

# Oil Review

Oil · Gas · Petrochemicals

## Middle East

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- Oil residue deep conversion
- Non-destructive testing to save assets and lives
- Injecting new life into deepwater wells
- ADIPEC Preview

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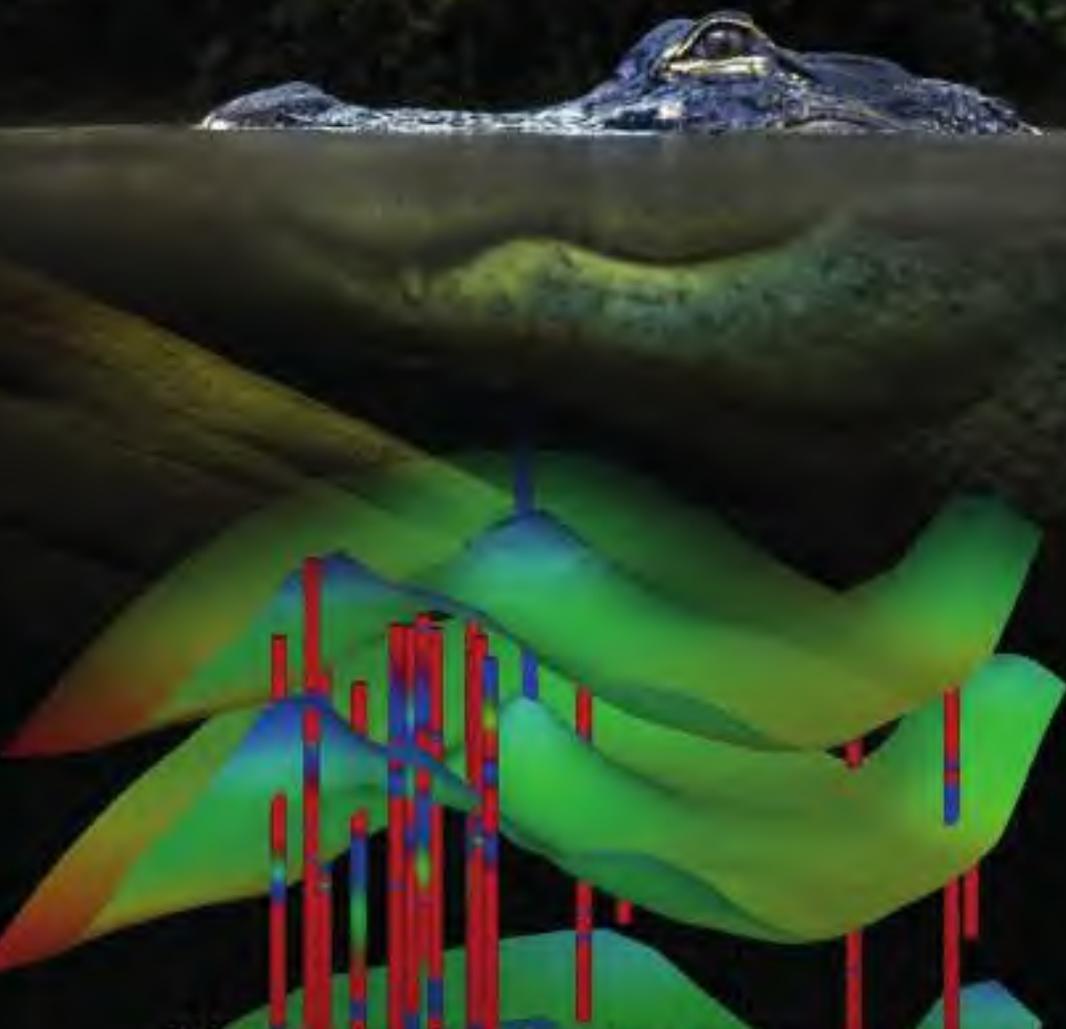
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## → Editor's note

DIGITALISATION IN THE oil and gas industry has really taken off over the past year, and is set to be a big theme at this year's ADIPEC, as well as at the World Energy Congress which the UAE will be hosting next year. The Middle East is particularly receptive to digital technologies, such as machine learning, AI, blockchain and sensor technology, and is increasingly aware of the savings and efficiencies they can unlock. ADIPEC is responding to these trends with the addition of a Digitalisation in Energy Zone and Digitalisation conference this year. See our ADIPEC Preview for all the show and exhibitor news (p80).

Our ADNOC Review (p16) covers the NOC's latest initiatives as it focuses on tie-ups with like-minded, commercially-driven partners to add value. Other topics covered in this issue include corrosion protection, nondestructive testing, fire-safe materials, blockchain and oil residue deep conversion.

We hope to see you at ADIPEC; do come and visit us at our stand.

## → Contents

### Calendar

#### 4 Executives' calendar and event news

With a look ahead to the 4th Annual Health Safety & Security Forum, the World Future Energy Summit and BBTC MENA 2018

### News

#### 10 Developments

A round-up of the latest news from around the region, including Saudi Aramco's latest deals and RAKGas' agreement with Zanzibar

### ADNOC Review

#### 16 ADNOC enters a new era

ADNOC presses on with new initiatives throughout the value chain, with some innovative new tie-ups

### UAE

#### 28 Energy for prosperity

As the UAE prepares to host the prestigious World Energy Congress in September 2019, Dr Matar Al Neyadi, undersecretary at the UAE Ministry of Energy and Industry and chairman of the UAE Organising Committee, speaks exclusively to *Oil Review Middle East*

### Analysis

#### 34 Iraq targets production hike

The past decade has been one of outstanding growth for the nation's oil sector, despite the challenges

#### 40 A catalyst for growth in the chemical industry

How GCC chemical companies can benefit from adopting a circular economy (CE) model

### Refining & Petrochemicals

#### 44 Oil residue deep conversion in the Middle East

Drivers and technologies for oil residue deep conversion

### HSE

#### 50 Fire-safe materials for the oil and gas industry

The importance of fire-safe materials, and the use of materials with good reaction-to-fire properties, to prevent small fires from starting and developing with serious consequences

### Technology

#### 56 Injecting new life into deepwater wells

An innovative technological solution to manage injection rates while preventing the mobilisation of solids during shut-ins, prolonging the life of wells

#### 62 Protecting against corrosion with high performance linings

The importance of selecting the correct linings solution to combat corrosion

#### 68 Blockchain in the oil and gas industry

How blockchain can facilitate supply chain management in the oil and gas industry

### ADIPEC Preview

#### 80 ADIPEC looks to the future

All the show and exhibitor news

### France at ADIPEC

#### 92 French Pavilion returns to ADIPEC

Business France will be hosting more than 40 leading companies from France at ADIPEC this year

### Innovations

#### 116 Industry developments

The latest product advancements, including new cyber security solutions from Honeywell, enclosure systems from Rittal, an innovative power-from-shore solution and new lines of compressors from Rotair, Sullivan-Palatek and Atlas Copco

### Arabic

#### 4 News/Analysis

## → Executives' Calendar 2018-2019

### NOVEMBER

|       |   |           |                   |
|-------|---|-----------|-------------------|
| 12-15 | <b>ADIPEC</b>   | ABU DHABI | www.adipec.com    |
| 17-19 | <b>MEFSEC</b>   | CAIRO     | www.mefsec.com    |
| 27-28 | <b>4th Annual Health, Safety &amp; Security Forum</b> | DUBAI     | www.hse-forum.com |

### DECEMBER

|       |  |        |                    |
|-------|--|--------|--------------------|
| 5-6   | <b>BBTC MENA Conference</b>                            | MANAMA | www.europetro.com  |
| 10-12 | <b>SPE Int'l Heavy Oil Conference &amp; Exhibition</b> | KUWAIT | www.spe.org/events |
| 11-12 | <b>ME-SPEC</b>   | MANAMA | www.me-spec.org    |

### JANUARY 2019

|       |                                   |           |                                 |
|-------|-----------------------------------|-----------|---------------------------------|
| 14-17 | <b>World Future Energy Summit</b> | ABU DHABI | www.worldfutureenergysummit.com |
| 20-22 | <b>Intersec</b>                   | DUBAI     | www.intersecexpo.com            |

### FEBRUARY 2019

|       |                             |           |                   |
|-------|-----------------------------|-----------|-------------------|
| 11-13 | <b>Egypt Petroleum Show</b> | CAIRO     | www.egyps.com     |
| 26-28 | <b>ME-TECH</b>              | ABU DHABI | www.europetro.com |
| 26-28 | <b>IP Week</b>              | LONDON    | www.ipweek.co.uk  |

*Readers should verify dates and location with sponsoring organisations, as this information is sometimes subject to change.*

## BBTC conference – A solution for Middle East refiners

AS THE RESIDUE upgrading is increasingly recognised as a major solution to the growing market for cleaner fuels, the gradual substitution of heavier feedstock and the decreasing demand for heavy oil.

Euro Petroleum Consultants' Bottom of the Barrel Technology Conference (BBTC) series is all set to focusing on technologies, project trends and equipment innovations relating to residue upgrading in refineries. The conference will be taking place from 3-4 December 2018 in Bahrain and has become one of the most insightful events for the refining industry in the Middle East, especially as increased focus is given to residue upgrading.

Taking place under the patronage of H.E. Shaikh Mohammed bin Khalifa Al Khalifa, minister of oil and with the support of the National Oil & Gas Authority and BAPCO being principal sponsor, some of the major technologies will be presented by market leaders such as ExxonMobil, Axens, Wood, and Chevron Lummus Global and will include delayed coking, gasification, slurry hydrocracking and residue fluidised catalytic cracking (RFCC).

Aside from this, the BBTC MENA Conference, the Middle East Catalyst Technology Conference (ME-CAT) will take place from 5-6 December, focussing on bringing together catalyst suppliers, licensors, contractors, service providers and end



Image Credit : Euro Petroleum Consultants

*The conference aims to provide the specialists with a forum to learn about the latest developments from the leading technology and service providers combined with extensive networking opportunities.*

users for a unique opportunity to exchange on the latest catalyst developments.

ME-CAT will focus on catalysts for refining and petrochemicals, catalyst management and the importance of research in producing performance catalysts.

The conferences are rich in technical content providing specialists with a forum to learn about the latest developments from the leading

technology and service providers combined with extensive networking opportunities.

Catalytic processes are at the heart of all refineries and petrochemical complexes. With the recent drive for increased integration, the number of units using modern catalysts has increased significantly. The right catalyst solution aims to improve margins, achieve better product quality, higher yields and longer cycle lengths.



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## Leaders in the chemical industry to converge on Bahrain to share success stories

ETHYLENE MIDDLE EAST Technology (EMET) Conference & Exhibition will be held in Bahrain from 11-12 December, 2018 as a convergence of three events at the one location - EMET will be running in tandem with ME-Spec, the Middle East Fine and Speciality Chemicals Conference and Exhibition; and ME-CWE, the Chem-World Exhibition for the Middle East. Now in its third Edition, EMET is growing in terms of participation to the conference and the size of the exhibition.

The ME-Spec part of the event is in its second year and will provide a forum for petrochemical suppliers, converters, original equipment manufacturers (OEMs) and potential investors to showcase products and solutions, network and share knowledge and experiences across the value chain.

ME-CWE, meanwhile, aims to support and encourage enterprises to understand chemical trends and requirements to expand business opportunities between China and the Middle East. This platform will provide

face-to-face networking opportunities for chemical CEOs, managers, engineers, technocrats and scientists, policymakers, planners, and the world's largest chemical companies.

Participants in past editions of this event have praised it for the opportunities it offers. Ziad Al-Labban, former CEO, Sadara Chemical Company, said, "EMET was successful in meeting its objective of providing a venue for companies and institutions who have interests in the ethylene business to share experiences and network in a constructive and value creating manner. The participant level was higher than the first EMET in 2014 and reflected the support and wish for participating companies for a technical conference which addressed the challenges of the ethylene industry today and into the future."

See [www.me-spec.org](http://www.me-spec.org) for more information.

## WFES to focus on sustainability



Image Credit: Damian Zech/Flickr

Abu Dhabi will host WFES.

OIL AND GAS companies will be among the participants at the next edition of the World Future Energy Summit (WFES), which will be held in Abu Dhabi from 14-17 January 2019.

With oil and gas playing a role in energy transition to renewables, the WFES Energy Transition Forum will focus on how the long-term shift towards cleaner, more sustainable energy can be encouraged, supported and optimised. The forum will bring together government officials, consultants, financiers, developers, technology companies, researchers and engineers from around the world to discuss international collaboration and knowledge sharing. With solar investment on the rise in the Middle East, oil and gas companies will be on hand to talk about how they are diversifying and working to minimise the impact on the environment of their current operations.

For more information, go to [www.worldfutureenergysummit.com](http://www.worldfutureenergysummit.com).

## New summit for MEOS in Manama

THE MIDDLE EAST Oil & Gas Show and Conference (MEOS), to be held in Manama, the capital of Bahrain, from 18-21 March 2019, will include a new energy summit on the programme.

The one-day summit will address the theme "Towards

Resilient and Sustainable Energy Strategies". With many countries in the Middle East still heavily reliant on non-renewable natural resources to meet energy and fuel demands, the summit will provide a platform for energy experts to share best practices and discuss challenges in regard to meeting long-term energy demand



Image Credit: Daniel Kwok/Flickr

The Middle East still relies on non-renewable fuels.

sustainable in the context of local needs and economies.

The topics will include energy efficiency, environmental and regulatory standards, and pricing strategies.

For more information, go to [www.meos19.com](http://www.meos19.com).

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# Prevent! Prepare! Protect - for good HSE performance

The 4th Annual Health, Safety & Security Forum is set to take place from 27-28 November in Dubai, under the patronage of the Ministry of Health & Prevention and with the support of ADNOC, Emirates Authority for Standardisation & Metrology, Emirates National Accreditation System and the World Safety Council.

**T**HE HEALTH, SAFETY and security sector is receiving heightened focus in the UAE. Strengthened government regulation, the evolving security threat landscape, and high profile developments such as Dubai Expo 2020 which prioritise health, safety and sustainability are amongst the factors driving investments in this sector. Furthermore, the business benefits of an effective health and safety culture are increasingly being recognised. Fire protection also has huge growth potential, with the Middle East's fire security market estimated to grow annually by 12.5 per cent from 2012 to 2020, from US\$1.6bn to US\$4.2bn, making it one of the largest in the world.

The latest in the highly successful event series will be a debate driven platform for valuable insights into effective health and safety programmes. It will highlight best practices, process improvements, technology advances and innovative applications to enhance HSS performance in the UAE. In addition, the summit will endeavour to align world class principles with local industry requirements.

## Visionary speakers

The two-day forum will bring together visionary international and local speakers in a joint effort to bring HSS issues to the fore combined with an audience of leading solution providers to ensure workplace safety and analyse the role of modern technology in improving overall performance.

Some of the major themes this year include occupational health in the era of big data; preventing accidents caused by falling from height; crafting a behavioural change strategy; creating a resilient and productive workforce by investing in employee health; and managing security risks in the oil and gas industry.

Returning by popular demand is Raed Al Marzouqi, head of section, occupational Health and Safety, Dubai Municipality, who will speak on preventing accidents caused by falling from height, while Jorge Manuel Miranda Dias, professor, Electrical and Computer, Engineering Department, Khalifa University Abu Dhabi will discuss how to detect abnormal behaviour and human crowd modelling using video.

Farah al-Ansari, head – Airport Security, Dubai Airports will discuss embedding a world class security culture while ensuring stakeholder engagement. Dr Mohammed Aref, OSH expert, Ministry of Human Resources & Emiratisation, will address the subject of dealing with fatigue, while Dr. Waddah S. Ghanem, senior director - Sustainability, Operational and Business Excellence, ENOC, will speak on the



*A panel session at the 2017 event.*

transformational role of operational excellence management systems.

With numerous studies underlining the business benefits of investing in health and safety, Dr Ola Mira, head of Environment & Occupational Health & Safety, Ministry of Health, UAE will discuss the benefits of investing in employee health to create a productive and resilient workforce.

Following their very well-received presentations at the Kuwait Health, Safety & Security Forum, Dr Sajed Al-Abdali, medical department leader, Equate Petrochemical Company, will share his thoughts on corporate wellness and happiness programmes, and Jason Woods, Middle East and India Representative IPAF will address the topic of working at height.

A panel comprising Dr Rebab Al Ameri, director – national Accreditation System, Emirates Authority for Standardization & Metrology; Dr Ola Mira, and a senior representative from ADNOC will discuss how to achieve 'zero incidents' in onshore and offshore operations.

Harnessing technology will feature strongly at this year's event. The role of artificial intelligence and robots will be discussed, along with leveraging data technologies and analytics to improve HSE performance. The use of UAVS to inspect hazardous locations, VR as a learning tool and the effective use of wearable technology to prevent accidents will also come under the spotlight.

Highlights of the event will be a mock evacuation fire drill to prepare for emergencies, following its successful introduction at previous forums, and a mock investigation process run by Clyde & Co, a hit at last year's event. Another unique feature will be a workshop presented by the Ministry of Health. ■

*For further information see the website at [www.hse-forum.com](http://www.hse-forum.com).*

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## ‘Oil exporters need to diversify economies to evade financial risks’

MAJOR OIL AND gas exporters need to reform and diversify their economies in order to overcome the financial risks in the years ahead, the new report by International Energy Agency (IEA), Outlook for Producer Economies, observed.

The changing dynamics of global energy such as production from new sources such as shale, uncertainties over the pace of oil demand growth and deployment of new technologies pose a challenge to the exporters, the report said.

The special report in the World Energy Outlook series examined six resource-dependent economies that are pillars of global energy supply: Iraq, Nigeria, Russia, Saudi Arabia, United Arab Emirates and Venezuela. It assessed how they might fare to 2040 under a variety of price and policy scenarios.

The rollercoaster in oil prices over the last decade has brought into sharp relief the structural weaknesses in many of the major exporters.



Image credit: Martin Schachermayer/Flickr

*Since 2014, the net income available from oil and gas has fallen by between 40 per cent and 70 per cent.*

### APICORP signs financial mandate for Suez plant

THE ARAB PETROLEUM Investments Corporation (APICORP), a multi-lateral development bank, has announced signing a financial structuring mandate with Suez company for methanol derivatives to finance the development of formaldehyde and derivatives project in Damietta, Egypt.

The total project cost is estimated at US\$60mn. The amount of planned debt financing is expected to be worth between US\$35 and US\$40mn. The plant production aims to supply the local market, although certain quantities will be exported in the early years.

Dr. Ahmed Ali Attiga, CEO of APICORP said of the agreement, “APICORP has had a long and successful presence in Egypt. Supporting all areas of the regional energy and petrochemicals industries goes to the very heart of APICORP’s approach, the announcement is evidence of our continued and successful efforts to support and contribute to the stability and growth of the Egyptian economy.”

### ENOC, Microsoft team up to pilot AI-powered service station

EMIRATES NATIONAL OIL Company Group (ENOC) has announced a new partnership with Microsoft to design and develop the service station of the future.

The MoU noted that the service station of the future concept centres on the digital transformation of the station. By linking ENOC services with mobile apps and leveraging artificial intelligence, customers will get a personalised and convenient experience that can direct them to less busy stations on their routes, reducing their waiting time at the pump.

Customers will enjoy a personalised experience as they get products and services recommended to them based on their preferences and get them delivered to their cars while they refuel. ENOC will select a single service station to serve as a pilot, it stated.



*The MoU was signed by Zaid Alqufaidi, managing director, ENOC Retail and Sayed Hashish, regional general manager, Microsoft Gulf.*

Saif Humaid Al Falasi, group CEO, ENOC, said, “Dubai has witnessed transformational growth over the past years, largely driven by the emirate’s ability to adopt innovative technology solutions to spur its development. Key institutions continuously strive to achieve excellence, and ENOC is proud to play a major role in this success story.”

The service station of the future concept will harness the power of the intelligent cloud to build rounded views of ENOC customers and promote enhanced standards of safety, security and information on forecourts.

## Saudi Aramco signs 15 MoUs worth US\$34bn

SAUDI ARABIAN OIL company Saudi Aramco has signed 15 MoUs and strategic and commercial collaborations worth more than US\$34bn at the Future Investment Initiative (FI) forum in Riyadh.

The MoUs reflect both Saudi Aramco’s and the kingdom’s international partnership strategies and the determination to diversify the economy, enhance the domestic investment environment and boost employment opportunities.

The agreements support Saudi Aramco’s forward-looking strategy across business units including downstream, offshore and engineering. They engaged with companies representing eight countries including major businesses in France, China, US, Japan, the UAE, UK, South Korea and India.

A number of these MoUs will enhance the In-Kingdom Total Value Add (IKTVA) programme, Saudi Aramco’s flagships initiative to improve the domestic supply chain, its operations and its employment potential, through greater commercial engagement with Saudi businesses. IKTVA’s localisation objective is to achieve 70 per cent of locally supplied goods and services by 2021.



Image credit: Saudi Aramco

Aside from these, Saudi Arabia also signed deals worth more than US\$50bn in sectors including oil, gas and infrastructure. Companies involved in the deals included Trafigura, Total, Hyundai, Norinco, Schlumberger, Halliburton and Baker Hughes, Saudi state television reported.

The multi-billion dollar ventures include the establishment of a copper, zinc and lead smelter with Trafigura Group; an agreement to build an integrated petrochemical complex and downstream park in the second phase of the SATORP refinery, jointly held by Saudi Arabia’s Aramco and Total; and investments in retail petrol stations also by Aramco and Total, a source familiar with the matter said.

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## Petronas takes 10 per cent stake in Oman's Khazzan gas field

MALAYSIA'S PETROLIAM NASIONAL Berhad (Petronas) has announced that its subsidiary would buy a 10 per cent stake in Oman's Al Khazzan gas field, following a bidding exercise held by the exploration arm of state-owned Oman Oil Company.

The Petronas unit, PC Oman Ventures Ltd, would acquire the stake in Oman Oil Company Exploration and Production (OOCEP), a subsidiary of Oman Oil Company, in block 61 of the field, which is expected to produce around 42.4 mcm of natural gas per day by 2020.

Max Petrov, from Wood Mackenzie's corporate

analysis team, said, "Petronas is no stranger to Oman, having held exploration acreage adjacent to Khazzan until 2014. The announcement highlights Petronas' strong appetite for international business development and gas resource capture, coming less than six months after it joined Shell's LNG Canada project."

