communication infrastructure of the application. The standard connectivity provided by Pepperl+Fuchs is Cat 5 or fibre-based KVM Monitors, Ethernet Remote Network Monitor or Full Panel PC. Their adaptable design enables operator workstations throughout the processing facility to have a consistent look and feel, but with different functions.

Pepperl+Fuchs

Field calibrator and communicator

The new Beamex MC6 Advanced Field Calibrator and Communicator is a solution to new process industry requirements. The MC6 is an advanced, high-accuracy field calibrator and communicator. It offers calibration capabilities for pressure, temperature and various electrical signals. The MC6 also contains a full fieldbus communicator for HART, FOUNDATION Fieldbus and Profibus PA instruments. The usability and ease-of-use are what really makes the MC6 unique.

The robust IP65-rated dust- and water-proof casing, ergonomic design and light weight make it an ideal measurement device for field use. The MC6 is one device with five different operational modes, which means that it is fast and easy to use, and reduces equipment needs in the field.

Beamex Group

Rugged computer for hazardous areas

The Mesa for Hazardous Locations is a rugged handheld computer designed specifically for the intrinsically safe market, allowing users to safely collect data where potentially explosive gases, liquids or vapours may be present.

The unique features of the Mesa Rugged Notepad include the unprecedented large active viewing display and universal Windows Mobile operating system, plus the optional integration of the high performance Mesa 1D/2D barcode scanner. These features combined with the Class I, Division 2 certification promise a unique and powerful solution to improve data collection processes in hazardous locations.

The Class I, Division 2 certification is available for all three models (Standard, Geo, and Geo 3G) of the Mesa Rugged Notepad. The Standard Mesa features Wi-Fi and Bluetooth wireless technology, while the Geo model adds two to five metre accuracy GPS and a 3.2MP camera enhanced with Juniper Geotagging (the ability to embed and emboss photos with date, time, and GPS position). The Geo 3G model includes all of the features of the Mesa Geo, plus a 3.5G GSM data modem for increased connectivity capabilities. Like other Juniper Systems rugged handheld computers, the Mesa for Hazardous Locations is built to survive the toughest environments. It is built to IP67 standards, making it fully waterproof and dustproof, and designed to MIL-STD-810G standards.

Juniper Systems

Modular design for optimized solutions in range of demanding applications

KSB Canada introduces the CPKN family of pumps aimed at meeting the special needs of chemical and petrochemical industries.

Based on a standardized, highly modular design, these pumps thrive in a wide range of demanding applications. They are especially suited for the smooth and efficient transport of corrosive, gaseous or temperature-sensitive liquids.

Optional features include jacketed casings (to enable heating or cooling of pump internals), special impellers to handle solids-bearing or gaseous liquids, a variety of high-performance mechanical seals, and a wide range of corrosion resistant materials, up to and including nickel and titanium alloys.

While CPKN pumps are versatile they are also cost effective, thanks to the standardized, modular architecture. Maintenance costs are minimized by the use of highly efficient seals, rugged, long-lasting bearings and maintenance friendly layout.

These pumps are available in a wide range of sizes, with capacities as high as 4150 m^3/hr (18,200 USGPM) and heads of up to 185 metres. Operating temperatures of suitably configured pumps can range from -40 to 400 degrees C.

"The CPKN family is the most flexible standardized range of process pumps in the industry," comments Mike Blundell, President of KSB Pumps in Canada. "They have provided excellent service in the petrochemical and chemical industries, along with biofuels, food processing, seawater desalination and the energy industries."

KSB Canada Inc.

Shutdown valve receives important safety certification

GE has announced its Becker Emergency Shutdown Valve (ESD) offering has received an important safety certification – the IEC 61508 Safety Integrity Level 3 (SIL 3).

Attention to safety has intensified in the oil and gas, petrochemical and other process industries over the past decade, driving the global demand for safer systems to protect both workers and the environment. Consequently, operators in key regions around the world are looking to improve the safety of their equipment and reliability certifications such as the SIL3 are increasingly important.

