

OIL & GAS TECHNOLOGY

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**Creating value from
subsea processing**

Oil sands lead the way

**Building a culture of
safety at ExxonMobil**

Well integrity comes of age



**Facing the challenge
of low oil prices**



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OIL & GAS TECHNOLOGY

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In a recent speech at CERA Week in Houston, ExxonMobil chairman and chief executive officer Rex W Tillerson called this the New Era of Abundance' and he went on to explain that this is a result of innovation and collaboration.

And without a doubt he is correct. In just over a generation, the oil and gas industry has pioneered a host of technologies and techniques enabling us to erase the old lines between conventional and unconventional sources of energy – giving us access to energy from oil sands, ultra-deepwater, shale and tight rock, the Arctic and the sub-Arctic.

These innovations have brought vast new supplies to the market – creating energy diversity, greater reliability, and increased flexibility in the global energy portfolio. But as he rightly pointed out, it is now in North America where this new world is most visibly taking shape.

In a transformation few could have imagined a decade ago, the United States has become the number one producer of total energy coming from oil and natural gas. Even more striking, the United States is currently well positioned to be a net energy exporter by the end of the next decade.

For everyone in the energy sector, these abundant new supplies and the resulting decline in prices have created new pressures which will demand increased discipline and focus. Unfortunately, as much as the investments and technologies are shaping – and will shape – the 21st century, the industry continues to struggle under the weight of policies that are products of 1970s thinking.

If society is to fully benefit from the historic opportunity before us, we need sound energy policies – policies worthy of the science and engineering and entrepreneurial daring that has redefined the modern energy landscape. Policies that recognise the turning point moment.

We need optimistic policies that reflect shared aspirations for energy and environmental protection, that appreciate the power of free markets to create revolutionary innovations, and that proceed with the conviction that a new world is best constructed on free trade and global co-operation.

Mark Venables

Editor



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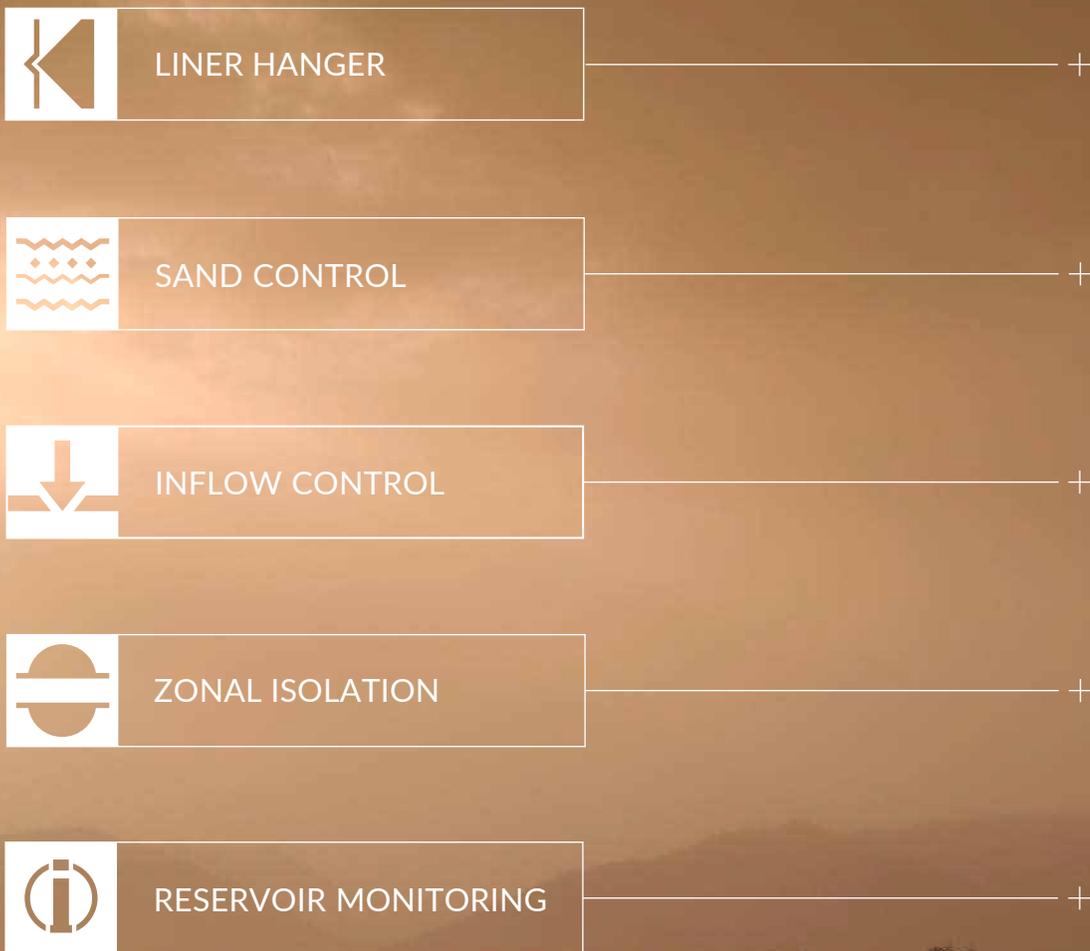
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MAXIMUM PERFORMANCE ZONAL ISOLATION FOR LONG-TERM STABILITY AND RELIABILITY



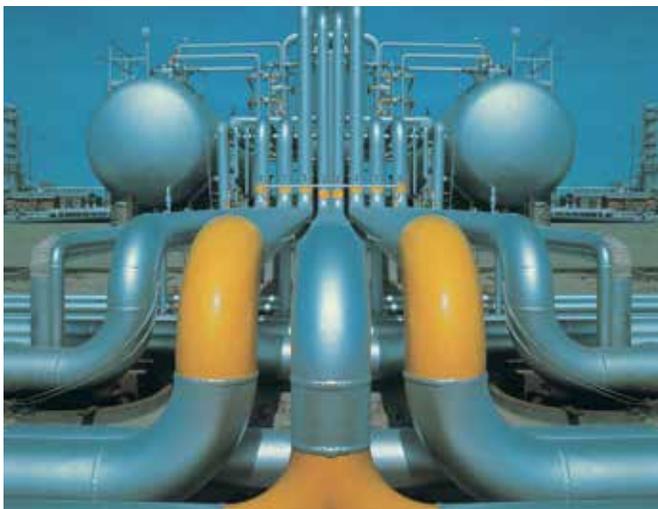
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Honeywell helps to improve efficiency at Russian refinery

Honeywell Process Solutions (HPS) has announced that its control technology will help improve efficiency and reliability at LUKOIL's gasoline blending facility in Kstovo, Russia.

The company's Nizhegorodnefteorgsintez refinery uses HPS' Profit Blend Optimiser software, which is designed specifically for on-line blend reformulation and optimisation, allowing for efficient production of fuels to required specifications. LUKOIL is one of the leading primary crude oil processing companies in Russia.

"Profit Blend Optimiser, formerly known as OpenBPC, has a significant impact on quality control, improves process, and impacts on product processing costs at the LUKOIL's facility," said Alexander Rodionov, HPS head of sales in Russia. "It will help optimise the overall performance of a facility that is key to meeting Russia's growing need for production fuels."

"We selected Honeywell Profit Blend Optimiser technology since this solution enables obtaining an optimal gasoline blending recipe at the station, Honeywell's blend property control technology expands the functionality of existing control solutions and allows refinery to achieve optimal gasoline blending recipes," said Mikhail Shamanin, head of APC implementation group, LUKOIL-Nizhegorodnefteorgsintez. "The advantages of the solution are its flexible implementation, best-in-class functionality and expert consultative support by Honeywell personnel."

LUKOIL-Nizhegorodnefteorgsintez obtained a system for real-time blending recipe optimisation, which controls the process automatically using a flow analyser (IR spectrometer by Bruker) measuring the component and blend properties, APC virtual analysers and laboratory data enabling production of gasoline of a pre-set quality at minimum costs. ■

BG Group ships first LNG from QCLNG Train 2 in Australia

BG Group has started up and loaded its first LNG from the second production train at the Queensland Curtis LNG (QCLNG) facility in Australia. The first LNG from Train 2 set sail on the Maran Gas Posidonia. At plateau production, expected mid-2016, both trains at QCLNG will be producing enough LNG to load ten vessels per month combined, exporting around eight million tonnes per year. Since production from the first train commenced in December 2014, 27 cargoes have been shipped.

BG Group began commercial operations in May 2015, when control of Train 1 formally transferred to QGC, BG Group's Australian subsidiary, from the constructor Bechtel Australia. Train 2 commercial operations will begin once a similar commissioning process has been completed.

Helge Lund, Chief Executive of BG Group, commented: "The start-up of QCLNG's second LNG train is another important operational milestone delivered in line with our plan. The completion of our upstream infrastructure and the two LNG trains are achievements of which BG Group, particularly our team in Australia, can be proud. We have already shipped more than 1.5 million tonnes of LNG from Queensland, and Train 2 will add significant further volumes and flexibility to our LNG shipping and marketing portfolio." ■



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SampleManager LIMS at a glance:

- Method and SOP Execution
- Scientific Data Management
- Workflow Design
- Lifecycle Workflow
- Instrument Integration
- Dashboards



CIS group completes subsea piling operation

Conductor Installation Services (CIS) has successfully completed a subsea piling operation for Subsea 7 in the UK North Sea. CIS used its remotely-operated Subsea Piling System, which makes it possible to drive piles as large as 42 inches in diameter, in water depths to 300 metres. The operation was executed as part of the Cladhan Field Development, located approximately 100 km northeast of the Shetland Islands. The development will eventually connect Cladhan field via a new subsea tieback to the Tern Alpha oil production platform, which lies 17.5km northeast of Cladhan field. In preparation for the tieback, CIS drove piles to secure a subsea manifold to the seabed on Cladhan field.

"This operation on Cladhan field for Subsea 7 was the first time that the company had commissioned a subsea operation from CIS to use our remotely-operated Subsea Piling System," said Andy Penman, group managing director of CIS. "We are very pleased that it performed reliably, and that the operation was completed ahead of schedule."

Work was carried out as a result of a contract awarded to CIS by Subsea 7 on 9 April 2015. Following preparation and testing of all equipment at its base in Great Yarmouth, England, CIS transported it to the port of Nigg in Invergordon, Scotland. On 28 April 2015, it was loaded onto the support vessel, from which CIS would carry out the subsea piling operation remotely. In the early hours of 30 April 2015, the crew set sail for Cladhan field to the site of the



subsea pile-driving operation.

The subsea operation commenced and completed on 2 May 2015. CIS worked in a maximum water depth of 160 metres to drive four 24-inch pipeline end manifold (PLEM) piles. Each pile was driven to its target depth of 12 metres. The piles driven measured 16.5 metres from the Seven Falcon vessel, ultimately reaching a depth of 12 metres (39.4 feet) below the mudline of the seafloor.

CIS completed the entire subsea driving operation in well under four hours.

In an effort to minimise impact on the environment, CIS uses only the highest grade of fully biodegradable oils to operate the hydraulic hammer. By doing so, in the unlikely event that any oil leaks, it disperses safely, without damaging the subsea environment. In addition, the fact that the Subsea Piling System is controlled automatically means that it takes less time to deploy and operate the hammer, making it that much more efficient. ■

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A large offshore oil rig is shown at sea, with a prominent red derrick structure. The rig is mounted on a dark-colored vessel. The background is a clear blue sky and the sea.

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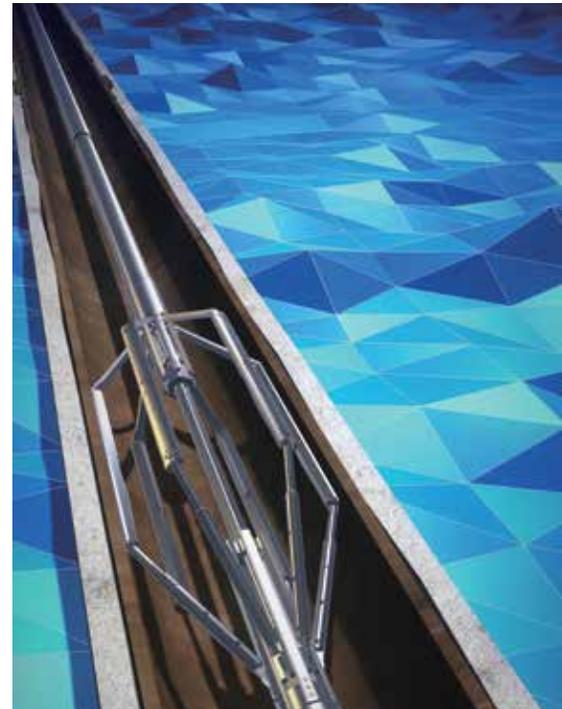
Emerson enhances reservoir modelling software

Emerson Process Management has launched the latest version of its reservoir modelling software, Roxar RM. The new version – RMS 2013.1 – comes with enhanced structural modelling tools that acknowledge realistic uncertainties in the data and improve volumetric sensitivities. This makes it faster and easier for geo-modellers to build geological scenarios, investigate the full effects of structural uncertainty, and maximise the value of their reservoir assets.

“Too often in the past reservoir modellers have had to resign themselves to using best case estimates of faults and horizons, with the inherent uncertainty in these interpretations often neglected and thereby underestimating the actual uncertainty in reservoir volumes,” said Kjetil Fagervik, managing director of Emerson’s Roxar Software Solutions. He continues: “With our new version of Roxar RMS and our tightly integrated structural modelling and gridding tools, users will be able to quantify uncertainty more effectively and increase confidence when it comes to crucial decisions on where to drill, what production strategies to adopt, and how to maximise recovery.”

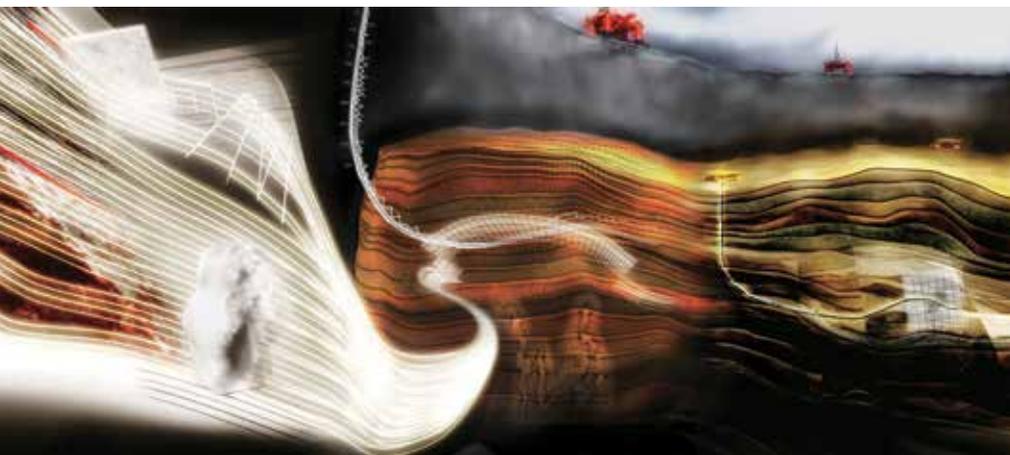
As part of the new enhancements, RMS 2013.1 also sees fault uncertainty tools further integrated with structural modelling and 3D gridding. This enables users to build fault uncertainty models in full and investigate a wide variety of scenarios corresponding to the uncertainty in the input data. In addition, horizon uncertainty modelling is significantly enhanced, allowing users to create horizons and zones based on uncertainty data and information derived from well picks, velocities, seismic travel times and isochores. Uncertainty modelling has also been extended with new parameters added such as the modelling of fault sealing effects and fractures.

Reservoir management decision-making is also improved with RMS 2013.1 through improved well targeting and a new adjust to wells job that supports the calculation of residuals between the grid and well picks and can adjust the grid to exactly match the well picks. Other features include an integrated isochore modelling tool that provides users with full quality control over isochore input data and a predictive analytics tool for identifying sweet spots within unconventional fields.



The focus on the geophysical domain sees further enhancements to the new Model-Driven Interpretation (MDI) tools first released in RMS 2013, with improvements to MDI and velocity modelling through new tools for QC-ing the velocity model, providing input for horizon uncertainty modelling, and for well-ties. Finally, Roxar RMS 2013.1 comes with improved workflow efficiencies and performance through multi-threading (the ability for computing to take place in parallel), SEG-Y importing and RMS Data Explorer that allows users to manipulate large amounts of data with advances in well administration and fault grouping/sorting.

Kjetil Fagervik concludes: “When it comes to strengthening operator confidence in their reservoirs’ economics, improving decision-making and increasing workflow productivities and efficiencies, Roxar RMS is changing the reservoir modelling landscape. RMS 2013.1 will be the first of a number of significant modelling advances over the coming months.” ■



Baker Hughes introduces revolutionary technology for cement evaluation

Baker Hughes has released its Integrity eXplorer cement evaluation service: a radical change in the evaluation of the cement integrity of oil and gas wells. Existing evaluation techniques, which have been used for over thirty years, are acoustic-based and may not provide the accuracy needed when faced with some of today's challenges. This new electromagnetic-acoustic technology allows operators to directly assess the integrity of cement bonds in any current wellbore environment or cement mixture.

Operators in the upstream sector rely on the accuracy of cement-bond logs to make

critical decisions that can affect long-term well integrity and the environment. While cement compressive strength has typically been used as a key indicator of cement quality, today's challenging environments require a more detailed assessment. The Integrity eXplorer service provides operators with accurate and comprehensive data about the properties of the respective cement – thereby enabling them to make critical decisions to help protect their assets, reduce non-productive time, and minimise unnecessary remediation.

"In our role as innovation leaders, we

realise that applying yesterday's technology to today's challenges may not meet our customers' emerging needs" said Mariano Gargiulo, vice president of Baker Hughes' Wireline Services business. "This is especially true in today's demanding environments that can test the accuracies of traditional evaluation methods. The Integrity eXplorer service provides answers that were previously unattainable."

The Integrity eXplorer service is the latest example of Baker Hughes' strategy to improve well efficiency, optimise production and increase ultimate recovery. ■



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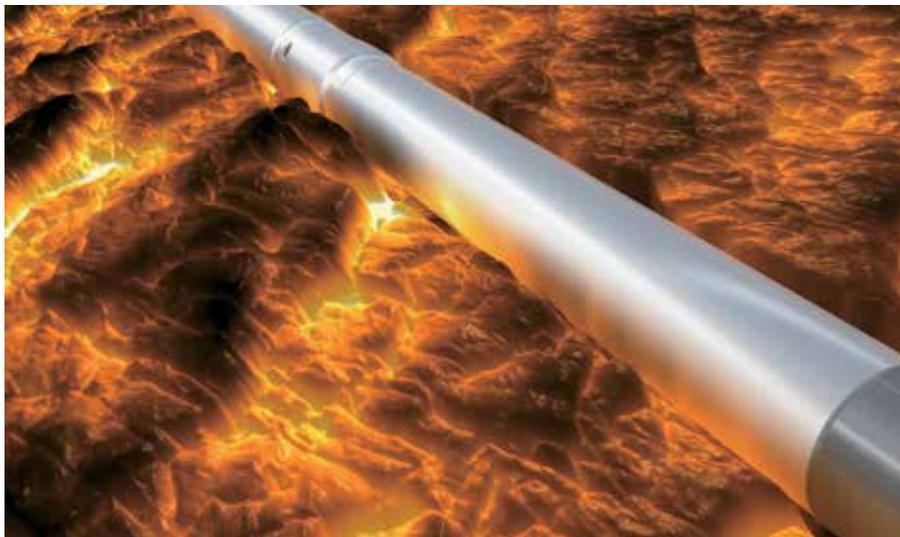
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Halliburton introduces formation evaluation service

AGR releases multi-disciplinary well data software

Global oil and gas service company AGR has released new functionality for its bespoke well data software, iQx that will improve the analysis of spatial well data from more than 6,000 wells drilled on the Norwegian continental shelf.

The new GEO module is aimed at geologists and petroleum engineers, expanding on the existing modules, Offset and Experience, for drillers.

The software's new capability creates multidisciplinary synergies between the drilling teams and geoscientists. iQx is designed to simplify well data management by reducing its cost.

iQx GEO represents a paradigm shift in well data management. Rather than focusing on the safe storage of numerous data files,

iQx captures numerical values. The online database enables data integration with the third party interpretation software, and generates immediate graphic dashboards of key reservoir characteristics.

VP Software Solutions at AGR, Petter Mathisen commenting on the new application, said "iQx represents an innovative database which can be utilised from exploration through to well delivery and production. The uniqueness of the product lies in its multi-disciplinary functionality where different types of data are standardised and exportable in short periods of time. iQx is also a tool for processing great amounts of geological and operational data in a mergers and acquisitions scenario." ■



Halliburton's Wireline & Perforating business has introduced the Reservoir Monitor Tool 3-Detector (RMT-3D) pulsed-neutron tool that helps solve for water, oil, and gas saturations within reservoirs using three independent measurements (Sigma, CO, and SATG). Relying on only one or two independent measurements can reduce the accuracy of results depending on conditions in the formation and formation fluids. The RMT-3D tool allows operators to calculate saturations using different methods to acquire accurate results. The data is collected with one trip in the hole, reducing non-productive time and the potential for costly additional trips.