He further added, "We believe the company is buying into the project for its strong gas reserves potential. The size of resource on Block 61 means that future phases could be developed, beyond the current expansion, provided the partners can secure a buyer for the additional gas."

Liam Yates, from WoodMac's Middle East upstream team, noted, "The deal could be worth in excess of US\$1.3bn to OOCEP, Oman's state-owned oil company. The consideration will be important for the company as spending on Khazzan's second phase, Ghazeer, ramps up."

"OOCEP paid US\$136mn for the equivalent 10 per cent stake in 2013 when the first phase of development was sanctioned. The stake is now worth US\$1.3bn. The value reflects the significant cost savings achieved and reserves expansion following sanction of the second phase of development earlier in 2018," commented Yates.

## Oil demand to peak in 2023: DNV GL

DNV GL'S 2018 Energy Transition Outlook, an independent forecast of the world energy mix in the lead-up to 2050, has predicted that oil and gas demand will peak in 2023 and 2034.

According to the DNV GL's Outlook, new oil fields will be needed until at least the 2040s, while new gas developments will be required beyond 2050. DNV GL's Outlook predicts that operators will favour production from a greater number of smaller reservoirs with shorter lifespans, lower break-even costs and reduced social impact compared to those currently in operation.

Liv Hovem, CEO, DNV GL-oil and gas, said, "Most easy-to-produce, 'elephant' oil and gas fields have been found and are already in production. Smaller reservoirs will likely be harder to

explore and develop commercially."

"Digitally-enabled technologies such as directional drilling and steerable drill bits, 4D seismic backed by advanced data analytics and steam flooding, will be crucial to ensure that exploration and production is economic and efficient," Hovem further noted.

Image Credit : drpepperscott230/Pixabay



**New oil fields will be needed until at least the 2040s, while new gas developments will be required beyond 2050.**

## Petrochemicals to lead demand growth

PETROCHEMICALS WILL SURPASS cars, trucks and aviation in future oil demand growth, according to a study by the International Energy Agency (IEA). Petrochemicals are expected to account for more than a third of the global oil demand growth to 2030, and almost half the growth to 2050, adding almost seven million bbl of oil per day. They are poised to consume an additional 56 bcm of natural gas by 2030 and 83bcm by 2050.

Dr Fatih Birol, IEA's executive director, said, "Our economies are heavily dependent on petrochemicals, but the sector receives far less attention than it deserves. Petrochemicals are one of the key blind spots in the global energy debate, especially given the influence they will exert on future energy trends. In fact, our analysis shows they will have a greater influence on the future of oil demand than cars, trucks and aviation."

Demand for plastics, the key driver for petrochemicals from an energy perspective, has outpaced all other bulk materials (such as steel, aluminium, or cement), doubling since 2000. Advanced economies are currently using up to 20 times more plastic and up to 10 times more fertilisers than developing economies on a per capita basis.

The USA has re-emerged as a low-cost location for chemicals production and is now home to around 40 per cent of the global ethane-based petrochemical production capacity. The Middle East remains the lowest cost centre for many key petrochemicals, with a host of new projects announced throughout the region.

However, the production, use and disposal of petrochemical products present a variety of environmental challenges. The report outlines a Clean Technology Scenario (CTS), which provides an alternative future in line with UN sustainable development goals.



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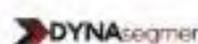
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## Eni buys 49 per cent stake in three Algerian oil concessions

AFRICA-FOCUSED OIL AND gas company Eni has signed an agreement with Algeria's state oil company Sonatrach, a move in which Eni takes a 49 per cent stake in three oil concessions in the onshore North Berkine basin, located in the Algerian desert.

The agreement, which was signed at the Algeria Future Energy Summit in Algiers, will cover three areas including Sif Fatima II, Zemlet El Arbi and Ourhoud II. Sonatrach will retain a 51 per cent stake.

The licenses cover a total area of 8,500 sq km and are located in the North Berkine basin, an area where Eni has had a leading position since 1981 and where all the company's current production assets are also located, including Bir Rebaa North (BRN), from where Eni began producing oil in the country in 1995.

Eni and Sonatrach will carry out an important exploration programme in order to develop the reserves of the three blocks, estimated at 145 mmbbl of oil equivalent. Production is expected to start by the end of 2020.



Image credit: Bureau of Land Management/Flickr

Eni signed an agreement with Sonatrach for three onshore concessions in the North Berkine basin.

## KPC unit invests in catalyst testing technology from hte

HTE, THE HIGH throughput experimentation company, has supplied a high throughput catalyst testing system for hydroprocessing applications to Kuwait Petroleum Research and Technology (KPR&T), an affiliate of Kuwait Petroleum Corporation (KPC).

The test unit provided by hte is able to process atmospheric residue feedstocks. It supports KPR&T in establishing cost-effective catalyst research.

The 16-fold reactor system was installed in 2018 in Rotterdam, the Netherlands and is now delivering its first results.

KPC has the largest combined Atmospheric Residue DeSulphurisation (ARDS) capacity in the world, which in turn requires leading expertise in residue processing. KPR&T decided to use high



Image credit: Flickr/Flickr

hte supplied a high throughput catalyst testing system for hydroprocessing applications to Kuwait Petroleum Research and Technology.

throughput catalyst testing as it is a time-saving and cost-efficient approach for commercial catalyst testing. With hte's proprietary technology, full-size commercial catalysts can be tested under commercially relevant conditions. These tests can be performed on real refinery feedstocks ranging from diesel, vacuum gas oil (VGO), and deasphalted oil (DAO) to the atmospheric residue.

"After a thorough selection process, we chose a high throughput unit from hte that meets the extensive requirements for processing atmospheric residue," said Albert de Bont, director of Q8 Research.

"We are pleased that KPR&T has decided to use hte's top-performing high throughput technology and we are looking forward to developing a reliable and long-lasting relationship. This collaboration brings a great opportunity for hte to further expand its exposure in the fast-growing R&D market in the Middle East," commented Wolfram Stichert, CEO at hte.

## NETZSCH unveils TORNADO T2 rotary lobe pump

NETZSCH PUMPEN & Systeme GmbH has introduced TORNADO T2 rotary lobe pump aiming to increase reliability, maintenance and performance while reducing the total cost of ownership.

Self-priming and valve-less, the TORNADO T2 is a positive displacement pump ideal for any kind of liquid, including media containing gas, solids or fibrous matter. The TORNADO T2 pump can be used in intermittent, continuous or metering applications.

The concept of the TORNADO T2 is based on two hardened steel lobes that rotate in a geometrically adapted elastomer insert. This bi-lobe rotor design creates a considerably longer sealing line, providing more wear padding. A specially developed pulsation reduction system ensures minimal pulsation or shear forces.

The pump features an elastomer insert design that saves energy, reduces wear and increases overall service life. Vulcanised onto the edges of the lobes to create a permanent hard-soft contact between the lobes throughout the 360° rotation cycle, the inserts avoid high-wear contact.

## RAKGas signs oil exploration agreement with Zanzibar

RAKGAS, THROUGH ITS international subsidiary RAKGas Zanzibar Limited, has signed an oil and gas production sharing agreement with the government of Zanzibar, the first of its kind. Zanzibar signed the agreement following its implementation of the oil and gas (Upstream) act of 2016.

Negotiations regarding the production sharing agreement for the acreage known as Pemba Zanzibar Block, which measures

11,868 sq km, have been concluded and RAKGas Zanzibar Limited is executing the agreement with the Zanzibar Government and the Zanzibar Petroleum Development Company.

Sheikh Saud bin Saqr Al Qasimi, the UAE supreme council member and ruler of Ras Al Khaimah, arrived in Zanzibar after receiving a formal invitation from the President Dr Ali Mohamed Shein of the Zanzibar Government to witness the signing of this historic agreement.

RAKGas LLC is a wholly Ras Al Khaimah government-owned oil and gas exploration and production company established under Emiri Decree number 14/84 by the ruler of Ras Al Khaimah.

The company has been pursuing exploration opportunities across the Middle East and Africa, and this year opened a licencing round in Ras Al Khaimah to allow for prospective companies to bid for acreage.



During the signing ceremony.

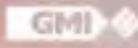
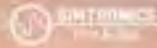
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# Growth reinforcing the role of oil & gas

There are opportunities for expansion, investment and growth in the oil and gas industry, as demand for energy continues to rise, particularly from the high-growth economies of Asia, according to HE Dr. Sultan Ahmed Al Jaber, UAE Minister of State and Group CEO of the Abu Dhabi National Oil Company (ADNOC).

**S**PEAKING IN LONDON in October at the 39th Oil and Money Conference, Dr. Al Jaber said global demand for oil is reaching record highs and that by the end of this year, much sooner than expected, the world will see the historic milestone of consuming 100 million barrels of oil per day. In addition, the petrochemicals sector will become the single largest driver of oil demand growth by 2050.

“Perhaps the most important takeaway from current energy trends is that oil demand continues to gain strength,” Dr. Al Jaber said. “Global GDP is at its highest point since 2011, all the major economies are expanding, and we are witnessing the highest growth in Asia. This growth is driving energy demand and reinforcing the role of oil and gas play as key enablers of global economic progress.

“Never before in history has the map of the world’s energy needs looked so promising and so rewarding. Today’s evolving energy landscape is filled with opportunities for achieving greater success for our companies, our shareholders and our customers.”

Dr. Al Jaber said ADNOC shares this positive outlook as it continues to optimise efficiencies and remains fiscally prudent, while taking full advantage of growth opportunities.

“The name of the game is minimising costs, while maximising value. At ADNOC, this is what we are focused on in every aspect of our business, from drilling platforms to trading platforms,” he said.

“Since 2016, we have reduced our operating expenditure significantly. We are deploying our capital more efficiently, attracting strategic investors and leveraging capital markets, where and when it makes sense. At the same time, we constantly seek innovative, commercial, financially savvy and value-add partnerships to enable our ambitious smart growth plans – partners that bring technology, know-how and market access.

“We are also leveraging the power of digital technology, such as AI, machine learning and neural networks to enable us to make better decisions, faster. And, importantly, to drive efficiency across our entire value chain, from reducing drilling time to maximising the value of every barrel we produce,” Dr. Al Jaber added.

Dr. Al Jaber highlighted the recent announcement of the strategic partnership between ADNOC Drilling and Baker Hughes GE, which will

“Never before in history has the map of the world’s energy needs looked so promising”



HE Dr. Sultan Al Jaber  
addressing the Oil & Money  
conference in London.

Image Credit : ADNOC

accelerate the growth and market access of the region’s integrated drilling company, as a perfect example of ADNOC’s expanded approach to partnerships. The combined capabilities of ADNOC and BHGE, he said, will optimise efficiencies, strengthen performance, reduce well completion times and generate strong profits for both parties. It will also provide ADNOC with a solid platform to explore expansion into regional markets and allow it to capture more value at home.

The Minister said that the Abu Dhabi government has taken the historic decision to open up six new onshore and offshore oil and gas exploration blocks, in a competitive bid process that closes this month. These blocks, spanning 30,000 km, have attracted an overwhelming response from 39 bidding parties from all over the world.

In addition, he said, ADNOC will continue to tap the substantial, unexploited, potential it has in gas, by accessing gas caps, exploring undeveloped tight reservoirs, moving into unconventional and significantly expanding its sour gas production, as part of its strategic objective to develop its gas resources sustainably and economically.

At the same time, HE Dr. Al Jaber said ADNOC is significantly boosting its Downstream capabilities, investing US\$45bn, alongside partners, to capitalise on state of the art facilities in Ruwais, to the west of Abu Dhabi city, to create a plug and play manufacturing cluster and industrial hub. When fully operational, the complex will be the world’s largest integrated refining and petrochemicals complex and will act as a catalyst for GDP growth, skilled jobs and economic diversification within the UAE. ■



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ADNOC is offering six new onshore and offshore exploration blocks.

# ADNOC enters a new era

Image Credit : iuri/Shutterstock

It may still be a beacon of dependability in the Gulf, but the times are changing for Abu Dhabi National Oil Company (ADNOC), says Martin Clark.

**A**T A TIME of general uncertainty for oil markets, Abu Dhabi National Oil Company (ADNOC) remains something of a rock. As well as sustaining output for world energy markets it is continuing to invest in new production.

The state-backed company is still on track to increase its oil production to 3.5mn per day (bpd) by the end of 2018. It leaves some spare capacity available should the markets demand it. ADNOC – which manages almost all of the UAE’s proven oil reserves – said in the summer that it has the ability to lift production by several hundred thousand barrels per day if required.

## Changing times

And yet the times are changing too for this famous, flagship Gulf institution. Over the past year, ADNOC has carried out various fundraising activities as part of an overhaul of its capital structure, including several loans, a public bond issue, and the listing of a 10 per cent stake in its distribution unit last year, the largest IPO in Abu Dhabi for a decade.

ADNOC chiefs have shown that they are not afraid to take a few risks, investing even when markets were more subdued, and embracing alternatives, breaking away from traditional, decades-long ways of doing

business. In the field, that includes pioneering work in key areas such as monetising complex or difficult gas reservoirs. Crucially, it has also meant embracing alternative investment strategies, including elements of privatisation, in an overall drive towards efficiency. Since 2016, that has meant slashing operating expenditure, while attracting strategic investment.

“The name of the game is minimising costs, while maximising value”

“The name of the game is minimising costs, while maximising value,” UAE Minister of State and ADNOC chief executive Dr. Sultan Ahmed Al Jaber told a recent conference.

## Upstream

That strategy of course includes the all-important upstream sector.

Here, Abu Dhabi is opening up six new onshore and offshore oil and gas exploration blocks, via a competitive tender process – marking its first ever competitive bid round. Two of the blocks are offshore and four are onshore,

with estimates suggesting they each contain substantial amounts of oil and gas. The blocks cover 30,000 km and have attracted dozens of bids from interested parties the world over. The successful bidders will be granted exploration and development rights under terms to be set out in the bidding package. Gaining a foothold in the Gulf’s lucrative upstream sector has long been a dream for oil and gas companies.

ADNOC hopes to announce first results from the round before the end of 2018. The long-term expectation is that investment from private sector partners in these six blocks will go on to drive further resources and production growth.

## Services sector

A further indication of the profound changes afoot is the recent partial privatisation of the ADNOC Drilling subsidiary. It is the largest drilling company in the Middle East and the sole provider of rigs and associated services to ADNOC group companies.

American drilling giant Baker Hughes, now a part of the GE group, is to take a five per cent stake in the company. The US\$550m deal values ADNOC Drilling to be worth some US\$1.1bn. The partnership marks the first time that ADNOC has brought an international strategic partner to acquire a direct equity



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stake in one of its existing services businesses –another landmark deal.

ADNOC said the partnership will enable it “to capture more value from every barrel of oil it produces”. It plans to grow its conventional drilling activity by 40 per cent by 2025 and substantially ramp up the number of unconventional wells, in line with its 2030 ‘smart growth’ strategy.

“This partnership is another important step in ADNOC’s group-wide transformation and value-creation programme, which addresses the evolving energy landscape and helps ensure ADNOC remains a resilient and flexible company able to take full advantage of market opportunities – from upstream to downstream,” said Al Jaber.

## Gas projects

While Abu Dhabi remains known for its oil wealth, ADNOC continues to aggressively unlock the emirate’s gas potential. Multiple gas projects are underway, predominantly to meet fast-rising domestic demand.

ADNOC’s subsidiary, ADNOC Sour Gas, is on track to construct a new sulphur pipeline that will carry molten sulphur produced by its Shah field sour gas operations, reflecting a growing technical prowess.

ADNOC LNG has signed a US\$860m contract for engineering work on the second phase of its Integrated Gas Development Expansion (IGD-E) project with a consortium of Spain’s Tecnicas Reunidas and local firm Target Engineering Construction Company. The second phase IGD-E project, which will take 54 months to complete, will add 245 million cubic feet per day of associated gas to the 1.4bn cubic feet per day of offshore gas sent from Das Island to ADNOC Gas Processing’s Habshan gas facilities to be processed for use in power generation.

Work on the original US\$11bn Integrated Gas Development programme, to enable the transfer of one billion cubic feet a day of high-pressure gas from the offshore Umm Shaif field, via Das Island, to onshore facilities at Habshan and Ruwais, was completed in 2013.

## Downstream investment

At the same time, ADNOC is investing heavily in raising its downstream profile. At the heart of this strategy is a US\$45bn investment over five years that will create the world’s largest integrated refining and petrochemicals hub in Ruwais, to the west of Abu Dhabi city. ADNOC will then convert 20 per cent of its crude output to chemicals, tripling petrochemical production capacity to 14.4 million tons per year by 2025.

The company hopes the new facilities will act as a catalyst for economic growth, skilled jobs and diversification within the UAE.

In parallel, it intends to grow its international, integrated downstream presence, including securing additional crude refining capacity in growth markets.

Closer to home, that includes building a



ADNOC has signed a partnership with BHGE in a landmark deal.

crude oil storage facility under the mountains of Fujairah. The underground facility will be able to store about 40 million barrels of oil and could be completed by 2020.

“ADNOC continues to aggressively unlock the emirate’s gas potential”

## ADNOC looks to deepen energy partnership opportunities with India

HE Dr. Sultan Ahmed Al Jaber, UAE Minister of State and Group CEO of ADNOC, visited India in October where he met with His Excellency Narendra Modi, Prime Minister of India, and took part in an energy leaders’ roundtable, as the UAE seeks to expand partnership and investment opportunities, especially in the energy sector.

Speaking after the roundtable, Dr. Al Jaber said, “The United Arab Emirates and India have long-enjoyed strong bonds of friendship, based on cultural, political and trading links between our two nations. This is especially true in the energy sector, where the relationship has advanced beyond a buyer-seller dynamic to that of strategic energy security cooperation.

“We believe there are mutually beneficial partnership and co-investment opportunities across our Upstream and Downstream value chains. ADNOC is ready to work with its existing and potential new partners to meet the growing demand for energy and petrochemical products in India.”

Dr. Al Jaber participated in the CERAAWeek India Energy Forum, where he delivered a speech highlighting the key role the UAE will play in providing the energy that will drive

India’s economic expansion over the next two decades. India’s energy demand is set to grow by 165 per cent over the next two decades – more than six times the global average and triple the rate of growth projected throughout non-OECD countries.

“India’s energy security is a top priority for the UAE and ADNOC. As ADNOC continues to explore opportunities internationally, we look forward to deepening our ties with Indian energy partners across the entire crude, refining, petrochemical and derivatives value chain,” Dr. Al Jaber said.

“In addition, we are keen to invite Indian companies into our ambitious Downstream investment plans within the UAE. There are multiple opportunities to join us in partnerships that will generate attractive financial returns for strategic partners, while delivering long-lasting economic benefits for the UAE.”

Dr. Al Jaber highlighted the June agreement with Saudi Aramco, Indian Oil, Bharat Petroleum and Hindustan Petroleum – making ADNOC a strategic partner in the Ratnagiri refining and petrochemicals complex – as an example of the growing energy links between India and the UAE. ADNOC will be a major supplier of crude to the 1.2mn bpd refinery, which will plug directly into a plant with a capacity of 18 million tons of higher value petrochemical products destined for India’s high growth market.

Other examples of the energy cooperation between India and the UAE include the supply of six million barrels of ADNOC crude to India’s Strategic Petroleum Reserve to fortify India’s energy security as well as the ONGC Videsh-led consortium participation in Abu Dhabi’s Lower Zakum offshore concession, the first time Indian oil and gas companies have been awarded a stake in Abu Dhabi’s upstream business. ■

Image Credit : ADNOC

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# Designing safety, engineering positive change

Sandra Antonovic, chief operating officer for Reflex Marine, speaks to *Oil Review* about how the company has revolutionised marine transfer.

**F**OUNDED 25 YEARS ago, Reflex Marine designs, engineers, manufactures and markets crew transfer carriers which facilitate safe crew transfers by crane. FROG, Reflex Marine's main product, is used on offshore platforms, vessels and installations worldwide, transferring more than one million offshore workers each year.

## Oil Review: How has Reflex Marine revolutionised marine transfer?

Sandra Antonovic: Reflex Marine very much revolutionised the way people think about offshore crew transfer; and it certainly revolutionised marine transfer. Almost singlehandedly, Reflex Marine transformed marine transfer from an obsolete and risky operation to one of the safest methods of crew transfer offshore. We remained revolutionaries over the years, in how we do business, in how we approach the market and in how we keep reinventing ourselves; never forgetting our prime purpose: designing and delivering products that ensure the highest level of offshore safety.

Reflex Marine has always been, and always will be, a company that pushes the boundaries and explores the unexplored, not just in what kind of products we design and manufacture, but in how we do it. Going to work offshore involves limited commuting options, and the way of commuting is predefined by the operator. Helicopters are good for getting people from the port to remote installations in deep water; gangways are useful when we need to get large number of crew from a vessel to the platform; and then there is transfer by crane, which gives flexibility and cost effectiveness.

"How can we keep the cost effectiveness and flexibility offered by crane transfer while ensuring people are safe and protected from impacts and harsh weather?" was the question Philip Strong, Reflex Marine's CEO and the person behind the FROG idea, kept asking himself, as he embarked on a journey of improving safety of offshore crew transfer. The original FROG range was launched in



Image Credit : Reflex Marine

*The FROG-Xt in action.*

1999 and fifteen years later the re-designed and re-engineered FROG-Xt range was introduced to the global market.

“ Going to work offshore involves limited commuting options”

## What design and technical features helped your product differentiate itself on the market?

The FROG-Xt Personnel Transfer Carriers (PTCs) are personnel transfer device designed to provide increased passenger protection when carrying out the transfer of personnel between vessels and installations.

Crane personnel transfers are carried out for a wide variety of reasons including routine, urgent operational and emergency reasons. The FROG-Xt can accommodate a stretcher to transfer injured personnel in a protected environment. The FROG-Xt comprises the following two main assemblies: firstly, the stainless steel outer framework containing polyethylene buoyancy panels; secondly, a spring-dampened seating assembly mounted on a central column. All materials have been selected specifically to minimise corrosion in the marine environment. The outer framework protects passengers from impacts and contains the buoyant elements which ensure the FROG-Xt floats and is self-righting in water. The outer shell lands on four feet that provide shock absorption and ensure that the FROG-Xt is stable on uneven surfaces or when landing on a



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heaving vessel. The outer shell also has four large open accesses that allow rapid unimpeded entry and exit. During transit, passengers are seated and secured with full harnesses to protect them against whiplash and falling. Seating is mounted on a sprung carriage to provide protection against heavy landings. The lifting assembly is of a special design to prevent rotation.