The SIL 3 certification was performed and awarded by Exida, a leader in safety and security processes. An SIL rating measures the ability of a system to reduce the overall level of process risk in safety applications.

GE's SIL 3-certified Becker emergency shutdown valve incorporates the Becker Full Port Ball valve as well as the Becker VRP-SB-GAP and Masoneilan SVI II ESD products.

"SIL certification provides our customers with a third-party validation and improved confidence that our emergency shutdown valves have the capability to help reduce risk and improve safety within a facility," said Mike Lee, product line leader – Becker Valves for GE Oil & Gas. "While GE's Becker products are designed with performance and safety in mind, the certification will provide an added peace of mind for processes that require a higher level of reliability and risk reduction."

GE

Proportional relief valves for piping up to one inch

Swagelok RHPS series PRV model proportional relief valves provide proportional venting of overpressures for piping systems up to 1 inch in size. End connections include NPT female, BSPP female, and BSPP male in sizes 1/4, 1/2, 3/4, and 1 inch. Available Swagelok threaded adapters convert from BSPP to NPT to allow for easy product installation.

Valve operation is smooth, opening gradually and reseating accurately in proportion to the increase and decrease in pressure over the set opening pressure. The PRV's balanced valve design is unaffected by system back pressure up to 50 percent of the valve's set pressure. PRV proportional relief valves feature 316L stainless steel construction of the body, trim, and spring housing. Choose fluorocarbon or nitrile seats and seals.

Available set pressure ranges are: 145 to 580 psig (10 to 40 bar), 580 to 1160 psig (40 to 80 bar), 1160 to 2170 psig (80 to 150 bar), 2170 to 4060 psig (150 to 280 bar), and 4060 to 5800 psig (280 to 400 bar). Depending on body size selected, flow coefficients (Cv) range from 0.49 to 4.36. All valves are factory-tested, set, and secured with a lock-wire to the pressure range desired. Each valve is tested for specified reseating and shipped with a test certificate. Operating temperature range is -4 to 176 degrees F (-20 to 80 degrees C).

Swagelok

Product Spotlight:
Drilling Equipment
...Coming in July/August

Plunger arrival sensor for plunger lift wells

Production Control Services Inc. (PCS) recently introduced its new 3DSO Plunger Arrival Sensor for plunger lift wells.

Mounted on the surface lubricator, the 3DSO detects the plunger's arrival and activates the controller to the appropriate mode for gas sales or shut-in. The arrival sensor's proprietary technology represents significant improvements in plunger arrival sensing.

Driven by an embedded microprocessor, the 3DSO continually self-calibrates to filter out environmental noise. It uses advanced 3-D technology, like that used in military and navigation applications, to detect the plunger's arrival.

By sensing the plunger in three coils in three axes (X, Y and Z), the sensor is able to more accurately detect plunger arrival.

The combination of the microprocessor and 3-D technology enables the 3DSO to detect arrival of the plunger traveling at any speed, even if the plunger is stopped in front of the sensor.

PCS does extensive quality control on each sensor. The sensors go through a 25-point, 3-axes electronic test, as well as a functionality test.

All the test data is stored electronically within the unit, making it easily retrievable and useable.

Production Control Services

Convert valves for different uses

Buckling Pin Technology can convert any gas actuated valve into a relief valve or emergency shutdown valve.

The pilot can sense differential, upstream, or downstream pressure to buckle the pin at an exact set point. A piston shifts a two position five way spool valve. This in turn shifts the valve actuator. The size, pressure or vacuum rating depends only on the primary valve selected.

The pilot can be used on gate, ball or butterfly valves. The combination can lower the cost of conventional valves where automatic reseating is not an issue.

Buckling Pin Technology

Stainless steel AODD pump

The new PX800 Advanced Series Stainless Steel AODD Pump is centre-ported and features a full 51 mm (2-inch) flow path and threaded 51 mm (2-inch) horizontal fluid connections. This construction makes the new PX800 pump ideal for liquid-transfer applications where superior product containment, high flow rates and superior efficiency are required.

Like all Wilden Advanced Series pumps, the PX800 model features bolted construction.