"Halliburton continues to add technologies that support our customers' needs and operations," said David Topping, vice president, Wireline & Perforating. "With the addition of the RMT-3D technology to our portfolio of solutions, we have the capability to provide valuable answers to help our customers increase recovery on their wells."

The tool will play an important role in mature fields, which account for 70 per cent of the world's oil and gas production. During secondary and enhanced oil recovery methods, which can involve water, steam, and CO2 flooding, it is imperative to monitor changing saturations accurately within formations to optimize recovery rates. The RMT-3D analysis packages are useful in recovery

projects because they are designed to work in these challenging environments. Using the independent measurements helps to correct saturations for influences from the secondary and enhanced recovery fluids, so better oil saturation profiles can be calculated. The tool is deployed through the casing to quickly log and calculate saturations and other properties that help identify and characterize pay zones.

The RMT-3D tool has been successfully deployed in the Permian Basin in a CO2 enhanced recovery flood to acquire challenging saturation profiles and formation properties of the reservoir during one trip in the hole. This reduced non-productive time, costs and risks associated with additional trips. ■

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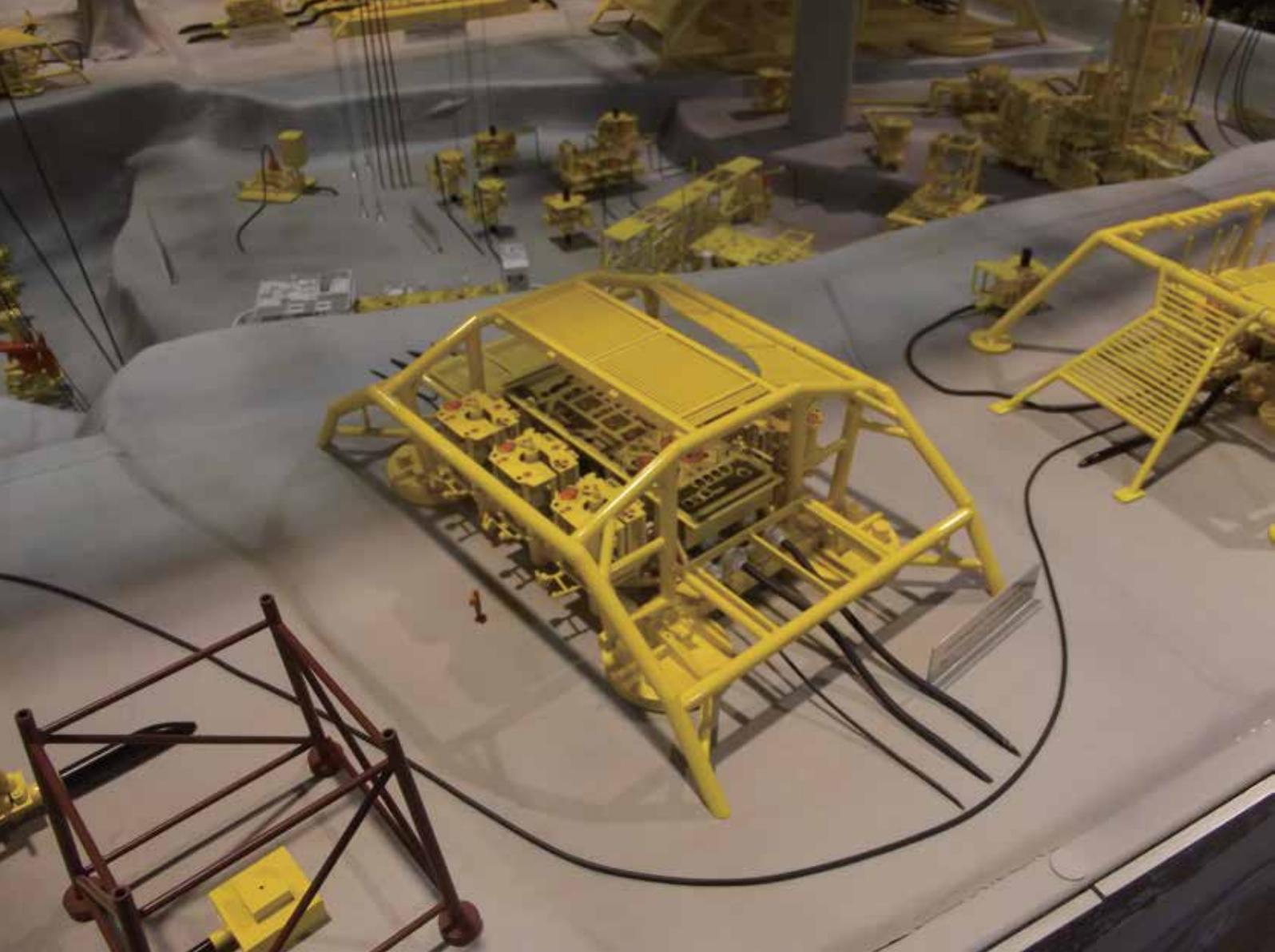


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Creating value from subsea processing

DNV GL has launched a research paper exploring the viability of moving offshore oil and gas processing subsea, including the techno-economics of an all-subsea solution. The report addresses current limitations, but also highlights opportunities for subsea technology

Subsea is an essential part of most contemporary common floating development concepts and tie-ins to fixed installations. While the industry is seeking standardisation and simplification of subsea installations, inspired by concepts like the Statoil Subsea Factory, questions remain over the viability and ultimate potential of an all-subsea solution.

"In our research paper published in June we explore these questions, highlighting opportunities and current limitations as we evaluate a hypothetical all-subsea solution: SuPPS – Subsea Production with Pipeline to Shore," Principal researcher and lead author of the paper, Tore Kuhnle, said. "The primary objective is to investigate the viability of an all-subsea field development solution.

We consider those circumstances in which all-subsea solutions may become preferred field development concepts in the future as compared with existing alternatives, mainly floating production, storage and offloading units (FPSO).

Subsea installations are inherently complex, and as this paper demonstrates, a hypothetical all-subsea solution has a

plethora of interrelated and interdependent systems. "Unfortunately, the technical complexity can over-complicate discussions regarding the potential business viability of an all-subsea concept. In order to add clarity to the discussion, we 'unpack' the SuPPS (our all-subsea concept) into a number of discrete steps, and assess the business case for each individual step as, one-by-one, we move the main components of our 'benchmark' (a conventional FPSO-based solution) from topside to subsea.

"Based on this approach, we conclude that while certain technologies are clearly enhancing

(i.e., offering superior performance and value compared with other technologies) or even enabling (i.e., opening up new opportunities for profitable production), other parts of the concept severely limit its overall applicability."

Subsea processing is now a real alternative to conventional technologies, but there are currently limits to its widespread adoption and hence on its potentially transformative effect on the industry.

For brownfield projects, the various technologies may be used alone or in combination with other technologies. In contrast, an all-subsea solution has more limited applicability.

The most likely near future all-subsea applications are oil and gas field developments in mature geographies. Gas discoveries that only a few years ago were assumed to be developed with subsea compression to onshore LNG liquefaction, are instead moving in the direction of floating liquefaction, FLNG. A greenfield concept for deepwater, subsea on the shelf, is presented in which subsea strengths and multiphase flow capabilities are used to mitigate shortfalls related to power, complexity, and availability.

"Subsea technology is today an essential part of offshore field developments in all but shallow waters, with subsea wells in fields of different sizes, flow characteristics, geographies, water depths, and weather conditions," Kuhnle added. "The move towards deeper waters and away from simpler jacket

structures with dry wellheads has been the main contributor to the growth of subsea.

"While dry wellheads are still an option, for example with tension leg platforms (TLP) in water depths of up to 1,700 m, subsea wells are the norm for field developments using floaters.

"In shallower waters, tie-ins and large-area complex field developments have also driven subsea growth through subsea developments with tie-back to either floaters or fixed platforms. This has been a cost efficient way of increasing the ultimate recovery and enabling marginal field developments by utilising existing installed processing and export capacity."

Over the past 15 years, subsea technology has moved from subsea wells, manifolds, flowlines, and templates, to include subsea boosting, separation, and now compression. New technologies open possibilities for moving ever-larger sections of the topside subsea.

Of the many challenges facing the global offshore oil and gas industry, the two most critical challenges are: cost and production replacement. How can the ultimate recovery of maturing fields with declining production be increased? And can new fields be developed cost efficiently, including in the context of challenging production fluids, deepwaters, and remote locations without existing infrastructure?

"Cost-efficient technology is an important part of the answer to both these key challenges.

Regardless of the challenges of low, or at least volatile, oil price, and the cost escalation, production replacement is still needed if future revenue is not to be jeopardised," Kuhnle continued. "Although North American onshore unconventional has gained pace in recent years, a growing proportion of offshore development projects by the larger oil companies is expected to be in deeper waters. In other words, the shift to deepwater, and thereby also to subsea, is expected to continue despite the North American shale revolution.

"A significant part of the global oil and gas discovered in recent years has been in deepwater (typically defined as more than 1,500 m) which is expected to remain a leading source of conventional oil supply growth, equalling the output of global shale liquids in the long term. Although over 50 per cent of the giant oil discoveries in the last six years are in waters deeper than 2,000 m, only a handful of developments at these depths have been brought on stream."

One factor that favours subsea in this situation is that some of the deepwater developments are among the most cost-effective barrels available, due to the sheer size and multi-decade revenue streams, despite the large up-front CAPEX. For example, Brazilian pre-salt undercuts most other development alternatives with respect to breakeven oil price for the net present value (NPV). This means that deepwater developments are not necessarily the first to be cut from a breakeven price perspective.

However, the CAPEX of deepwater, and thus subsea, could be prohibitive in an environment already struggling with cash flow issues. Thus, it might be more tempting to produce barrels with lower upfront CAPEX, but also lower NPV, as this reduces the short term negative cash flow effect.

"One way of addressing these challenges could be to expand the capabilities of subsea production technology," Kuhnle said. "Over the years, subsea tie-in field developments have proven to be a cost-efficient solution in shallow to mid-water. This, together with the generally increasing subsea-enabled deepwater production, means that subsea may still see a relative growth in an otherwise flat, or even declining, offshore E&P spending market."

The question for the subsea sector therefore is not whether it will grow, but rather by how much. Can the scope of what we understand as subsea today be taken further? Does an all-subsea concept carry cost and production efficiency advantages over conventional solutions? ■



Oil sands will continue to be a leading source of global oil supply

The vast size of the resource, openness to private capital and proximity to world's largest economy among reasons oil sands growth expected to continue

Despite lower oil prices and other challenges, growth in Canadian oil sands will continue and remain one of the top sources of global supply growth in coming years, according to a new report by IHS, the global source of critical information and insight.

Oil sands growth, which previously rose 1.2 million barrels per day (mbd) from 2005 to 2014, is expected to add an additional 800,000 barrels per day (b/d) of new production by 2020. This would keep Canada the third largest source of supply growth in the world through that period (a rank it has held since 2005). IHS will release its complete oil sands production forecast later this month.

The report, entitled *Why the Oil Sands: How a Remote, Complex Resource Became a Pillar of Global Supply Growth*, is a research project of the IHS Oil Sands Dialogue. Drawing on previous IHS research into specific aspects of the oil sands, the report provides a historical context of oil sands growth over

the past decade and a half and discusses the reasons that growth continues.

"A review of oil sands development over the years shows a history of growth, even when headwinds to production emerged," said Kevin Birn, director for IHS Energy. "Oil sands growth has propelled Canadian production higher, and Canada now produces more oil—conventional, unconventional and oil sands combined—than every member of OPEC except Saudi Arabia."

Among the attributes supporting continued oil sands growth are the enormous scale of the resource—oil sands are the third largest source of proven reserves in the world and the only reserves of this scale outside OPEC—and its location in a stable jurisdiction. Openness to private capital and proximity to the world's largest economy (United States) are also factors that support future growth, the report says.

The IHS report says that growth of oil sands supply will continue through the medium term despite headwinds that

include lower oil prices, cost escalation, environmental scrutiny and uncertain timing of new pipeline capacity to access new markets. Slower growth from the lower price environment is emerging from a slower pace of construction, declines from more conventional oil sands production, and delay in unsanctioned projects (projects where significant capital has not been spent). Yet the report concludes growth is expected as a result of both existing projects and those under construction where significant capital has already been spent.

"Certainly growth would have been greater had prices remained high, but there is sufficient inertia in the system from projects already underway to carry growth to nearly 2020," Birn said. "Those projects where significant capital has been invested will continue to operate and proceed to completion."

Environmental concerns related to oil sands include regional impacts as well as greenhouse gas (GHG) emissions. Though

oil sands account for about 0.14 per cent of worldwide emissions, their share of domestic emissions in Canada has grown with production. While GHG intensity of oil sands production ranges 1–19 per cent higher than the average barrel of crude consumed in the United States, other crude oils can have a similar level of GHG intensity. The report notes that some of the more recent oil sands projects have trended closer to the U.S. average as a result of innovation and learnings over time.

Uncertainty of new pipeline capacity (Keystone XL being the most notable example) has, in the past, contributed to price discounts as high as \$30 per barrel, the report says. The increase of rail transport for oil sands (from no notable movements in 2010 to nearly 190,000 b/d towards the end of 2014) has eased transportation bottlenecks and alleviated the

price discounts. However, the report notes that moving crude by pipeline—which is generally less expensive and more predictable, remains the preferred option by producers and refiners alike.

Previous IHS research found that construction and operation of the Keystone XL pipeline would not have a material impact on GHG emissions. The study concluded that complex refineries on the U.S. Gulf Coast that are designed to process heavy crudes will continue to demand types of crude that have a similar GHG intensity to oil sands, meaning that the U.S. will continue to import crude oil of similar quality from offshore sources such as Venezuela if additional supply of oil sands are not available.

The new report concludes that, while the long-term path of oil sands growth will be linked to the pace and scale of the global oil

price recovery, the fundamentals that have supported oil sands growth in the past remain in place.

"While trajectory of longer-term oil sands growth beyond 2020 is not assured (for instance, the impact of some new government policies remains uncertain), the pillars of past growth—innovation, collaboration and stable investment climate in Canada (not to mention U.S. heavy crude demand)—certainly remain," Birn said.

The IHS Oil Sands Dialogue convenes stakeholders in the oil sands to participate in objective analysis in the benefits, costs and impacts of various choices associated with Canadian oil sands development. Participants include representatives from governments, regulators, oil companies, pipeline companies, academia and nongovernmental organisations. ■

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Building a culture of safety at ExxonMobil

Darren W Woods, senior vice president at ExxonMobil, speaks about the Valdez spill and how that spurred the company on to greater efforts in its quest for accident free operations

Born in Wichita, Kansas, Darren Woods is a graduate of Texas A&M University, where he earned a Bachelor of Science degree in electrical engineering. He also holds a Master of Business Administration degree from Northwestern's Kellogg School of

Management in Evanston, Illinois.

Woods first joined Exxon Company International in 1992 as a planning analyst in Florham Park, New Jersey. He progressed through a number of domestic and international assignments for Exxon Company

International, ExxonMobil Chemical Company, and ExxonMobil Refining and Supply Company.

In 2005 he was appointed vice president of ExxonMobil Chemical Company in Houston, Texas, where he managed global specialty-

chemical businesses. In 2008, he moved to Brussels, Belgium, to work as ExxonMobil Refining and Supply Company director of refining for Europe, Africa, and the Middle East. In 2010, he was appointed vice president of supply and transportation and moved to Fairfax, Virginia. Two years later he was appointed president of ExxonMobil Refining and Supply Company and vice president of ExxonMobil Corporation. In this role, he had primary responsibility for ExxonMobil's global refining, supply, and transportation activities.

"Energy is the indispensable industry" Woods says. "It fuels development and human progress around the world. Our industry touches the lives of billions of people every day. Access to reliable and abundant sources of energy is the foundation for our many areas of society's advancement."

The modern world in which we live – a world of electricity, transport, trade, labour-saving inventions, and profoundly improved health – has been made possible by the widespread use of energy. And where there is no or little access to modern, reliable forms of energy, there is poverty, subsistence living, and undue hardship.

The immense scale of the global energy industry is hard for many to comprehend. The entire world consumes more than 92 million barrels a day of oil and liquid fuels. "That works out to more than 1,000 barrels per second," Woods adds. "But these statistics pale when put in the context of the story of even one of the projects that supply the world with energy. For instance, on the east coast of Canada, we are progressing a project called Hebron. Hebron will take five years to build. It will cost more than USD14 billion. It is scheduled to start up in 2017, and over the course of its 30-year lifetime, it will likely produce about 700 million barrels of oil. People who haven't even been hired yet will spend most of their entire careers working on this project. And yet, Hebron's entire production will be enough to supply current global demand for just eight days.

That is just one project. To meet the enormous and growing demands of advancing nations, the industry has pioneered



The Exxon Valdez oil spill occurred in Prince William Sound, Alaska in 1989, when Exxon Valdez, an oil tanker struck Prince William Sound's Bligh Reef

technologies and techniques that are often compared to putting an astronaut on the moon. Consider ultra-deepwater production, which started in the Gulf of Mexico. Ultra-deepwater entails drilling from a platform offshore in water as deep as two miles. From there, wells are drilled to pinpoint accuracy another five miles below the ocean floor.

"I know quite a few engineers who make a compelling case that this is far more difficult than sending people to the moon – admittedly, they work in our industry – and, yet, our industry does it every day," Woods says.

But all the endeavours, pioneering spirit and innovation must be done safely. The cost of accidents, in lives, environmental damage and cost is huge when working on projects at such scale. "ExxonMobil's approach to running our business: safety, operational integrity, and risk management is a culture, not a priority. We often hear it said that companies must make safety a top priority. We believe that a commitment to safety must run much deeper than simply being a priority.

"A company's priorities evolve over time depending on business conditions and other factors. A commitment to safety therefore, must be more than a priority, it must be a

value – a core value that shapes decision-making all the time, at every level. Every company desires safe operations, but the great and abiding challenge is to translate this desire into action.

"The answer is not found only in written rules, standards, and procedures. While these are important and necessary, they alone are not enough. The answer is ultimately found in a company's culture, the unwritten standards and norms that shape mind-sets, attitudes, and behaviours. Companies must develop a culture in which the value of safety is embedded in every level of the workforce. It must be reinforced at every turn. And it must be upheld above all other considerations. This is something that we spend a lot of time working at ExxonMobil."

The most important event in the evolution of ExxonMobil's safety culture dates back to 1989 and the Valdez spill. Valdez was a low point. "It was a traumatic event, with enormous consequences for all involved," Woods explains. "But it also served as a catalyst and a turning point which prompted us to completely re-evaluate how ExxonMobil understands, approaches, and manages risk. That is not to say that, prior

to Valdez, we did not take safety seriously. ExxonMobil had been in business for more than 100 years, and we had always taken steps to maintain safe operations.

"In fact, we were proud of our safety record. We believed, as our safety credo at the time stated, that all accidents and injuries are preventable. Like many companies, we worked to meet or exceed all industry safety standards. We trained our employees in safety procedures. And we tracked metrics that measured our success, but we did not have the comprehensive and systematic approach to managing this aspect of our business as we have today."

In the early 1990s, ExxonMobil undertook a visionary approach. The goal was to wholly re-organise the work to make safety – of people, facilities, and the environment – an integral part of everything it did. In this approach safety would not only come first, it would pervade every step and stage of planning, development, and execution its work.

"It was the beginning of a long journey for our company," Woods continues. "One that we are still on. We know that we cannot rest or waver from the objective of driving incidents to zero. We are certainly not there. But we have made significant progress. As we have advanced in this journey, our experience continues to reinforce that improvements have to be driven from within the company."

"Governments cannot impose a safety culture, and we cannot hire one. Regulators, experts, and consultants provide valuable services, but for an organisation to change its culture, change must come from the inside-out, not the outside-in. You cannot buy a safety culture off the shelf. You have to craft it yourself."

"So we began. We began by creating a framework that puts our safety commitment into measurable action. Today, that framework is called the Operations Integrity Management System, or OIMS for short. Because OIMS is multi-faceted, it can be hard to describe briefly. But here are the basics. OIMS is a rigorous 11-point set of elements designed to identify hazards



The ExxonMobil safety mantra is 'nobody gets hurt'

and manage risk. Its framework covers all aspects of safety, management leadership and accountability, design, construction and maintenance of facilities, operating procedures, emergency preparedness, management of change, assessment of performance, and, of course, thorough inquiries into incidents.