Safety of the transfer operation is both a function of the design and of the operation of the FROG-XT unit. The FROG-XT Design Dossier sets out to establish the performance expectations and define the safe operating envelop of the design and to understand the risks of operation and how these might be operationally mitigated and controlled.

There are a large number of factors that affect the safe conduct of marine personnel transfers. These include crew skill and experience, met-ocean conditions, landing areas, vessel station keeping capability and response to sea conditions, visibility and line of sight. A combination of many factors will determine the risk involved.

### What is the situation in the offshore industry generally, when we talk about safety in crew transfer?

Sandra Antonovic: Before Reflex Marine's work began, there was no central database for marine transfer incidents. By collecting and analysing data spanning a 20-year period, the company has been able to isolate when and where these incidents happen. Crucially, this allows us to consider how best to protect personnel with the carriers we create. As expected, the study showed that most incidents happen on the vessel itself. Less predictable was the high level taking place during pick-up, which can result in serious injuries or fatalities, compared to those caused by heavy landing, which are more likely to result in minor injuries. From detailed analysis, it was found that many incidents are caused by the pendulum 'swing factor': an often unavoidable misalignment between the crane line and the transfer device. The research showed that the pivotal risk factors in transfers are equipment design and crane operating error. A lack of training, planning and preparation was also a concern in a considerable number of the incidents studied. Using these findings, Reflex Marine tailored their carriers to address the specific risks crews face. With falls during pick-up causing serious injuries or even fatalities, Reflex Marine developed devices that offer additional safety measures. Passenger fall restraints are a design essential in all of their carriers, preventing loss of grip or dislodging. A protective outer frame and buoyancy panels reduce the dangerous effects of side impact, which frequently results from the pendulum 'swing factor'. Reflex Marine also



*Sandra Antonovic, chief operating officer, Reflex Marine*

put in place comprehensive training programmes to encourage safe practice.

### Can you tell us about your new market approach?

We were always very focused on the quality and safety. The last oil price downturn, a few years ago, showed us that we need to be equally focused on the market and the client.

Our core market has always been offshore oil and gas. IOCs, drilling companies, supply vessel companies. Our main ambition was to improve our original FROG range, and we certainly did that with our FROG-XT range, introduced back in 2014. This was tested using techniques and approach very similar to those testing a VOLVO car. We were keen to deliver the safest crew transfer option, and we succeeded. One question remained, though – how do we make sure we can continue our work amidst severe market fluctuations that are impacting our bottom line?

“ I see Reflex Marine as a company that will always be an innovator”

We decided to diversify to other offshore sectors, researching merchant shipping, tankers, VLCCs, ports, navy and coastal guard, and yes, LNG. The potential was enormous. Our decision to diversify triggered many changes in how we work and with whom.

We recognised that the market conditions changed. While that change started long before the oil price drop, it became evident

and emphasised during the last oil price crisis. What used to take two years, now takes eight months, and so on. For suppliers, that meant only one thing – adapt, and do it fast. You have to reduce your lead time, your transit time, you have to lower the prices and you have to be available 24/7. Flexibility and responsiveness are the key ingredients.

Reflex Marine reduced the number of employees by 30 per cent, but increased productivity and responsiveness by 50-60 per cent. We have a much better understanding of the global markets and we are able to see and comprehend the fine layers of the industry. We moved from a company that operates from 9-5 in one time zone, to a company that operates almost 24/7 in all time zones. The focus is on the outside, on the market, on the client, and on our role in helping them solve their problems. The change in focus changed everything for us.

Defining and developing a strategy for any region inevitably includes understanding the wider geopolitical context, market volatility, currency fluctuations, and inevitably, the oil price trend. Having that context helped us define and deliver the strategy that improves, strengthens and facilitates the operations of our clients.

### What is the role of international agreements, regulations and bodies in understanding SWOT analytics and strategy planning?

International agreements, regulations and regulatory bodies can have quite a significant role in strategy planning and looking at SWOT analysis. One of the most recent examples is when the Brazilian regulatory body for offshore operations changed the regulation on what types of carriers can be used to move people back and forth while working offshore. That change stipulates that people have to be seated, and we are one of two companies that manufactures personnel transfer carriers for seated passengers. Needless to say, this change has had and will continue to have a huge impact on our strategy, from supply chain, manufacturing and post-sale approach, to market communications and general focus.

### What is next for Reflex Marine?

Keep innovating. We have a very defined idea on where we want to be not only two years from now, but also five and ten years from now. I see Reflex Marine as a company that will always be an innovator, both in products we place on the market, but more so in the approach we take and particularly in how we execute our ideas. Execution will be the key, understanding the market and behavioural change are essential. Without those things there is no real progress, no real revolution. I am confident and excited about Reflex Marine's future. ■



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# Plant maintenance & turnarounds: Mammoet's concept heavy lifter

Mammoet has developed the Focus, a concept for a new type of heavy lifter that will revolutionise the way plant owners and EPCs think about construction efficiency, plant maintenance and turnarounds.

**A**S COMPANIES OPERATING in heavy industries continue to face highly competitive markets, Mammoet, the global leader in engineered heavy lifting and transport, has recognised the valuable role lifting operations can play in improving economies of scale and cost effectiveness.

Understanding that crane capabilities in these industries can contribute significantly to a project's efficiency, Mammoet developed the Focus, a concept for a new type of heavy lifter that will revolutionise the way plant owners and EPCs think about construction efficiency, plant maintenance and turnarounds.

Following the concept announcement, Mammoet conducted further consultation with its customers, realising their need for greater lifting capacity and ease of maneuverability with fast (de)mobilisation, particularly in limited and congested spaces.

The feedback led Mammoet to extend the concept even further, devising two types of Focus cranes, the A-Frame Focus and the Y-Frame Focus, which will significantly benefit the FPSO market and those operating in the upgrades and maintenance of existing plants.

## A-Frame Focus

The A-Frame is designed to lift much heavier and larger modules in confined spaces. Its capacity is second to none in the lifting industry. This new found efficiency in delivering module construction at ever larger scales will be a valuable asset to the FPSO market, providing significant project optimisation and time-saving benefits.

## Y-Frame Focus

Combining greater lifting capability, versatility and reach, the Y-Frame is the ideal lifting machine for use in plants with complex



*The Y-Frame Focus is designed for confined spaces with limited ground-bearing capacity. This vertically self-erecting crane can be built in a space of 22 by 22 m.*

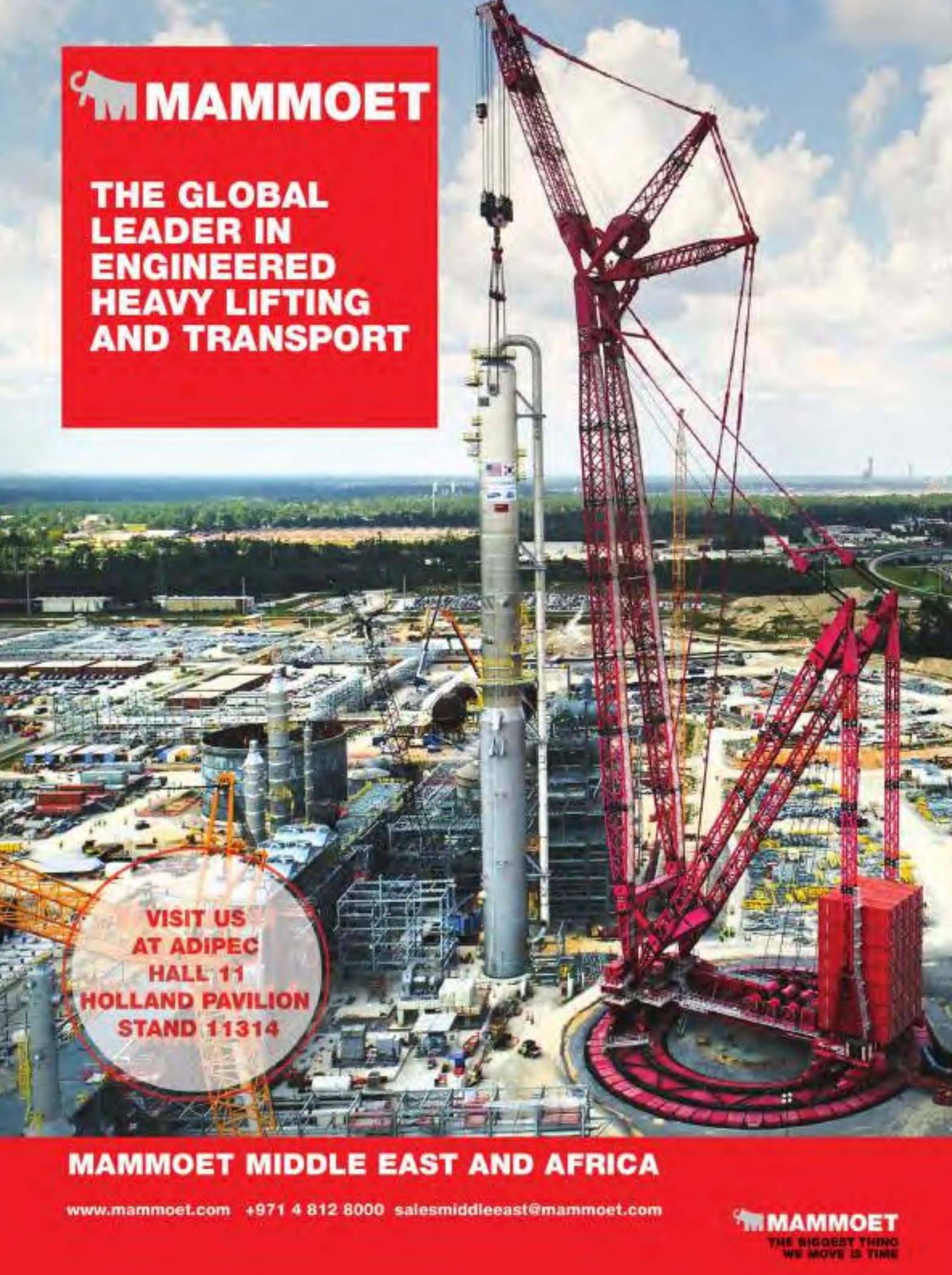
infrastructure and space limitations. Its ability to be built up vertically and maneuvered with flexibility in very limited or congested areas will have a powerful effect on the efficiency levels of plant upgrades, maintenance and turnarounds.

Key innovative features and advantages of the Focus include:

- The mast sections of the Focus are assembled from separate chords and braces. Conventional mast dimensions are defined by road transport limitations. Mammoet's approach allows for larger dimensions in width and depth, creating stronger masts and greater lifting capacity. At the same time, the assembly method still allows for efficient, containerised transport. Furthermore, the separate chords and braces can easily be moved to any location on-site and assembled without interrupting productivity.
- The Focus is uniquely designed as a vertically self-erecting crane. Based on the principle of an extension ladder, the crane can be built vertically up to a height of 200 m on an extremely small surface without compromising stability or strength. This is especially the case for the Y-Frame Focus which only requires a 22x22 m surface.
- The jib is integrated in the design of the main boom in such a way that the Focus can switch from fixed boom to a luffing jib configuration without re-assembly. The jib position in the front boom is variable. This allows for tailor-made versatility that effectively deals with the height and type of buildings and structures the crane has to operate in.
- Due to the self-erecting principle, the back mast can be built up at the same height as or even higher than the main boom, which can significantly increase the lifting capacity for long back mast length and overall versatility of the crane. ■



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# Energy for prosperity

As the UAE gears up to host the 24th edition of the prestigious World Energy Congress in Abu Dhabi next year, Dr. Matar Al Neyadi, undersecretary at the UAE Ministry of Energy and Industry and chairman of the UAE Organising Committee, speaks to *Oil Review Middle East* about his hopes for the event.



The 2016 edition of the World Energy Congress in Istanbul.

Image Credit : World Energy Congress

## How significant is it that the 24th World Energy Congress is to be held in Abu Dhabi, and what will this mean for the UAE and its energy sector?

The 24th World Energy Congress will be the first time that the Congress has been hosted in an Arab nation, and by an OPEC member country, in its 94-year history. It will be a momentous step for the UAE in our journey to further reinforce our position as a leading force in international energy policy, and as a world leader in sustainability and energy transformation.

Our country has already embraced the vision that energy plays as a driver of social and economic growth. Hosting the Congress is a testament to this vision, as it highlights the fact that major companies and organisations are joining us in our ambition to deliver the most relevant World Energy Congress since its creation in 1924. To achieve this, the Organising Committee has worked since the day the Congress was awarded to Abu Dhabi in October 2014 with the goal to bring the most relevant leaders and stakeholders of the global energy industry together in Abu Dhabi to discuss the fundamental role that energy plays in providing prosperity. This is why the 2019 World Energy Congress runs under the theme “Energy for Prosperity.”

The progress of the Organising Committee has been remarkable: with nearly one year ahead, we already count the full support of the leadership of the UAE, and of the Abu Dhabi National Oil Company (ADNOC), Department of Energy (DoE), Dubai Electricity and Water Authority (DEWA), the Emirates Nuclear Energy Corporation (ENEC) and Mubadala as host sponsors. The Federal Electricity & Water Authority (FEWA)

joined recently as a co-host sponsor and Arab Petroleum Investments Corporation (APICORP) as a gold sponsor. We have also partnered with regional and international leaders such as the Organization of Arab Petroleum Exporting Countries (OAPEC), Kuwait Petroleum Corporation (KPC), the Gulf Cooperation Council Interconnection Authority (GCCIA), the German energy agency (dena), business information provider IHS Markit and the World Nuclear Association. The list does not end here. In the coming months we will be announcing additional strategic partnerships, sponsors and exhibitors.

Together with our partners, we are looking forward to welcoming the most influential and diverse group of participants – from heads of state, ministers and policymakers, to world-leading energy and technology companies and financial institutions, energy-engaged citizens, start-ups, think tanks, universities and technology providers – to provide a fresh perspective and ignite action on how to resolve the world’s energy challenges. For Abu Dhabi and the UAE, the Congress will provide a unique opportunity to show the world the progress made to diversify our energy sources.

“The Congress will provide a unique opportunity to show the world the progress made to diversify our energy sources”

We have a lot of exciting announcements in the next twelve months and we look forward to our engagement with energy stakeholders and the general public.

**What will be some of the main themes of the event? To what extent will the energy transition be a focus?**

The Congress will run from 9-12 September 2019. It will attract more than 250 speakers and have more than 70 sessions. The four-day programme is centred on the theme “Energy for Prosperity” and it is ultimately set to highlight the need for cross-sector collaboration and action-orientated goals to ensure a sustainable and more prosperous future for all.

The energy transition will definitely be a key component, but we are addressing it from a holistic perspective. Our discussions will therefore extend beyond the usual industry experts to include leaders from technology, finance, and civil society so we can collectively look at the trends that are shaping the future of energy, urbanisation, technology, and social development to deliver a more prosperous future.



Dr. Matar Al Neyadi.

“ The oil and gas sector has traditionally been a pioneer in using digital technologies to model exploration and production assets”

Day One will open by exploring the pathways and new visions that are reshaping the outlook for energy systems. We will then look at the new opportunities and risks facing energy businesses, exploring new business models and the radical choices energy leaders face in remaining competitive today. The third day will focus on the discussion around the policy actions needed to achieve inclusive prosperity in the energy transition. The final day is entirely dedicated to innovation, a topic which is central to both the energy sector and the UAE Government, with sessions exploring the emerging opportunities for collaboration within and beyond energy systems.

**How important is digitalisation and the digital transformation for the UAE's energy industry?**

They are very important: digital technologies are making energy systems in the UAE and across the world more connected, intelligent, efficient, reliable and accessible. As the recent report ‘Digitalisation & Energy’ from the International Energy Agency (IEA) highlighted, innovation and digitalisation are inherent to the energy sector. At the same time, digitalisation exposes energy systems to an inherent risk, and this is why the issue of cybersecurity is so fundamental to energy stakeholders and why it will form a key component of the 2019 Abu Dhabi World Energy Congress.

The oil and gas sector, for example, has traditionally been a pioneer in using digital technologies to model exploration and production assets. The UAE’s energy leadership has been built, among others, on this strong heritage. We are now taking the same approach in other energy sectors and parallel areas such as smart appliances, autonomous cars and 3D printing.

The case for digitalisation in the UAE is very strong, and it can be felt across sectors. If we look at buildings, for example, smart thermostats, controls and sensors can cut energy use by 10 to 20 per

cent according to the International Energy Agency (IEA) by using real-time data to improve operational efficiency. The potential for energy savings in the UAE can be even greater.

Being a relatively young nation with a strong energy heritage, we are well positioned to take a leading role in grasping the massive opportunities

that digitalisation offers while also addressing any emerging security and privacy risks.

**How is the UAE spurring innovation in the energy industry, and how can further innovation and entrepreneurship be encouraged?**

Innovation is a theme very close to the heart of the UAE leadership, and it will run throughout the 24th World Energy Congress. When we talk about innovation we should be thinking broadly. For example, in the UAE we have been encouraging the transfer of clean technologies through economic free zones such as Masdar City, one of the world's most sustainable urban communities.

We believe that innovative business models and projects can make a big difference on the path to a sustainable energy future. The World Energy Congress is the ideal platform from which to show this, by connecting innovators with policymakers and investors who can take their ideas to the next level, while strengthening and promoting the innovation ecosystem here in the UAE and enabling knowledge sharing.

For example, our partnership with Deutsche Energie-Agentur GMBH (dena) is testament to this knowledge sharing, and part of our goal to bring the major energy stakeholders to the 2019 Abu Dhabi World Energy Congress. The Congress will be the perfect opportunity for dena to provide global expertise in energy transition to local entrepreneurs by bringing to Abu Dhabi its Start Up Energy Transition (SET) programme. Launched in cooperation with the World Energy Council, the SET initiative is based on the approach that energy transition and climate protection can only become global models for success with the help of innovation. It is comprised of an annual start-up award that identifies the top global innovators, a vast network of key international energy players and a global summit – the Tech Festival – where the network is brought together.



*A panel session at a previous edition of the WEC.*

Image Credit : World Energy Congress

“ Our country, through the UAE Energy Strategy 2050, is committed to developing a sustainable energy mix”

**How do you view the future role of oil and gas in the UAE, and what do you see as the main challenges and opportunities?**

The UAE has been blessed with abundant natural resources which have helped in the growth and development of the nation, making it the country that it is today. As a forward-looking country, we also know that energy diversification is a fundamental component to secure our future and that a carefully selected portfolio of energy technologies have been selected to power the future of our nation.

Globally, all sectors and all energy sources have a role to play and it is the role of the energy planners and policymakers to take the right decisions as to what technologies are ideal to power their nations. Our country, through the UAE Energy Strategy 2050, is committed to developing a sustainable energy mix that maximises our natural resources while transitioning to clean fossil fuels, nuclear and renewables.

Today, digitalisation is the number one issue keeping the CEOs of the global oil and gas sector awake. According to recent research by international consulting firm, McKinsey, a range of interconnected

emerging technologies have the power to unlock a potential US\$50bn in savings and increased profit. This is the type of trend that will be under the spotlight in the 2019 Congress.

**What do you hope will be the main outcomes and achievements of the WEC?**

As the world's largest energy event and the only one to cover the entire energy spectrum and energy sources, from oil and gas to renewables and nuclear as well as power, the World Energy Congress is a global stage, and we intend to make the most of it. We will ensure that the 2019 event does not comprise conversations that begin and end within its walls, but discussions that promote action-oriented and sustained activity far beyond the closing remarks.

We want every keynote, discussion and side conversation to be a catalyst for ongoing action to shape the future of energy and its touchpoints, including urbanisation, technology and social development – all of which will contribute to a more prosperous global future. This is why in preparation for 2019, we call on innovators, entrepreneurs, students – and dreamers – to bring fresh ideas to the table.

**What are the latest updates on WEC?**

With less than a year to go until the UAE hosts the 24th World Energy Congress, Dr. Matar Al Neyadi has begun a series of engagements with world energy leaders in the run-up to the Congress. At the World Energy Week in Milan, numerous energy leaders from around the world including Germany, India, Japan, Nigeria, and Canada discussed their intentions for attending the world's most influential energy event. In preparations to gather the most prominent stakeholders under one roof, Younghoon David Kim, the chairman of the World Energy Council, HE Sheikh Nawaf Al Khalifa, director-general of the Electricity and Water Authority in the Kingdom of Bahrain and chairman of GCCIA, and HE Dr. Matar Al Neyadi launched the registration system for the Congress.

Based on this global engagement, the UAE Organising Committee is now in the process of working with the World Energy Council to finalise the programme which will centre on the theme of Energy for Prosperity. To date, 44 sessions are already confirmed to take place that will address the most critical issues facing the energy sector today and in the future. ■



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# Oil & gas: growing talent with the industry

Companies need to keep up with immigration and employment legislation to facilitate worker mobility and benefit from oil industry growth, says Shayan Sultan, senior manager, Fragomen Worldwide.

**A**S THE WORLD'S seventh largest crude oil and gas reserves, the UAE has always been an attractive destination for professionals in the oil and gas industry. Now, thanks to recent market changes, the industry is preparing for potential growth. Of course, this brings a new set of challenges, including a rise in demand for professionals in the oil and gas sector. This raises the question: how do businesses keep up with the changes?

Firstly, there are several factors behind the potential growth in the industry. Oil producers, mainly led by Saudi Arabia, Russia and the UAE, did cut back production from last year in an effort to lower global oil inventories and prop up prices under the OPEC deal. The US sanctions on Iran have contributed further in impacting the global oil prices. As a result, the price per barrel is at one of the highest points it's been in the last three years.

Secondly, the Abu Dhabi National Oil Company recently opened registration for the first-ever bid round for new licensing opportunities for the exploration, development and production of oil and gas in the Emirate of Abu Dhabi. Between the rise in oil prices and new licensing opportunities, we can certainly see the positive impact on the UAE's oil and gas industry recruitment.