These pumps are constructed with a 316 stainless-steel wetted path, feature BSPT or NPT threaded inlet/discharge connections, and a variety of elastomer options, including neoprene, Buna-N, EPDM, PTFE and Viton.

The design of these pumps allows them to deliver flow rates as high as 176 gpm (665 lpm) at operating pressures up to 8.6 bar (125 psig).

The PX800 is also equipped with Wilden's patented Pro-Flo X Air Distribution System (ADS), which delivers cutting-edge operational flexibility through its patented Efficiency Management System (EMS). The EMS allows the user to optimize the ADS through the use of a manually selectable control dial, for any application demands, regardless of pump size.

Advanced pumps are also now available with full-stroke PTFE diaphragms that deliver increased product displacement per stroke, resulting in maximized flow rates and higher efficiencies.

Wilden

Progressing cavity solution for multiphase pumping

The Moyno Tri-Phaze System is the patented progressing cavity solution offered for multiphase pumping applications within the oil and gas industry. The low total cost of ownership and superior pumping efficiency have turned marginal wells profitable again in simply months.

The Moyno Tri-Phaze System allows all fluids produced at the well site including oil, water and gas to be transported simultaneously through one pipeline to a central processing station. Its exceptional abrasion-resistance allows for smooth transfer of sandy fluid as well. The unit is capable of generating flow rates up to 60,000 BFPD with suction pressures up to 900 psi and discharge pressures up to 1,200 PSI. Additionally, the Moyno Tri-Phaze System features a stator elastomer formulation that exhibits exceptional resistance to aromatics. Additional advantages include efficient handling of gas void fractions up to 99 percent, low-shear pumping action that preserves each fluid's characteristics without emulsification or degradation, an extended well production life and decreased well bore pressures.

Moyno

Maximize production ability of operations

The 811 Series ANSI Centrifugal Pumps possess a "speed to market" rate that enables oil and gas producers to maximize the production ability of their operations. Griswold 811 Series pumps can be critical components for use in saltwater handling and transfer applications in oil and gas recovery. Saltwater is a byproduct of oil and gas production and, as such, needs to be separated during the product-recovery process. The 811 Series pumps are ideal for transferring the collected saltwater out of the well bore and into storage tanks or trucks so that it can be disposed.

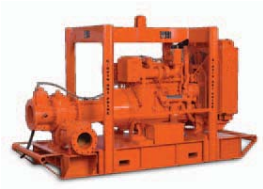
The 811 Series pumps meet the needs of this oil and gas application because they have two times the wear area between the case and impeller when compared to closed impeller designs. The open-impeller design also minimizes concentrated wear by balancing the hydraulic axial thrust load and reducing the stuffing-box pressure. This not only

maximizes the pump's performance, but also simplifies maintenance, extends pump life and reduces repair costs.

These pumps also have casings that can be constructed of a wide choice of materials, including ductile iron, 316 stainless steel, CD4MCu and alloy 20. They are constructed through investment and no-bake casting processes to ensure smooth, precise finishes that guarantee consistent, reliable performance.

Griswold Pump Company

Heavy duty self-priming pump



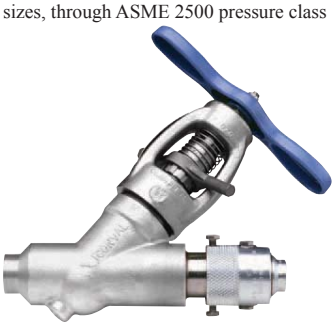
The HL250M high head pump is a heavy duty, fully automatic self-priming pump specifically offered for pumping under discharge pressure conditions or high discharge lift applications. Flow rates are up to 5,700 gpm, and total dynamic heads up to 390 feet. Applications include water movement, ballast control, jetting nozzle supply, pipeline pigging and fire suppression backup.

The HL250M pump is available in both diesel and electric drive versions. Customers benefit from reliable service and sturdy construction.