"OIMS guides the activities of each of ExxonMobil's more than 75,000 employees, as well as our third-party contractors, all around the world. Over time, it has become embedded into our work processes at all levels. Through OIMS, ExxonMobil monitors, benchmarks, and measures all aspects of our safety performance. Its structure and standards are

shared and communicated the world over."

One of the greatest benefits of OIMS is that it has enabled ExxonMobil – a large organisation that operates across diverse cultures and geographies – to be of one mind when it comes to safety and risk management. You can visit a refinery, a lab, an office building, or an offshore platform anywhere in the world and immediately be on the same page as the local workforce regarding safety practices and expectations.

"We expect our contractors to be knowledgeable and aligned with our OIMS requirements," Woods explains. "Not every company has this mind set, but we have found that when everyone in the workplace speaks



environment in which safe behaviours are internalised, reinforced, and rewarded," Woods says. "The culture of safety starts with leadership. Leadership drives behaviour and behaviour establishes culture. Leaders influence culture by setting expectations, building structure, teaching others, and driving accountability.

"That is why the first element of OIMS is 'management leadership and accountability'. ExxonMobil managers are expected to lead the OIMS process. A significant part of their performance assessment is based on doing this successfully. But management alone cannot drive an organisation's behaviour. For a culture of safety to flourish, it must be engrained throughout the organisation.

"To get where we need to be on safety, continuous improvement is essential. In an industry such as ours – which operates 24 hours a day, around the world – the need to manage risk never ends. Even the best safety framework should be viewed as a work in progress. Developing a culture of safety is a journey.

"For ExxonMobil, that journey was transformed nearly a quarter century ago, when we put our global safety framework in place. Once that framework became embedded in our organisation, we saw the culture start to change and our results improve. Over the years I have seen people at all levels come to understand that our safety systems are put in place for them. They see that it is all about protecting themselves, their co-workers, and their communities.

"Until an organisation reaches the point where everyone owns the system and believes in it, until it enters the hearts and minds of the people to become a very part of who they are as a company, that system and culture of safety is not sustainable.

"We often use the phrase at ExxonMobil, 'Nobody Gets Hurt' to describe our safety objective. Some observers of our company question this. They say it cannot be done. We disagree. It can be done. We have units operating today that have gone years without a recordable injury." ■

the same language of safety – and works to the same standards – better results follow. You may have heard the phrase: 'If you can't measure it, you can't manage it'. We believe it's true. That is why ExxonMobil measures and analyses its safety performance – all the way down the line, to every business level. We record not just our injuries, but our near misses. We know there are lessons in each of these.

"We also learn OIMS required assessments. Importantly, these assessments at ExxonMobil are performed not only by trained safety personnel, but by cross-functional, cross-regional teams drawn from all over our global operations. In this way, all employees feel responsible for each other's

safety. It also helps employees take the safety knowledge they learn back to their home sites and back to their communities."

Yet, OIMS by itself is only one part of the equation. Even the best safety systems are not fully effective unless they exist as part of a broader culture of safety. While ExxonMobil and other energy companies use a lot of equipment – everything from concrete and steel pipe to supercomputers and deepwater submersibles – it is people who apply and operate this technology. Their behaviour determines safety performance.

"By beginning to instil the value of safety in our employees from the first day of hire, ExxonMobil strives to create a working



Low oil prices continue to challenge industry

The oil and gas industry is continuing to experience significant challenges as a consequence of reduced oil prices. The result of which means changes within the sector are inevitable

Grant Thornton's oil and gas team conducted a survey where it sought the opinions of senior executives within the sector on what the current market

environment meant for them and their company. It found that a prolonged drop in the global oil price is forcing companies in the sector to dramatically reassess and reshape

their operations. Based on a survey of senior oil and gas executives, the report finds that 42 per cent have put some plans on hold, while 11 per cent need to raise extra finance

opposed to 46 per cent of existing producers who saw the price within this range. Looking further, to the end of 2016, 85 per cent of early stage company respondents believed the oil price will rebound to between USD56 - USD100 per barrel, whereas 66 per cent of existing producers thought this.

"Despite demand remaining buoyant over the past year, oil prices have been on a rollercoaster of volatility which the industry hasn't seen for decades," Linda Beal, global leader for the energy and resources industry at Grant Thornton UK says. "This has forced many oil and gas companies into a new mind set. Particularly at the smaller end of the spectrum, companies have had to redefine the meaning of 'normal operations' over the course of the year and that's leading to some transformative, and often difficult, decisions being made. Whilst it's understandable that nerves have been rattled in the short-term, doing nothing is not an option, nor is that approach sustainable in the long term."

The report suggests consolidation in the sector will increase over the coming months, particularly amongst suppliers to the industry. Forty two per cent of respondents believe

heightened merger and acquisition (M&A) activity along their supply chain is a likely outcome, as margins are cut and operating costs continue to decline.

"With the prospect of contracts not reverting back regardless of a bounce back in oil price and on-going M&A activity in the supply chain, agility is proving the key to success," Beal adds. "Executives need to keep all options open with a more flexible workforce that can readily scale up or down and is even more able to move internationally than has been the case until now."

The survey opened by asking how a prolonged drop in oil price would impact the respondent's business in 2015. Just over 42 per cent stated that some of their strategic plans will be put on hold. "Whilst this is understandable in the very short term, doing nothing is not an option nor is it sustainable in the long term," Beal says. "Groups who move quickly to address challenges and seize opportunities will be the likely winners."

"Predicting future oil price is always difficult but perhaps even more so in the current environment. What was clear from our survey was that our respondents disagreed

Whilst it's understandable that nerves have been rattled in the short-term, doing nothing is not an option



or sell existing assets to remain operational. Moreover, a further 11 per cent suggest they will need to engage in significant financial restructuring before the end of the year.

Asked for a prediction on oil prices by the end of the year, a divergence between existing producers and early stage companies was clear, with 63 per cent of early stage respondents predicting the price of oil to be between USD55 - USD65 per barrel, as

about not only the level but also the direction of longer term pricing. Just over half of our respondents clearly see the low prices as a short-term feature that will be followed by an increase as supply is removed from the market.

"What our survey also showed was that existing producers were not as optimistic as early stage respondents when assessing where the oil price would be at the end of 2015. This may reflect natural optimism on the part of explorers, but it is the producers who will generally be closest to the markets."

So what is driving the pricing? We know that the answer in broad terms is supply and demand. "However, the oil price dropped by 50 per cent whilst, as one of the respondents to our survey stated, the demand for oil has not dropped by this amount," Beal continues.

The Bank for International Settlements stated that oil production has been close to prior expectations, whilst demand has only been a little weaker than forecast. Therefore the huge drop in oil price appears to have been caused at least in part by trading and

financial flows, rather than purely by changes in supply and demand. The World Bank as of January 2015 predicted an average price for this year of USD53 and USD57 for 2016, indicating a period of continuing low prices. It appears the recent years of a high, relatively stable low volatility price have for the time being gone.

"Whilst some still predict a strong rebound, the point is that this cannot be assumed and companies have to therefore address the potential of long term low prices," Beal says.

A future perspective

We all know that the future is unpredictable. If the survey had been conducted last year, who would have predicted an oil price of below USD60 a barrel. Predicting future trends in the industry is not an exact science.

"A key factor with regard to pricing moving forward will be around the storing of oil, which is the physical equivalent of financial derivatives," Beal says. "This will

have a direct impact on supply and demand and ties into trading.

"Where significantly higher prices are expected in the near future, it can make sense to buy early, store and then sell when prices are higher. The greater the storage capacity available and the lower the cost, the more likely it is that storage is used, with consequent smoothing impacts on pricing. Even though China and India are using low prices to build strategic reserves, there is limited further storage capacity available though, so that smoothing effect is coming to an end."

Grant Thornton's US oil and gas leader Kevin Schroeder comments that in the US the downturn in oil price has resulted in the oil and gas industry planning for stagnant oil pricing over several years. "US producers significantly reduced their capital budgets for 2015 which means less wells will be drilled and less producing wells will be worked over to preserve liquidity," he says. "Indeed, this extends to US shale producers who will continue to drill but will focus on drilling



A recent survey suggests that the daily rate for a high spec horizontal rig will drop by 30 per cent in 2015

optimal development wells. In many cases all exploratory wells have been removed from drilling schedules and capital budgets due to the continuing low oil price."

In theory, with demand due to rise, the price should too, given that supply should, if anything, reduce in the short term. Unfortunately the impact of trading and herd behaviour means that this cannot be guaranteed.

Supply chain issues

There is already clear evidence of the supply chain suffering in various ways as a result of the price reductions. Some companies are imposing unilateral cuts on suppliers across the board, demanding a reduction whatever the contract says. "We asked our respondents if they were anticipating issues in their supply chain as a result of current market conditions," Beal says. "Forty two per cent of respondents believe that M&A activity within the supply chain is likely, whilst just over a fifth believed that there would be issues within their supply chain. The pressure being felt across the supply chain as a result of the lower oil price impacts on the cost of rigs and seismic vessels, which are all dropping significantly."

A recent piece of analysis by WoodMackenzie suggests that the daily rate for a high spec horizontal rig will drop by 30 per cent in 2015, hitting contractors' profitability. In the US the active drilling rig count has declined for 14 straight weeks to the lowest count in five years, with active oil rigs down over 700 rigs since the previous high of just over 1,600 in October 2014. Furthermore, reduced drilling count will result in a decline in US oil production beginning around the third quarter of 2015.

"Without new wells coming on line and with decreased well workover activity, natural decline in production will occur," Schroeder adds. "Even if the oil price rebounds fully, it is unlikely that supplier pricing can simply revert to where it was. This means that throughout the supply chain a far greater focus on operational efficiency can be expected and a greater premium on flexibility, so possibly



The stronger companies have better positioned their debt structure

more hiring of equipment rather than purchasing it."

Capital conundrums

A number of investors in the sector, whether debt or equity, have had a sharp reminder that oil prices can indeed be very volatile. Many, even those that have been in the industry for a long time, had perhaps forgotten that. Whilst there are new structures available to raise finance such as royalty based lending, there is clear evidence of increased difficulty of sourcing finance in the market. This has led to increased debate about the price scenario to adopt for company valuation.

"Raising capital is not just an issue for E&P companies, but also oil field service companies, equipment providers and those reliant on the sector who are all finding it more difficult to raise capital," Beal says. "Producers have also been active in managing their debt positions, most remembering challenges in the last downturn in 2008. Many companies will face challenges with upcoming borrowing base redeterminations of their

credit facilities, which are often determined twice a year based on the lender's estimate of a borrower's oil and gas reserves values. This means that companies that did have a healthy lending margin may suddenly find themselves in a very difficult position and banks face a greater risk exposure. The stronger companies have better positioned their debt structure to be free of certain covenants or have not borrowed to levels that could require principal payments from a downward revision of a borrowing base. Many companies have also been renegotiating terms of their debt with banks to avoid related issues.

"This does not mean that all reserve backed lending has ceased. Some will continue, for example, Eland Oil and Gas raised USD75m with Standard Chartered in January 2015. What it does mean though is that all of these positions will be more closely managed, that there will be a number of defaults and that this can be expected to be less available as a source of financing. This is what will drive some consolidation, restructuring or even insolvency."



Corruption in Brazil led to huge protests

Regulations

The short-term pricing issues in the sector can tempt people to overlook other issues such as bribery and corruption and ensuring that the right corporate governance is in place. The complexity of contractual relationships with suppliers, capital partners and national governments means the sector comes under specific scrutiny in this area. Some of the most significant penalties incurred for non-compliance have been handed out by regulators to companies within the oil and gas sector.

"We asked our respondents what their views were with regard to fraud and corruption, particularly as the industry

continues to operate in geographical areas where these risks are prevalent. Thirty two per cent of respondents did not expect more fraud and corruption, but did expect more discovery to take place," Beal explains. "Over a quarter of our respondents expect more enforcement and action by national governments. With new wide ranging legislation in some countries plus greater enforcement of existing legislation such as the UK Bribery Act, companies in the sector will need to apply thorough country-by-country reviews and risk assessments of their anti-bribery and corruption systems and controls."

As the cases of companies big and small

like Petrobras and Afren show, any issues around fraud have a dramatic market effect. Petrobras has had its credit rating slashed to junk status by Moodys, whilst Afren has lost around 90 per cent of its share value since March 2014.

"It is wrong to assume that going forward the pursuit of corruption will be mostly driven by the US and EU, as it often has in the past," Beal concludes. "These days there is growing pressure from governments around the world such as a crackdown in China, a new law in Brazil (and doubtless more pressure as a result of Petrobras). We expect this trend to continue adding further complexity and regulatory burden on the sector." ■

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Within oil and gas organisations IT crosses many departmental boundaries

Optimising IT to meet the challenge of low oil prices

It is not only the front office that is feeling the brunt of cost cutting measures in the oil and gas sector. IT departments are also coming under pressure to share some of the pain of optimisation

When business prospers, IT departments often struggle to meet the demand for new capabilities. To maximise limited resources, most IT groups seek methods to collaboratively select and prioritise projects to ensure effective delivery to the business. The result is an improved IT and business partnership, co-ordinated decision making, and a pace that often brings

complexities and increases to the IT budget. When revenues decline, IT departments discover the new increases to maintenance and support are difficult to sustain.

As revenues begin to decline with oil prices, IT is often asked to contribute to cost reductions with little regard for the new systems, integrations, and support required to continue delivery of services during the

booming days. The memory of improvements provided by key projects and the impact on IT maintenance costs are quickly forgotten in the haste to reduce budgets. The IT leadership and business collaboration on how to improve the IT department's cost structure also disappears quickly, as few people wish to help identify the best methods to reduce budgets. Let's face it, deciding how to invest money is much

more gratifying than deciding how to reduce spending.

"This often leads to irrational cost cutting behaviour resulting from a lack of transparency, impact analysis, and co-ordination," Lawrence Eribarne, director of Enaxis Consulting, IT advisors to many Fortune 500 companies, explains. "Many of the capabilities developed previously are impacted by a short-term focus of immediate budget reductions. Long-term views of IT strategy, architecture, delivery, and business alignment lose emphasis in the scramble to identify what is perceived as the lowest impact budget targets. Meanwhile, leaders work to limit the impact to their own areas of ownership, driving costs down in ways that are not sustainable or simply shift costs out of IT and back into the business, thereby eliminating the value of the exercise. When IT is working to support business competitiveness, this type of gamification of the cost improvement process leads to failure.

"Creating significant, sustainable, cost optimisation requires a comprehensive approach that crosses all IT budget owners and maintains or improves business delivery. Knowing where to focus when times are tough is just as important, if not more so, than focusing on the right activities when revenues are climbing."

Cost cutting typically consists of a straightforward reduction target, pursued by unguided individual budget owners within their areas of responsibility. These targets are usually the same across the board, as this simple method seems to advocate fairness and a distribution of accountability. Everybody does their part and struggles equally with the burden. What if one area is far more critical to current operations than another? What if somebody has driven impactful efficiency programmes for years? What if one area has run far looser with available budget, avoiding hard decisions, resulting in more reduction opportunities? While these questions may lurk beneath the surface, they never seem to come to light, perhaps even leading to dissension within the leadership. How could all of us have the

same target?

"Unlike straight line cost reduction tactics, IT cost optimisation is a strategic approach which leverages collaborative processes and analytical models to improve IT value while supporting business alignment and optimizing service delivery requirements," Eribarne says. "The focus is not on individual budgets and fair targets across the organisation. IT cost optimisation provides a sustainable efficiency model across IT delivery and services, allowing for various levels of impact to individual budgets.

"Unlike cost cutting, there is a heavy dependency on opportunities which extend across budgets, requiring collaboration and transparency. This can necessitate a shift in management maturity requiring skill development. Leaders must change from a

view of independent budget ownership and accountability to a view that encompasses an enterprise value focus. The goal is cumulative efficiency, and not a focus on any single area alone. Once targets are identified, analysis is conducted using a common approach and set of tools to ensure all opportunities are evaluated and selected fairly. When cost reductions are driven from a need to keep a company profitable during low oil price periods, the approach must be effective, measurable, and sustainable."

Focusing on cost cutting within budget silos rarely results in measurable, sustainable, efficiency gains. Short-term budget reductions may be achieved, but often at the price of even larger budget requirements or significantly delayed benefits. "The desire to comply with a quick-win budget reduction

Cost pressures can be an opportunity to improve IT value



can obscure detailed analysis of the reduction impact," Eribarne explains. "Many typical cost cutting tactics deliver negative effects which erode delivery capabilities, bringing IT out of alignment with business expectation, or causing a budget overrun in a different area. When a decline in oil price is the key factor in seeking efficiencies, delaying costs or pushing costs to a different area will not achieve the desired outcome.

"Without analysis and programme oversight, seemingly straight-forward cost improvement efforts can quickly drive unanticipated consequences. Rectifying each of these situations may ultimately cost more than the reduction ever achieved."

Identifying, analysing, and capitalising on cost optimisation opportunities is dependent on several critical success factors as Eribarne explains. "In order to achieve successful impact on IT value, the cost optimisation effort requires a holistic programmatic approach. The focus must shift away from individual cost drivers toward a model of transparency. The most impactful initiatives will cross multiple IT budgets and may impact various areas differently. In fact, many of the largest reductions could require an investment in another part of IT or within the business.

"Each optimisation target will require

detailed analysis in order to understand the impact, risk, commitment, value timing, and level of business commitment required to optimise successfully. Trade-offs exist between these factors within each target. Understanding the impact of these trade-offs, and the level of business sponsorship required, will drive the target selection, timing, and achievable levels of optimization allowing for transparent, comprehensive decision making."

Initial target identification often falls within IT ownership and focuses on IT controlled areas, with minimal requirement for business consensus. "Optimisation around IT contracts, vendor pricing, consolidation efficiencies, or standardisation efforts are frequent optimisation targets, worthy of consideration," Eribarne says. "However, focusing only within IT owned targets limits the total programme opportunity. Internal IT targets can often yield up to 15 per cent reductions in overall IT expenditure within some environments. Opportunities which require business sponsorship, such as application rationalisation, restructuring, process automation, or business decision enablement, can far exceed a 15 per cent target."

Evaluating the trade-offs requires a standardised approach. The framework does not necessarily require undue complexity, but companies must leverage the framework in a consistent manner. "Trade-off analysis considers overall benefit to the organisation, required levels of investment, timing of value achievement, degree of business impact, level

of change impact on the organisation, and an assessment of the technical risk," Eribarne adds. "Companies may also include decision elements which are specific and meaningful within their organisation."

During the focus on cost optimisation,

"It is critical that IT does not shirk this responsibility by only focusing on near term costs"

significant effort is applied to understanding cost drivers, relationships, and impacts. Once targets are selected, prioritised, and achieved, sustaining the same level of focus, transparency, and financial analysis may require long-term commitment to IT finance maturity. "Many IT organisations lack financial skills, tools, or metrics to maintain visibility and focus on continued optimisation," Eribarne says. "Understanding the gaps in IT finance maturity is key to transforming into a value based organisation, partially achievable through the IT cost optimisation programme. The maturity path of many organisations usually begins with a focus on total spending and progresses towards value based metrics and decisions."

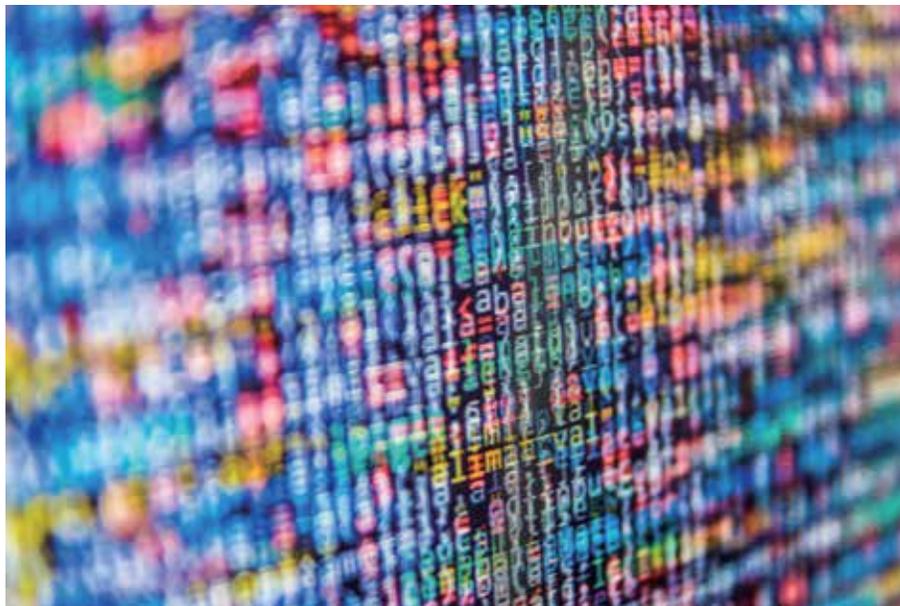
As oil continues to hover below USD60/barrel, IT leaders will continue to face pressure from the business. "Every dollar reduced, which does not impact production, helps the organisation adjust to the new market," Eribarne concludes. "It is critical that IT does not shirk this responsibility by only focusing on near term costs, missing



As revenues begin to decline with oil prices, IT has to contribute to cost reductions

impactful, strategic opportunities, or simply pushing IT costs back out of the business.