Lastly, the International Monetary Fund predicts GDP growth of 3.4 per cent in the UAE, and, of course, predicted growth in the oil and gas industry is a contributing factor. To keep up with rising demand in the workforce, the UAE is likely to also see an increase in the mobilisation of workers. So, the question remains: how do businesses stay ahead of this growth?

## Changes in laws and regulations

As the demand for oil and gas professionals is changing, so are the laws and regulations governing the UAE's talent pool. It all comes down to keeping track of changes in the legislation and, most importantly, ensuring compliance and avoiding any last-minute delays. Some of these changes include the facilitation of part-time employment, the introduction of ten-year visas for professionals in innovative, medical, scientific and technical fields as well as stricter rules around the employment of Emirati nationals.

Noncompliance with these regulations does trigger significant consequences for employers and foreign nationals in the UAE, from the suspension of government online portals, through monetary fines and high processing fees. These are just some of the actions the

“Certain employers must demonstrate that they have tested the local market before employing a foreign worker”

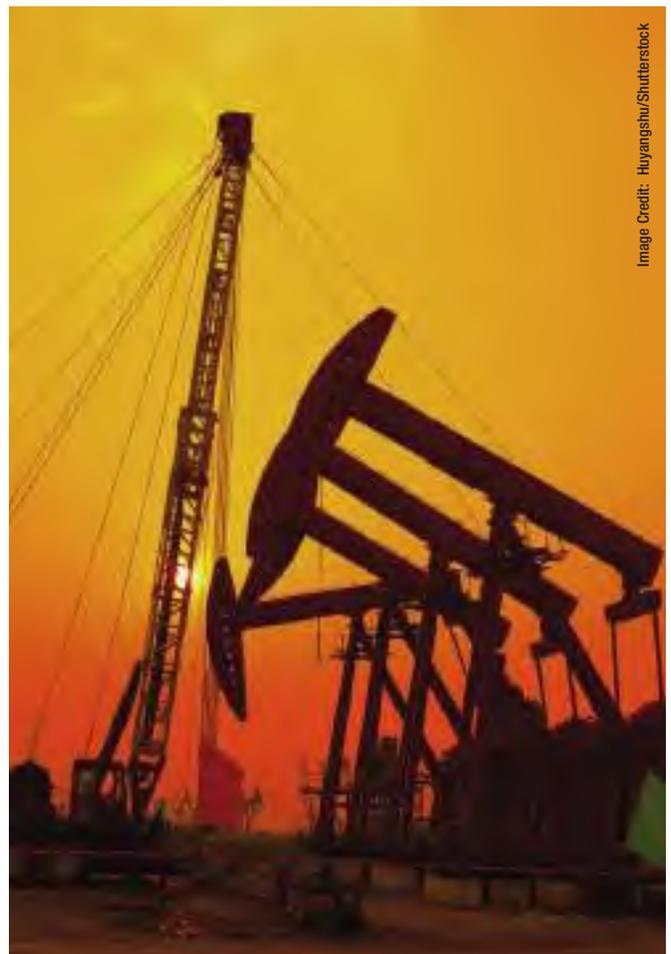


Image Credit: Huyangshu/Shutterstock

*The rise in oil prices and new licensing opportunities are having a positive impact on recruitment.*

government authorities may undertake, and which could severely hamper the continuity of doing business.

The oil and gas sector in the UAE is considered as a high priority industry and therefore attracts considerable attention when it comes to Emiratisation requirements. According to recent announcements, companies in high priority sectors are often required to have a ratio of Emirati workers to foreign workers – anywhere between four and twelve per cent. In return, they will be offered a membership in the Emiratisation Partners Club (aka Tawteen Partners Club) which triggers various benefits and incentives, including the priority in labour-related

transactions. Certain employers must demonstrate that they have tested the local market before being able to employ a foreign worker. In such cases, the company may extend an offer to a foreign candidate only if no suitable Emirati candidate has been identified. Keeping track of similar regulations and being aware of any recent changes in their implementation can help oil and gas companies stay on top of the mobilisation process of employees.

Considering different types of visa categories is also important when planning the mobilisation of resources for short and long-term assignments. To accommodate long-term work, companies should consider an employment residence permit. The requirements are more extensive than for short term visa options, but it allows the employee to work for up to three years



Image Credit : Fragomen Worldwide

*Shayan Sultan, senior manager,  
Fragomen Worldwide*

depending on the jurisdiction of the employer. Foreign nationals can start working as soon as they have entered the UAE with their employment entry permit or upon change of their immigration status if they are recruited within the country.

Oil and gas companies may consider other short-term visit and work visa options that are available in free zones and mainland. The majority of visit visas do not allow obtaining security passes required to access sites deemed a critical part of UAE infrastructure. Accordingly, employers in the mainland should consider a mission work permit (for stays of up to 90 days) which allows access to these oil and gas sites provided the relevant security pass is obtained.

Whether it's short or long-term work, or under the mainland or free zone work authorisation process, appropriate assessment and compliance with

regulations is key. This is especially true for the oil and gas sector, since they require a specific and specialised talent pool. The workforce is always the driving factor behind growth, and facilitating worker mobility by accounting for immigration rules is what will set successful businesses apart when responding to the increase in demand for oil and gas jobs. ■

“ Appropriate assessment and compliance with regulations is key”

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# Iraq targets production hike

Iraq faces the same old challenges, yet the past decade has been one of outstanding growth for the nation's oil sector, says Martin Clark.

**F**EW THINGS ARE certain in Iraq except change – and, as always in Iraq, there is plenty of it. That includes a new appointment at the top of the National Oil Company (NOC) – though a familiar face in oil minister Jabar al-Luaibi. Luaibi is to remain as oil minister, at least for now, or until a new government is formed, but will lead the country's most important industry through what remain difficult times.

Politically, at least, recent elections give good reason for encouragement that Iraq remains on track. The new president, veteran politician Barham Salih, has appointed another former oil minister Adel Abdul Mahdi as his prime minister. Crucially, the latest elections mark Iraq's fourth peaceful transition of power since 2005.

Still, Luaibi has his hands full at the new-look NOC, which is itself facing something of an overhaul, serving as an umbrella entity for other state oil firms, focusing on the upstream sector. That means overseeing the key regional operating firms, notably the North Oil Company and the Midland Oil Company in the north and central regions, and the South Oil Company and the Missan Oil Company in the southern regions.

Iraq's parliament voted earlier this year to establish the new NOC to manage and develop the nation's all-important energy sector after years of sanctions and wars. The move has been years in the making and revives a company originally established in the 1960s and later merged into the oil ministry in 1987. Ultimately, it will be nurturing an industry that remains vital not only for Iraq itself, but for world oil supply.

Iraq's oil production is currently averaging more than 4.5mn bpd, while the nation's economy is almost entirely dependent on its oil wealth.

“Iraq's crude oil production has grown rapidly over the past seven years”

## Production targets

Despite the changes, and ongoing security concerns, the country holds long-term significance for the energy market that has not been eroded by the chaos of recent decades. Iraq, which is now OPEC's second-biggest crude oil producer, also holds the fifth largest proved crude oil reserves in the world. And it has done a solid job in restoring output in the wake of some pretty devastating conflicts.

Iraq's crude oil production has grown rapidly over the past seven years, rising from around 2.6mn bpd in 2011, to where it is today, thanks, in part, to a series of tie-ups with the large international oil companies.

And, theoretically, production has the potential to double again. Indeed, earlier this year oil ministry officials said the next major goal was to raise output to more than 6.5mn bpd by 2022. Capacity building in the southern fields, which account for the majority of the country's production, continues.



Image Credit : Dambaz/Adobe Stock

But while growth has been the hallmark of Iraq's oil production this past decade, there are major challenges in reaching the next step.

The major international players – the likes of Shell, Total, BP and ExxonMobil – have long complained that Iraq's technical service contracts are too stringent and give little return on their investments.

After their enthusiastic return to Iraq earlier this decade, the focus from these companies is now likely to be determined more by plain economics and their margin of return.

Another feature of any new contracts with foreign oil companies, according to Luiabi, will be a requirement that 85 per cent of the workforce hired on a project will be Iraqi; similar local content initiatives are now widespread among the Middle East's oil economies.

## Export grades

It all underscores the prominence of Luaibi and his role at the revamped NOC, but there are other major shifts taking place as well.

That includes redefined oil grades with the launch of a new light graded oil, with an API gravity of around 34-43, a move that is intended to boost overall confidence among buyers. Iraq split its oil supply into two grades in 2015 to resolve quality issues: it offered Basra Heavy produced from southern oilfields separately from its traditional Basra Light crude.

The current Basra Light grade that Iraq exports – a blended grade using crude from different fields, which has led to varying qualities in different cargoes – is to be renamed Basra Medium.

State oil marketing firm SOMO hopes that selling the blends separately will further increase confidence in Iraq's oil sales. Luaibi says the goal is to produce and sell one million bpd of the new light oil grade in 2019, drawn from the Luhais, Tuba, and Artawi southern oil fields.

Nearly all of Iraq's oil is currently exported via its various southern terminals. During the month of September, export levels of all grades out of the south reached almost record levels averaging around 3.6mn bpd.

And yet, in the same area, Iraq is facing immense social pressures, following months of protests in the oil-rich southern Basra province.

This area contributes 95 per cent of Iraq's oil revenues yet suffers

from poor basic services, unemployment and lack of access to clean water.

Again, the oil ministry has indicated that any new contracts with foreign oil companies will also include provisions to improve vital services such as infrastructure, education, health, and water.

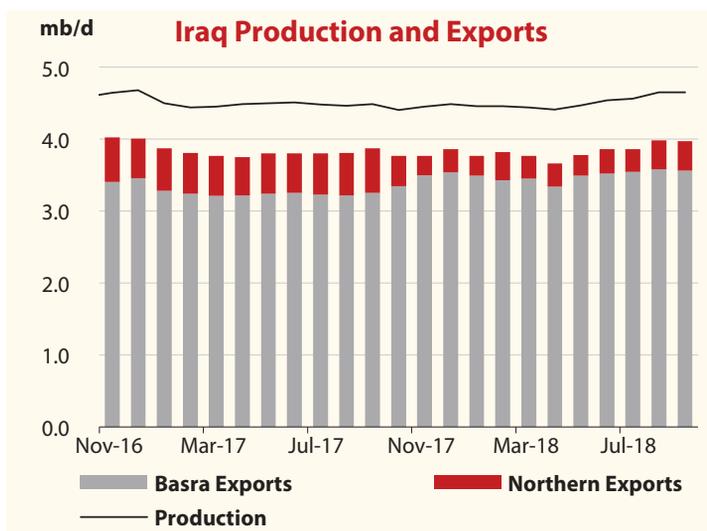
### Northern Iraq

In the north, where much of Iraq's oil wealth is also located – including the super giant Kirkuk oil field – the situation remains even more complex. While the fight against Islamic State (IS) has largely come to a halt, there remain ongoing tensions with the northern Kurdistan region, which gained semi-autonomous status after the 1991 Gulf War.

Iraq has now regained control of half the oilfields that fell under Iraqi Kurdistan's control in 2014, in the wake of the war with IS. That includes the strategic oil city of Kirkuk, although crude sales from this field have been halted since Iraqi forces took back control from the Kurds a year ago. A referendum on Kurdish independence fuelled further acrimony between Baghdad and the Kurdish Regional Government (KRG), with no real end in sight for the dispute.

Independent producers inside the KRG region continue to grow production, however, including Norwegian firm, DNO, which said in October that production at its Peshkibir field was now at 50,000 bpd; this is currently transported by tanker truck and a six-inch pipeline to Fish Khabur, on the border with Syria and Turkey. It also said output from the Tawke field stands at just over 80,000 bpd.

Meanwhile, Iraqi engineers are continuing to patch up various oil and gas facilities damaged during the bitter conflict with IS. Most recently,



that includes repairs to the Ajil oilfield, near Tikrit, which is expected to be producing 17,000 bpd by the year-end, according to Luaibi; the field was torched by IS militants back in 2015.

For now, it remains a work in progress, but overall Iraq's oil sector has made tremendous strides despite the often turbulent backdrop, testimony to the determination of the people behind it. ■

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# Why is NDT a 'necessary evil'?

Experts at Gulf Nondestructive Testing (GNDT) Expo in Dubai explain how the testing methods for the oil & gas sector can save assets and lives.



The speakers, delegates and exhibitors at the GNDT Expo 2018 in Dubai

Image Credit: Emerald Events

**F**OR THE FIRST time in the GCC, Emerald Events, in association with the American Society for Nondestructive Testing (ASNT) UAE Section, organised the Gulf Nondestructive Testing (GNDT) Expo in Dubai from 25-27 September to create NDT awareness and highlight its contribution to the oil & gas industry.

Nondestructive testing (NDT) is broadly referred to as the ability to inspect/evaluate critical components of equipment without impairing them. Although it is used in daily oil and gas operations across the globe, few are aware of its significance or even what it actually is.

Media partner Oil Review Middle East spoke with ASNT top brass – David Bajula, ASNT chairman of the Board; John Kinsey, ASNT Certification Management Council Chairman, David Mandina, ASNT President, and Marwan Basrawi, Regional Director of ASNT Middle East and the chairman of the GNDT EXPO 2018 to learn more about NDT and the role of the ASNT.

## **Oil Review Middle East (ORME): Can you elaborate on ASNT's role with regards to NDT in the GCC's oil & gas sector?**

David Bajula (DB): The oil & gas sector in the Middle East is one of the biggest in the world and there are NDT technicians specifically for 24/7 operation – be it offshore or onshore. Currently, ASNT is incorporating an international standard certification along the lines of ISO 9712, which is a third-party certification system to globally standardise qualifications and certification. We will be embracing that first in the oil and gas sector. ASNT will also be qualifying and certifying technicians to do the inspections for ISO 9712.

## **ORME: What are the training and certification programmes that ASNT specialises in?**

John Kinsey (JK): For many years, ASNT has been providing internationally recognised Level III certification programmes that are internationally recognised. As David mentioned, we are also rolling out the ISO

9712 certification programme to perform five main methods of testing – magnetic particle, radiographic, ultrasonic, visual and liquid penetrant – and certify technicians on Level II and III.

A non-profit dedicated to furthering the NDT profession, ASNT provides training globally both online and in the field. We also incentivise engineering undergraduate students to choose NDT as their field of specialisation. Many oil & gas firms are also well-versed in improving their staff's NDT capabilities.

Many think that NDT is expensive, but inspections are a necessary evil. They are costly but they save lives. The cost of failure is much more. Some equipment needs mandatory inspections due to the requirements of regulatory bodies, and some for safety and economic reasons.

## **ORME: ASNT also provides third party certification. Is it the same in the GCC?**

JK: Third party certification is the bedrock of



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ASNT. Now ASNT has expanded to include more competency based qualifications. As NDT is not limited to oil & gas but overlaps into infrastructure and utilities, we customise programmes to suit the clients. We are also working hard to come up with the best-in-class certification programme that will ensure safety of the personnel working in the field.

**ORME: Can you throw some light on some of the cutting-edge techniques that NDT uses worldwide in pipeline inspection? What is the adaptability in the GCC region?**

David Mandina (DM): NDT is all about evolution. It all began with stethoscopes, and now we have doppler images and laser techniques. Real-time inspection techniques are today at the heart of NDT. It's a very exciting industry. Thanks to Marwan, we are able to bring these techniques to the GCC.

DB: Here at NDT, we witnessed the real-time 3D radiography for pipeline inspection from Guided Ultrasonics Ltd., UK for subsea levels at 4,000 feet.

Marwan Basrawi (MB): Advanced technologies are the focus of GNDT Expo 2018. We have had 45 technical presentations from more than 20 countries and we are proud of bringing some of the breakthrough techniques to this part of the world. GNDT is a regional conference that caters not only to oil & gas but also to nuclear, aviation, infrastructure and utilities.



*Marwan Basrawi, regional director of ASNT Middle East and chairman of the GNDT EXPO 2018*

Image Credit: Emerald Events

The ASNT implements, manages, organises and plans the NDT functions in a credible and ethical way. The mission of UAE Chapter of the ASNT is to create a safer world, and safety and quality really are synonymous. We are trying to make the regional industries aware that they cannot only rely on the conventional technologies. There are more advanced technologies that are not reaching the sectors here. Technology and its equipment are ever advancing and they must keep up with them. This can certainly be done through ASNT.

**ORME: What are some of the challenges that the NDT sector faces?**

JK: In Dubai, every structure has undergone NDT. We do not lack technology, we lack awareness and qualified NDT personnel. Our biggest challenge is promoting NDT to get people involved and fulfil the needs of the industry.

DM: We are working to bridge the gap between engineers and NDT. Realistically, most of the universities do not teach about NDT as a specialisation; it is more of an on-the-job process.

MB: I believe engineering schools must ensure that part of their curriculum includes NDT. ASNT is working hard to make that a reality within engineering, design engineering and construction companies. To further this, ASNT is providing grants at the research level as well as hosting conferences and training across the globe.

**ORME: What does the future hold for NDT in the region?**

MB: NDT has not reached its potential worldwide. We have a technology that converts sound waves into pixels for videos called phased array. It's a very interesting concept but has little appreciation until

companies are informed about it. We have a lot of work to do in this area. ASNT is the largest society in the world that offers NDT certifications and standards.

DM: I agree. The future of NDT is endless, and the implementation we are talking about here is going to be computer-based real-time inspection. It is going to happen very fast and our biggest challenge, besides recruiting the correct personnel, is to let end users know what we can do with these technologies. We have so much technology but its not being used to its full potential. Oil & gas and construction companies and even governments do not understand best practices. This is our challenge. With an ever-changing technology, we need a workforce that is equally competent.

DB: Today's technology is just a small part of where we are going to be 10 years from now. Remote sensors, drones, advance warning systems, fitness services will make sure the project assets live the life they are intended to. I believe the future of NDT will be a combination of enhanced technology, AI and enhanced skills of the individuals that are interpreting the results. It's going to be about predictive, AI and preventive technologies.

Emerald head of exhibitions Brett Lee says that the inaugural edition of GNDT has proved to be an amazing experience and a steep learning curve. "With 50 countries, 45 exhibitors, and more than 700 visitors over the three days, we have seen a very active and productive conference."

He points out NDT is not limited to oil and gas but also encompasses sectors such as aviation, healthcare, construction and healthcare. Besides oil and gas companies such as Saudi Aramco, exhibitors included Emirates, Fuji Films, Phoenix and Prosecc. ■



*Titan the Robot – Ambassador of the GNDT Expo 2018*

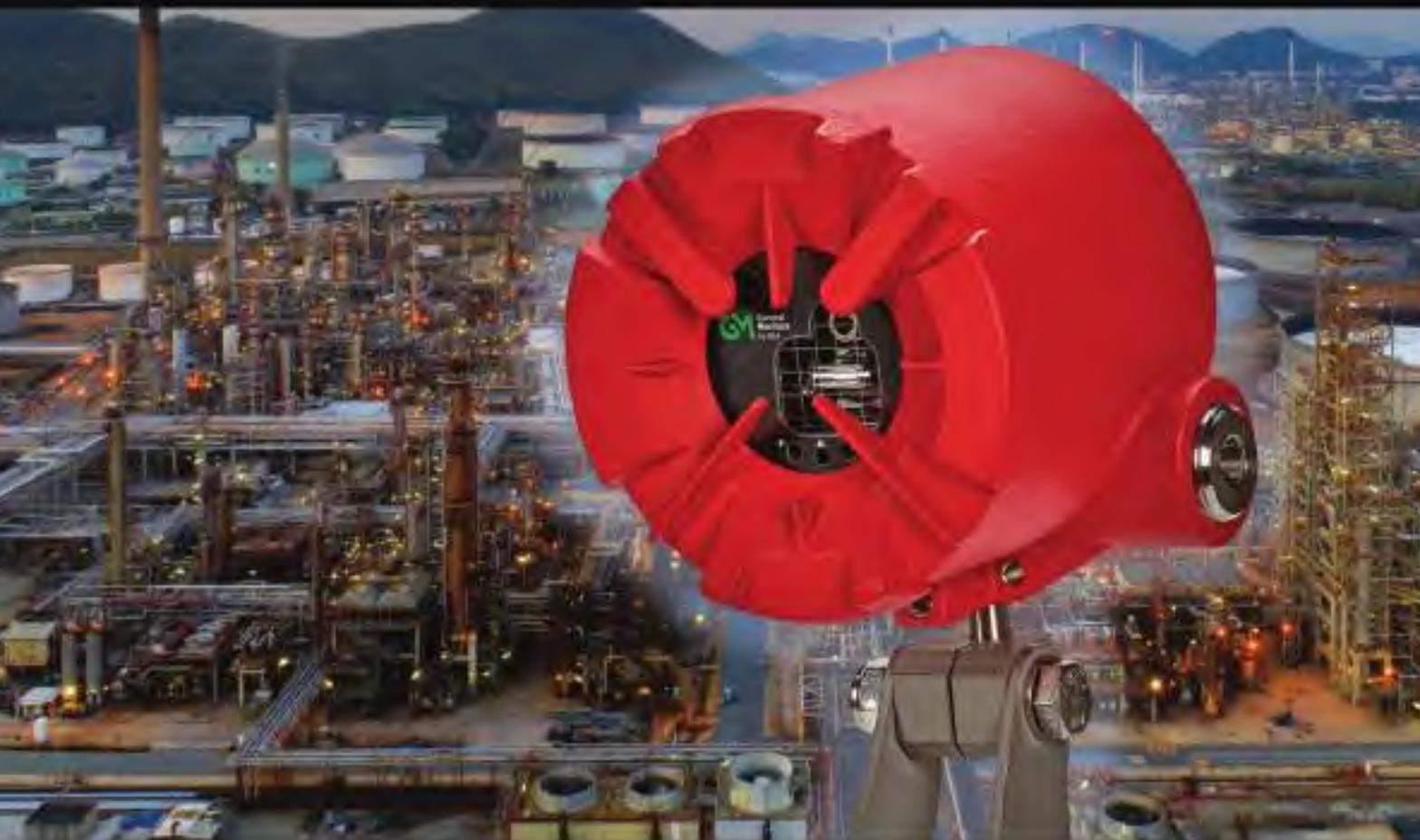
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# A catalyst for growth in the chemical industry

Andrew Horncastle, Dr Yayha Anouti and Jana Batal discuss how GCC chemical companies can benefit from adopting a circular economy (CE) model.