Xylem

Safe vent and drains provide dual seal system

The SaVD safe vent drain enhances leak-free valve performance and allows for fast, safe, environmentally-friendly venting and draining of piping systems. Safe depressurization is achieved in just one drip of fluid. The SaVD safe vent drain is available in 1/2- through 2-inch sizes, through ASME 2500 pressure class



with NPT, butt weld or socket weld ends. Standard materials include Stainless Steel SA182-F316, A105 and F22.

The SaVD features a HILTAP metal-to-metal wedge safety connector with two dynamic sealing surfaces, compact profile, ultra-safe residual pressure venting, and quick connectability to a gravity drain hose. The coupling locks under line pressure. Locking threads are located outside wetted volumes. Valve-mounted couplings may be steam cleaned and pressure-purged.

Conval

Tailgates designed for higher haul capacities

The unique line of Philippi-Hagenbuch Autogate Tailgates is designed specifically as an avenue to maximize haul truck utilization, effectively increasing haul capacities by up to 20 percent while also providing added safety and extended tire life. Philippi-Hagenbuch's tailgates include models suited for both articulated and rigid frame trucks. The increased volume capacity proves effective for any material – hard and rocky or liquid.

Philippi-Hagenbuch designed the Autogate Tailgates as a solution for maximizing the truck's volumetric capacity while reducing spillage. The Autogate series is built with a specific spec for each model and make. This tailored approach serves to not only eliminate spillage from the rear of the bed, but also prevents side spillage – even when driving on inclines or making sharp turns. By blending the unique design and customized fit with the specific truck requirements, such as increased height clearance or enhanced capacity, the PHIL Autogate Tailgates flow with the overall truck design to enhance capacity while also ensuring balanced load distribution for easy maneuvering and enhanced safety.

Philippi-Hagenbuch

Dump truck with up to seven axles

The new Ox SuperDump from TBEI features four, six or seven axle configuration increasing payloads up to 25 tons and 80,000 GVWR depending on regulations. With the multiple axle configurations, the Ox SuperDump distributes the weight over a much longer area meeting payload restrictions throughout the United States, Canada and Mexico.

The benefit of the design is an increased load resulting in lower operation costs. The Silent Drive Maxle air-suspension trailing axle is designed to carry the extra weight of the payload and ensure a smooth ride with superb stability and handling. The result of this is larger loads with fewer trucks, fewer operators, greater fuel savings and maximized profit potential.

The Ox SuperDump is also available with a wide range of time saving, productivity enhancing options including air retractable mud flaps, on-board weight scales, non-stick liners, a variety of tarp systems, aluminum or poly fenders and cab shield options.

TBEI

Crawler handles harsh off-road conditions

The new Panther T8 operates in extreme off-road and weather conditions efficiently, reliably, cost-effectively. The Panther offers exceptional performance and versatility, in oil and gas operations, mining and construction, among others. The Panther's widened chassis accepts virtually all implements without any modifications.

With its two-person cab, large deck space as well as ease of implement installation, the Panther is designed to perform without fail. From construction to ROW (right-of-way) maintenance, in the middle of nowhere or within city limits, the Panther has the toughness, tenacity and reliability operators need in a crawler.

Prinoth recognizes that the oil and gas industry requires specialized maintenance and equipment to keep facilities and infrastructures both operational and safe. That is where the Panther comes in. It tracks into hard-to-reach worksites all year round with all the implements necessary for site preparation. From building access roads to exploratory drilling and pipeline installation, the Panther gets it done – quickly, safely, and economically. With the ability to employ just about any implement, it is one very capable platform from which to work. All standard implements can be affixed to the Panther's 860 mm (34 inch) truck-inspired chassis.

Prinoth

Backup cameras add safety

As backup cameras become increasingly popular for trucks and passenger vehicles, equipment owners are discovering how similar cameras can improve safety and productivity for operators.

RMT Equipment is answering the call with the TRACK-VISION line of backup safety cameras. The TRACK-VISION cameras are designed specifically to withstand the bone-jarring, teeth-rattling all-season conditions that can mean a short life.