"This comprehensive approach requires a level of consolidated accountability and transparency which could be new for many IT organisations. Gaining the leadership skills, financial tools, and optimisation methodology can make IT a true partner with the business, doing their part to keep the company successful while holding ground on capabilities which will drive even more success when the market turns around. Cost pressure can become an opportunity to improve IT value and business partnership, rather than disconnected reaction that damages past progress, and impairs the ability to drive more success in the future." ■



With the advent of big data IT is playing an ever more important role



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- One moving part.
- Reaches open position in milliseconds.
- Provides a bubble-tight seal to set point.
- Rugged and has a long life.
- Field repairable.
- Stainless steel seat & piston is standard.

Well integrity comes of age

The current downturn in the oil and gas industry has coincided with the maturing of integrity management, and operators are now well positioned to exploit the developments of the past decade

Hit by a reduction in revenue, oil and gas operators are currently focusing on cost-saving initiatives and pulling back from more speculative investments. Exploration activity has experienced a strong downturn; instead operators are concentrating on squeezing maximum value from existing assets.

However, getting maximum production out of these assets, particularly older ones that are close to or even beyond their originally anticipated lifespan, requires vigilance. Optimised production from wells must be achieved without worsening damage mechanisms like erosion and corrosion. "Tuning chemical treatments to optimise production in wells which have a tendency to scale requires continuous

Dr Liane Smith, managing director and founder of Wood Group Intetech



attention if costly chemicals are not be wasted through over-treatment," Dr Liane Smith, managing director and founder of Wood Group Intetech, says. "Evidence-based decision making is needed when evaluating whether a well that is exhibiting symptoms of a potential problem is safe for continued operation. When there are so many parameters to monitor and when timely warning and responses are necessary, a well-integrity management system, delivered through user-focused software, is needed to achieve total operational control."

It is now almost ten years since the first operators took the step of implementing well-integrity management. Those pioneers worked without the benefit of international standards for guidance. At that point, only the NORSOK standard D010 on well integrity existed (published in 2003); API RP 90, with its focus on annulus pressure management, did not appear until 2008.

It is really only since Macondo in April 2010 that the industry has pooled its expertise to generate international guidelines and standards on well-integrity management. In 2012, Oil and Gas UK generated well-received guidelines on well integrity and on suspension and abandonment. Two years later, the international standard ISO 16530 Part 2 on well-integrity management in the operational phase was published.

In the unconventional arena, the Queensland Code of Practice for coal seam gas (CSG) well head emissions, detection and reporting was published in 2011, followed in 2013 by the Code of Practice for constructing and abandoning CSG wells.



"Operators today benefit enormously from these initiatives and can apply many excellent concepts to the optimisation of their well-integrity management procedures to achieve both economic advantage and safe operation," Smith explains. "Yet even without such guidance, early adopters of well-integrity management software were able to derive economic benefit.

"The earliest applications of these systems were in fields producing hydrogen sulphide. The focus was on leak prevention in the face of particularly toxic well fluids. However,

The new generation of shale gas operators recognise the benefit of advanced well-integrity management tools



moved on from being a fire fighting activity focused on treating symptoms and became a more strategic and proactive function that focused on dealing with underlying root causes.

"Well-integrity tools have also been used to optimise the frequency of preventative maintenance, often focusing on specific at-risk equipment in order to keep it operational for a longer period. With the information provided by well-integrity management systems, operators can minimise production downtime by planning repair-and-replacement work on equipment with a high likelihood of failure to coincide with other interventions on the well."

New levels of insight

Since the early days, the levels of control have become even more granular. Information gained from well integrity management systems enables operators to take preventative action against an asset's underlying weaknesses, or to proactively respond as minor problems arise.

Modern well-integrity management software can generate figures to show the frequency of equipment failure and mean-time-to-failure. This data pinpoints which specific types of equipment or models work reliably and which are more prone to problems, enabling operators to identify which wells have the more problematic equipment installed. This in turn enables evidence-based, performance-led decisions regarding maintenance, which has helped to reduce the frequency of routine preventative maintenance (PM) for wells with more reliable equipment.

"Proprietary information remains the basis for effective decision-making, but well reliability software also enables operators to share their barrier element-reliability data with other operators," Smith says. "It helps enhance an operator's knowledge of areas where they may have less experience, and broadens the statistical base for future decision making by drawing on existing asset data for use in quantitative risk analyses.

"These highly-evolved systems sit at

because most wells have the potential for catastrophic failure, as well as less dramatic but still reputation-damaging leaks, the software spread in application to both conventional and unconventional wells."

Well integrity management software has since been adopted by operators of mature fields to reduce the costs associated with shut-in wells. Evidence from the field suggests that up to half of all shut-in wells and half the work-overs have been caused by integrity problems. But where state-of-the-art well integrity management software has been

used, operators have been able to get on top of those problems and stop them dominating and interfering with production.

"In at least one case, an operator has been able to halve the numbers of wells that are shut in due to well integrity problems within two years of implementing well integrity management software," Smith adds. "Because the software was able to identify the most problematic wells and highlight the specific issue that needed to be addressed, the operator could design a permanent solution to the problem. In this instance, well intervention

the heart of preventative and proactive maintenance operations: resolving issues in a timely fashion, instead of waiting for problems to escalate. The commercial advantages have become clear as have the benefits of improved safety and compliance records."

Maximising output from aging assets

All of which brings us up to date and the current low-price environment. With opportunities to invest CapEx in new and potentially more risky sites, keeping older assets in production has become a favoured option.

"However, this requires an even higher level of vigilance," Smith continues. "Environmental limits define the conditions that will prevent the acceleration of asset deterioration as well as catastrophic failure. Every well has a set of operational limits, as defined in ISO 16530, within which safe operation is proven, and all assets must be maintained within their safe operating envelope at all times.

"Inevitably, such operational limits need to be reviewed as assets age, and will typically become tighter over time. For example, as wall thickness decreases thanks to corrosion and wear, so operational pressure limits are reduced and tolerable corrosion rates constrained. Either the frequency or the

concentration of corrosion-inhibitor treatment may need to increase as a result.

"Keeping track of these and all other relevant parameters across multiple assets requires integrity management systems that can react quickly to any breaches of these safe limits. Although global controls are often set, they still need to ensure that the nuances of individual wells are accounted for.

"The right technology will allow operators to run each well to a unique set of proven operational limits. It also provides some form of real-time rapid response (typically involving email alerts being automatically sent to key parties) so that operators can respond immediately if limits are exceeded. Without this form of rapid response, wells can only be run at very conservative, centrally established limits – with inevitable consequences for profitability. In the case of aging assets, where the safe operating envelope offers operators very little room to manoeuvre, integrity management enables them to make the most of their assets by ensuring they work safely at the boundaries of performance."

An unconventional future

Looking beyond the current price environment, the future of oil and gas production will involve greater exploration and exploitation of unconventional fields such as shale gas. Plans for shale gas may currently be dialled down in key areas, but the new generation of shale gas operators recognise the benefit of advanced well-integrity management tools in countering the reputational damage caused by reported loss of integrity by some international shale operations.

Here the advantages of well-integrity management are not confined to optimising output from wells, but also addressing opposition to fracking operations and shale gas production. "Well-integrity management software is already being deployed to monitor and trend the fluid composition in the relevant aquifers before, during and after drilling and fracking to identify any possible fluid contamination from well construction and fracking," Smith says. "It is likely that regulatory bodies will wish to see such a level

of control being implemented more widely, and there is even the potential for trend data to be made publicly accessible to provide ongoing reassurance to local populations.

"Well-integrity management tools are also being deployed in other unconventional areas. Coalbed methane fields in Australia have a particular focus on using advanced tools to monitor for leakage. In this instance the concern is more around protecting local environments from gas emissions, as well as ensuring the health and safety of operating staff and other land users. Faced with responsibility for several thousand wells, operators have little option but to use software that is able to monitor well data and report exceptions simply to keep on top of operations."

Lessons, trends and challenges

According to Smith after ten years of direct operational experience, a number of clear trends and important challenges have emerged in well-integrity management. "The first is that there has been a keen desire to move to a global approach by operators with international operations," she explains. "This has created challenges for software, in that it must be applicable in various jurisdictions with national or regional regulations providing the framework for integrity controls.

"The second is that global systems need to integrate a diverse array of legacy third-party software and databases which contain different parts of the integrity story. Relevant data is typically stored in a variety of repositories: production data, for example held by operations; preventative and corrective maintenance in maintenance management systems; and drilling activity records in drilling information systems."

To obtain a comprehensive view of the well's performance, well integrity engineers often have to keep an eye on the output of a number of different systems. Which leads to the final and perhaps most fundamental challenge for monitoring and managing well integrity. "Monitoring multiple systems is error-prone and can create gaps in the integrity picture," Smith continues. "But

It is really only since Macondo in April 2010 that the industry has pooled its expertise to generate international guidelines

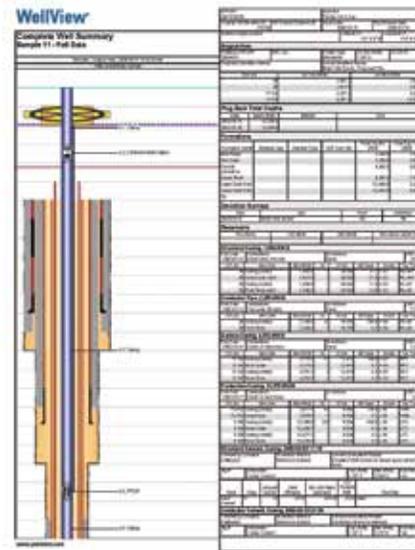


getting part, or even most, of the information is not good enough: operators that do not have the whole story do not have any of the story.

"If there is a possibility that the information gathered is even partially inaccurate or incomplete, they cannot be confident about the conclusions they reach, or sure that proposed actions are the right ones to take. For well integrity technology to deliver on its promises, it needs to deliver a holistic view of any given well and field. The integration piece is therefore of critical importance."

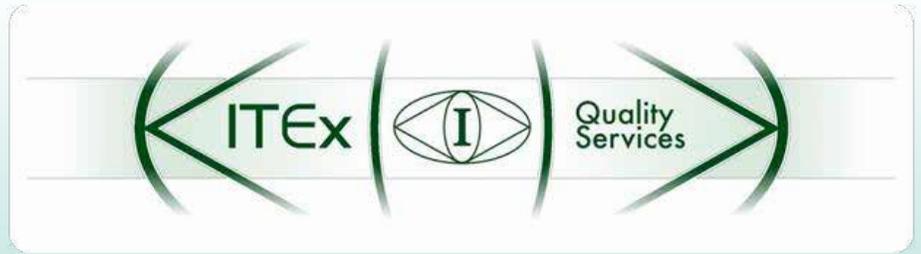
The long-term view

Operators need to be aware that what they are managing today is not going to remain constant. The safe operating envelope of each well needs review, adjustment and tightening over time.



Global systems need to integrate a diverse array of legacy third-party software and databases

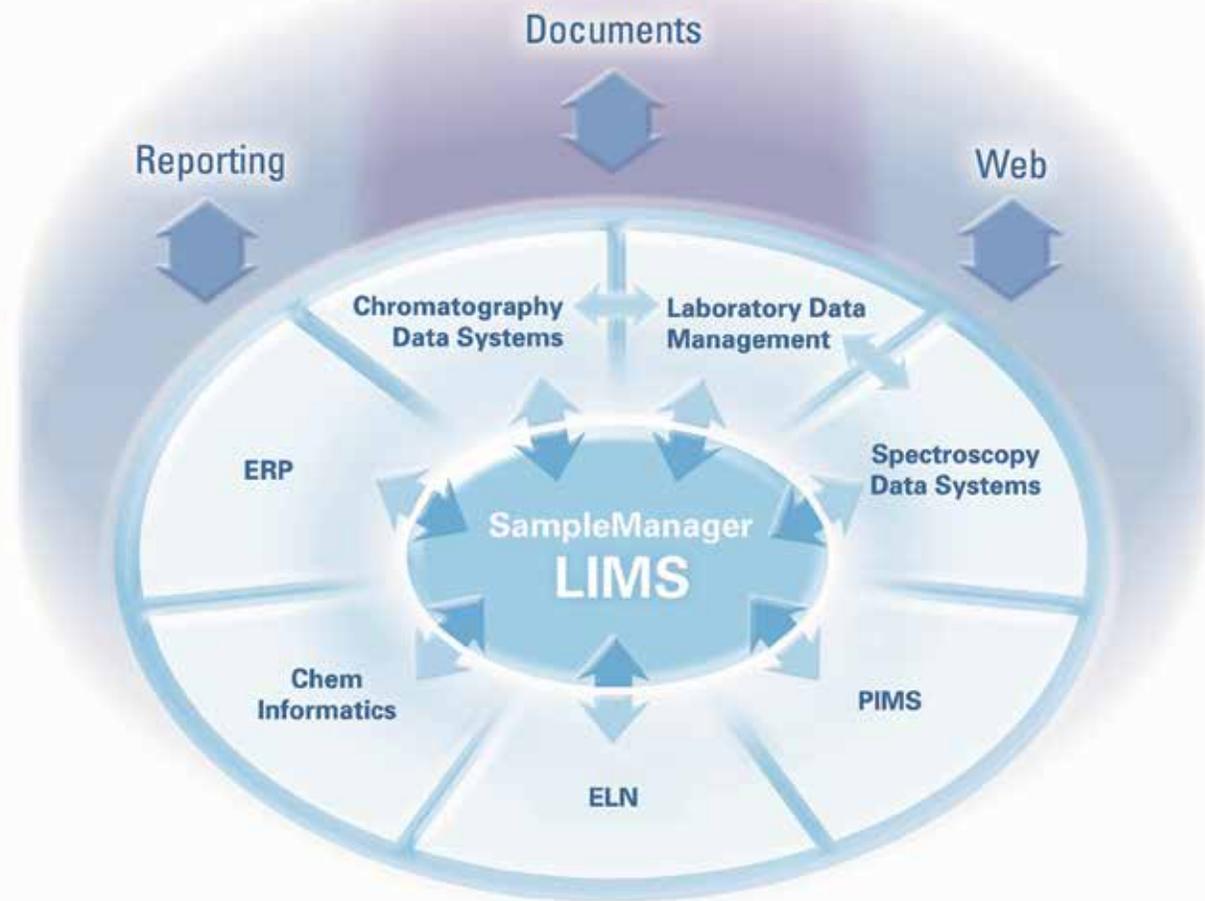
Integrity challenges will also evolve. The water cut rises in oil fields over time and once water breakout conditions are reached and the limit of water-carrying capacity of the water-in-oil emulsion is exceeded, corrosion rates can accelerate rapidly. "Well-integrity management systems that incorporate advanced corrosion modelling capabilities can generate the real-time evolution of corrosion rates, automatically triggering chemical treatment workflows to bring the corrosion back under control," Smith concludes. "Implementing a software system is generally a long-term decision so it is important that the system implemented is structured in a flexible way to be future proof. The integrity challenges of tomorrow may be hard to anticipate today, but it is wise to be prepared. The ability to quickly adjust to new threats will be essential." ■



CORPORATE INTRODUCTION

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I.T.Ex QUALITY SERVICES (ITEx) was established in 1994 as a technical inspection organisation with the purpose to provide worldwide high quality services [*Inspection, Expediting, TPI, QA Audits, Vendors assessment, Site QA/QC activities, Inspection Coordination etc.*] to all customers, fulfilling their requirements and offering quality solutions at the most cost effective conditions.



Engineering Defensibility

Jeanne Mensingh, president and founder of Labtopia Solutions, Thermo Fisher Scientific Partner explains how LNG labs can use data management tools to improve the reliability of their results and strengthen the business they serve

Laboratory data is critical to every part of the LNG industry. From soil sample data for upstream exploration to purity data used downstream to ensure product quality, LNG professionals rely heavily on timely, accurate and well-organised sample data.

These data must be reliable and defensible. Fortunately, many laboratories adhere to strict protocols to ensure data accuracy – they can ill afford to have decision-makers question what they're seeing. The real challenge for these labs isn't data quality; instead, it's the ability to prove data quality as efficiently as possible. In a word, the lab's findings must be defensible:

based on proven processes and robust supporting data.

This data-driven approach to lab data reliability is nothing new: ISO 17025, the international standard for testing and calibration laboratory competence, has mandated comprehensive data collection and management for 15 years. What has changed are the software solutions that labs can deploy to meet this challenge.

The importance of data management

A laboratory test result doesn't exist in a vacuum: even a common gas chromatography result is the sum of many complementary parts, from supplier shipment data and staff

training records to carrier gas and reagent quality checks. Ideally, all of these data work together to prevent errors and make results more defensible.

Historically, defending data has been a time- and labour-intensive process. Lab employees had to collect data from dozens of different sources – including handwritten notes – to build a case in support of a disputed result. Even today, many labs spend as many as ten hours a week manually collecting and managing data. This represents a lot of time spent on manual and labour-intensive tasks that could be better spent on more important or revenue-generating activities. Time spent on

these manual tasks represents a significant opportunity cost.

Fortunately, comprehensive data management software makes it much easier for today's labs to defend their data.

Laboratory Information Management Systems (LIMS), first introduced in the 1980s as basic sample management and data reporting tools, have today grown into comprehensive platforms that gather, monitor and manage all laboratory data and records. They also serve as the integration point for all lab instrumentation and can also link to enterprise systems such as PIMS, MES and SAP. Having all these data well-organised and readily available makes the process of defending lab results much easier, allowing lab employees to focus on productive work and assuring management that the data they're relying on for key business metrics are defensible.

Gas chromatography, a common analytical technique in LNG laboratories, serves as a useful example of the sheer volume of data necessary to support the validity of a single lab result. A LIMS allows lab employees to easily access these data when and how they need them, ensuring the reliability and defensibility of all test results.

Case study: gas chromatography

Gas chromatography (GC) is used to determine the composition of a liquid or gaseous sample. It works by vaporising a sample and then sending the resulting gas through a coiled tube, called a column, filled with an inert carrier gas. The sample's constituent gases are slowed down by the carrier gas as they pass through the column; each constituent gas is slowed to a different degree depending on its molecular structure. By measuring the time it takes each constituent molecule to reach a detector at the other end of the column as well as the volume of each constituent, lab professionals can determine the composition of the sample as a whole.

The goal here is not to provide an in-depth explanation of GC, but rather to make

clear the enormous number of variables that can influence a GC result. Everything from technical errors, such as using the wrong column or improperly calibrating an instrument, to staff management errors, like improper training or manual data entry inaccuracies, can render a lab result indefensible.

To defend their results, labs must account for all the variables and provide evidence that they were executed properly. A LIMS makes this much easier by automating the entire data collection and reporting process.

Technical quality

Technical quality data include all variables involved in producing an accurate result from an instrument. These data are different than those related to employee performance, which primarily concern the lab staff's competency and adherence to standard operating procedures (SOPs).

For GC analysis for the LNG industry, relevant technical quality data would include reference material certificates, records of approved suppliers, maintenance records and more. A LIMS provides an entire suite of capabilities for managing these data.

Suppliers

Labs require many consumables to operate GC analysers. Rather than retest all of these consumables as they arrive at the facility, most labs find it easier to build a network of trusted suppliers. These suppliers likely have a well-earned reputation for quality which they can support with their own laboratory data.

A LIMS can automate supplier data management by associating materials with a supplier as they enter the facility. If a technician needs to defend the results from a test, she can reference the LIMS database to verify that all consumables used were from approved suppliers. If they are, she can partially rule out consumables as a fail point.

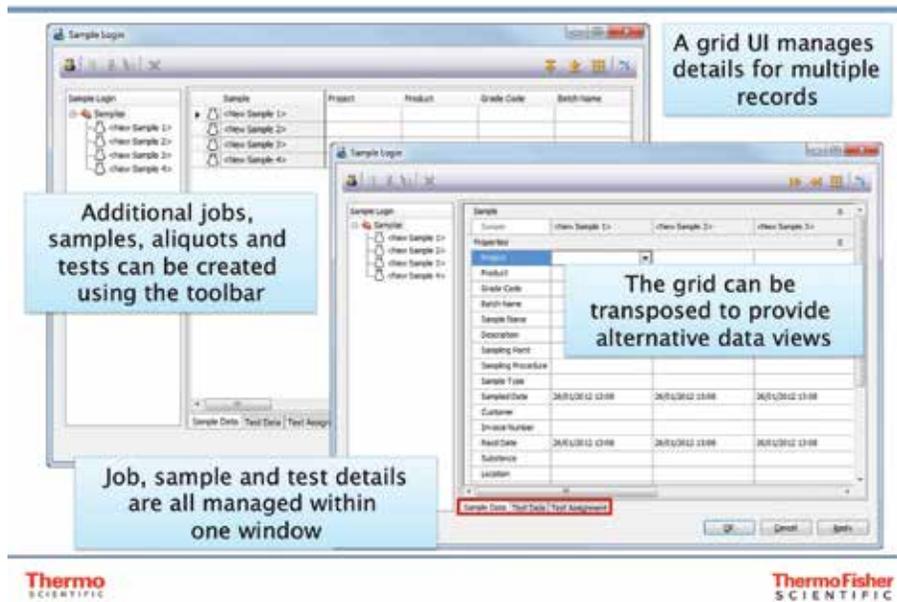
Consumable quality

Verifying that a consumable comes from an approved vendor is only part of the equation. Consumables can also go out of specification during storage or use. Fortunately, a LIMS can help solve this problem as well: lab administrators can configure the LIMS to trigger periodic consumable quality checks. Together with verification of supplier data, this capability can help labs avoid the inadvertent use of out-of-specification consumables.