**C**HEMICAL COMPANIES IN the GCC can gain competitive advantage by adopting the circular economy (CE) model. This approach rejects the dominant linear economic model of “take, make, use, waste.” Although the linear economy results in growth, it runs down the resource base and produces vast amounts of waste and emissions. Companies are increasingly looking at CE models, because of volatile commodity prices, growing economic scarcity in resources, more stringent local and international environmental standards and a desire for new sources of growth.

The CE has three principles: optimising the consumption of finite resources, maximising the utilisation of products, and recovering by products and waste. CE approaches are now feasible, thanks to technological breakthroughs and changes in consumer behaviour. CE models work by establishing a closed-loop for materials, along the entire production and consumption cycles, treating waste as value leakage.

The CE is particularly attractive for chemical companies. A recent Strategy & Middle East survey found that the CE is emerging as a priority for the GCC chemicals industry. Respondents were divided evenly between those who feel that the CE needs major investment and those who believe that it will generate positive net present value.

Traditionally, companies have adopted different aspects of CE under the corporate social responsibility agenda. Yet, our analysis reveals that embracing circularity brings five differentiated benefits. First, companies can slash natural resources consumption by up to

30 per cent through CE processes that optimise resource use and recover spent material. Second, circularity gives companies access to new customer segments and more diverse revenue streams, by creating differentiated product and service offerings that respond to evolving customer demands. Third, the CE creates a smaller environmental footprint, as resources are expended to maximum efficiency, spent material is recovered, and products are more durable, energy efficient, and recyclable. The CE has allowed some companies to reduce wastewater contamination, by up to 70 per cent and CO<sub>2</sub> emissions by up to 75 per cent. Fourth, CE positions its adopters at the frontline of innovation and disruption in business models and products design. Fifth, the spread of the CE offers the opportunity to increase local content levels along the value chain of production and within the ecosystem of suppliers and customers.

There are four CE areas in which the chemicals industry can advance, with immediate impact.

## Circular procurement

Traditional procurement is perceived as a cost centre, that engages in volume purchases from suppliers. By contrast, circular procurement treats suppliers as partners. It is also “dematerialised”—instead of selling products as items, it makes them into services, that can be leased, reused or sold back, or shared. This “product-as-a-service” approach allows companies to optimise resource use and extract value from end-of-life equipment through reuse and resale.

Circular procurement extends the lifetime of products, reduces operating costs, as there is greater incentive for energy efficiency, and lessens the negative effect on the environment. In the GCC, circular procurement will also allow companies to stimulate local production through refurbishment and remanufacturing activities.

## Chemical management

Previously, sales functions mainly sold chemicals to customers. Instead, a CE approach shifts towards collaboration with customers to maximise value creation, by offering chemicals under long-term service management contracts.

In the GCC, chemicals companies can offer CE chemical management, to help many industries. Utilities can optimise their use of chemicals for water and wastewater treatment, and have less waste for disposal. Food companies can spend less on cleaning pipes and vessels, decontaminating water, conveyor lubricant, and packaging. The oil and gas sector can significantly optimise chemical use from extraction to refining. The mining and metals sector can spend less on abrasives management. Manufacturing can have better product protection, less wastewater treatment, less degreasing of equipment, and less waste overall.

## Circular products

The CE encourages a new mindset that develops products that are durable, energy efficient, and recyclable. AkzoNobel now makes an additive for asphalt that makes paving roads less energy intensive. Dow

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makes recyclable dishwasher pods, which it came up with through a partnership with a green products manufacturer. The benefits of circular products are that they respond to evolving customer preferences, are differentiated, force companies to innovate, and lead to new revenues.

Chemical companies should start planning for increased demand for specialty chemical products, because of GCC plans for increased localisation of industries, such as aerospace and automotive, renewable energy and recycling. Paints and coatings for the aerospace and automotive industry can prevent corrosion and extend product lifetime. More environmentally-conscious societies and increasingly sophisticated recycling sectors will want recyclable, bio-degradable, and reusable plastics and packaging. As of December 2017, Saudi Arabia requires that importers comply with regulations on the degradability of plastics packaging.

## End-product recycling

In the linear economy, end-of-life products are discarded "as is" into landfills or other disposal sites. Under a CE approach, products last longer and are mechanically or chemically

recycled at the end of their lives, allowing materials and components to be recovered.

GCC chemicals companies are well positioned to turn old tire materials into flooring, insulation, and soundproofing, while old plastics can become commercial grade chemicals, fuel or feedstock, or given another use. The benefits of end-product recycling are reclaiming of components, potential for local industrial developments, and reduction in carbon dioxide emissions.

“ There are four CE areas in which the chemicals industry can advance”

To move ahead with a CE agenda, chemical companies should first create a map of how materials flow in the value chain, showing circular flows within their own operations and outside in the broader ecosystem. This can generate a visualisation of input and output, along with a heat map of leakages. Second, they should identify quick-

wins that they can implement through project pilots and that provide high value potential. Third, they can start building a CE-based organisation by transforming their operating model, including processes, funding, teams and resources, metrics and motivators, and overall governance.

To support these internal efforts, companies should ask policymakers and regulators to provide specific support that will foster an ecosystem of suppliers and customers. Such assistance is vital for all stakeholders in the chemicals industry to move to the CE model.

The CE is a means of gaining competitive advantage for chemical companies. As its adoption increases, the sector and the broader chemicals ecosystem will reap financial, environmental, and socio-economic benefits. ■

*Andrew Horncastle and Dr. Yahya Anouti are partner and principal respectively with Strategy& Middle East (formerly Booz & Company), part of the PwC network. Jana Batal is senior fellow with the Ideation Center, the leading think tank for Strategy& Middle East.*

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Image Credit: Aungmy/Adobe Stock

*Global consumption of fuel oil has been on the decline since the 1970s.*

# Oil residue deep conversion in the Middle East

Valentin Kotlomin, director, Strategic Studies & Downstream Economics at Euro Petroleum Consultants (EPC) discusses drivers and technologies for oil residue deep conversion.

INCREASING THE DEPTH of conversion and reducing heavy residue volume is a global trend in oil refining, caused by a global decrease in fuel oil consumption. The tendency is not something new – since the end of the 1970s, global consumption of fuel oil has been on a downward trend. Of course, the situation varies in different regions. In Europe, the maximum was reached in the early 1970s, and in the Former Soviet Union (FSU) it was at the end of the 1990s – the last years of the USSR. In the Asia Pacific region the peak was in the late 1970s, and then the region had ten years of decline in fuel oil consumption followed by ten years of growth caused by extensive economic growth in countries such as China, South Korea, Singapore and Thailand.

Nevertheless, from 2000 to 2016, the annual average global growth rate of fuel oil consumption was < 1.6 per cent, and the Middle East is the only region with sustainable growth. The reason for this growth is the region’s booming economy – according to the World Bank, during

this period, the GDP of the MENA region increased by more than three times. Fuel oil consumption was primarily related to the growth of maritime navigation in the region, hence seeing an increased consumption of bunker fuel with an average annual growth rate of around five per cent per year. As a result, from 2000 to 2016, fuel oil consumption as international marine bunker fuel increased from 13 million tons per year to 28 million tons per year.

Meanwhile, it is common knowledge that in 2020 maritime navigation is in for a revolutionary shock, comparable to that of transiting from coal to fuel oil at the beginning of the 20th century. Such are the new requirements of the International Maritime Organization (IMO) on harmful emissions from ships. Today, there is no shortage of forecasts on how these requirements will affect shipping and which of the possible solutions – installing scrubbers on ships, switching to low-sulphur fuel oil, accelerated development of alternative fuels such as LNG, methanol, electricity, etc. – will be most prevalent. However there is one thing most experts agree on – these requirements will lead to a reduction in the consumption of fuel oil with sulphur content above 0.5 per cent.

Another significant application for fuel oil in the Middle East – electricity and heat generation – also saw a consumption increase in the period reviewed. Yet, this growth was significantly lower than regional economic growth – only one per cent per year. Besides, the global

“ These threats and trends are forcing local refiners to focus on ways to minimise fuel oil production ”

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generation trend is to displace oil-based fuels with the more environmentally friendly alternatives such as natural gas and renewable energy.

While the fuel oil supply-demand balance in the Middle East has been fairly stable in the past few years, the trends and threats we mention above are forcing local refiners to focus on ways to minimise fuel oil production at their facilities. Some success was already achieved in the period from 2000 to 2016 when fuel oil yield decreased from 30 per cent to 25 per cent, but this is still significantly higher than that of competitors from other regions, such as North America, Western Europe and the Asia-Pacific.

Currently, there is a whole range of commercially proven deep conversion technologies such as delayed coking, visbreaking, deasphalting, residual fluid catalytic cracking (RFCC), ebullated bed hydrocracking, slurry processing, etc., but the selection of an optimum configuration strongly depends on the specific aims of the refinery – whether it is maximising gasoline or diesel production, integration with petrochemical business,



Middle East refiners are taking steps to increase the depth of conversion.

Image Credit: anekono/Shutterstock

production of niche products such as bitumen, lube or petroleum coke, power generation, etc.

“ The selection of an optimum configuration depends on the specific needs of the refinery ”

### Deep conversion processes

Below are just a few examples of how Middle East refiners are increasing the depth of conversion.

In terms of prevalence, delayed coking is the most popular process to convert oil residues in the world, and the Middle East is no different.

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On 2 September, Abu Dhabi National Oil Company (ADNOC) announced that it successfully commissioned a specialised delayed coker unit (DCU) as part of its Carbon Black and Coker Project. The new unit will enable ADNOC's refining business to recover highly specialised and valuable grades of carbon black and calcined coke – the compounds used in tyres and rubbers, and the steel and aluminium industries, respectively. Through its Carbon Black & Coker Project, ADNOC Refining can produce 40,600 tons of two different grades of carbon black per year, and 430,000 tons of anode grade calcined coke, which is low in sulphur and metals. Borouge, a joint venture between ADNOC and Austria's Borealis, makes extensive use of special carbon black grades across a range of products, including high-pressure water and gas pipes, steel pipe coatings and linings, and standalone piping.

Another example of a DCU project is Oman's Duqm Refinery and Petrochemical Industries Company (DRPIC). The company is constructing a 230,000 bpd refinery that will be able to process a variety of crudes. As a deep conversion complex, the company chose a 52,000 bpd DCU licensed by Wood. The completion of the project is scheduled for the third quarter of 2022.

## “Another factor is the development of residue hydrocracking technologies”

The global demand growth for petrochemical products became a driver for strengthening the integration between oil refining and petrochemistry even in the Middle East – a region that has traditionally used gas as a feed for petrochemical plants.

Kuwait National Petroleum Company (KNPC) is developing a new multi-billion grass roots refinery in the Al-Zour area, 90km south of Kuwait City. Known as the Al-Zour Refinery project (ZOR), it will be able to process 615,000 bpd of Kuwait's crudes and produce Euro V motor fuels and petrochemicals products such as paraxylene and propylene. Focusing on refining/petrochemical integration, the project includes a 50,000 bpd RFCC complex with ethylene and propylene recovery licensed by Honeywell UOP. In January, KIPIC confirmed that all five packages of the integrated complex are proceeding in line with the original schedule, with all packages due to be completed by year end 2019 and initial refining units still on track for startup in May 2019.

Another factor that predetermines the configurations of deep conversion complexes is the development of residue hydrocracking technologies. Bahrain Petroleum Co. (BAPCO) is implementing the Bapco Modernisation Programme (BMP) that aims to reduce fuel oil yield to seven per cent vol. from 15-16 per cent vol. now. As a deep conversion solution for its 267,000 bpd refinery at Sitra, the company chose LC-FINING residue hydrocracking technology licensed by Chevron Lummus Global (CLG). The capacity of the unit is 65,000 bpd and the Sitra modernisation project is scheduled to be completed in 2022.

The examples above are just a few of the projects that are being implemented in the Middle East aimed at curbing fuel oil production, in line with global trends in the development of the refining industry. Today the licensors have a variety of technologies to offer the refineries, and each refinery can find a perfect fit for its operating and investment strategies. ■

*EPC is a leading independent consulting company in the oil, gas and petrochemical sectors, as well as a producer of specialised annual international conferences and training seminars focusing on market trends, technological advances and business strategies for the petroleum industry. EPC has offices in Dubai, London, Moscow, Sofia and Kuala Lumpur. For more information, please visit [www.europetro.com](http://www.europetro.com). EPC is organising BBTC MENA 2018 – Bottom of the Barrel Technology Conference, taking place on 3-4 December in Bahrain, which will focus on modern deep conversion technologies. [www.bbtc-mena.biz](http://www.bbtc-mena.biz).*

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# Enhanced air freight capability for capping stacks



*The air-freightable capping stack.*

Oil Spill Response Limited (OSRL) has successfully completed an air transport test flight of a fully assembled subsea capping stack for the first time.

**O**IL SPILL RESPONSE Limited (OSRL) has successfully completed an air transport test flight of a fully assembled subsea capping stack for the first time.

The newly demonstrated expertise has the potential to significantly reduce capping stack mobilisation times, and represents the realisation of a key objective for OSRL and all those involved in its Subsea Well Intervention Services (SWIS).

Matt Clements, OSRL's director of SWIS, commented, "At OSRL, part of our mission is to constantly identify new ways to better support our members and adapt to their changing requirements through new technology, equipment and processes. From our leading role working with the Subsea Well Response Project (SWRP), to the recent development of our Offset Installation System for subsea wells, to today and the realisation of another major achievement, we are continuing to lead and demonstrate the value we provide to our members and the wider industry."

OSRL worked with its Subscribers Technical Advisory Forum (STAF) to understand members' requirements, looking at various options to reduce capping stack mobilisation response times, including an

**“When every minute counts, the number one priority is stopping the flow of hydrocarbons as quickly as possible”**

assessment of existing alternative air freight capping stacks and new-build proposals. A STAF working group, led by BP, was established to investigate and develop the best technical solution for the AFCS project with OSRL. The recommendation from the STAF's investigation conveyed that expediting mobilisation of the existing best-in-class OSRL Capping stacks (developed under the industry Subsea Well Response Project (SWRP)) would be the preferred solution. Key for the members was the compatibility of the OSRL capping stacks with the extensive suite of tooling, including the Containment Solution and Offset Installation System, also offered through OSRL.

After an extensive logistics study by Chapman Freeborn, looking at the members' areas of operations, the AN-124 was chosen

as the most suitable airframe due to its payload, self-loading/off-loading capabilities and availability on the European spot market.

To facilitate the movement of the capping stack in a single operation, OSRL worked with L+M to design and fabricate a bespoke frame, with support from Trendsetter as the original equipment manufacturer (OEM) for the capping stacks. Antonov Airlines and Volga Dnepr reviewed and approved the combined skid/capping stack design and physical load for flight.

Chris Lund, technical manager for OSRL's SWIS team added, "When every minute counts, the number one priority is stopping the flow of hydrocarbons as quickly as possible. The ability to transport a fully assembled capping stack by air is a critical development for the industry. Sea transport remains the most likely mobilisation option for the majority of well sites, which is why we have four capping stacks strategically located in key upstream regions – fully assembled at storage bases with direct quayside access. But for wells in more remote areas, and for members looking to secure drilling licenses in new or remote exploration locations, this is a vital addition to our subsea capping and containment offering." ■



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*Prevention is always better than having to deal with an emergency.*

# Fire-safe materials for the oil & gas industry

Anne Steen-Hansen and Karolina Storesund from Bloomsbury Fire Security discuss the importance of fire-safe materials, and the use of materials with good reaction-to-fire properties, to prevent small fires from starting and developing with serious consequences.

**T**HE CONSEQUENCES OF fire in the petroleum industry can be severe. Fires on offshore facilities can start in several types of equipment and sites.

An analysis of the 985 fires registered in the Norwegian Petroleum Safety Authority's database between 1997 and 2014 showed that approximately 67 per cent of the incidents were registered as fires or explosions that did not involve hydrocarbons. About one-third of the fires happened in the ancillary systems, which cover a wide range of functions. Six of the 985 events were categorised with the highest severity level, with a great potential for serious accident or fatalities – three of those occurred at offshore facilities. Sixty-six of the fires took place in living quarters.

This shows that serious incidents related to fires do not occur very often. However, some of the reported incidents could have developed into fires with disastrous consequences. This stresses the need for continued efforts to increase the safety and to focus on the barriers that prevent escalating events. The right choice of materials in components, construction and furnishing is an important barrier to prevent the fires from starting, and prevent small fires from developing into larger fires that will be difficult to control.

The HSE regulations in the Norwegian petroleum sector are primarily performance-based. The materials used on the Norwegian continental shelf must meet the fire safety

requirements given in the facilities regulations. These regulations give requirements to the performance of materials and the related guidance documents describe acceptable methods for documentation of reaction-to-fire properties. The facilities regulations describe important principles in the selection of materials in or on plants, and the guidelines specify which test methods should be used to document the fire properties. This list of test methods has not been updated in many years, it contains several outdated methods, and several of the references do not set criteria for approval of products.

“Some of the reported incidents could have developed into fires with disastrous consequences”

RISE Fire Research AS (former SINTEF NBL AS and SP Fire Research AS) published recommendations about how to interpret the regulations and other specifications (e.g. the NORSOK standards) in 2008, which have been frequently used within the industry. These recommendations for testing and

documentation are now updated. They include references to new and updated test standards and are published in English. The recommendations can also be useful for other industrial applications of combustible materials all over the world, both for on and offshore plants.

RISE Fire Research AS is in close dialogue with industry and suppliers about the documentation, test methods and criteria to be used for installations in the North Sea. It helps the parties to meet the regulations, and to maintain a satisfactory level of fire safety. It is up to operators to determine which documentation they will require for different products, based on requirements given in the facilities regulations and the NORSOK-standards. The company have developed guidelines and recommendations for appropriate fire safety documentation requirements for materials covering various products and applications within the industry. The recommendations are based on an assessment of the fire risks in different areas of offshore installations, combined with our knowledge of materials' reaction-to-fire properties, as well as knowledge of how selected test methods can be used sensibly. ■

*The report "Recommendations for the documentation of the reaction-to-fire properties of materials offshore" can be downloaded at [risefr.no](http://risefr.no).*

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# The way ahead for decommissioning

Steve Gilbert, Ana Severova and Richard Devine discuss some of the challenges and opportunities of decommissioning in the Middle East.

**W**ITH A SIGNIFICANT number and concentration of older oil and gas facilities, decommissioning is becoming a hot topic in the Middle East. While jurisdictions vary, many producing countries in the region do not yet have mature legislative and regulatory structures for decommissioning, and older oil and gas contracts do not address the issue in detail. This creates the potential for uncertainty regarding the allocation of decommissioning liabilities, the standards applicable to the abandonment of infrastructure and the handling of residual long-term liabilities.

Exploitable quantities of oil were first discovered in the region in 1908, and today new hydrocarbon discoveries are still being made and the industry will continue to be a significant part of the economic future of the region.

However, much of the infrastructure used for the exploitation of hydrocarbons is ageing and will shortly come to the end of its useful life. Assets will need to be retired and the land or marine areas restored to a condition that allows future beneficial use.

“ A lot of infrastructure still in use has already reached the end of its original design life”

Decommissioning is the natural end of the life cycle of an oil and gas field; it may be delayed but it cannot be avoided, and the need to retire this infrastructure may even accelerate as the region adopts new sources of energy.

## The technical and commercial landscape

Existing oil and gas infrastructure in the Middle East is considerable. It has been estimated that there are around 700 facilities that will need to be decommissioned in the Middle East.



Image Credit: Chase Clausen/Shutterstock

*It has been estimated that there are around 700 facilities that will need to be decommissioned in the Middle East.*

In addition, many fields have been more prolific than expected. As a result, a lot of infrastructure still in use has already reached the end of its original design life. Age degrades infrastructure, but declining production means investment in new infrastructure may not be viable. This presents governments and oil companies with a conundrum: how to maximise production while operating safely.

There are strong economic incentives not to retire assets, as the longer a production facility remains available, the more opportunity there will be for adjacent fields and pools of resource to be exploited. Regulators across the world recognise the attractiveness of maximising opportunities and the inter-dependency of oilfield operations.

Also, large scale decommissioning can be very expensive. Eight international oil companies have Asset Retirement Obligations (AROs) on their balance sheets of more than US\$10bn each and, since 2010, the AROs of the seven largest international oil companies have increased year-on-year. Estimating future costs is inherently risky, as the industry does not know how technology or standards will develop so, whilst decommissioning is clearly a critical issue, it is difficult to tell whether sufficient or excess capital is being set aside.

The challenge is clear: to produce safely and efficiently for as long as possible and to have sufficient financing to dispose of the infrastructure responsibly and return the land or sea to future legitimate use. This creates a three-dimensional challenge for policy makers

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with cost, risk and governance/legislation to be considered.

**The regulatory landscape**

Allocation of decommissioning liabilities is an area of tension between governments and oil companies. Governments want the companies that benefit from petroleum operations to be liable for the costs of decommissioning infrastructure used during such operations. On the other hand, oil companies want to ensure that their liability is proportionate to the benefit they have received from such infrastructure and for other beneficiaries to contribute their fair share. Oil companies also want to be able to cost-recover decommissioning expenses during production pursuant to the terms of the relevant government contract.

**Contract terms**

In the Middle East, the specific decommissioning liabilities and obligations of the relevant oil companies (the contractor) are typically set out in the applicable host government granting instrument (HGGI).

There are a range of different types of HGGIs utilised by governments in the Middle

East: production sharing agreements, technical services contracts, concessions, royalty and tax agreements or others (such as hybrids). Whatever the type of HGGI, as a minimum, modern HGGIs usually have provisions dealing with liability for decommissioning of assets. In many cases, modern HGGIs provide for (1) when and how the contractor must contribute towards the costs of decommissioning; and (2) whether the contractor is required to provide any security for decommissioning costs, which may not crystallise for many years after the HGGI is signed.

Although decommissioning provisions in different HGGIs vary, often they stipulate when the contractor is required to establish a decommissioning fund and to start paying into it. The trigger point might be calculated on a unit of production basis and be based on remaining petroleum reserves, or be triggered after a certain number of years following commencement of production.