The standard TRACK-VISION camera provides a 115-degree field of view, wider that most mirrors, to the rear, to the sides or overlooking the tool end of the machine. The high-resolution lens delivers a crisp, clear image even in low light; its sensitivity is acute enough that it actually "sees" in the dark better than the human eye.

Despite its sensitivity, however, the camera is ruggedly built to withstand all kinds of impacts, vibration and weather. The camera lens is heated to keep ice, frost and fog from obstructing its view. Its housing is filled with nitrogen gas, so no humidity can form condensation on the inside of the lens, either. The entire unit is fully watertight and salt-spray tested and able to stand up to high-pressure washing.

RMT Equipment

Applying key lessons from forestry to oil industry operations

by Kevin O'Marah and Andrea Feunekes

In many Hollywood movies, resource industries are cast as the bad guys; the image of industries that produce the raw materials needed to run society tends to be uniformly negative on the big screen. The petroleum industry, for all its efforts to project a green image, remains lumped in with these villains by much of the general population.

Is this fair? Maybe not. Perception is reality, however, and oil may want to consider looking across the tundra to its neighbours in the forest industry for a few pointers on how to get ahead of this. For starters, both industries are capital intensive, natural resource businesses operating under heavy regulation. Both also must wrestle with political and social concerns arising from the upsides of money and job creation and the downside of environmental impacts. Finally, both are accustomed to operating with a decades-long view of strategy.

Where the two sectors differ most dramatically is in their profitability – based on financial data from the 2011 Fortune 500, the top four oil companies were 100 times more profitable in aggregate than the top four forestry companies. The good news is that oil has the money to invest in solving whatever problems it faces. The bad news is that this profitability has insulated the industry from the kind of continuous cost pressure that has led to lean operations not only in forestry but in every other manufacturing industry.

Lesson one: Copy forestry's well-established frugality

Many of the costs associated with harvesting timber are big capital expenses that are not easily made variable and that are driven up substantially by poor project coordination. Road building, harvest equipment movement and mill location and operations do not naturally lend themselves to the kind of agility common in sectors like high tech or consumer products.

Tackling this reality without simply giving in to the boom and bust cycle typical of raw materials takes planning – lots of planning.

Outfits like JD Irving in Canada or Suzano in Brazil for instance have developed intensive forestry planning models that take account of these sudden lumpy expenses in the context of a "factory" (the forest itself) which runs very slowly. The key is stochastic optimization embedded in powerfully descriptive models of the entire system that can predict behaviours a century into the future. Unlike the deterministic optimization approach common to large scale engineering projects, this type of planning accepts organic behaviour and works with it. The result is extraordinarily efficient deployment of labour, equipment and cash precisely targeting individual stands of forest for harvest and removal.

Forestry's lean imperative has driven it away from mega-scale exploitation toward a role more like that of a steward. The petroleum industry, especially as it embraces non-traditional reserves like tar sands and shale gas, may find that these resources, like forests, are better accessed gradually, with a lighter

operational footprint and better long term control of product volumes. In any case, the precision and minimalism of production offers a strong response to the Hollywood style bogeyman image so popular among opponents of the industry. It may also add a few basis points to development assets' returns.

Lesson two: Politics and portfolios

Political energy can build pretty quickly when images of clear cut forests make it into the media.

And the political pressure is not limited to those directly impacted by timber management practices.

Consumer demand for green products continues unabated to the extent that makers of everything from coloured pencils to coffee crawl up the supply chain to assure their ingredients come from Forest Stewardship Council certified woodlands. Has any green catchphrase been uttered more frequently than "save the rainforest?"

On top of environmental politics, forestry must also contend with geopolitics, meaning who owns the land and what rights can they confer to businesses looking to harvest some wood?

Publicly owned land or land claimed by indigenous peoples may be on the schedule for harvest 10 or 20 years down the road.

That is more than enough time for politics to intervene and change the economics of a given stand of timber. In other words, regulatory compliance in forestry is less a matter of following the rules and getting on with things than guessing if and when the rules might change.