Standard Dashboards



Multi Sample Login



To prevent this, labs must be able to comprehensively monitor the execution of laboratory processes and reference them to individual results.

A LIMS achieves this by storing and automating SOPs to walk staff members through each process. As staff progress through the steps of an SOP they mark their progress in the system, creating records to document that they executed everything correctly. Process errors can be reported to a lab manager in real-time, allowing them to correct problems before erroneous results are even reported. In fact, multiple SOPs and workflows can be stored in the LIMS so that changeover for production can be done in the most efficient manner possible.

Data entry and transcription

Manual data entry errors made by staff can significantly affect lab results. Even if a process is nearly entirely automated, a single manual data entry error can make the result indefensible. A LIMS helps alleviate data entry concerns by automatically collecting and aggregating lab instrument data. A vendor-agnostic LIMS is particularly important, as it's capable of interfacing with a broad range of instruments from multiple vendors.

Conclusion: complete traceability

The areas covered above are not an exhaustive list of variables involved in GC analyses. But they do demonstrate the point – there are many ways for a single experiment to go astray and lead to a disputed result. Defending results is about more than simply verify inputs and outputs; it's about documenting complicated processes rigorously at every step.

A LIMS can provide complete visibility into processes and the staff that execute them. Moreover, it can direct processes in a manner consistent with SOP. This complete traceability – from materials supplied to training and instrument calibration – significantly streamlines laboratory operations and provides critical data defensibility. ■

Instrument maintenance and calibration

GC analysers must be regularly maintained and calibrated to deliver accurate results. To defend their results, labs must also be able to demonstrate adherence to proper maintenance procedures. This is another area where a LIMS excels. Lab managers can organise and retrieve records by instrument, time period and even staff member, allowing them to demonstrate that the instrument in question is adhering to a pre-defined schedule. Verifying this would be much more time-consuming and error-prone in a paper-based environment.

A LIMS adds additional value for calibrations that require certified reference materials. In addition to tracking the calibration itself, the LIMS can store reference material certificates that demonstrate the quality of the materials used.

Staff performance

In addition to instrument error, lab results can also be invalidated by human error. Human errors in the lab originate from issues in one of three broad categories: training,

process and data management. A defensible lab result must be able to demonstrate that the lab staff that produced it did not inadvertently make errors in any of these areas.

Staff training

New lab staff typically undergo initial training on the unique processes within their new work environment. Regular retraining is necessary as processes change. Training for each employee must be closely monitored to ensure that they're up-to-date; otherwise, results from any part of an analytical process in which they participate could be questioned. Maintaining these accurate and up-to-date staff competency records is an onerous process that can be simplified by storing all personnel training records within the LIMS.

Process quality assurance

Human error is one of the most common causes of failure in any process: small errors in the execution of a GC analysis can render a result invalid.

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Always bigger, always faster

The increasing pressure on the supply chain by the increase in capacity and the accompanied expectancy in the industry has its profound effect. As an example the tube and pipe manufacturer VandeGrijp in the Netherlands could be used



Conveniently located, just upriver from Rotterdam, in Papendrecht, Holland sits its versatile workshop with a pipe mill for dredging pipe lines. Based on its experience building pipelines VandeGrijp branched out in tools and parts for dredgers, like spud poles, suction lines and valves.

Since the dredging industry started using ever larger vessels for efficiency to complete large projects in shorter time frames, VandeGrijp grew its bending capacity for bending to be able to build the larger tools that were needed. With the size, the weight increased and materials could not always be shipped out by truck anymore. The location at the river offered VandeGrijp the possibility of

using barges to ship completed projects over water, basically to anywhere in the world. To accommodate, VandeGrijp invested in a



Ro-Ro quay to offer a more convenient way of loading.

In larger projects the total supply chain may consist of many companies putting a lot of pressure on the total project time span. A component shop like VandeGrijp should therefore have an increasingly fast reaction time, while maintaining quality of service.

At VandeGrijp, maintaining flexibility throughout the process, while producing at the highest quality is part of the culture. Since its capacity for bending increased so much over the years, VandeGrijp started getting large orders for the offshore industry as well. To accommodate these larger components, VandeGrijp invested in a new assembly hall, with an even larger roll-bending machine capable of cold rolling 150mm thick steel. Tube diameters up to 10 metres could be accommodated in the new hall.

With the added capacity, VandeGrijp is now able to build large single items, like spreader beam or pile hammer, but also foundation piles. At the same time, VandeGrijp can quickly react to orders for winch drums or produce some kilometres of flanged pipe for the dredging industry, while maintaining the agreed projects schedule and quality standards. ■

Further information

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Seeking peace of mind in aviation

Entering ever more remote regions drives increased safety considerations

As scarcity of resources continues to drive the search for energy into ever more remote regions, companies are increasingly having to plan around mounting geopolitical risk in unchartered territories, while trying to keep costs under control.

Greater risk has increased the need for firms to seek better logistical expertise and advice, especially in aviation, where the requirement to balance cost-effectiveness against high standards of safety is paramount. Some recent aviation disasters in the oil sector saw workers refuse to fly, causing further downtime. Clearly, the prospect of this type of standoff is not sustainable, and consequently some organisations are adopting aviation policies to establish guidelines for the use of aircraft.

A number of oil and gas companies rely upon the knowledge and expertise of air charter companies with developing and implementing a strategy for safely procuring aircraft for projects across the globe. However, choosing a charter broker can be a challenge in itself. There are multiple suppliers, but not all of them are adequately equipped to provide the necessary levels of quality assurance which are demanded by the industry.

Some charter firms can act as 'single source' brokers, offering commercial jet, freight and private jet solutions, to companies seeking a total outsourced solution for all their requirements. This may extend beyond crew

rotations to flying Board members and the transportation of vital equipment. Unforeseen interruptions to the supply chain can be extremely costly, but charter solutions can offer a speed of response and flexibility that means goods are quickly moved to the areas of production, minimising disruption.

Growing geopolitical instability in unchartered territories has placed even further emphasis on safety, with companies putting in place contingency evacuation plans. Graham Davey, head of the emergency planning division at Air Partner remarks that he has seen "a significant increase in demand for emergency planning and evacuations over the last couple of years, with much of this coming from the oil and gas sector. Clients want to plan how they can safely get personnel out of isolated areas in a hurry."

Established aviation charter firms are well placed to execute on the exacting needs of oil and gas organisations by having not only a holistic view of the supplier and operator market, but a sound appreciation of the specific needs of the sector. As independent brokers they are able to maintain competitive prices and demand better safety standards.

"Over the years Air Partner has designed and rigour-tested a quality assurance methodology that maintains the highest of standards, providing unrivalled confidence to its clients," Davey continues.

Your aviation policy should include:

- Airlines must adhere to the OGP standards as a minimum requirement, however we recommend clients seek higher standards of aviation practise, for example:
- Preference for use of Western (or newer) aircraft
- Two pilots on the flight deck
- Use of multi-engine aircraft where possible
- Strict 'no fly policy' for blacklisted operators
- Compliance with 'local content' regulations where necessary – ask your charter broker if they can manoeuvre Western aircraft in blacklisted countries
- Suppliers must hold valid, current and adequate insurance for your needs
- Suppliers should be able to provide 24 hour support and be able to respond in real-time

By choosing the right charter partner, organisations can maintain their cost base in ever more demanding and complex travel scenarios whilst improving supply chain reliability and safety. ■

Further information

Air Partners
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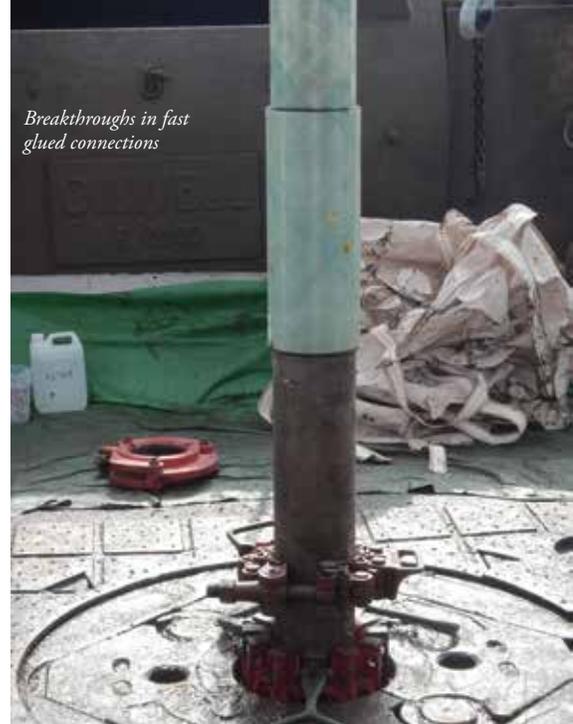
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*Crossover
Composite to Steel*



*Breakthroughs in fast
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Innovative materials for well construction

Since the early days of drilling the industry has faced the challenges of securing the integrity of wells against collapse and unwanted in- and outflow of liquids and gases from the formation

Steel has proven to be a versatile and robust material and for decades all casings, tubings and liners were manufactured from different grades of steel. Sizes were standardised to ensure compatibility with drilling rigs and auxiliary equipment.

Nevertheless steel has some properties that cause problems that are often hard to negate or that are costly to circumvent. The most common of these is corrosion, which can severely limit the long-term integrity of wells and can lead to early abandonment. Resources are then left only partially exploited or significant expense in the form of drilling new wells is incurred. Corrosion can be limited or eliminated by a number of methods such as the use of chromium or nickel alloys, cathodic protection or coatings. These methods are costly and in many cases only partially solve the corrosion problem because the root cause of corrosion, steel as casing material, has not been eliminated.

Another inherent property of steel for tubulars is its specific weight. The easiest example of this is the sheer complexity

and size of drilling rigs that are required to support the weight of free hanging strings of steel tubulars in the well. Another example is in extended reach drilling where the maximum drillable outstep easily exceeds the achievable reach of steel casings or liners. This may lead to long stretches of well that are left bare, reducing productivity and risking collapse of the well.

Composite tubulars (using glass fibre reinforced epoxy) have developed into an alternative to steel because of resistance to corrosion and significantly lower specific weight. Although composite tubulars are proven as reliable alternative to steel their use is limited because of relatively low ratings for collapse and burst and lower tensile and compressional strength. But more importantly, to give the joints enough strength these have to be wider than typical for API graded steel tubulars. Valuable space down hole is lost and problems may arise in the use of auxiliary tools and equipment.

In the last few years developments in composite technology have largely eliminated these shortcomings of composite. With new

production technologies producers are able to position the fibres in the composite material exactly in the direction of the largest forces in any particular application. Couplings can be made as slender as those of API graded steel tubulars and new cross-over technology allows running mixed steel-composite strings.

This brings new possibilities to operators. Combinations of steel and composite can be used to complete a well in such a manner that the composite is used in corrosive strata while the remainder of the completion is in steel. Collapse and burst properties can be over 3000psi (207bar) and 5580psi (385bar), respectively and tensile loads of 280klbs (1260kN) can be absorbed by a 7 inch casing.

This opens up opportunities for applications in ERD wells where the composite tubular is almost floating in the drilling mud and can be installed in horizontal stretches of wells for thousands of feet in a single run. The completed system can allow for continuous logging of the reservoir because electromagnetic rays pass through the composite undisturbed. With time lapse logging gas fronts or oil-water contacts can be monitored enhancing control while reducing risk and cost.

With these new composite tubulars operators can go beyond the limitations of steel and yet be secured that wells will last as long as the reservoir does. ■

Further information

Akiet
www.akiet.com

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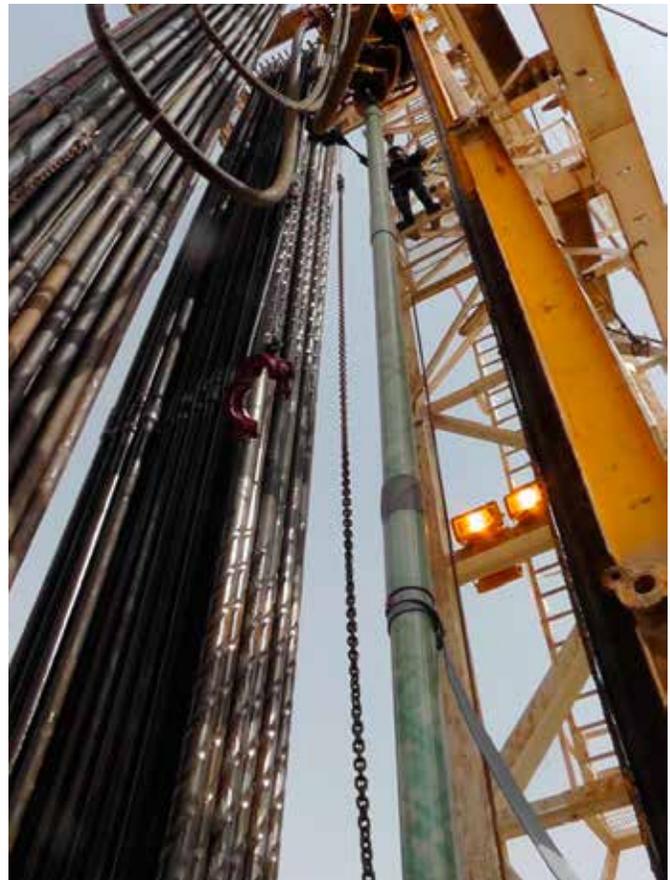
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For more information please contact:

WEP ME LLC (Well Engineering Partners Middle East LLC)

PO box 919

Postal code 100

Muscat

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Mr. Manoj Kumar

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Safety by design

Lester Millard, managing director at Alcatraz Interlocks takes a look at the use of key interlocks as an effective, safe locking device in preventing process control equipment from being incorrectly operated



Petrochemical and chemical processing industries have a disciplined method to design and operating practice, ruled by international standards and enforced by regulators and authorised notified bodies. Protocols are unavoidably victim to 'human error'.

Probability and accountabilities

The Health and Safety acts that may vary around the world, check your own local act, assigns the responsibilities on employees who design, manufacture and or supply equipment for use at work to ensure as far as is reasonably possible that all is safe.

When operators rely on written safety procedures (protocols), in actual fact they are relying on the employee to follow the guidelines exactly, 100 per cent without failure. How can an operating company reduce this risk and eliminate such possible errors? Alcatraz Interlocks provides a full mechanical solution with mechanical key interlocking on all types of valves, gears and switches.

Mechanical key interlock systems are twin-keyed mechanical locking devices which operate on a 'key transfer' principle to control the sequence in which process equipment may be operated. This system is widely accepted as an effective safety management tool and is being adopted by many of the world's oil, gas and chemicals majors. Valve mechanical interlocks are also recommended in a number

of internationally recognised standards for specific process applications.

Trapped key interlocks are applied to valves, gears, pig launcher closure doors, switches, machine gates and still to this day, railways or any form of equipment which may be operated by a human. The 'open' or 'closed' position of a locked valve, of an interlock can only be changed by inserting a unique coded key; inserting the key unlocks the operating mechanism enabling the operation of the valve or other devices.

Operating the unlocked equipment immediately traps the initial (inserted) key; when the operation is complete, a secondary (previously trapped) key may then be released thereby locking the equipment in the new position. This secondary key will be coded in common with the next lock (item of equipment) in the sequence. By this simple coded key transfer principle a 'mechanical



logic' system is created which prevents any operator error.

Whether a process system is of simple design or controlled manually, key interlocks can provide a reliable mechanical assurance of safe operating practice in which the operator's scope for error will be eliminated.

Whether adopted as a primary or secondary safety system, key interlocks can be customised by the Alcatraz design team, to fit any type, make or size of valves, switches or devices.

Among the standards for specific process applications are:

Alcatraz Interlocks are all Fire Safe to API 607 6th Edition

EN 1088 (ISO 14119)

API RP 520 – Pressure Relieving Systems for Refinery Services.

BS EN62061:2005 Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems.

BS PD 5304:2005 Safe use of machinery.

BS EN 954-1 1997 Safety of machinery.

BS EN 1037:1996 Safety of machinery: Prevention of unexpected start up.

BS EN 60812:2006 Analysis techniques for system reliability. Procedure for failure mode and effects analysis (FMEA).

The applications include: changeover of pressure relief valves, loading and unloading of pig traps, sampling devices, industrial mixers, separators, filters and granulators.

Alcatraz is famous for its innovative and flexible engineering department. In close co-operation with the customer, Alcatraz develops a safety system specially designed for the individual situation. Alcatraz offers effective and reliable safety systems safeguarding the most complex operating sequences, special locks for pneumatic valves, loading and discharge equipment or switches.

To reduce delivery time, Alcatraz maintains a stock of most major parts of its safety systems. ■

Further information

Alcatraz Interlocks

www.alcatrazinterlocks.com

HOW CAN WE PREVENT THAT ALL RELIEF VALVES ARE BLOCKED AT THE SAME TIME?



Having a spare relief capacity enables continuous production while conducting maintenance on your system on a live plant without a shut down of the process. These twin or multiple pressure relief systems are often fitted with isolation block valves upstream and downstream of each safety relief valve. Alcatraz Interlocks are an adequate solution to prevent blocking all relief valves at the same time.

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Sized material strengthening provides improved drilling performance

Despite low oil prices, operators still have wells to drill and this has emphasises the need to keep operating costs as low as possible

One particular problem that drillers face, whether on land or deepwater, is that of lost circulation, where the drilling fluid is lost into fractures in the formation being drilled. This has inspired the use of specialist techniques, one of which uses carefully selected 'sized particles' to bridge the openings in the rock and thereby stem the losses.

This particular technique is known as 'wellbore strengthening' and enables operators to drill deeper on some sections without incurring losses. In some cases it also allows them to drill deeper and possibly reduce the number of casing strings. Substantial cost and time savings can result.

There is a problem though. When the drilling fluid used to clean the wellbore returns to the surface, the drilled rock and the expensive 'sized particles' are mixed together making it difficult to remove the drilled rock without also discarding the valuable 'sized material'.

One option commonly used, known by drillers as 'drilling dirty', is simply to bypass the conventional solids removal system and recirculate all the solids, good and bad, back into the well. This however makes effective management of drilling fluid properties almost impossible and, to deal with the increase in solids content, the drilling fluid must be diluted. Given the volumes involved, this can be very costly and involves significant logistical issues. The cost of drilling fluid alone on some wells drilled in this way is known to have exceeded \$8 million.

An alternative method, introduced and patented by Axiom Process, is to use the high performance three deck shaker system which is configured to remove the drilled solids but also to capture and retain the valuable 'sized material' fraction. This technique is known as Sized Material Retention (SMR).

Used in over 60 wells, this simple though highly innovative approach can effectively reduce the cost of drilling fluid by up to 60 per cent compared to 'drilling dirty'.

At a time when operators are seeking opportunities to reduce the cost of drilling wells, techniques such as 'wellbore strengthening' can make a real difference. As explained however, new techniques often require complementary, 'enabling' technologies to ensure that they deliver the right result with minimum disruption. This is certainly the case when combining 'wellbore strengthening' and 'sized material' retention. ■

Further information

Axiom Process
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Filtration and water treatment systems

Effective water filtration is vital to the productivity of oil and gas production



The growing demand for energy throughout the world is increasing the drive to maximise production from reservoirs whilst also reducing the production costs.

An important part of this process is the filtration. BEA Technologies can define and supply the optimal turn-key solutions for the filtration and treatment of water and water based completion fluids depending on the characteristics and composition of the fluid.

Filtration is required for: injection water treatment systems; cooling water filtration to protect heat exchangers and bearings; service and utility water filtration; pre-filtration for reverse osmosis (RO) desalination systems;

filtration of seawater for pipeline flushing; and source sea-water treatment systems.