The HGGI will usually provide how decommissioning costs are accounted for and whether they are cost recoverable. No methodology or trigger point is perfect.

Changes in oil prices can result in a premature

trigger of funding obligations or a trigger that occurs too late. A trigger based on a bright-line time period may also be problematic, if it does not also take account of the reserves that are available to fund the obligation, or the condition of the assets.

Decommissioning funds may contain significant sums of money. Both oil companies and governments are loath to tie up capital. In future, Middle Eastern governments may consider the merit of allowing such funds to be used for authorised investments with an appropriate risk profile. There may also be instances where decommissioning is underfunded, and oil companies will doubtless make the case that the governments should share the risk. In order to reduce such risks and to encourage investment in new projects, governments may wish to consider whether tax rebates should be available for some or all of any unfunded decommissioning costs. ■

*Steve Gilbert is a director of Asset Management & Decommissioning at Lloyd's Register, a leading oil and gas consultancy. Ana Severova and Richard Devine are partners at Devine & Severova, a boutique oil and gas law firm based in the UAE.*

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# Injecting new life into deepwater wells

Steven R. Fipke, business development manager, Tendeka, describes an innovative technological solution to manage injection rates while preventing the mobilisation of solids during shut-ins, thereby prolonging the life of the well.

**T**O IMPROVE THE performance of deepwater Gulf of Mexico assets, simultaneously managing injection rates and preventing the formation of material entering the completion during a shutdown, is a common, yet complex challenge. Though tubing deployed injection valves and regulators have been available in the industry for many years, it cannot address the problem of annular flow.

For example, within only a few years of completion, several miocene and lower tertiary water injection wells in the basin had suffered a severe loss of injectivity. This was further compounded by the accumulation of formation solids inside the lower completion. The most damaging factor in solids production is likely cross-flow, wherein varying pressured injection zones can flow between layers inside the tubing/casing annulus.

The challenge to increase the life expectancy of these wells involves sustaining high injection rates, with no loss of injection pressure or the requirement for additional horsepower, while stopping solids being mobilised during shut-ins. A range of options was considered by the operator. This included the costly and complex process of either sidetracking or re-drilling a new deepwater injector well.

Since 2014, Tendeka, the independent global completions service company, has been working with a major operator in the USA to develop an innovative technological solution to overcome this problem.

An internal study and analysis of historical data found that the severe loss of injectivity was caused principally by fine matrix sand that had been pulled in from the reservoir. These solids are normally stationary during steady injection, but can be activated due to powerful transient flow effects such as back-flow, cross-flow and even water-hammer. This results in an accumulation of enough solid fill inside the lower completion to diminish the injection rates.

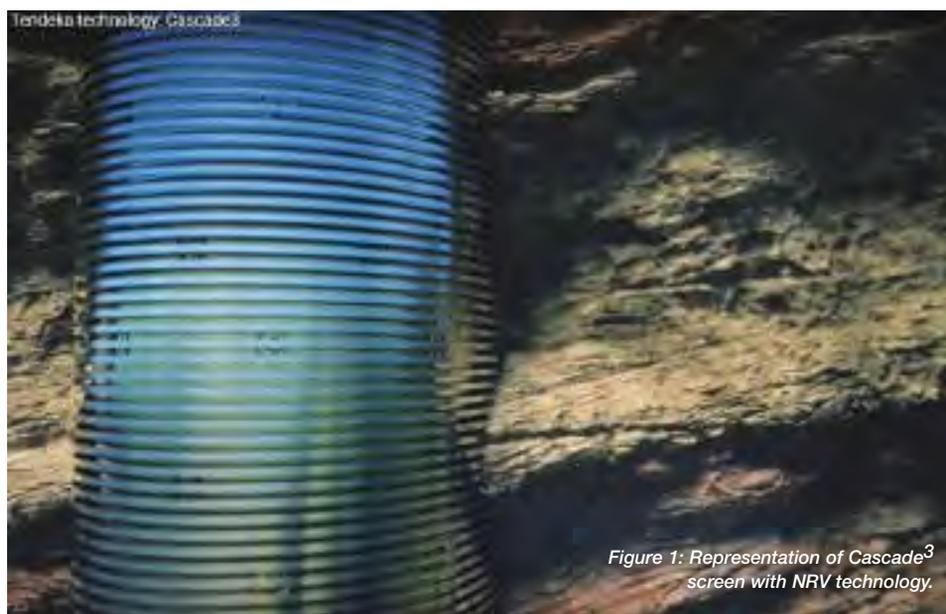


Figure 1: Representation of Cascade<sup>3</sup> screen with NRV technology.

Image Credit : Tendeka

## A new sand control technology

To address the challenge of sandface injection flow control, the company developed a new sand control technology, Cascade<sup>3</sup>. This new well screen, flow control completion system utilises intrinsic check-valves to prevent any back-flow or cross-flow during shut-ins. Depending on well conditions, it also limits the damaging effects of water-hammer: rapid, high-amplitude pressure cycles that can occur during a sudden stoppage of flow.

During the R&D phase of the project, the company used extensive laboratory testing, flow loop testing, and computational fluid dynamics (CFD) modelling to develop a series of non-return valve (NRV) prototypes. Each valve design was tested in-house and further qualified at third party laboratories. The technology was designed to handle a variety of well conditions including erosion, plugging, temperature, and repeated checking cycles. Components were manufactured with high-alloy stainless steel and tungsten carbide components to resist tortuous downhole conditions for up to 15 years. After a series of prototypes and design iterations over an 18-month period, a final design was qualified to reliably withstand thousands of pressure-checking cycles at 1,500 psi, and up to 10,000 psi static differential pressure.

The three-year R&D project<sup>1</sup> culminated with a field trial in March 2018. Its purpose was to test the valves under the most challenging well conditions possible, so the test assembly was built without a sand screen to filter out any of the solids. This exposed the system to the

“ To address the challenge, the company developed a new sand control technology, Cascade<sup>3</sup>”

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worst-case injection scenario for any potential erosion or plugging problems to be observed.

**Field trials**

A Permian salt water disposal well (SWD) was selected to test the system under the most adverse conditions: injection of untreated produced water. SWDs are common across West Texas and Oklahoma, disposing of up to 30,000 barrels of water per day (BWPD) per well.

The system was built on 4-1/2" base pipe with an array of 630 NRVs (Figure 2). The quantity of valves is a function of the expected injection rate. To minimise flow velocity, and hence erosional concerns, the flow is limited to 40 BWPD per valve. The size and positioning of the valves is critical to be able to mount them flush with the pipe so that a direct wire wrap screen can be manufactured over them without interference.

“ The system performed as designed for downhole conditions ”

The test well was completed with the Cascade<sup>3</sup> system installed permanently on 4-1/2" production tubing, below a production packer. For the purposes of the test, a single injection zone was adequate to observe the effects of the non-return valves to achieve the following downhole test objectives:

1. Observe and record water-hammer, with/without check valves
2. Prove that check-valves can hold back pressure
3. Observe for any evidence of plugging or erosion over an extended time.

The field trial was set up to test several aspects of functionality using multiple downhole memory gauges to record pressures at reservoir depth:

- Baseline step-rate injection test
- Step-rate injection test through valves
- Check test (bleed off tubing pressure, observe annulus pressure)
- Multiple hard shut-in tests to record water-hammer
- Longevity test, continued injection (3-6 months).

The test assembly was positioned at the top of the injection zone, which was completed openhole with approximately 2,000 ft of sandstone pay. With the tubing plugged below the test assembly, and pressure gauges set to record both the tubing and annulus pressures, the test was conducted by pumping down the tubing. A pump truck was brought to location to simulate injection, and portable tanks were tied into the flow line to take any returns.

**Evidence of functionality**

Baseline injection rates were brought up to 10 BPM with no increase in

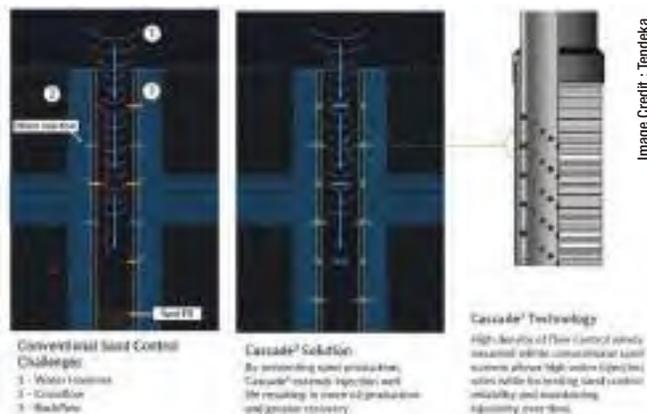


Figure 2: Cascade<sup>3</sup> screen with intrinsic non-return valve (NRV) technology



Figure 3: Cascade<sup>3</sup> valve under injection



Figure 4: Cascade<sup>3</sup> valve checking against back-flow

pressure, verifying that the NRV valves could accommodate a high flow rate without additional pressure drop, as shown in Figure 3.

Multiple hard shut-in tests were done by quickly stopping the surface pumps to record any fluid bounce and/or water-hammer on the downhole pressure gauges. The well was then opened to the surface tanks and tubing pressure was bled off to zero. No flow was observed into the tanks, which indicated that the check valves were effectively isolating the tubing from any back-flow (Figure 4).

Evidence of the technology's check-valve functionality was clearly visible during the check tests and flow rates and pressures were as expected when pumping through the test assembly. Finally, when the tubing pressure was bled off to zero, the NRVs prevented any back-flow and held annulus pressure constant. This observation verified that the system performed as designed for downhole conditions, checking against flow from the annulus to the tubing.

**Continued observation**

As of October 2018, the SWD well has been put on full-time water disposal duty for several months. Future plans include running a set of downhole pressure gauges to observe the injection rates and pressures after a sustained period of injection.

Offshore plans are currently in progress for the implementation of Cascade<sup>3</sup> in an injector well for a deepwater Gulf of Mexico asset. Several offshore Gulf of Mexico fields are at risk of losing reservoir pressure support without sustained water injection, and the expectation is that this technology will improve injection rates over a longer time. The potential CAPEX savings related to fewer injection wells drilled or re-drilled over the life of these offshore oil and gas assets is considerable.

While the system was originally developed for deepwater, offshore environments in the Gulf of Mexico, it has also found useful applications in land-based injector wells with sand problems. ■

<sup>1</sup>J Charles & T Webb, Shell, and S Fipke, Tendeka, (2017). *New Sand Screen Increases the Reliability of Sand Control in Water Injection Wells by Mitigating Common Failure Mechanisms*. Society of Petroleum Engineers. 187103-MS

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Halliburton's iCruise system automates the drilling process

Image Credit : Halliburton

# New technologies for better performance

Colby Fuser, vice president, business development and marketing, Middle East and North Africa, Halliburton, discusses technologies that are helping to increase drilling speeds and boost recovery potential in Middle East reservoirs.

**T**HE MIDDLE EAST is a diverse market that presents a number of unique challenges for operators as they move to drive further growth. Many national oil companies and international oil companies are expanding into unconventional reservoirs and trying to enhance the performance of existing mature fields which account for more than 80 per cent of the region's reservoirs. The recent introduction of several new Halliburton technologies helps operators view more of the formation for greater recovery, increase drilling speed and accuracy in long laterals, and better analyse downhole fluid samples.

Operators across the Middle East and North Africa are also looking for ways to reduce well construction costs while optimising well placement and increasing production to maximise asset value. In new developments, the main obstacle to optimal well placement is uncertainty in the reservoir position and structure because of the inherent limitations of surface seismic data. In mature fields the reservoir position and size are generally well-known; however, significant uncertainty is associated with the position of fluids within it because of movement caused by production or waterflooding. This fluid movement is difficult to predict and leads to well placement challenges.

Conventional resistivity-based geosteering tools are sensitive to bed boundaries up to five metres (18 feet) from the borehole. This range is sometimes insufficient to detect important structural features in time to make

appropriate steering decisions and can result in undesired exits from a reservoir target zone, suboptimal positioning of the well in a target zone or the failure to hit a target zone altogether. By knowing the location of hydrocarbon pockets in the reservoir, being able to correlate the geological structure with surface seismic data, identifying bypassed pay and seeing more of the reservoir, operators can make better drilling decisions.

The Halliburton EarthStar ultradeep resistivity service addresses these challenges using electromagnetic wave-propagation technology to illuminate and map reservoir and fluid boundaries more than 60m (200 ft) from the wellbore – twice the depth of investigation of current industry standards. It provides operators with a much clearer view of the surrounding reservoir environment. In mature fields, this technology helps operators optimise field development.

A comprehensive service, EarthStar also includes geosteering software to provide reservoir insight before, during and after the drilling operation. The software holds two primary functions: to process the data using a customised process and to display the results graphically on a 2-D inversion plane. It also includes various quality control functions useful for interpreting the results.

In the first twelve months of deployment, an operator in the Middle East used EarthStar to successfully drill nine well sections, incurring zero non-productive time. The wells included geostopping applications in reservoir landing intervals, challenging geosteering

scenarios and geomapping applications where the formation structure was not as expected. The service helped reduce drilling uncertainty and maximise potential recovery.

## Drilling automation enables faster decision-making and delivers predictable results

Another major transformation occurring in the oil and gas industry is the intersection of predictive analytics, the Internet of Things and artificial intelligence (AI).

What has changed today across exploration and production is the number of different elements that can connect to each other, the way data is shared and transferred and most importantly, the speed at which this data is translated into actionable insights for operators.

Halliburton is accelerating this digital transformation by implementing systems that enable smarter decision making across the well construction lifecycle. At the core, we have implemented an enterprise architecture that integrates systems, applications, big data analytics, advanced modelling and workflows from multiple applications. In the field, we execute drilling operations according to a specified well plan with predetermined drilling parameters.

Recent advances in sensor technology, downhole processors and high-speed telemetry systems deliver real-time data processing and analysis at a rate and accuracy that cannot be matched by human operators. Machine learning and data

analytics help field experts analyse drilling conditions, optimise the drill plan and make smarter decisions at the rig site.

At the centre of directional drilling automation lies the new iCruise intelligent rotary steerable system (RSS) to place wells accurately, reduce well time, improve reliability and achieve predictable results. This intelligent push-the-bit system includes advanced electronics for tool prognosis and diagnosis, multiple downhole sensors, high-speed processors and distinct survey packages to assess drilling conditions in real-time. It contains multiple high-bandwidth sensors which continuously measure downhole vibrations, annulus pressure and borehole inclination to predict unforeseen trends and enable precise well placement.

The intelligent RSS system is integrated with Halliburton automated drilling advisor software to help operators make informed and efficient drilling decisions around directional control, vibration management and tool maintenance. Based on models of the bottom-hole assembly and drill bit, machine learning is used to augment these models to define current drilling conditions and predict future well uncertainties.

In the Middle East, the iCruise system drilled the second lateral in a dual lateral well

using azimuthal resistivity to accurately place the well in the reservoir. It drilled more than 2,600 feet in one run, saving two days of rig time. The well was drilled with significant mud losses without any impact on directional performance to reach the planned target.

By automating the drilling process, Halliburton helps operators maximise asset value through reduced nonproductive time and lower costs per barrel of oil equivalent while delivering predictable, dependable and consistent results.

### Advances in coring reduce exploration risk

One of the challenges an operator faces in unconventional reservoirs is obtaining accurate coring samples to properly evaluate production potential. Traditional coring tools allow 50 to 70 per cent of the hydrocarbons to escape from the rock, as the samples are depressurised while being brought to the surface. As a result, analysis had to be based on estimates of fluids lost rather than measurement of fluids in place. Additionally, conventional coring operations could take hours to days to obtain just one sample.

The Halliburton CoreVault system changed

this process by allowing an operator to capture up to 10 rock samples in a single run and preserve 100 per cent of the fluids within the core sample. The container technology prevents reservoir fluids from escaping during core retrieval and transport and once transported to a laboratory, the reservoir fluids in those cores can be measured and analysed with much greater accuracy.

The samples taken with the system often reveal dramatically more oil and gas in place than previous estimates would indicate, which can significantly enhance economic value and reduce exploration and development risk for operators.

In a Middle East unconventional reservoir, an operator deployed CoreVault, collected 10 out of 10 cores and successfully sealed the vessel downhole so that complete laboratory analysis of the gas in place could be performed. Based on this success, the operator chose to supplement their logging programme of a nearby well and performed 20 core retrievals in an unconventional oil reservoir. The operations team had less than 24 hours to mobilise for this unplanned operation, and successfully completed the job. ■

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# Protecting against corrosion with high performance linings

AkzoNobel discusses the importance of selecting the correct linings solution to combat corrosion.



*Degradation of a tank due to corrosion not only results in damage to the tank but can also result in contamination of the contents.*

Image Credit : AkzoNobel

**T**HE CURRENT OIL and gas market's demands for cost savings, reduced maintenance budgets, shorter payback periods and increased efficiency have become the 'new normal'. Every part of the process is scrutinised to generate efficiencies and improve overall margin. Corrosion can severely impact these factors.

Degradation of a tank due to corrosion not only results in damage to the tank, but can also result in contamination of the cargo in the tank, which in some processes can cause future problems, for example the contamination of jet fuels causing malfunction of a jet engine or contamination of drinking water leading to poor taste quality, illness or worse.

The common practice is to manufacture a tank from carbon steel to have the required low cost, easy formable, strong tank shell and then to protect the carbon steel from corrosion using linings.

Linings tend to be relatively thin film when compared to the steel thickness (floors are typically between 6 and 8mm), easy to apply to the inside of the tank and have a resistance to a wide range of chemicals.

Many lining specifications will simply specify a lining system by generic type, for example epoxy, epoxy phenolic, epoxy novolac, vinyl ester, novolac vinyl ester etc. Such a specification infers that all linings with a similar resin backbone will perform to a similar level, but this has been proven not to be the case.

## Extensive track record in corrosion protection

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extensive track record in corrosion protection. Our complete range of performance linings are proven to provide long-term asset protection, reduce process downtime, and protect against the most aggressive industrial cargoes at a wide range of temperatures.

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The Enviroline range can be applied in a single, thick-film coat which significantly reduces overall application cost as well as inter-coat adhesion problems common with multiple coat systems, and with a superfast cure of only hours, not days, your tank or pipe can be returned to service quickly. ■

“ We also designed our Enviroline range to minimise application problems ”

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# Preventing corrosion through drone-based inspections

Syed Kamran Ali, from Industrial Skyworks, writes about the different types of corrosion that impact on oil and gas assets and the potential of drone-based inspection surveys to ensure small problems do not become serious risks.

**E**VERY ENGINEERING WORK in physical form has to be assiduously protected from environmental and process corrosion, starting from the day it is installed on ground. For high value assets such as energy and infrastructure, designed for long life operations, protection against corrosion is extremely important.

Corrosion is caused inside as well as outside of piping, pipe fittings, pipelines, tanks and vessels. Crude oil and raw gas from the wellhead contain impurities, carbon dioxide, water and toxic gases, all of which are corrosive in nature and cause internal corrosion of piping. External corrosion is caused by environmental impact and is a variable game changer for those companies operating in hostile, corrosive marine environments. Corrosion control for offshore structures requires critical corrosion control methods and techniques that will prolong structural life while saving millions in cost.

The energy industry has learned to live with corrosion. International standards organisations have identified different measures to counter and minimise the effects of this inevitable phenomenon, such as API – RP 583 (Corrosion under Insulation and Fireproofing) and DNV-RP-C101 (Allowable Thickness Diminution for Hull Structure of Offshore Ships). Usually, two approaches are used in this regards. The first approach involves incorporating for corrosion allowance in the design wall thickness of the vessel, pipe or structure and second one is to use corrosion inhibitors. NACE International (formerly National Association of Corrosion Engineers) provides globally recognised standards that are responsive to the latest changes in products and technology, and whose implementation streamlines processes and trims costs. Businesses can prolong the life of their premium assets by following standards such as NACE SP0108-2008 (Corrosion Control of Offshore Structures by Protective Coatings) and NACE TM0194-2014 (Field Monitoring of Bacterial Growth in Oil and Gas Systems).



Image Credit : pichistock/Adobe Stock

*Offshore structures are particularly prone to corrosion.*

“The energy industry has learned to live with corrosion”

## Types of corrosion

Corrosion control of offshore structures requires special attention of designers as well as operators of the facilities. DNV GL provides safety and sustainability advice to maritime, oil and gas and energy industries in the form of classification, technical assurance, software and independent expert advisory services. DNV-RP-C101 discusses various types of corrosion in offshore structures as follows:

**General Corrosion:** Where uniform reductions of material are found. Criteria for minimum thickness of hull structural elements

may be applied in order to determine average diminution values. Typically, repairs will include steel replacement to original scantlings and/or reinforcement upon special consideration.

**Pitting Corrosion:** Random scattered corrosion spots/areas with local material reductions. The intensity of the pitting must first be estimated before applying criteria. Typically, repairs will include renewal of plates, building up pits by welding.

**Grooving Corrosion:** Local line material loss normally adjacent to welding joints along abutting stiffeners and at stiffener or plate butts or seams. Due to the complexity and effects of groove corrosion, diminution criteria are limited and special repair considerations are required.

**Edges Corrosion:** Local material wastage at the free edges of plates and stiffeners. Typically, if not renewed, repairs may be carried out by means of edge stiffeners / doublers. For each of the corrosion categories separate

assumptions, criteria and typical repairs should be applied as given in relevant chapters.

High resolution cameras mounted on drones can provide a very handy tool for detecting the above stated forms of corrosion.

Corrosion is not limited to mild steel structures and piping. With LNG facilities, which are primarily stainless steel and high alloy materials, the cryogenic process causes large variations of temperature (thermal cycles), thus inducing stresses related to expansion, contraction, bending and fatigue (expansion and contraction cycles). Additionally corrosion becomes a serious concern with the passage of time, which includes pitting corrosion as well as stress corrosion cracking. The subtle danger with stainless steel is that the corrosion may not be recognised until the component starts leaking.

LNG steel tanks require regular inspection for bottom grouting between the outer bottom footer plate and the ring wall for any evidence of leakage or corrosion, for anchor straps for corrosion at the concrete ring wall / platform interface, and for frost spots on the outer surfaces, as these would indicate a loss of insulation performance in the annular space. Infrared imaging of the tank would detect this

condition, and this can be easily carried out through drone-mounted IR cameras.