Forestry's limited financial resources mean its best approach to politics is generally not to lobby for what it wants but instead to work with what it has. This means that forestry relies heavily on portfolio tactics similar to those used in financial services. In fact, Timber Investment Management Organizations (TIMOs) have emerged in the past two decades specifically to take a financial portfolio risk optimization approach to the industry.

At its most evolved, forestry has ceased to be primarily a production industry and become instead an investment vehicle with known patterns of growth and risk.

By building complex, long time horizon models of a portfolio of timberlands assets, these TIMOs have been able to absorb political and regulatory risk at an aggregate level that would be unacceptable at the level of a single asset.

Lesson three: Looking at the entire sector as a renewable resource

Trees grow, so of course they are inherently renewable, but that is not the way timber was historically viewed. For centuries forests have been cleared with little concern about their disappearance. Only recently have forests come to be considered renewable with long term practices established to maintain species diversity, carbon-fixing and of course product availability.

This now standard model is gradually converting public attitudes and allowing pioneers in sustainable forestry like Weyerhaeuser to take a lead in setting the course for long term management of this basic natural resource.

Oil and gas will not regrow like trees. Energy, however, is renewable and companies who set out to provide energy for consumers are part of an ecosystem that grows and changes with the economy and society.

Proven oil and gas reserves in North America look rich now that oil sands mining, hydraulic fracturing and deepwater offshore drilling have opened new channels for accessing hydrocarbon deposits.

Associated infrastructure like the much debated Keystone Pipeline is as much a part of this ecosystem as traditional oil wells or Gulf Coast refineries. This global picture of the oil and gas sector can certainly be modelled at an aggregate level and merged with consumption models of gasoline, fuel oil and utility demands to see energy as a closed loop system.

Such a picture could not only assure all concerned that surface conditions would be restored in the Albertan tar sands region but that big bets like a pipeline are all part of a long term strategy for energy sustainability.

Forestry has soldiered through a long history of being demonized by environmentalists, jerked around by governments and poorly rewarded by investors. Its persistence proves two things: first that we need wood to run the world so forestry is here to stay, and second, that which doesn't kill you makes you stronger. Oil and gas would be wise to learn what forestry has about managing itself as a renewable resource.

Andrea Feunekes is co-founder and co-CEO of Remsoft, Inc.; Kevin O'Marah is a Senior Research Fellow at Stanford University's Global Supply Chain Forum.
Remsoft, Inc.

Services company grows in North America

Swire Oilfield Services has reinforced its commitment to growth with a significant investment in its North American operations, as part of the company's global $150 million investment this year.

The company entered the Gulf of Mexico in 2007 with the establishment of an operations headquarters in Houma, Louisiana. Since then it has rapidly expanded with nine new facilities. In the same period staff numbers have risen from 50 to more than 110 across North America and Swire intends to further triple its employees in the next three years, underlining its commitment to the region and the industry as a whole. Swire, which has a global fleet of 60,000 units, has now significantly increased its local fleet across North America. Swire will also continue with its investment in sustainability and the environment through its total water management services, which is associated with the hydraulic fracturing market in the non-conventional shale plays across North America.
Swire Oilfield Services

Dehydrator retrofit captures emissions

Engineered Concepts, LLC emission free natural gas dehydrator technology may be incorporated into new or retrofitted to existing systems of any capacity without variance in efficiency or functionality. Unlike other BTEX systems that depend upon ambient cooling, the Engineered Concepts retrofit is a temperature controlled "all-weather" system. The process consumes or sells all uncondensed hydrocarbons and is unaffected by gas volume or "rich gas" content. The manufacturer that higher gas volumes and the richer the gas content speeds the operators pay back. Retrofitting to an existing dehydrator usually requires minimal field construction and applies to small remote wellhead applications, large plant dehydrators, or offshore service – anywhere elimination of hydrocarbon emissions, increased dehydrator performance, and improved safety is desired. This technology eliminates odours and creates a safer working environment while reducing fuel requirements and maintenance.

Engineered Concepts, LLC

Gas turbine control applications

Turbine Technology Services Corporation (TTS) has designed a solution to offer triple modular redundancy (TMR) for gas turbine control applications. This solution leverages control technology from Rockwell Automation.