To satisfy this need it is necessary to install reliable filters and filtration systems for the separation of solid particles from 3,500 micron to 0.2 micron. To achieve this range of operations BEA can supply the following type of filters: self-cleaning sea-water automatic filters up to 6,000m³/hr per unit; basket strainers for service and source water filtration; bag filter units, available in single or multiple bag vessels; high pressure cartridge filters for water injection; skid-mounted systems for cooling water filtration; pre-filtration to protect RO systems; activated

carbon filtration systems; filters for the retention of high quantity of fine particles from produced water; and high-pressure filter for injection of chemicals.

The removal of particles, of 50 micron or less, represents the most significant quantity of particles to be removed in offshore applications and especially in recovery of produced water. ■

Further information

BEA Technologies
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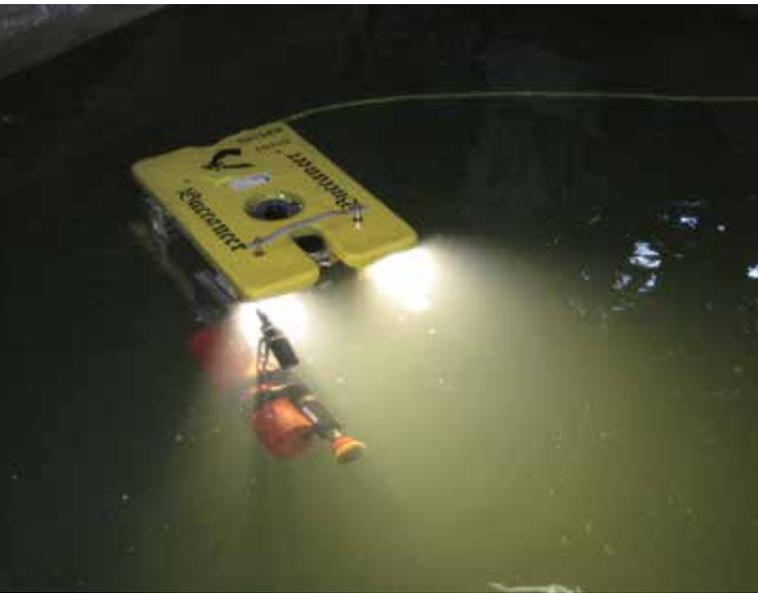


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ODIN: Diverless Hull Inspection

Despite the effects of low oil prices, the continuing growth in the floating production sector shows the industry's strong preference for floating assets for deepwater exploration and production, EM&I Group writes

Many operators expect to remain on station for extended periods up to 25 years, and this brings a number of integrity and compliance challenges particularly in a climate of cost reduction. A primary reason for coming off station is related to maintaining hull integrity.

Regulators and class societies require operators to demonstrate the integrity of these key components and traditionally this was achieved by drydocking.

More recently, alternative methods such as divers or work class ROVs have been used, but these solutions are costly and incur significant safety, commercial and technical risk.

The industry responded by forming the Hull Inspection Techniques and Strategy (HITS) joint industry project to look at ways of improving the approach to hull inspections and one of the key areas of focus was the inspection of the underwater hull.

The EM&I Group is a founder member of HITS and has been a market leader in asset integrity management services to the oil and gas industry for over 30 years.

"The last ten years have been spent developing new asset integrity strategies for floating offshore assets, based on a 'No Drydock... Safely' concept," says Danny Constantinis, CEO of the EM&I Group.

The development of ODIN, EM&I's

Diverless UWILD (underwater inspection in lieu of drydocking) methodology is an intrinsic part of this package.

ODIN was demonstrated to class societies, regulators and operators worldwide in 2014 which led to acceptance by the major class societies and Bahamas Flag. The ODIN methodology was proven and refined on two operating FPSOs in Brazil in 2014.

The drilling industry was quick to see the benefits of the ODIN approach and fleet-wide contracts were awarded by three major drilling companies in early 2015.

Drillships required the introduction of three innovations: remote laser cameras to inspect moonpool welds, maintenance/inspection-class ROVs (to both clean and inspect critical areas) and a method for installing class-approved ODIN inspection on internally coated and rubber-lined lines without affecting coatings.

ODIN is a complete hull structural integrity package that gives operators and regulators better information on hull condition. It allows a detailed inspection and functional test of critical isolation valves whilst the valves are in-situ, a job that would require divers to blank off the hull openings and a maintenance team to strip the valves down for inspection.

ODIN also enables the inspection of the outside of the hull from within, thus avoiding

removal of marine growth and avoiding damaging coatings.

The inspection programme can be periodic or spread over five years as part of the hull internal structural inspections thus benefiting operators by avoiding additional tank entries and reducing overall annual costs.

Cost reductions are around 20 per cent, even in the first year (which includes set-up costs), and overall cost reductions are greater than 30 per cent over a five-year period. ODIN is not weather sensitive and thus budgets are very accurate.

Drilling operators gain additional benefits because, unlike FPSO/FLNG operators, dynamically positioned MODUs cannot put divers in the water or the moonpool for safety reasons, the only option being to come off station and off-hire.

ODIN inspections can be carried out while the asset is on-hire and this makes drilling companies more competitive with their own clients by bringing in first hydrocarbons earlier. ■

Further information

EM&I

www.emialliance.com

It's good to talk



It has become evident that communications technology is changing the maritime industry on a daily basis. Historically, the maritime industry has lagged behind the land-based systems and it has become generally accepted that technology had simply not reached the vessels sailing the globe.

What about today? In today's society almost everyone is connected, it can be through their Mobile Phone (GSM), laptop or almost any device acting as a mini

computer. Indeed it could be claimed that it should be considered a norm to be socially connected and able to connect to anyone, whether you are sailing the Singapore Straits or working in the Gulf of Guinea.

A survey carried out by Futureonautics Research in collaboration with the Philippine Transmarine Carriers between December 2013 and March 2014 reveals that some seafarers still do not have access to phones on board vessels. Furthermore the survey indicates that seafarers spend an average of USD135 per month to communicate with family and friends. However, six per cent of seafarers have no access to any form of communication at all.

Development of maritime technology and costs has been the main hindering factor for vessel owners to initiate communication platforms for crew in the past. Technology has

Welfare on board vessels is beneficial for crew and for company

moved forward in the maritime industry and now there are simple GSM systems available on the market that work with almost any type of satellite systems currently on board (any VSAT terminal, Inmarsat Fleet broadband, Iridium Open Port, Thuraya IP and more).

Simple solutions often are the greatest answer to complex issues that arise when sailors are sailing the seven seas far away from family and friends. High quality, affordable solutions for the maritime market can clearly benefit crew in their off time on the vessel and the company by having a happier crew in the workplace. ■

Further information

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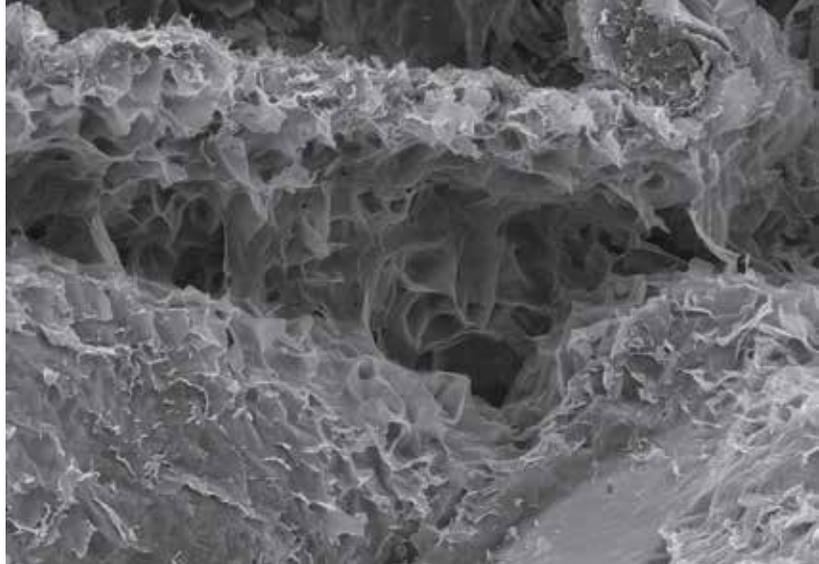
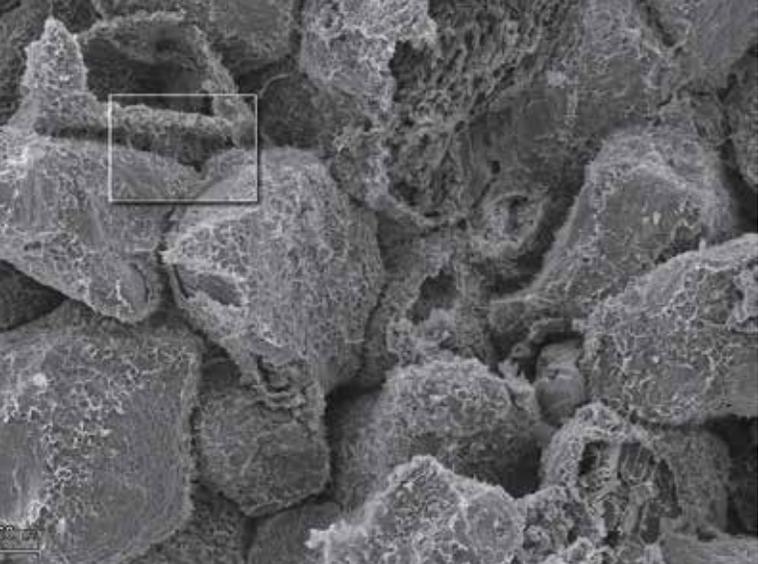
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Inquiries: info@on-waves.com

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You can't get blood out of a stone

As oil and gas companies look to maximise productivity from each reservoir and avoid expensive drilling issues accurate mineralogy data is growing in importance for the industry

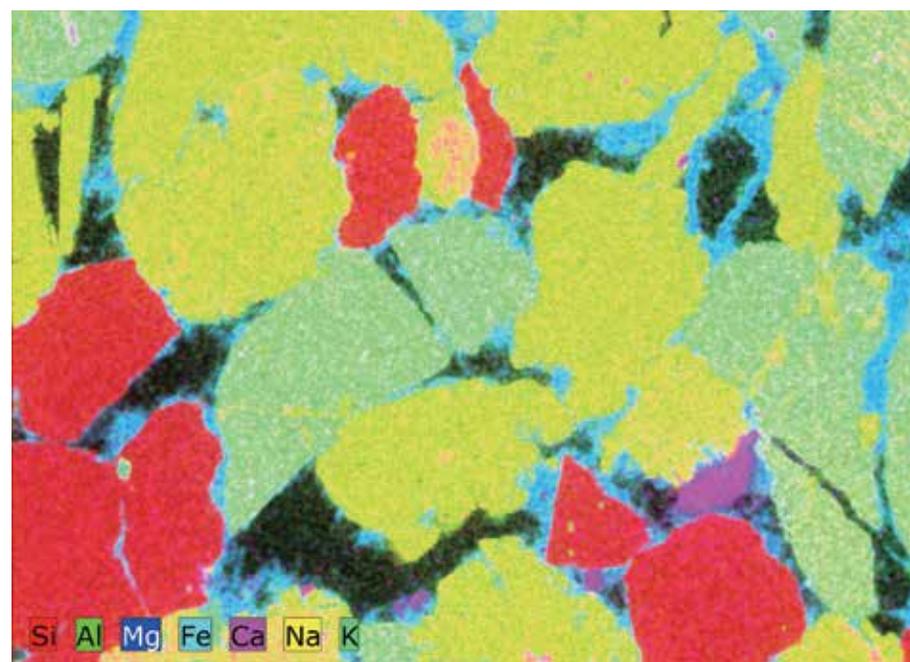
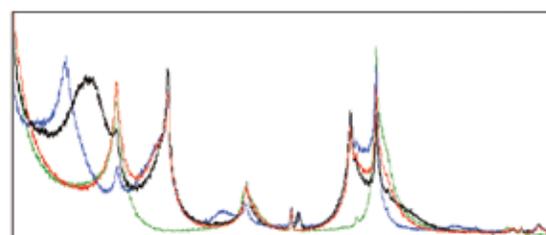
The old proverb was first recorded in Giovanni Torriano's Second Alphabet, 1662:

'To go about to fetch blood out of stones' and represented the attempt to do what is impossible.

Strictly speaking this is still the case, however the science of Mineralogy (a subsection of geology, specialising in the study of the chemistry, crystal structure, and

physical properties of minerals) is getting us much closer to understanding the composition and structure of stone and helping us shape not only the geological sciences, but modern industrial processes.

Early writing on mineralogy has been found in several ancient cultures, Babylonia, Greco-Roman world, China and India. Historically, it was heavily concerned with taxonomy of the rock-forming minerals,



there are over 4,000 species of minerals recognised by the International Mineralogical Association. However recently, driven by advances in experimental technique such as X-Ray Diffraction (XRD), Scanning Electron Microscopy (SEM) and Infra-Red (IR) Spectroscopy the science has been put to more pressing and modern-day industrial questions such as quantitative mineralogy. This is particularly true for mining and oil and gas sectors.

Mineralogy matters.

Mineralogy holds the key to unlocking the characterisation of the properties and quality of reservoirs and seals; it influences decisions and understanding of reservoir quality, trap integrity, seismic response, log response and calibration, drilling fluid design, borehole stability, and fracture properties.

WHAT IS X-RAY DIFFRACTION?

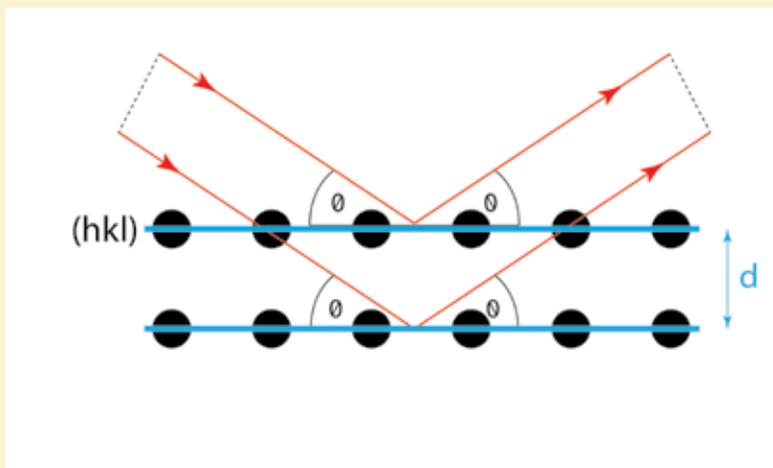
X-Ray Diffraction (XRD) is an extremely versatile technique that can be used to identify any crystalline substance, such as most minerals. It can also be used to quantify the proportions of different minerals or indeed many other substances when they are present in a mixture. Crystalline minerals have regularly repeated arrangements of their constituent chemical atoms described as their crystal structures. Indeed it is the crystalline structure of a mineral that fundamentally defines what mineral it is. The wavelengths (λ) of X-rays are similar to the distances between atoms in crystal structures and as a consequence crystal structures may act as a diffraction grating for X-ray. If a monochromatic X-ray beam is used the peaks of constructive interference in the resulting diffraction pattern can be related to distances (d spacings) in the crystal structure via the well known Bragg equation

$$n\lambda = 2d(hkl)\sin\theta$$

where n is an integer, λ is the wavelength of the X-rays, d is a spacing between planes (hkl) of atoms in the crystal and θ is the angle of incidence of the X-ray beam.

The diffraction pattern is in effect a finger print of the crystal structure and may be used to identify the mineral(s) in a sample when examining an unknown specimen, because different minerals have different characteristic XRD patterns. Most clay minerals are beyond the limit of optical microscopy and it was the advent of XRD techniques that led to the discovery that most clay minerals are crystalline; without doubt XRD remains the most important tool for the study of clay minerals.

Like many analytical methods obtaining reliable powder XRD data is very dependent on sample preparation. In particular, particle or crystallite size must be suitably small (microns), and texture in the specimen, known as preferred orientation, must be avoided since it will bias the diffraction data. Spray drying of micronized specimens is ideal. Reliable diffraction data are essential for mineral identification but they are indispensable if a quantitative analysis is required to determine the amounts of different minerals present in a mixture. Quantitative analysis of materials by XRD has a long history. Up to around the mid 1980's mostly single peak based methods were employed. Since then there has been a major growth in the use of full pattern methods wherein every data point in the pattern is used rather than just a few selected peaks. For accurate clay mineral analysis so called pattern summation methods are arguably the best approach since as well as accounting for peak overlaps they explicitly include the background so that disordered and X-ray amorphous phases, for example volcanic glass, can also be quantified directly.



Decreasing risk and uncertainties comes with obtaining accurate, precise and robust mineralogy to understand and predict the properties of rocks.

The most difficult of all minerals to analyse are the clay minerals; but they are also the most crucial to all of the rock's properties and the models that are used in the industry today.

At The James Hutton Institute in Aberdeen, formerly Macaulay Institute, there is a long history of research into clay minerals in the petroleum industry and the quality of our accredited mineralogical analysis services is internationally renowned.

Our scientists have developed new innovative procedures for the quantitative analysis of the mineralogy of rocks by XRD methods providing better accuracy and quality of characterisation that is improving the capabilities and providing new opportunities in this challenging field. They also provide complimentary techniques such as SEM and IR spectroscopy which, when they are combined, are often able to resolve even the most problematic samples.

For those who wish to increase their knowledge of clay minerals there is a popular and intensive three day course based in Aberdeen on 'Clay mineralogy and its

application to the oil industry'.

So while we are still not able "to get blood out of a stone" these sophisticated techniques are helping with what was once thought impossible - providing critical information to help industry find new fields, characterise reservoirs, improve extraction process and much more. ■

Further Information

James Hutton Institute
www.claysandminerals.com



Martin Jones CompEx Operations Manager presents the 50,000th CompEx Gas & Vapour Certificate to Shaun Mitchell (Haliburton) at the CompEx Stand at SPE Offshore Europe in Aberdeen on 9th September 2015

CompEx - enhancing your workplace safety with an internationally accredited scheme

Major oil, gas and chemical users and employers who have responsibilities for explosive atmospheres at work, remain loyal to the CompEx core competency validation scheme for both electrical and mechanical operatives/technicians and electrical application design engineers, with the new Ex14 Module for Responsible Persons due for launch in Q4 this year

Despite the oil price fall from USD124 – USD44 / barrel between July and December 2014 and a very slow recovery up to the Autumn 2015, there is still a healthy volume of personnel passing through the 48 Licensed CompEx Centres worldwide, striving to have their core competency validated in their relevant discipline. This enables employers/agencies to utilise staff with this accredited validation, with over 10,000 certificates issued worldwide in the last 14 months, enhancing the understanding of safe working in explosive atmospheres.

Operating now for over 21 years, the last two years has seen significant development and progress of the CompEx Scheme, the competency validation initiative, owned and operated by JTLimited, the CompEx Certification Body. Traditionally delivered in English, CompEx is now delivered in six different languages and operating in 18 countries, namely Azerbaijan, India, Italy, Iraq, Ireland, Kazakhstan, Netherlands, Nigeria, Oman, Philippines, Poland, Qatar, Singapore, South Africa, South Korea, UAE (Dubai & Abu Dhabi), United States, with centres in Australia, Brazil, China, Jordan and Myanmar currently in the various stages of development.

All candidates undergo a series of practical assessments to determine their

ability to correctly install, inspect and maintain a variety of equipment with different protection concepts, as well as having their underpinning knowledge of the IEC 60079 Parts 14 & 17 examined through an online theory examination.

The IEC Standards and latterly the US NEC 500 & 505 Code of Practice are at the heart of all CompEx delivery to ensure international conformity and harmonisation of safe working practices. This tried and trusted methodology has provided the major users with a pool of international core competent practitioners to utilise on the construction and installation phase of major projects and their subsequent inspection and maintenance activities as well as the operational activities involved with drilling and exploration platforms, offshore and onshore extraction activities as well as downstream refining operations.

In 2014, having successfully completed the four yearly cycle of witnessed assessments against the international standard ISO/IEC 17024 : 2003 'General Requirements for the Certification of Persons', JTLimited as the CompEx Certification Body were accredited by UKAS (United Kingdom Accreditation Service who are accredited by the International Accreditation Forum) to the latest standard attainable, ISO/IEC 17024 : 2012 making the

CompEx Certification Body one of the first certification bodies worldwide to achieve these exacting standards.

A world leader, one of CompEx's key strengths is that the oversight and drive to develop the scheme are firmly in the hands of major users of equipment – the companies responsible for safety in service. The impartial architecture of governance for the CompEx scheme secures impartiality by encompassing input from a huge variety of equipment user companies, through organisations such as EEMUA (Engineering Equipment Materials Users Association), offshore oil and gas operator associations, regulatory authority representation, employer and employee representation and from the experienced sector Engineering Managers who represent the CompEx Certification Body, JTLimited. ■

This article was written by Martin D. Jones, CompEx Operations Manager, JTLimited – CompEx Certification Body

Further information

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Competency in Explosive atmospheres



ATEX Certification Services (Houston, Texas) NEC 505 Practical Rig - CompEx covers IEC 60079 Parts 14 & 17; ATEX Directives and NEC 500 & 505 Codes and is based upon validating core competency by a series of practical assessments and an underpinning knowledge examination of the relevant standards.