Surface corrosion can be easily detected, but Corrosion Under Insulation (CUI) is more difficult. With the use of IRT (InfraRed Thermography) and capturing multi-spectral images of insulated components, the thermal signature on a portion of pipeline or vessel is identified to be different from the rest of the pipeline or vessel – an indication of anomaly and possible corrosion. By installing IRT sensors on drones it is possible to inspect those areas of the refinery or processing plant which are not easily accessible otherwise.

“Surface corrosion can be easily detected, but Corrosion Under Insulation (CUI) is more difficult”

In the absence of scheduled NDT inspections, the condition of piping and fitting is largely unknown to the plant manager.

As required under API, CSA or ANSI standards / guidelines as well as for compliance under EPA regulations, it is a must in today's

business environment to watch out for corrosion. Most rupture and leakage incidents in the oil and gas industry are related to metal loss as a result of corrosion, mechanical creep over time or mechanical damage caused by external or internal factors. Neglect in this area leads to imposition of heavy fines, and a company may also get involved in damage recovery suits. Oil spills from a storage tank or transport pipeline leakage may cause severe or irrecoverable damage to the environment.

Drone-based inspection surveys, such as those offered by Industrial Skyworks, can provide the required resources at affordable cost, keeping regular vigil on corrosion related damages. The drones are equipped with high resolution visual cameras as well as IR cameras, which make them suitable to identify surface corrosion in difficult / dangerous areas as well as CUI detection under API – RP 583 through IRT. Industrial Skyworks' drone-based inspection solutions provide improved results in prevention as well as containment of a catastrophe, while preventing additional risk of deploying personnel for data gathering in a dangerous environment. ■

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# In-line inspection for hard spots in heavy plate production

Leading heavy plate manufacturer Dillinger has developed an inspection technology, integrated into the production process, that automatically inspects linepipe plates for hard spots.

**S**OME TIME AGO, pipeline operators in the Asian region reported that lines consisting of sour gas were beginning to leak after only a few days of operation, due to cracks running in the wall-thickness direction and caused by corrosion reactions. These pipelines were taken out of service before any incidents could occur, and had then to be reconstructed.

According to information supplied by the pipeline operators, the reason for this cracking was to be found in so-called "hard spots", i.e., small areas on the surface, the hardness of which was greater than that of the remaining pipe surface. These hard spots occurred irregularly and in diverse sizes on the surfaces of the plates. The thickness of hard spots in these zones would, typically, amount only to a few tenths of a millimetre. The difference in hardness relative to the remaining surface was immense, however, resulting in an extremely steep hardness gradient. It is assumed that this surface defect, in combination with the acidic fluid conveyed in the above-mentioned pipelines, was the initiating factor for the cracking.

Dillinger experts focused on the development of a technology which would meet the demands of oil and gas companies for detection of those hard spots on plates for special pipelines as early as possible during the production process. Dillinger firstly examined the various inspection technologies that can be used to find hard spots on plates. A typical linepipe plate has a length of 12 to 18 m, and a width of 1.50 to 4.20 m. The hardness-testing methods available generate indentations of a diameter of around 1 mm!

In cooperation with the Rohmann Company of Frankenthal, Dillinger's engineers developed an inspection method based on "eddy currents" capable of detecting such hard spots. This eddy-current technology was first installed on manually propelled inspection trolleys which were moved on specified inspection paths over the plates by the inspection employees. Manual inspection technology is highly labour-intensive, however, since both sides of the plate have to be inspected separately.



*The newly developed D-Tect inspection technology from Dillinger makes it possible – even during the production process – to detect hard spots on plates.*

Image Credit : Dillinger

In order to increase capacity and accuracy, Dillinger therefore decided to install an automated eddy-current testing system integrated into the roller table of the rolling-mill, now making it possible to inspect the plates in the uninterrupted flow of production, without any major additional effort.

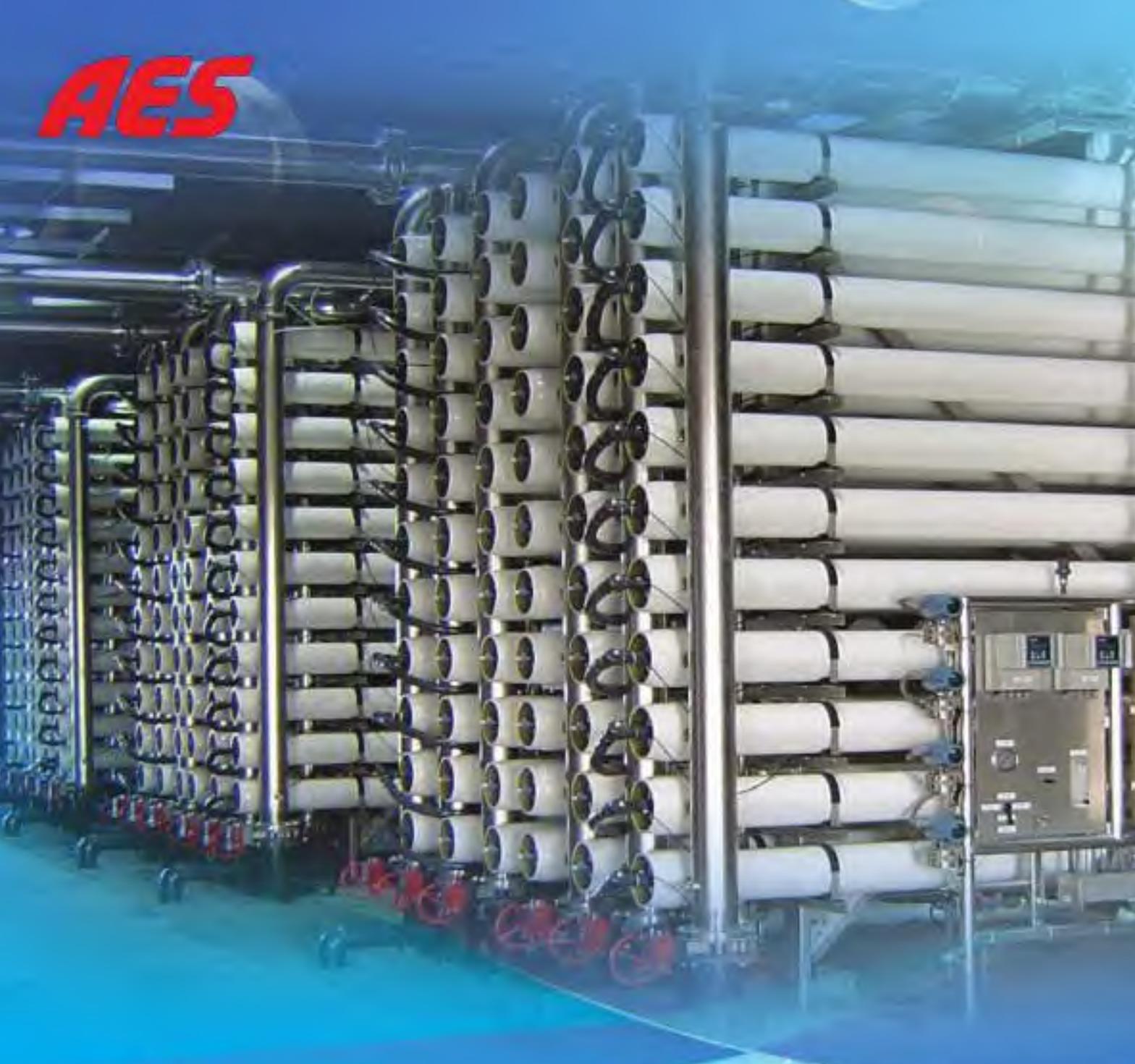
Unlike the old manual system, the innovative scanning transducers used in this new system can, in theory, detect indications of as little as 10 mm in diameter; these hard spots are then eliminated by means of gentle grinding.

Specialists from the major oil and gas companies, who operate pipelines around the world, were involved in this project from an early stage. Alternatives to the thermomechanically rolled and accelerated-cooled carbon steel previously used for these types of pipelines are at least ten times as expensive, suggesting that it is also in these companies' interest to find solutions to make carbon steel pipelines for the transmission of sour natural gas safer and to allow them to resume using this material for their projects.

Dillinger is currently conducting a process of qualification of carbon steel for this application, under the new requirements and specifications set by the customers and the pipeline operators.

Experience to date indicates that the process which causes the formation of these excessively hardened spots cannot, on physical criteria, be totally suppressed. As a result, it can be assumed that the eddy-current testing technology developed at Dillinger will provide the most rational approach for the achievement and supply of plates which have been 100 per cent inspected to ensure the absence of hard spots. This inspection system is fully integrated into the production path and constitutes a significant improvement over the previous labour- and time-intensive method of trolley. Thanks to further refined scanning transducers, test results have become even more accurate, and now make possible precise documentation of inspection, as well as simultaneous examination of both surfaces of the plate. ■

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# Blockchain in the oil & gas industry

Laura Brownhill, Eden Scott, discusses how blockchain can facilitate supply chain management in the oil and gas industry.

Image Credit : Sashkin/Adobe Stock

*Blockchain is essentially a distributed digital ledger.*

**D**IGITAL SUPPLY CHAIN integration is becoming increasingly dynamic. As blockchain continues to evolve from pilot tests to real-world platforms in 2018, supply chain management is set to be transformed completely by this distributed ledger technology.

Efforts are already being made in this direction, for example, a joint venture by IBM and Maersk to deploy a blockchain-based electronic shipping system that will digitise supply chains and track international cargo in real time.

According to recent studies, the global blockchain supply market is expected to grow from US\$145mn in 2018 to US\$3.314bn in 2023, which reflects an 87 per cent compounded annual growth rate. With the phenomenal growth projected in the next few years, it is important to understand how this technology will disrupt supply chains – especially in the oil and gas industry.

## What is Blockchain?

While the most prominent use of blockchain is in cryptocurrency, the reality is that blockchain

– essentially a distributed, digital ledger – has many applications and can be used for any exchange, agreements/contracts, tracking and, of course, payment.

“Commodity exchanges on blockchain can support oil and gas trading anywhere in the world”

Blockchain serves as a shared database that eliminates the role of third parties in transaction processes and information sharing. As a result, technology, inventories, contracts, payments and other data is shared directly between parties with encrypted connections.

Speaking in terms of the oil and gas industry, commodity exchanges on blockchain can support oil and gas trading directly between parties anywhere in the world while

removing the role of banks, brokerage firms or other intermediaries.

Due to the complexity and significant lack of transparency of current supply chains, it is incredibly difficult for customers or buyers to truly know the value. In a similar way, it is extremely difficult to investigate supply chains when there is suspicion of illegal or unethical practices. They can also be highly inefficient, as vendors and suppliers try to connect the dots on who needs what, when and how. Because of these discrepancies, there is a growing interest in how blockchains might transform the oil and gas supply chain and logistics industry.

## Blockchain in the oil and gas industry

Technological innovation on the operations side, such as hydraulic fracturing, 3D seismic and other extraction processes, has become the norm in the oil and gas industry. The same degree of innovation has not been adopted for back office functions as the industry generally hasn't brought much new digital technology to the supply chain, procurement,

or finance aspects of the business.

However, oil and gas executives began to show a wide-scale interest in blockchain as early as last year. According to a Deloitte Consulting report published in 2016, 55 per cent of oil and gas executives agree that blockchain is required to retain a competitive advantage, while 45 per cent acknowledge its disruptive potential.

In order to fill this gap, last year a number of oil and gas companies, including BP plc and Royal Dutch Shell plc, announced the creation of a blockchain commodity exchange. Trading on the blockchain platform is expected to begin by the end of 2018. Further application of blockchain technology has been carried out by Diamond Offshore Drilling, who announced the launch of their Blockchain Drilling service - the first application of blockchain technology in the offshore drilling industry. This service drives efficiencies and enables oil and gas operators to reduce their total cost of ownership

### How could it help supply chains?

The Deloitte report has highlighted four key areas of consideration which can help shape the discussion around blockchain in the oil



*Blockchain raises the prospect of enhanced data security.*

and gas supply chain management area:

**Transparency** - Every transaction in blockchain is recorded on a block and across multiple copies of the ledger that is distributed over many nodes (computers). If any attempts are made to try and modify data on a

blockchain, the other nodes would note that the data doesn't align with their own and disregard it. Thus, blockchain could increase the efficiency and transparency of supply chains and positively impact everything from warehousing to delivery to payment.

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However, it does involve issues, such as the standardising of data between companies on a supply chain, storing data in a cost-effective way (since this can be very expensive) and protecting companies' confidential information on a platform intended to be transparent. These issues raise the question of whether it can provide the level of transparency required to achieve success while ensuring more efficient data and systemic security.

“ Every transaction in blockchain is recorded on a block and across multiple copies of the ledger”

**Security** - Since every block links to the one before it and after it, there is not one central authority over the blockchain, which makes it extremely efficient and scalable.

Storing data in fragments at multiple sites, rather than concentrating it one place, raises the prospect of enhanced data security even without a fully encrypted system.

**Efficiency** - Blockchain will provide a platform to classify all assets in a singular class. It will blur the boundaries between asset classes, resulting in cash, energy products and other commodities becoming digital assets trading inter-operably. More value can be derived by not restricting activity to a single asset class.

A few other ways in which blockchain can promote the supply chain efficiency is by facilitating automation of import/export records and notifications, including triggers for beneficial tariff programmes, and help prevent manual errors and redundant efforts as assets are processed.

**Contracts** - The sheer size and volume of contracts and transactions to execute capital projects in oil and gas have historically caused significant reconciliation and tracking issues among contractors, sub-contractors, and suppliers.

To reduce the chaos, blockchain enables the creation of 'smart contract' – a computer code hosted on a blockchain that defines and executes the terms of an agreement between parties. A standardised contract for all stakeholders involved in the supply chain has

“ Blockchain enables the creation of ‘smart contract’”

many benefits, such as verification, visibility, self-execution, clarity of agreement terms, fraud protection and connectivity. Removing third-party supervision and paper-based contracting because of smart contracts further reduces costs and overheads.

**Conclusion**

There is no getting away from the momentum being built by blockchain technology.

Blockchain supply chain applications are already growing in other industries, notably retail and consumer goods; healthcare and life sciences; manufacturing and technology; logistics, and many more.

We are already seeing some 'real time' examples of where blockchain is being utilised in the oil and gas industry. So for the time being, watch this space. ■

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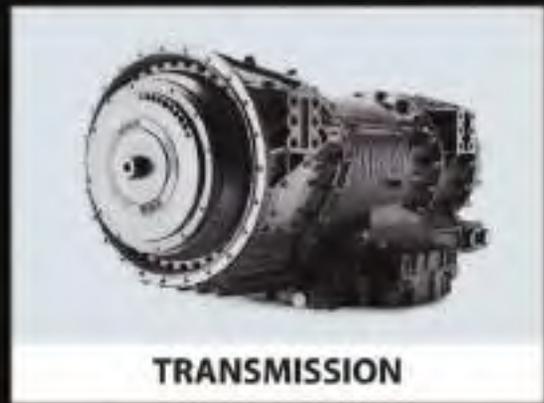
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# A superior thread connection for horizontal completions

TMK describes the application of its semi-premium thread connection for efficient horizontal completions.

**H**ORIZONTAL DRILLING HAS been developing rapidly in the past decade. This technique provides improved oil recovery and for development of reserves that are difficult to recover. According to RPI data, during the period from 2006 to 2016, the number of horizontal wells in Russia increased fivefold. At the same time the construction of multilateral wells with horizontal laterals is becoming more and more popular.

Casings with thread connections while running in hole operation in deviated and horizontal wells are subjected to combined loads caused by axial load, bending load and differential pressure.

The most critical point of the casing string is the thread connection. 50-80 per cent compression efficiency of connection becomes insufficient. This article describes results of FEA (finite element analysis) for API Buttress and TMK UP CWB connections and full scale test for TMK UP CWB 177.8 x 9.19 N80.

## Subjected to stresses

During tripping in horizontal hole, the string is subjected to various loads, which depend on considered section. Conventionally the casing string may be divided into two sections:

1. Vertical and directional section. There are acting positive forces (useful)  $W_1$  on this section. Final bottom hole and horizontal section directly depends on force values.
2. Directional and horizontal section: There are acting negative forces which slow down string movement.

The main criteria of successful run in hole operation is:  $W_1 > W_2$  condition. Final force values on both sections depend on friction factors as in opened hole and cased hole.

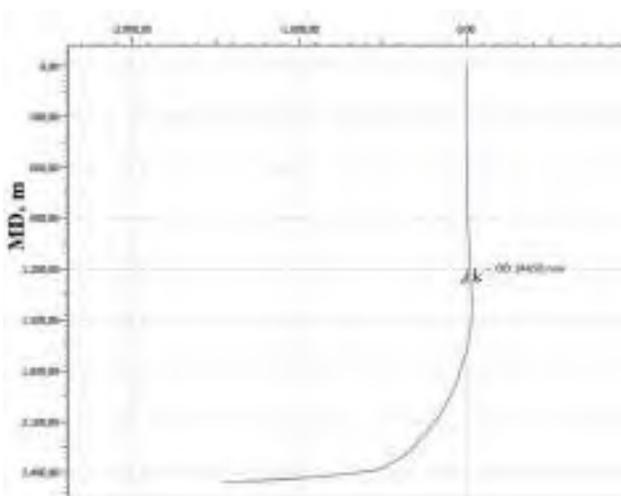
Consider directional well N with maximum DLS (dogleg severity) 40/30 m from 2,500 m to 2,600 m MD (measured depth) and a horizontal section 915 m long (Fig.1a).

Fig.1b shows axial stresses during 177.8 x 9.19 N-80 string tripping to 3,800 m in according in well path (Fig.1a). Maximum expected value of compression stresses reaches 392 kN in directional section at 2500 m MD (friction factor in an open hole is 0.35), according to analyses performed in Well Plan Landmark version 5000.15.1.5.

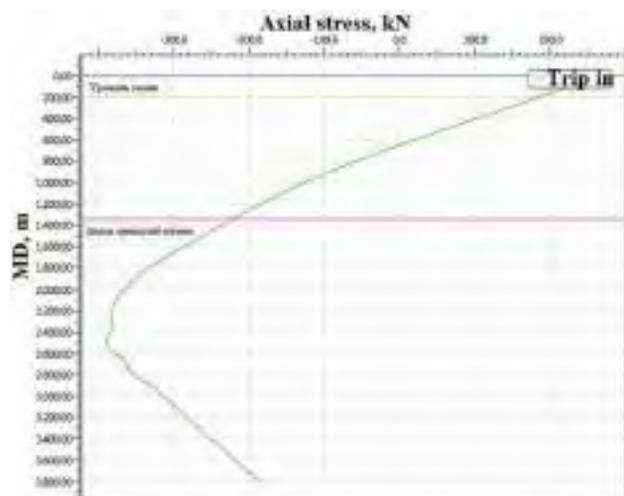
Besides compression axial stresses, a pipe body and a thread connection in directional section are subjected to bending stress and internal/external pressure stress. According to SPE paper 22547, upon analysis of combined loading, considering bending loads, stress value may be 7-8 times higher. In this case, connections with 50-60 per cent compression efficiency cannot provide for the string operating servability.

All these factors influence a thread connection selection and require check of a thread connection operating servability under impact of von Mises equivalent stresses. The value of combined loading may exceed maximum allowed stresses for standard thread connections as per GOST and API, leading to plastic deformation in the coupling area thus resulting in local ID restriction and loss of sealability.

Fig.2 shows a photo made inside well N (Fig.1). An operator used thread connections with maximum 60 per cent compression efficiency. During the string run in hole, a drilling contractor was rotating the string. High compressive loads combined with bending stresses and torque application led to swelling of the box shoulder. The cementing plug did not reach the landing collar because of local ID restriction in production casing and increased time for well construction.



a – well path, vertical projection



b – distribution of axial stresses along the hole

Fig. 1: Path of horizontal well N and distribution of axial stresses (according to Well Plan)

Image Credit : TMK



# TMK UP CWB

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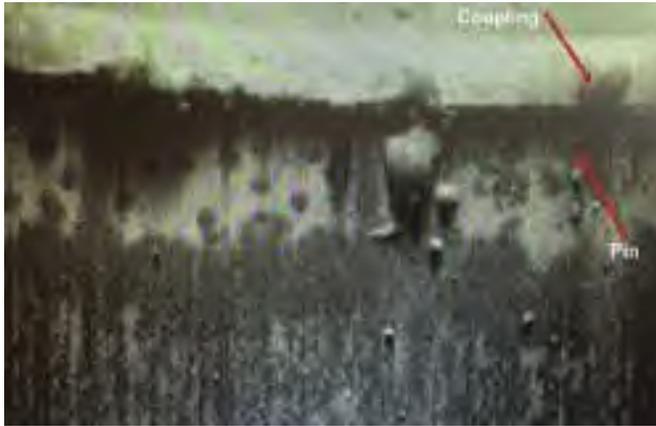


Fig. 2: Photo of box shoulder swelling

| E, MPa  | Poisson ratio | $\sigma_y$ , MPa , | $\epsilon_{T,}$ % |
|---------|---------------|--------------------|-------------------|
| 210 000 | 0.3           | 552                | 0                 |
|         |               | 655                | 14                |

Table 1

Because the semi-premium thread connection has box/pin shoulder, connection compression efficiency is higher compared with the API and GOST standard. For example, the minimum compression efficiency for TMK UP CWB thread connection is 100 per cent. In addition, the box shoulder allows for the following:

- The string rotation
- Increase of operating torque
- Equal passage to exclude problems related to erosive wear and pit corrosion caused by CO<sub>2</sub>.

TMK UP CWB thread connection is a semi-premium thread connection with Buttress profile. High compression efficiency of the thread connection is ensured due to the design and strict requirements to accuracy of thread manufacturing. Size range is 101.6 mm – 339.7 mm.

For an engineer it is important to find the boundary of Buttress, OTTM application for directed and horizontal wells.

In order to determine an influence of bending loads upon axial compression on operating capacity for 177.8 x 9.18 N80Q Buttress and 177.8 x 9.18 N80Q TMK UP CWB Semi-Premium thread connection, an FEA study was performed using Abaqus software.