Aging power plants and gas compressor stations often require upgrade and modernization services to extend their operational lifetime in order to reduce outages and decrease downtime. Core to the TMR gas turbine solution is a Rockwell Automation Trusted TMR controller designed to provide enhanced safety and availability for power generation and gas compression applications. The Trusted controller incorporates a fault-tolerant architecture to help eliminate spurious system trips. It also provides high availability as part of its inherent safety-related functionality.

The Trusted TMR design uses a majority voting process to identify the source of a fault. Random hardware failures will cause one of three process control "slices" to react differently to the others. This discrepancy can then be captured and reported by the voting system. The Trusted TMR system reacts immediately to control-system faults, helping meet the user's safety integrity requirements.

"The Trusted TMR solution is ideal for gas turbine applications in the power generation and gas compression industries," stated Eric Fidler, Director of Global Oil and Gas Sales for Rockwell Automation.

Rockwell Automation

Job-ready line of premium footwear for tradespeople

Red Wing Shoe Company introduces Irish Setter Work, a job-ready line of premium footwear combining more than 100 years of Red Wing work boot experience with the more than 60-year legacy of the company's Irish Setter brand outdoor footwear.

Available in 6- and 8-inch lace-up boots, rugged pull-ons and tough loggers, the Irish Setter Work line features youthful styling, rich leathers, under-foot comfort that lasts all day and craftsmanship that lasts for years.

The new line of Irish Setter Work comes in 29 styles crafted specifically with job-ready features that skilled tradesmen demand, such as soft toe and steel or aluminum safety toe styles; Goodyear welt, direct attach or cement construction options; UltraDry waterproofing; Thinsulate insulation; and, CuShin Comfort Tongue padding.

In recent years, Red Wing Shoes observed a need for premium, purpose-built footwear available where many of today's potential customers prefer to find them.

"Irish Setter Work footwear meets the needs of today's Modern Craftsman," said Maurice McClurg, Marketing Manager, Red Wing Shoe Company. "He's a tradesman who uses his head and his hands, takes pride in his work and counts on his boots as much as his other tools and equipment. He wants performance and durability, as well as style and value."

"He also shops differently, whether it's buying his footwear online or finding the right boot right off the shelf at his favourite retailer," McClurg added.

Irish Setter Work boots are available at work, farm and outdoor stores, online and catalogue retailers and independent shoe stores, as well as Red Wing Shoe Stores and mobile shoe truck.

The 29 styles of Irish Setter Work boots include job-specific features for the work today's Modern Craftsmen take on – all competitively priced for maximum value.

Oil and gas tradesmen's #83800 boot has exceptional Comfort Trek sole under-foot comfort that's oil and slip resistant. For those who work in the dirt, the 9-inch lace-to-toe styles (#83811, #83812) feature UltraDry waterproofing and Thinsulate insulation, combined with padding at the tongue, to keep the feet snug, dry and comfortable.

Red Wing Shoe Company

SHOWS & EVENTS

25th World Gas Conference
June 4-8, 2012 – Kuala Lumpur, Malaysia.
www.wgc2012.com

SPE Americas Unconventional Resources Conference
June 5-7, 2012 – Pittsburgh, PA; David L. Lawrence Conference Center.
www.spe.org/events/urc/2012/

Global Petroleum Show
June 12-14, 2012 – Calgary, AB; Stampede Park.
www.globalpetroleumshow.com

Atlantic Canada Petroleum Show
June 20-21, 2012 – St. John's, NL; Mile One Centre.
atlanticcanadapetroleumshow.com

World Heavy Oil Congress
September 10-13, 2012 – Aberdeen, UK; Aberdeen Exhibition & Conference Centre.
www.worldheavyoilcongress.com

International Pipeline Conference
September 24-28, 2012 – Calgary, AB; Hyatt Regency Hotel and Telus Convention Centre.
www.internationalpipelineconference.com