New worker on site?
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Welding challenges for deepwater oil and gas exploration and production

It has been said for many years now that the 'easy' oil and gas has already been found. This is undeniable when you consider the extremes at which new fields are being explored and developed into profitable production offshore today



This is a key catalyst for upstream industry which has continued to innovate and achieve new world records in deepwater fields. Reaching miles down in the ocean and drilling well beyond the ocean floor, the collective upstream supply chain achieves new records regularly. Welding and its importance on the final integrity of every installation remains a critical path to the safety and success in the global upstream industry.

As the need to reach deepwater will continue to increase versus conventional plays, several challenges will continue to be introduced to the supply chain, especially related to the welding industry. A key question the engineer or designer continues to have to answer is, 'When will we reach the limits of material science and welding under such harsh conditions?' The primary challenges for contractor and welding industry is the increased use of higher strength materials, installations operating in more corrosive environments and higher well head pressures (HP) and temperatures (HT), collectively referred to as HPHT design.

The use of higher strength materials introduces several complexities into the supply chain from the welding perspective. We are talking about thick sections in a highly restrained environment and often built outside in yards subjected to all the extremes of weather. These are the three parts of the triangle that form the basis for hydrogen induced cracking (HIC). This isn't a new topic, however the challenges placed on the contractor and welding companies to reduce the presence of hydrogen in the welding environment remains a serious

concern, especially when the complexity of designs and material thickness increases. A key fact remains the consumables used during welding, welder skill and workshop practices drive success or failure in these applications. Recognising this fact, The Lincoln Electric Company has designed and continues to design the lowest diffusible hydrogen consumables in the world, thereby reducing one part of risk factors related to (HIC).

With deepwater production comes a more highly corrosive environment, including higher levels of hydrogen sulphide and carbon dioxide. In a time where the payback period of the project investment is being shortened and the life cycle of the installation extended, the role of the welding engineer and designer is critical. The use of super duplex and nickel base alloys will continue, particularly in the use of nickel-based cladding, which remains a critical and necessary project investment. Consider the following observation from an international super major: "If we released one or two large scale deepwater projects today at the same time, where cladding was critical to the project success, we could take up the global capacity of the entire industry." This demonstrates the point perfectly. Technology and innovation from the manufacturing side must accelerate to keep up with the future demands of the industry. New technologies are being developed to take laser and advanced waveform control to the cladding market, and Lincoln Electric is leading the way to take this manufacturing innovation to the market in the future.

With deepwater production, new records for wellhead operating pressures and temperatures will be set. High pressure and

high temperature applications are expected to increase, with BOP installs at >25,000 psi or more potentially becoming even more common. This will continue to challenge manufacturers to maintain the integrity of the base materials after welding, while still following historical industry codes governing the post weld heat treatment cycle and final weld properties (primarily hardness and strength). Each of these codes will need to be reviewed and challenged in the future to accommodate the need to maintain the integrity of the design after post-weld heat treatment at these levels. The Lincoln Electric Company, along with many of the leading business owners and contractors in the oil and gas industry, is participating in a very important organisation formed to address these types of questions. Led by the top universities in the United States focused on material science and welding, the Manufacturing, Materials and Joining Innovation Center (MAJIC), organised by The Ohio State University, Colorado School of Mines, Lehigh University and the University of Wisconsin is investigating and providing answers. Members of this organisation are providing input on different challenges determined by the membership to be critical to the future of the industry. The Lincoln Electric Company is proud to be a supporter of this organisation and recommends highly to the reader to investigate your own company's participation. ■

Further Information

The Lincoln Electric Company
www.lincolnelectric.com

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To find out more, visit us at www.lincolnelectric.com



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Arctic pipeline demands arctic pipelayers

As oil and gas reserves continue to be discovered in far reaching corners of the globe, the challenges of reaching, extracting and transporting them further afield will become more and more severe

The conditions that perhaps pose the most continuously relentless challenges to machines and operators alike are the freezing ambient temperatures within the Arctic Circle, where temperatures frequently drop below -50°C.

Without pipelayers that can withstand the extreme conditions, project efficiency grinds to a halt, resources stop flowing and in turn, so does profitability.

Alleviating the strain

Many projects require pipes to be welded outside of the trench and subsequently lowered into the trench as a big-long snake. With this system, several pipe layers need to be used and operated simultaneously.

The engine and fluids are the lifeblood of the pipelayer and are the mechanical factors that are most under threat from the sub-zero temperatures. As such, they should be protected by a series of advanced heating systems, including



coolant and air heaters, a heated battery compartment, heaters for the hydraulic oil and engine oil pan and a thermo insulation cover for engine hood. Both the engine and hydraulic systems should use synthetic oil.

If the fuel is untreated and exposed, a waxy solidification occurs that can be catastrophic for the engine's health. Therefore, a specialised in-fuel-line diesel heater should be installed to accommodate instant cold-weather starts and to prevent power loss and stalls.

The hydraulics for the side-boom

equipment are crucial, controlling the components most valued in any pipeline project. Often, operators face the problem of grease freezing in the boom of the hook hoist blocks. This can only be solved by diluting the Arctic grease with kerosene so the rollers start to properly rotate again.

Operator comfort

Operator comfort is key, so every effort should be made to ensure the operator can retain the desired performance levels in spite of the extreme weather conditions. You cannot control the weather, but you can control how you prepare to combat it by specifying machines engineered for your business requirements. ■

Further information

Dressta Pipelayers

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Corrosion Protection



HAE Management



Pressure System IRM



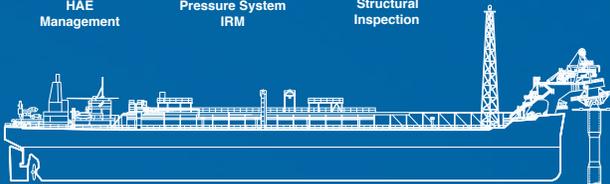
Structural Inspection



Flare IRM



Piping / Vessel R&M



Structural R&M



Integrity / Compliance System



In-Water Corrosion Protection



In-Water Inspection



In-Water Structural R&M



Moorings



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Cost-effective solutions to corrosion problems

From offshore structures to pipelines and refineries, corrosion plagues the oil and gas industry causing the loss of billions of dollars a year in maintenance costs

Threatened integrity caused by corrosion opens the door to safety critical issues such as the leakage of toxic gases and chemicals creating a significant liability for a company.

Oxifree's encapsulation process, using a patented polymeric resin with inhibiting oils, has proven successful in the prevention and protection of both new and old surfaces. Because our product is reusable, waste is virtually eliminated. Simply collect the excess material, remelt and reuse

Safety on offshore installations is paramount and with corrosion being the biggest enemy in this, compromising safety, Oxifree was developed to target these main areas: corrosion under insulation; firewater mains and deluge systems; flanges and bolting plant; valves; pipe supports; Christmas trees; choke valves; and pressure relief valves.

All of these form part of 'safety critical elements' that can compromise safety and production. Operators of offshore oil and gas installations know the history failure by their rigorous inspection and corrosion management programmes, until now there has been corrosion protection by painting, grease, Denso tape, galvanising, nickel plating and use of expensive corrosion resistant alloys.

Performance standards for corrosion control need to be supported by sound engineering justification and Oxifree was developed with these criteria in mind. Oxifree has been exhaustively tested to a wide range of industry approved standards.

That is why Oxifree Global can justifiably make claims that the longevity and cost effectiveness are unbeatable.

In action

Many multinational operators globally have approached us in the effort to determine if Oxifree can be successful applied to a wide range of equipment required for layup and mothballing due to the future expected inactivity caused by the potentially extended low oil price.



Oxifree's longevity is seen to provide the most practical mid- to long-term protection to the sensitive components where operators do not want to return to the installation for regular inspections.

As just one example Oxifree UK were contracted to coat a complete Christmas tree located within the North Sea to provide life extension of the asset and associated peripheries.

Oxifree UK visited the platform to perform

live component coating and protection using specialised ATEX rated equipment. The project involved coating one complete Christmas tree during a five-day operation.

The entire project revolved around the feasibility and practicality of Oxifree application on the asset. One complete operational Christmas tree was selected by senior operational staff to test the ability to coat and protect live equipment following the successful trial carried out over a 12 month period.

The five-day duration was selected to allow time to raise all permits and HSE documentation and to ensure the supplied equipment was suitable to complete works on the asset.

Oxifree UK were then contracted to visit the platform to carry out a coating project of a red anomaly Christmas tree stack. Following completion of the three-day project, Oxifree technicians were requested to remain aboard the installation to conduct further asset life extension on various different joints, valve assemblies and flanges. Oxifree technicians remained aboard the platform for 16 days and completed an extra 23 red anomaly joints and valve unit assemblies before being demobilised due to further commitments. ■

Further information

Oxifree
www.oxifree.com

OXIFREE[®]

METAL PROTECTION



Oxifree metal protection is a thermoplastic coating for the protection of metallic components. It contains organic corrosion inhibitors, is reusable and provides a shield against corrosive and abrasive contaminants ensuring ultimate protection of your equipment.

“Making a difference in global corrosion prevention”



Certified to a wide range of international industry standards

Oxifree Coating Features:

- Contains active organic corrosion inhibitors
- Minimum surface preparation required and fast to apply
- Proven to withstand years of exposure in harsh environments
- Easy to remove as the coating does not bond to the substrate
- No waste – Oxifree coatings are 100% recyclable
- Ecologically safe and non-hazardous
- Protects new and existing metal structures, including rotating equipment such as bearing housings
- Can be applied in hazardous environments with ATEX/IECEX Zone 2 rated equipment



For more information, visit our website at www.oxifree.com

Email: info@oxifree.com Phone: +1 281 251 7171



Interesting challenge from an offshore oil installation

Parsons Peebles were presented with a very interesting engineering challenge by a North Sea offshore platform operator

Initially we were approached to evaluate an existing pump drive where the end user was looking to increase the output of his pump. The challenge was to assess if a new motor with an increased output of around 15 per cent could be manufactured to meet the footprint of the original machine and be physically the same size.

A design review revealed that the request could just be met.

The project then became more interesting however, when the next request was for us to evaluate if the 'new' machine could be used in an adjacent drive location where another identical footprint motor was present driving a centrifugal compressor.

Initial reaction was that while the machines were the same footprint, the same supply voltage, frequency and speed of the drive applications were totally different.

A further design evaluation led to the conclusion that a single hybrid design could be manufactured which would accommodate the two differing starting characteristics of the pump and the compressor but 'yes' it could be done.

The next challenge however was to compare the electrical and mechanical attributes of the two machines for compatibility/similarity if a single hybrid was to be built.

The machine top mounted heat exchangers were both water cooled twin radiator style but had their connections on different mechanical centres but, more interestingly, were on opposite sides of the two machines.

The drive shafts on the two machines were different, one being a parallel extension the other being tapered.

The main terminal boxes on the two machines were physically the same and on the same side of the two machines but were at 90 degrees to each other.

The bearings on the machines were the same diameter, however, in respect of cooling one was arranged for a constant supply of re-cooled oil while the other had no oil flow but had a water cooling coil in the sump of the bearing.

The auxiliary instrumentation on the two machines was similar but had some termination points on opposite sides of the enclosures.

The challenge was taken up and a hybrid machine was drawn up where the heat exchanger terminations would be accommodated in a special pipework manifold, the shaft would be parallel with two dedicated special couplings, the main terminal box 90 degree rotation would be accommodated in a special connection to the main frame, the bearings would be a hybrid themselves arranged so by the bearing manufacturer and the auxiliary instrumentation terminations would be accommodated by cable runs and duplicate terminal boxes.

With all of the above outlined to the end user, an order was placed by a delighted customer for a very special but very useful hybrid machine. ■

Further Information

Parson Peebles

www.parsons-peebles.com



Comprehensive Service, Upgrades & Bespoke New Machines

Our core strengths are the breadth of our capabilities and the depth of our electrical engineering applications knowledge

- » Specialists in retrofit, upgrade or re-engineer services including design modifications, reverse engineering or certification changes
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- » New build or replacement for “niche” machines - specialising in low starting current, low noise level, unusual or unique applications and hazardous area applications

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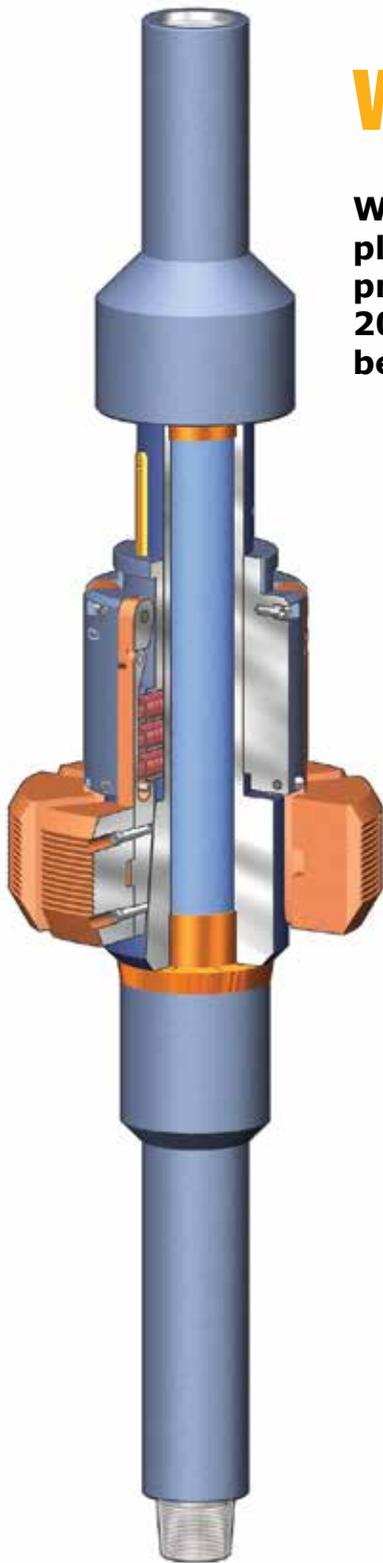


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Well Decommissioning Tools

With many operators having published abandonment plans and projected plugging and abandonment projects numbering in the hundreds over the period to 2022 from the North Sea alone it is clear that there will be a demand for tools to complete these projects



Large Scale Deflection Casing Spear

With many operators having published abandonment/decommissioning plans and projected plugging and decommissioning projects numbering in the hundreds over the period to 2022 from the North Sea alone it is clear that there will be a demand for tools to complete these projects. Aside from the obvious cementation component of decommissioning there are three facets of P&A projects each with specialist tooling suites: wellhead removal, casing removal and junk recovery. Pioneer Oil Tools Ltd provides tooling solutions for all of these and would be glad to assist in any enquiries.

Part of many decommissioning operations, casing removal seeks to recover down-hole assets for later reuse. The task of separating the casing into recoverable strings is typically accomplished by the application of a hydraulically actuated casing cutter. Cutters of this type use a piston system to engage tungsten carbide coated blades into and (in conjunction with torque) through the casing wall, permitting removal. Typically these tools can be preset to a predefined knife sweep in order to cut to a required diameter. Once the casing is cut it can be recovered by a casing spear.

Casing spears are available in a variety of styles and sizes however there are common features across the pist. The grappling mechanism typically consists of hardened steel wickers (saw tooth profile) that are forced into the casing wall through and over-pull as part of a mandrel mounted grapple mechanism situated in the bottom hole assembly of a tool string. Once set

these tools can lift strings of stuck casing. Premature setting is avoided by the use of a latching mechanism. There may be limits to the in bore restrictions that spears can navigate however some models can navigate substantial restriction.

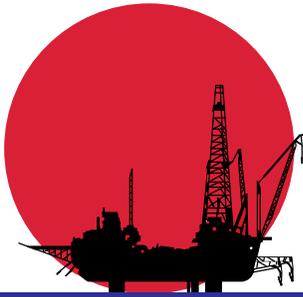
Both the casing cutting and casing recovery can be accomplished as part of the same trip through the use of a single trip retrieval spear operated in conjunction with a casing cutter. Spears can also be fitted out to catch and recover wellheads. For this function the wellhead catching profile of the grapple is specific to the type of wellhead.

As part of decommissioning procedures an operator may decide to recover junk from bottom-hole. One option is to use a fishing magnet, which uses powerful permanent magnets to collect ferromagnetic junk. Another option that exists is to use mud circulation to sweep junk into a catcher system implemented in junk basket tools. Tools of this class direct circulation out and down into the annulus then back up past catchers in the tool bore carrying junk with it. Junk baskets may also make use of a venturi system to create a low-pressure area at the top of the basket in addition to circulation. ■

Further Information

Pioneer Oil Tools Limited
 Tel: +44 (0)1241 877776
www.pioneeroiltools.com
sales@pioneeroiltools.com

DECOMMISSIONING EQUIPMENT

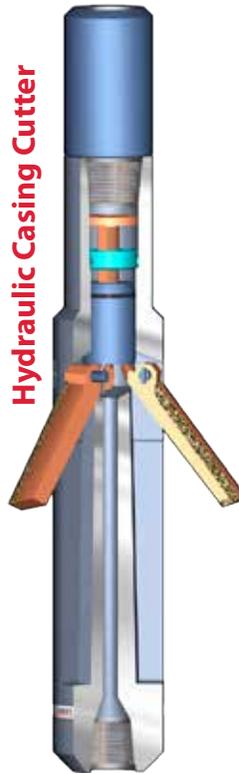


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- Venturi Jet Junk Baskets
- Fishing Magnets

Hydraulic Casing Cutter



Reverse Circulation Junk Basket



Wellhead Recovery Spear



Slick Bore Casing Spear



Venturi Jet Junk Basket



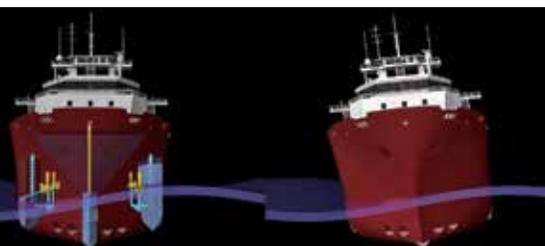
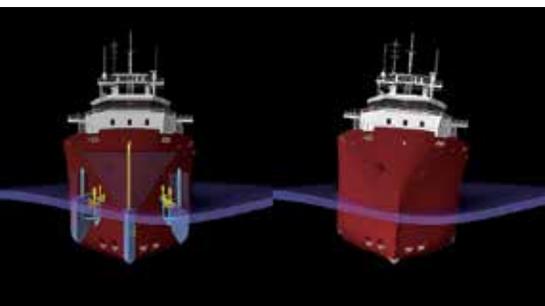
WHEN TIME IS OF THE ESSENCE, PIONEER DELIVERS

Crane limitation and vessel response, a) with MRPC system working, b) without MRPC system



An integrated solution to heavy lifting

A common control system that integrates vessel and lifting system performance can help optimise cost, performance and functionality of the entire vessel



One of the most important elements of today's marine, offshore, or subsea lifting equipment is the active heave compensation (AHC). It became an industry standard that allows safe and controlled load launching and recovery. However, the amount of power that needs to be provided, together with the high cost of such systems, especially when heavy objects and high sea states are considered, defines some significant drawbacks.

But there is an alternative and attractive solution. Marine Roll and Pitch Control (MRPC) and AXTech have worked on a system that can change the whole approach and perspective. The proposal will be integrated vessel and lifting system performance. This means a common control system not only providing the AHC function, but also vessel

performance control.

Many vessels have roll/pitch stabilisation features. The power required for both handling a heavy load weighing several hundred tonnes with great precision (AHC) along with controlling the vessel's motion, is huge. When you add dynamic positioning of the vessel there is a further drain on a finite energy source.

The solution is to use vacuum pumps (patented design) which control the air pressure inside vessel's tanks. The tank will have an opening on the bottom, allowing for a defined water flow. This way the tank level can be adjusted based on the signal from the controls. Depending on the hook load and vessel motions, different amounts of water can be exchanged which will yield

an appropriate stabilisation of the roll and pitch. The amount of energy needed is much less than today's large AHC systems. Also, the ability for the vessel to operate in higher sea states is significantly enhanced.

The plot (Fig 1) illustrates the effect of active vessel reduction and crane operational limits. A typical 250t offshore crane would have limitations (max. side-lead/off-lead angles) due to roll and pitch, which depend on vessel heading angle and sea conditions. As shown on the left curves in Fig. 1, the crane limit is violated when the significant wave height is between $H_s=1.7\text{m}$ (for beam seas) and $H_s=2.45\text{m}$ (30deg heading). Comparing to the right plot (no active roll damping), this is a significant improvement that allows to operate the crane even if beam seas are

present (which was not possible due to crane limits even with $H_s=0.5\text{m}$).

It is well known that the vessel response to sea waves is a key factor that defines the operational boundaries. Active roll reduction systems will increase operational weather windows, or, in other words, enable the lifting operations (involving AHC or not) with much reduced cost and safety requirement. This technology also opens a new perspective for the existing vessels and equipment - by integrating such control the load chart of existing crane or other handling system can be used in harsher conditions.

It is worth mentioning that such systems are developed with a close co-operation with our clients and ship operators/owners. We are providing the technology that allows us to

optimise the vessel performance and fine-tune the handling equipment towards maximum sea state and heavy object safe handling. Technology, knowledge and tools enable us to optimise cost, performance and functionality of the entire vessel. Such an integrated solution will result in the next generation of equipment, where crane and vessel performances are coupled. The system is also well proven for marine service vessels and in particular the new generation Walk-to-Work (W2W) vessels. ■

Further information

Axtech
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State-of-the art technology for laying pipelines in steep terrain

LCS Cable Cranes specialises in the construction of pipelines on steep terrain, rough slopes and in inaccessible areas, using cable crane systems, as David Domig, project manager at LCS Cranes explains

On critical sections, traditional pipe laying methods could reach their limits. By applying LCS's proven transportation systems, all material needed for the construction of a pipeline can be transported in mid-air. Cable crane systems, similar to material ropeways, are able to load and unload heavy-duty equipment and objects along the entire pipeline track.

High performance crane systems

LCS's cable cranes can carry payloads of over 20 tons along more than 3,000 metres in a single installation. The cable crane is installed directly above the designated pipeline track, and it is also possible to follow horizontal bends.

The crane unit consists of a diesel-hydraulic engine with two separately controlled lifting devices. With this it is possible to incline loads

such as pipes, and position them with the highest possible precision on steeply inclined terrain. Once the pipe is fitted into its welding position it can be joined using traditional methods. This ability to incline loads is used for other equipment and associated processes such as the transportation of sandbags and padding material, which are brought into inaccessible terrain using a transport bucket that can be inclined and easily unloaded.

"With the cable crane system, we are able to complete the entire steep slope pipeline construction process", explains Christoph Ludescher, managing director of LCS Cable Cranes.

Even when a construction site is totally unreachable and workers need to be brought to the operation site, LCS can install cable cranes that are licensed to transport personnel in a cabin and consequently facilitate the processes at the construction site.

Environmentally friendly and efficient

Reducing heavy machinery use in steep and critical sections reduces the associated health and safety risk. Furthermore, applying a cable crane system to steep construction projects contributes to cost-savings due to reduction in road constructions and less expenses for re-instatement works, as the ROW can be limited to only eight metres, when using cable crane systems.

LCS Cable Cranes operates all over the world and delivers projects across many different landscapes, from rainforests in Ecuador to the Rocky Mountains in Canada. ■

Further information

LCS Cranes
www.lcs-cablecranes.com

Innovative rope technologies defy corrosion in offshore applications

Teufelberger high-performance steel wire ropes are developed especially for lifting extremely heavy loads. In this field, they have been successfully used for several decades, with high-grade raw materials, innovative technologies and new production processes being the key to this success

Salt water, wind and weather are special challenges for steel wire ropes used in and on the water. In this context, the corrosion resistance of steel wire ropes is the decisive factor. The Protect product range, a particularly corrosion-resistant steel wire rope series, minimises the risk of early corrosion.

Protect unites the benefits of a unique coating of zinc/aluminium alloy on the individual steel wires with those of Pro Active Core Lubrication, a temperature-resistant special grease with significantly improved lubricating properties. In combination with the Plastfill technology, where the inner rope

is coated with a special non-absorbent plastic material, water is prevented from penetrating into the inner rope. Thus it is ensured that the special grease remains in the core.

Protect ropes afford a convincing added value by featuring a clearly higher resistance to corrosion than conventional galvanised wires. Lower friction also means clearly reduced wear in the rope. All these factors, as well as an excellent inner rope lubrication, even in case of Active Heave Compensation (AHC), result in a longer service life of the Teufelberger high-performance steel wire rope.

Maximum efficiency delivered by crane ropes in the oil and gas industry

Teufelberger high-performance crane ropes for offshore applications defy the toughest conditions. The Evolution TK 18, featuring Superfill compaction technology, Active Core Lubrication and Plastfill coating, is particularly interesting for use in special cranes in the field of heavy lift ship cranes. Each strand of the rope is compacted in a special process, which substantially improves the features of the rope. Thus, up to 30 per cent higher breaking forces are achieved, resulting in a longer service life. Last but not least, the smooth surfaces of the rope lead to lower abrasion and thus lower wear. ■

Further information

Teufelberger
www.teufelberger.com

ABSOLUTELY RELIABLE

EVOLUTION TK18

long service life. plastized steel core. Active Core Lubrication



More than a supplier of offshore containers



In some of the hottest and the coldest areas of our planet you just might see a TITAN Container; they are on all continents, including Antarctica! TITAN Containers is much more than a supplier of offshore containers and CCUs

Offshore containers are only a small, but increasing, part of our product portfolio which includes many other container types used in the oil and gas industries. These include:

ArcticStore: temperature controlled containers and modular cold rooms with precise and accurate control at settings between -60oC and +60oC. These containers can also be used for chilling, freezing and tempering products. Some models also available with ATEX certification and all models can be DNV certified.

TITAN 4people supply container and modular solutions to be used as accommodation, offices, laboratories and many other applications both on land and at sea where SOLAS compliance, DNV certification or ATEX certification may be required. We supply from simple gatehouses to complicated office and accommodation site camps.

Our original brand, TITAN Containers have supplied all types of new and used standard and special ISO containers for almost 30 years. Containers are available for shipping, transport logistics and storage applications worldwide. We also supply bespoke designed and certified containers or container sized modules to meet very special applications including diesel storage tanks, generator houses and we have even supplied mobile technique rooms and radar stations. Minimum quantity is only one so no order is too small and we are well known for alternative and innovative ideas and solutions.

New DNV-Containers and CCUs are regularly being added to the fleet. Not only are we adding to a fleet of established types but TITAN is also regularly adding new models or types. Most recently we added half height

open top containers that can be used both for offshore but also international shipping & transport. Using ISO container footprints for DNV offshore opens the added dimension of being able to pack, transport internationally and deliver to platforms with the same container. Our 3:1 6' containers can be locked together to form 1 x 20' footprint for international movement by rail, road and sea.

Such a wide range of products operating in so many market segments gives TITAN the ability to apply solutions learned in the storage market to offshore or from our refrigerated modular cold stores in the 4people product line.

All equipment is available for short or long term hire or for purchase if you prefer to own. We have many synergies to benefit customers around the world as well as at the top and bottom of our planet. ■

Further information

TITAN Containers
www.TITANcontainers.com



EXPERIENCE THE DIFFERENCE



TITAN supplies highly engineered, reliable and cost effective containers/CCU's all built in accordance with DNV 2.7-1

WORLDWIDE DELIVERIES

FACTORY STOCK · ALL SIZES AND TYPES · LONG LASTING DURABILITY · RENTAL AND SALE



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For more info visit www.DNV-CONTAINERS.COM



Pipeline equipment management: it matters

The cyclical nature of the pipeline construction industry makes maintaining margins a constant challenge. In lean times like today, margins are squeezed as more companies bid for fewer jobs. The rising costs of labour, capital and materials, along with the shortage of skilled operators, also chip away at potential profits

International pipeline contractors are transient and highly mobile, moving from one country to another country with a set of construction machines to build the pipeline. Generally, pipeline projects are time bound and short duration and works like a fast moving assembly line. And that's why pipeline contractors need highly reliable products or they start losing money. If a piece of equipment, especially pipelayer (side-boom) goes down, it shuts other operations down. Also, pipeline projects go through very remote locations and time required to restore the machine can be time consuming and very costly. One way to combat these pressures

is through effective equipment management to reduce costs, boost efficiency and substantially improve your bottom line.

What is equipment management?

Regardless of the number of machines you run, the equipment management equation is pretty simple, it boils down to monitoring and using your equipment to ensure that it delivers the maximum amount of work for the lowest possible cost.

It sounds simple, anyway, but achieving that goal requires focusing on several key factors:

Machine Performance: Well-maintained

machine systems work to the best of their capabilities, delivering more work at lower operating costs.

Machine Health: A healthy machine spends less time in the shop and delivers more reliable performance, when you need it, without surprises.

Planned Maintenance and Repairs: Adhering to a recommended maintenance programme helps you identify and fix small problems before major failures occur, reducing unscheduled downtime and disrupted production.

Safety and Security: Equipment that's well managed has less risk of being involved in



Jaya Sinnathurai

accidents, and carefully tracking machine locations and usage ensures that machines aren't stolen or used without authorisation.

Traditionally, equipment management data has been collected with checklists, spreadsheets and human memory—all of which can be tedious, expensive, error-prone and slow to get acted upon. But now, there's a better way to get the facts you need to manage your equipment for maximum value.

Technology makes it simple

Technologies built into today's construction equipment make it easy to gather accurate, up-to-the-minute information about your equipment. Where it is. How well it's working. When it's due for service. If there's something wrong

with a machine system. If it's being misused somehow.

And that information, in the form of electronic equipment data, can be transmitted right to you via VisionLink, web or mobile. You don't need to have someone go get it. And you don't have to spend precious time crunching numbers because a lot of the analysis is done automatically by advanced VisionLink software.

In the end, what you get is useful information that lets you make decisions faster. Decisions based on facts, not guesswork. Decisions that can help you improve your business.

The benefits of equipment management help your company achieve four important business objectives:

Control costs: How do I reduce the costs of

running my equipment?

Equipment management technologies help you see exactly where your money goes—where it's being used effectively and where you can potentially cut costs.

Improve operations: What can I do to get more done each day?

By tracking when, where and how often your equipment is used, you can identify situations that call for additional machines to meet a deadline or where less equipment is required to complete a job.

Manage people: How do I help my guys do their jobs more efficiently?

Your people often don't have the time or training to pay proper attention to your equipment. Cat technologies help them work more efficiently while spending less time thinking about the condition of the machines they run.

Reduce risk: How do I work around everyday uncertainties?

From weather to labour issues, things beyond your control can affect your equipment and your jobs. Smart equipment management helps you reduce the impact of these day-to-day uncertainties on your work schedules.

The National Insurance Crime Bureau reports that the construction industry loses more than USD1 billion annually from equipment and tool theft, a figure that grows by approximately 20 per cent each year. And the National Equipment Register notes that only about 10 per cent of those stolen assets are ever recovered. Theft is just one of the risks that equipment management technology helps you avoid.

Cat EMSolutions (Equipment Management Solutions) can show you how easy it is to put the latest technologies to work for your business.

Visit www.cat.com/EMSolutions or contact your Cat dealer to learn how EMSolutions can help you get more value from your equipment on every job, every day. ■

Further information

Caterpillar
www.cat.com

Protecting people and assets

Van Dam was established in 1906 and is now a global leading engineer and manufacturer of fire and blast protective products and solutions to protect personnel and critical equipment

The company focusses on three main industries: oil and gas, infra and defence and wind energy.

Within the oil and gas sector we offer both external and internal architectural solutions. Externally we supply fire and blast rated walls, fire & blast rated doors (manual, electrical and pneumatically operated), fire & blast rated windows, blast relief cladding, heat and wind shield cladding and winterising walls. For internal use we supply fire and blast rated medium duty doors, internal wall partitions, wet units and internal ceilings.

Our in-house engineering, R&D, testing and certification assures customers a well-defined and complete supply chain.

Our vision is to be an expert in the development and production of explosion proof and fire proof products. Our goal is to protect the people and equipment of our clients, with our fully certified and well tested products.

We support our clients by continuously developing & innovating our products to the latest regulations and technical standards. The safety aspects on our products are playing the most important role in our decisions.

Our clients are demanding more and more complex products due to the complexity of their projects. With our sales, engineering team and project managers we support them and focus on satisfying their high demands.

With an organisation HQ based in The Netherlands, several production facilities in Europe, Emirates and Far East and a sales force operating in 40 countries we are able to serve our clients worldwide. The key competencies of Van Dam are safety, people, integrity, responsibility, innovation and teamwork.



Van Dam has a unique approach that builds long-term relationships with our customers, based on our values of openness, collaboration, mutual dependency, professional delivery, sustainable, profitable growth and innovation.

Today's world demands the kind of attitude to business that Van Dam has adopted from day one: a collaborative approach that makes for easy and effective working partnerships.

The breadth and depth of our capability means we can deliver truly integrated solutions and our track record is a solid statement to the industry.

As a worldwide supplier Van Dam and the constant growth of Market share in both Offshore and Onshore products, we continuously increase our production facilities all over the world.

The production facilities are chosen on a strategic basis to be most beneficial for our customers.

Our QA/QC system is audited and accredited by Lloyds Register to ISO 9001 and is continuously updated. Quality is doing the right things right and is uniquely defined by each individual. You cannot separate the process and the human factor.

Therefore we believe that quality, when built into a product or project, generates emotions and feelings within those who have taken part in its creation. When you have established something to be proud of, when you have executed a project, or created a product, that brings smiles to your customers, then you have truly achieved quality.

You'll know it, they'll know it, and all will prosper from it.

It's trendy to be green these days. That's a good thing. We need to be responsible stewards of our planet. Even better, green practices are smart practices for efficient businesses interested in saving customers money. Environmental protection is a form of corporate social responsibility. Not only does Van Dam have a sustainable production process not involving hardly any waste materials or hazardous substances, but also the long life span of the products (usually 30 years) helps cutting the depletion of materials used. Later the materials can still be recycled. ■

Further information

Van Dam
www.van-dam.nl

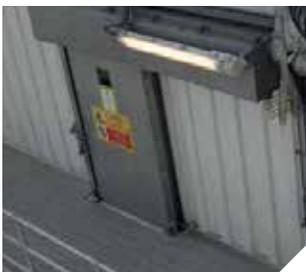


Fire and Blast protective products and solutions

Van Dam provides a complete architectural fit-out for Oil & Gas on- and offshore structures (topsides, modules etc.). Focus is on the external architectural package and supply is from our own product range:

- Fire & Blast Rated Doors (Manually, Electrically & Pneumatically Operated)
- Fire & Blast Rated Wall Systems
- Heat & Wind Shield Cladding
- Winterizing Walls
- Fire & Blast Rated Windows

Let our experience work for you!



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The world's smallest cross stack TDL monitor for O₂ measurement

As the world leader in gas analysis, it is little surprise that Servomex is continually pushing the boundaries of the size, scope, efficiency and capability of all its analysers

The launch of its SERVOTOUGH MiniLaser Oxy this year is no exception: it has given the industry the world's smallest cross-stack Tunable Diode Laser (TDL) gas analyser specifically optimised for O₂ measurement.

Based around Servomex's revolutionary new MiniLaser platform and developed at Servomex's UK Technical Centre, the MiniLaser Oxy is a remarkable ninety per cent smaller and eighty per cent lighter than many other comparable TDL analysers. The result is a revolutionary compact size and dramatically reduced footprint, offering unparalleled installation flexibility and a host of cost and performance benefits.

Instead of the time-intensive installation associated with traditional, bulky TDL analysers, the MiniLaser can be installed quickly by just one person. Simple installation is supported by a new built-in display, which negates the need for using a laptop for configuration and diagnostics, while improved advanced optical performance achieves a wider acceptance angle.

To ensure precision alignment from the outset, Servomex has also included a new mounting assembly for multi-direction adjustment. When combined with the new, quick-release mechanism, fast and accurate reinstallation - without the need for realignment - is achieved every time.

The MiniLaser Oxy also showcases Servomex's new purge design, which reduces nitrogen (N₂) and air purge costs by up to an impressive ninety per cent per annum; a significant return on investment when calculating lifetime operational costs.

Optimised for the fast, accurate and responsive measurement of process oxygen in hot or hazardous conditions exactly where it is needed, the MiniLaser Oxy is particularly suitable for a range of combustion and process control applications. It joins the SERVOTOUGH Laser range of TDL analysers, providing the same industry-leading performance delivered by Servomex's in-situ cross stack and extractive monitors.

Hailed as a ground-breaking development in TDL technology and the direct result of Servomex's continued investment in R&D to meet the ongoing requirements of its customers, the SERVOTOUGH MiniLaser platform is a challenge to traditional thinking across the whole industry, both in terms of design and application. Another bonus is that it is Servomex's most sustainable product yet, both in terms of manufacture and running costs.

Customer response to the Oxy has been enthusiastic, with the product receiving global orders and undergoing extensive field trials.

Based on the same platform, Servomex launched the SERVOTOUGH MiniLaser Ammonia in 2015, with the MiniLaser Combustion due for release later in the year. ■



Size matters: the next big thing in gas analysis - the revolutionary Servomex SERVOTOUGH MiniLaser Oxy is the world's smallest TDL analyser for O₂ measurement.

Further information

Servomex

www.servomex.com/minilaser

THE WORLD'S

SMALLEST CROSS-STACK TDL ANALYZER

90%
SMALLER*

EASY TO
INSTALL



80%
LIGHTER*

SIMPLE
TO OPERATE

SERVOTOUGH MiniLaser Oxy

SINGLE-MINDED OXYGEN MEASUREMENT,
OPTIMIZED FOR PROCESS O₂ APPLICATIONS



WATCH THE 5 STEP INSTALLATION VIDEO
servomex.com/youtube/analyzers

To REQUEST A QUOTE, REQUEST A DEMO, DOWNLOAD RESOURCES
visit servomex.com/minilaser
or contact your local Servomex Business Center.

*than comparable competitor analyzers



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2015

Professional diary

ESSENTIAL DATES FOR PROFESSIONALS WORKING IN THE OIL AND GAS SECTOR

June 23rd-26th 2015

13th biennial Moscow International Oil & Gas Exhibition (MIOGE)

Moscow, Russia

MIOGE is the largest and most recognised oil and gas trade event in Russia and Central Asia. Russian Energy Minister Alexander Novak has stated that Russia will continue to implement oil and gas projects in the Arctic region.

<http://www.mioge.com/>

June 23rd-26th 2015

Brasil Offshore

Rio de Janeiro, Brazil

Brasil Offshore enables E&P professionals to look for, and discuss new exploration and production technologies, discuss new ideas and find solutions that allow them to see the potential of the Brazilian offshore market.

<http://www.brasiloffshore.com>

September 9th-10th

22nd Annual India Oil & Gas Review Summit

Mumbai, India

Bringing together senior-level oil and gas executives from over 180 leading organisations across 15 countries, this event focuses on investments, growth, export and market capitalisation across the petroleum sector.

<http://www.oilgas-events.com/india-oil-gas>

October 6th-9th 2015

KIOGE 2015

Almaty, Kazakhstan

Since its first edition in 1993, KIOGE has become one of the most prominent events for the energy sector of Kazakhstan and a significant platform for discussing important issues affecting the oil and gas industry and providing a dialogue between national and foreign partners.

<http://kioge.kz/en/>

October 27th-30th 2015

Gastech

Singapore

Gastech Conference & Exhibition is the leading event for the international oil & gas industry and a global meeting place for energy professionals working in the natural gas cycle.

<http://www.gastechsingapore.com/>

November 9th-12th 2015

Adipec

Abu Dhabi, UAE

ADIPEC provides an unrivalled global platform for Oil & Gas professionals to do business. The world-renowned conference programme within ADIPEC further educates and provides knowledge transfer and unparalleled network working opportunities.

<http://www.adipec.com/>

November 17th-19th 2015

European Autumn Gas Conference (EAGC)

Geneva, Switzerland

With key fundamental shifts taking place within the global energy space such as the current oil price slump and first US LNG exports coming online within months, can Europe benefit from a surge in liquidity, investment and M&A activity?

<http://www.theeagc.com/>

New also
available for 50Hz



Drilling isn't getting any easier. Or is it?

Oil and gas drilling presents a greater challenge than ever before. Fortunately, the MTU Electric Drilling Package (EDP) provides the ideal solution by combining decades of experience with unmatched engineering expertise. Both the 60Hz and the new 50Hz packages integrate a powerful and fuel-efficient MTU Series 4000 diesel engine with genuine MTU components, engineered to meet the highest quality standards and designed for easy serviceability. Everything is built to work together seamlessly. The result? Unprecedented power. Longer intervals between preventive maintenance and overhauls. And high performance, efficiency and reliability, even in extreme conditions.

Check out more at www.edp.mtu-online.com



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view video.



Electric Drilling Package with 12V 4000 G23



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HELPING YOU REACH NEW HEIGHTS

Cat® PL83 and PL87 Pipelayers are purpose-built from the frame up to help you take on the unique challenges of pipeline work. Updated components give you the increased lift capacity and enhanced slope capability you need for rugged jobsites. Additional safety and visibility features to help protect your operators, while more responsive hydraulics and updated controls help make their job easier. Combine that with a machine that is designed for easier transport and you have a pipeline solution that is built to help you succeed.

To learn more, please visit

<http://india.cat.com/machines/pipelayers>

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