Send events to ltoop@baumpub.com

Distributed sensing for well surveillance

iDAS enables high quality digital recording of acoustic waves at every point along many kilometres of optical fibre cable up to frequency >100kHz with a wide dynamic range (>90dB). The distributed sensing system is used in a great variety of well surveillance applications including distributed flow metering, distributed seismic imaging, fracture mapping and well integrity monitoring.

iDAS technology can be combined with Silixa's distributed temperature sensor, Ultima DTS, to provide a continuum of benefits throughout the life of a well from exploration to drilling and completion, production and reservoir management. Applications include: seismic appraisal at the borehole, cement evaluation, monitoring fracturing and fracture analysis, flow profiling, monitoring casing leaks, gas lift and electric submersible pump optimization. Silixa has developed a range of advanced embedded data handling and visualisation tools to process the high volume of data generated by iDAS.

The fibre can be deployed in linear, directional or multi-dimensional array configurations. Acoustic array processing techniques allow the speed of sound in the material surrounding the fibre to be accurately determined. In multiphase flow measurement, the speed of sound can be used to profile the fluid composition such as the presence of gas in oil at different zones along the wellbore. In addition, the fluid velocity can be mapped by measuring the difference in speeds of sound due to Doppler shift introduced in the moving fluid. In seismic application the optical fibre sensor can be installed in the well-bore, on the surface or on the seabed.

Silixa

Compact thermal imagers

Omega introduces its new line of compact thermal imagers powered by FLIR. The OSXL-I series (FLIR I Series) is a compact, lightweight, point-and-shoot camera with an easy-to-use focus-free lens. This CE compliant product stores up to 5,000 jpeg images with a convenient thumbnail image gallery. The OSXL-I is much easier, faster and safer to use than infrared thermometers, and far more accurate. The 71mm (2.8-inch) LCD colour display makes it easy to read images and temperature data to help find wasteful energy loss, locate moisture damage, document repairs, detect energized equipment, minimize downtime and more.

Omega

Expanded line of certified enclosures

Pentair Technical Products announces an expanded line of Hoffman brand ZONEX IECEX- and ATEX-Certified Enclosures. ZONEX hinge-cover and screw-cover enclosures are designed for use in applications where "increased safety" protection (Ex e), as defined by the ATEX Directive 94/9/EC, is acceptable to safely house electrical components in Zone 1 and Zone 2 rated areas. These enclosures are not intended for use in explosion-proof or flame-proof (Ex d) applications. The expansion of the Type 316 stainless steel ZONEX platform includes new inch-based offerings in an extended range of sizes. Hinge cover models are ATEX, IECEX, and AEx certified. Screw cover models are ATEX and IECEX certified.

New inch-dimensioned hinge cover enclosures are available in sixteen standard sizes from 12 x 12 x 6 inches to 36 x 24 x 8 inches and come standard with NEMA-style mounting feet on the top and bottom, a full size bottom gland plate and a one-piece continuous gasket on the door and gland plate. Hinge cover models feature a 10-mm brass internal/external bonding provision, a quarter-turn latch with a 3-mm double bit insert and the required panel and bonding hardware. Side mount brackets, a high-temperature silicon gasket, gland plate changes from zero to four and enclosure dimension changes up to 60 x 36 x 18 inches are available.

Screw cover enclosures are available in five sizes ranging from 4 x 4 x 3 inches to 10 x 10 x 5 inches. These enclosures feature welded-on, full-width top and bottom wall-mount brackets, a 6-mm internal/external brass bonding provision, stainless steel cover screws, a one-piece continuous gasket and required panel and bonding hardware.

Pentair Technical Products

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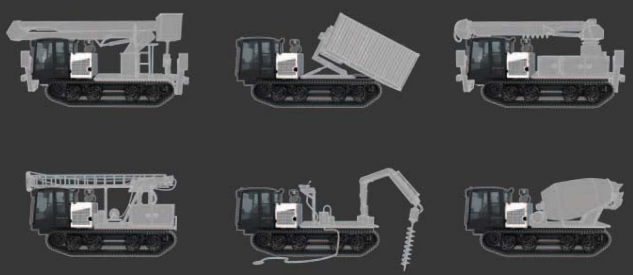

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