An FE model of API Buttress thread connection was developed based on API Spec 5B standard. The mechanical properties of N-80Q grade steel are provided in **Table 1**.

The calculation was based on nominal dimensions. The value of thread diametric interference for API Buttress thread connection was defined according to the make-up to the triangle stamp base:  $\Delta = 0.79$  mm. The value of thread diametric interference for TMK UP CWB thread connection – according to design documentation of TMK-Premium services, LLC.

The value of compression load was defined equal to 80 per cent from the load corresponding to the pipe yield strength  $F = -2148$  kN.

Internal pressure was chosen according to equality of equivalent stresses 95 per cent from the pipe body yield strength  $P = 19.9$  MPa with the compression load in the account.

One of the first tasks was to define equivalent and circumferential stresses upon thread connections make-up. It is well-known that upon API Buttress thread connection make-up to the triangle stamp, the coupling is getting heated.

The results of simulation of API Buttress thread connection make-up to the triangle stamp reveal plastic deformations both on pin and coupling (**Fig.3**). This is caused by a high diametric interference required for operation torque achievement.

Due to special design features, stress level in TMK UP CWB thread connection during make-up is well below (**Fig.3**), thus plastic deformations are found only in the shoulder. Besides, a shoulder

provides for higher optimum make-up torque as compared to API Buttress thread connection (**Ref. Table 2**).

The simulation of compression load application with internal pressure in API Buttress thread connection showed considerable areas of plastic deformations in coupling. Also an increase of circumferential stresses in coupling (**Fig.5**) was found which may result in its destruction. Thus, application of compression force 80 per cent from the pipe body may lead to the thread connection destruction.

In TMK UP CWB thread connection plastic deformations were almost absent due to the fact that compression load is considerably compensated by the shoulder (**Fig.4, Fig.5**).

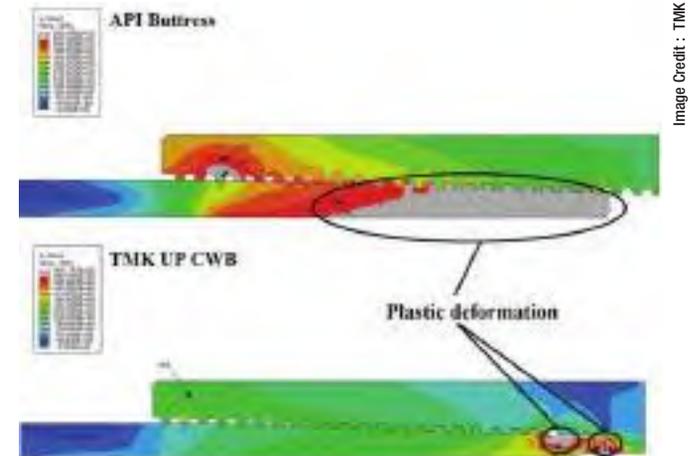


Fig. 3: Distribution of equivalent stresses in API Buttress and TMK UP CWB 177.8 x 9.19 N80 thread connections during assembly

| Name                   | API Buttress | TMK UP CWB |
|------------------------|--------------|------------|
| Standard size          | 177.8 9.19   | 177.8 9.19 |
| Grade                  | N80          | N80        |
| Minimum make-up torque | 9.1 kN-m     | 16,1 kN-m  |
| Maximum make-up torque | 15350 kN-m   | 19.7 kN-m  |
| Operation torque       | -            | 19.7 kN-m  |

Table 2

### Strength and performance characteristics

Based on FEA simulation results, the following conclusions on strength and performance characteristics of API Buttress and TMK UP CWB thread connections were made:

1. Due to the shoulder in TMK UP CWB thread connection, the maximum make-up torque and operational torque are increased.
2. Plastic deformations upon API Buttress thread connection make-up may reduce strength characteristics of the thread connection when it is operated.
3. During combined loading, several areas in API Buttress thread connection appear with irreversible plastic deformations, which may influence both the structural integrity and sealability.

The simulation performed cannot provide for conclusion on thread connection sealability. According to FEA results for API Buttress and TMK UP CWB, it was decided to test TMK UP CWB semi-premium thread connection for leak tightness under joint action of compression, bending loads and internal pressure.

A sample for the test was machined according to the design documentation of TMK-Premium Services, LLC. During its machining, deviations of geometric parameters of the thread connection from the nominal geometric parameters were minimised, testing for:

1. Determination of impact of make-up torque on the thread connection strength characteristics and sealability.
  2. Impact of bending stresses on the thread connection operating capacity.
- A bend upon intensity of curvature increase 30/10 m typical of directed wells was simulated in the test frame.

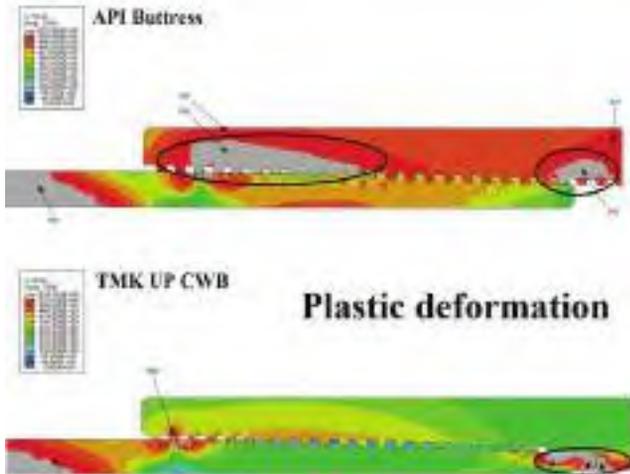


Fig. 4: Distribution of equivalent stresses in API Buttress and TMK UP CWB 177.8 x 9.19 N80 thread connections upon application of axial compression load with internal pressure

For investigation of make-up torque impact on sealability and strength of the thread connection, make-up from A-side was performed with make-up torque below the optimum make-up torque, and for B-side with make-up torque above the optimum make-up torque.

In developed loading schedule, load points are in the second quadrant of the diagram “axial force - pressure”. This corresponds to the area of compression loads with internal pressure. Loads envelope corresponds to the level of stresses in the pipe body 95 per cent from the nominal yield strength of the material. It was stipulated in the load schedule, that compression force 60, 80 and 100 per cent from the maximum allowed will be applied to the sample in succession along with internal pressure, which value was chosen based on condition of overlap of loading point with load envelope (quadrant II of loading ellipse). After application of compression load and hold during 15 minutes, its value was reduced and bending load was applied. Then the thread connection was pressurised with maximum allowed pressure with zero axial force (LP1).

Load envelope and load points are presented in Fig.6 and Fig.7. A 15 minute hold was used for load points without “a” index.

Tests for sealability were performed using liquid as a test medium. Pressure drop exceeding five per cent from applied pressure during the hold period was accepted as a leak criteria. The level of stresses in the thread connection was monitored using strain-gage sensors.

### Successful results

The TMK UP CWB thread connection succeeded in all the load points within the test programme. Test results proved conclusions on TMK UP

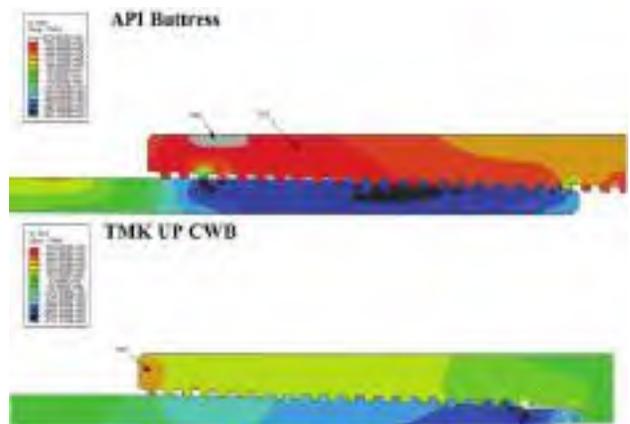


Fig. 5: Distribution of circumferential stresses in API Buttress and TMK UP CWB 177.8 x 9.19 N80 thread connections upon application of axial compression load with internal pressure

Image Credit : TMK

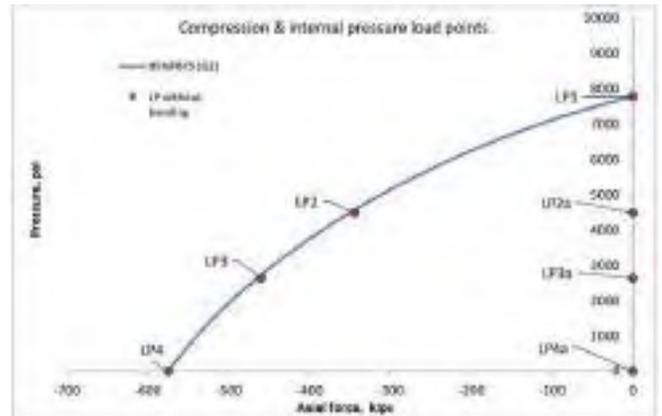


Fig. 6: Distribution of equivalent stresses in API Buttress and TMK UP CWB 177.8 x 9.19 N80 thread connections upon application of axial compression load with internal pressure

Image Credit : TMK

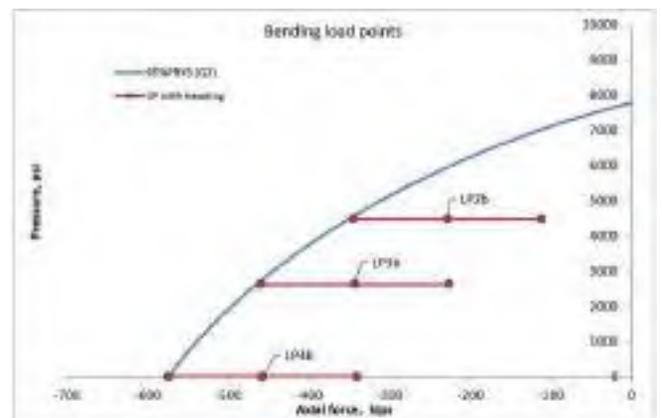


Fig. 7: Distribution of equivalent stresses in API Buttress and TMK UP CWB 177.8 x 9.19 N80 thread connections upon application of axial compression load with internal pressure

Image Credit : TMK

CWB thread connection performance characteristics made during FEM simulation:

- Sealability of the thread connection under compression load equal to 100 per cent from allowed load along the pipe body.
- Sealability of the thread connection under combined compression and bending loads (30/10 m) resulting in maximum axial stresses in the pipe body corresponding to 100 per cent level from the allowed ones.

Based on the Well Plan simulation of N well, FEA simulation as well as test results, the conclusions are as follows:

1. Along with increase of horizontal interval, axial loads for compression in directed area are increased.
2. During running a string down lasting horizontal intervals, it is rotated for transformation of sliding friction into rolling friction (decrease of force W2).
3. When considering equivalent loading in directed intervals: compression + bending, it is recommended to use semi premium connections with 100 per cent compression efficiency.
4. For rotation of a string during running down or cementing, thread connections such as TMK UP CWB are required.
5. FEA mathematical simulation of combined loading (less than 80 per cent compression) in Abaqus revealed that areas of plastic deformation may appear in API Buttress thread connection, and they may influence the structural integrity.
6. Tests of TMK UP CWB 177.8 x 9.19 N-80 thread connection proved its operating capacity under combined loading with bending 30/10 m and 100 per cent compression efficiency along the pipe body. ■

Image Credit : TMK

# Reducing project time and costs with Bentley software

Bentley's structural analysis and design software helped Aryatech Engineering Consultants FZE to reduce time and costs on a project to perform a shale shaker platform modification on a jack-up rig.

**A**RYATECH ENGINEERING CONSULTANTS FZE, the UAE-based office of Aryatech Marine & Offshore Services, was retained to assess the structural adequacy of a shale shaker platform on a jack-up rig owned by Shelf Drilling International, Inc. The scope of the project included checking the structural integrity of primary and secondary members against critical combinations of static and dynamic loads that developed during the lifespan of the jack-up rig. Aryatech was able to significantly reduce resource hours and project costs by leveraging structural analysis and design software.

In order to meet the tight schedule, the team used STAAD.Pro, Bentley's structural analysis and design software application to check for local failures in the primary and secondary members, as well as for maximum deflection against critical loads. STAAD.Pro's purpose-built features increased the pace of work while maintaining a high degree of accuracy. The team was not only able to improve the safety of the structure, but they were also able to reduce error-prone manual calculations by using STAAD.Pro.

The loads considered for design included equipment and live loads, as well as loads induced by rig motion. Equipment loads consisted of mud cleaner equipment, degasser equipment, centrifuge pump, and shale shaker. Rig motion was calculated based on the position of the platform from the rig's center of gravity. Calculations were done to find longitudinal and transverse acceleration of gravity.

The maximum displacements and adequacy of beams were evaluated for various load conditions. Design codes utilised for the project include AISC-13th Edition, AWS D1.1 and ABS MODU 2014. The design of beam elements was based on AISC Allowable Stress Design. Allowable stress increases of 33 per cent were considered in the case of environmental/dynamic loading conditions. The design of plate elements utilised the Von-Mises equivalent stress criterion.



Image Credit : Bombman/Adobe Stock

*The software was used for a project to assess the structural integrity of a shale shaker platform.*

“ Both simple and advanced features reduced time, eliminated manual calculations and improved accuracy ”

Maximum nodal displacements and reactions at supports were calculated for all load conditions and combinations. The strengths of beam elements were checked to ensure the safety of the structure. Several STAAD.Pro reports and plots were used to

study these results, including deflection, reaction, reaction summary, and beam strength check.

Aryatech relied not only on many of STAAD.Pro's basic features like different member sections, support conditions, load conditions, load combinations and some specified options like translational repeat, structural wizard, group, master slave, and design check, but also more advanced analysis from static, p-delta, geometric non-linear and pushover analysis to buckling analysis for wind load and earthquake loads. Both simple and advanced features such as these in STAAD.Pro reduced time, eliminated error-prone manual calculations and improved accuracy. ■

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تفخر الشركة السعودية لأنابيب الصلب باستلاكها أكبر مصنع لثني الأنابيب بقنينة الحث الحراري في المنطقة. لدى الشركة حالياً ثلاث خطوط إنتاج قادرة على ثني الأنابيب بأحجام تتراوح القطرها بين (2 بوصة) إلى قطر (64 بوصة) مع نصف قطر غير محدود وسماك جدار يصل إلى 120 ملم وذلك لتلبية متطلبات الجودة العالية المتوقعة في العديد من المجالات والتطبيقات. تملو خط أنابيب النفط والغاز البحرية والبحرية المتقدمة ومصانع البتروكيماويات والهياكل العملاقة بالإضافة إلى ثني أعمدة H & I بتصاصيم ثنائية وثلاثية الأبعاد لإعطاء إمكانيات لا محدودة لتكمب ريش العنبر.

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# ADIPEC looks to the future

The Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC) and its host, the Abu Dhabi National Oil Company (ADNOC) are set to welcome 110,000 attendees from 12-15 November at the Abu Dhabi National Exhibition Centre.



**H**ELD UNDER THE patronage of H.H. Sheikh Khalifa Bin Zayed Al Nahyan, President of the United Arab Emirates, ADIPEC is one of the world's largest, most important and influential oil and gas events that brings together industry stakeholders and experts to share knowledge and exchange ideas on a brighter future for the energy sector.

From operating companies to the international supply chain and those at the forefront of technological advances, ADIPEC 2018 is set to host more than 2,200 exhibiting companies and 28 exhibiting country pavilions that will showcase thousands of products, services and solutions across the 155,000 (gross) sq m of floor space. With 15 dedicated exhibition halls, ADIPEC will bring together 41 NOCs and IOCs, along with the decision and policy makers that shape the future of the oil and gas supply chain. It is expected to attract more than 110,000 visitors from around the world.

Building on the strength of the last 34 years, ADIPEC 2018 is shaping up to be another record-breaking year, bringing new features and enhancements. ADIPEC 2018 will also see a launch of three new dedicated exhibition zones, covering Digitalisation in the energy sector,

Heavy Machinery and the Commercial Dive Zone, hence proving to be the convening force behind tomorrow's oil and gas partnerships.

## Focus on digitalisation

Digitalisation will be a key focus for the 2018 edition. According to recent research by McKinsey, a range of interconnected emerging technologies have the power to unlock a potential US\$50bn in savings and increased profit. Encompassing fields such as artificial intelligence (AI), blockchain, robotics, sensor technology, machine learning, deep learning, and edge computing, digitalisation is expected to cut capital expenditure by 20 per cent, with operating costs in upstream cut 3-5 per cent and 1-3 per cent in downstream.



“ ADIPEC is shaping up to be another record-breaking year”

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Investing in natural gas to reduce the carbon footprint  
of the global energy mix



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**TOTAL**

Committed to Better Energy



Image Credit : dmg events

ADIPEC provides a global meeting point.

“Digitalisation is an urgent priority for industry CEOs and business leaders, offering cost savings, operational improvements, and safety and environmental gains that will reach into every corner of the business, but the opportunities come with risks that must be understood and navigated,” said Jean-Philippe Cossé, vice president – Energy at dmg events.

“ADIPEC is responding to this with a new Digitalisation in Energy zone, supporting innovation, and helping drive smart investments that will be the foundations of business success in the years ahead.”

Spanning both the exhibition halls and the strategic and technical conference programmes, the Digitalisation in Energy zone will include top technology providers and new start-ups serving the oil and gas sector. A purpose-built Innovation Theatre will provide tech companies with the opportunity to host expert talks and take digitalisation out of the technology silo and place it at the centre of a much bigger conversation.

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“ADIPEC is the meeting point where thought-leaders embrace change and capture new opportunities”

The premier meeting place for energy ministers, global business leaders and C-level executives from the world’s oil and gas giants, ADIPEC 2018 will see the return of the event’s highly regarded strategic and technical conferences. These will be led by energy ministers and international CEOs, spanning 200 sessions and 980 expert speakers, and are expected to attract more than 10,400 delegates.

Conference sessions for the downstream refining and petrochemicals sector, introduced for 2017, will return to ensure that ADIPEC covers each link in the oil and gas value chain. The co-located waterfront Offshore and Marine Exhibition and Conference will add a commercial dive zone as well as a new Middle East Maritime Club, an extension of the existing Middle East Petroleum Club, while other returning features include the ADIPEC Awards, which celebrate excellence in energy, and Young ADIPEC, a dedicated ‘edutainment’ programme designed to encourage students to choose a career in energy.

New for 2018 will be an Inclusion and Diversity in Energy conference programme, continuing and expanding on the work of the Women in Energy conference in previous years and exploring ways to build a diverse and inclusive oil and gas industry.

Hosting more than 100 ministers, CEOs, and global oil and gas business leaders as speakers, ADIPEC brings together the companies, decision and policy makers that shape the future of oil and gas supply, for four days of focused business, dialogue and knowledge transfer addressing today’s energy challenges and defining tomorrow’s hydrocarbon landscape.

The technical conference programme, organised in collaboration with the Society of Petroleum Engineers (SPE), sets the international standard for the exchange of best-practice and operational excellence in the world of energy. Sessions cover upstream, midstream and downstream sectors, including specialised programmes such as offshore and marine.

“ADIPEC is the meeting point where thought-leaders embrace change and capture new opportunities to deliver profitable market growth and value creation across the oil and gas supply chain,” said HE Dr. Sultan Al Jaber, UAE Minister of State and CEO of ADNOC. ■



Image Credit : dmg events

ADIPEC is set to welcome 110,000 attendees.



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# Leading in non-contact temperature measurement

Ametek Land will demonstrate the latest in non-contact temperature measurement technology at ADIPEC.

**A** AMETEK LAND, THE leading industrial infrared non-contact temperature measurement, combustion efficiency and environmental pollutant emissions specialist, will exhibit its latest temperature measurement and gas analysis technology for the hydrocarbon processing industry (HPI) on the stand of its distributor, AIMS, at ADIPEC.

Many HPI applications require accurate, reliable temperature measurements that are taken without interfering with the process. AMETEK Land's dedicated solutions produce critical measurements in reformer and furnace applications, along with flexible thermal imaging systems to cover a range of HPI applications elsewhere in plants and refineries.

“ADIPEC is a great opportunity for us to present our extensive range of measurement solutions”

As James Cross, regional sales manager for AMETEK Land in the Middle East, states, “ADIPEC is a great opportunity for us to present our extensive range of measurement solutions specifically designed for HPI. Offering radiometric infrared technology that doesn't contaminate the process, our instruments provide essential temperature measurements at critical locations. I am



The NIR-B 3XR Borescope

Image Credit : AMETEK Land

looking forward to working closely with AIMS, our regional distributor, to meet the needs of the HPI sector.”

At ADIPEC 2018, AMETEK Land will showcase its Near Infrared Borescope (NIR-B) 3XR, which delivers continuous reformer tube wall temperature (TWT) measurement and furnace optimisation and monitoring, allowing highly accurate temperature point data to be measured, stored and trended over the lifetime of a furnace. This temperature measurement solution for industrial gas applications results in increased productivity, greater asset protection and enhanced tube life.

Visitors will also see AMETEK Land's ARC, a rugged, compact radiometric thermal process imager, providing unsurpassed temperature accuracy across a wide range of applications. Using cutting-edge, high-resolution radiometric technology, ARC produces detailed thermal images with

unrivalled precision. The real-time thermal data provided by the ARC allows plant operators to detect any piping problems remotely, to monitor the flame of a flare stack from any distance, to detect combustion within a storage pile and more.

Also on display at ADIPEC 2018 will be the Cyclops L portable non-contact pyrometer and the compact, portable Lancom 4 multi-gas analyser. Easy to handle and simple to operate, the Cyclops L provides precise point-and-measure temperature readings and is ideal for reformer and heater tubes and reheat furnaces applications. The Lancom 4 multi-gas analyser measures up to eight flue gases in a range of combustion and emissions processes and is the ideal choice for complete portable flue gas analysis for industries burning natural gas and oil. ■

**Stand: 13056**

## Boosting IIOT in the digital oilfield

INTELLIGENT OIL RIG and wellhead automation can be achieved with a reliable Ethernet control and monitoring system that supervises operations from the rigs, wellheads, or Gas Oil Separation Plant (GOSP) in a SCADA-based control centre. This system combines field site drilling data transmission and acquisition and video monitoring, and requires a stronger backbone with non-stop redundant reliability and

real-time performance.

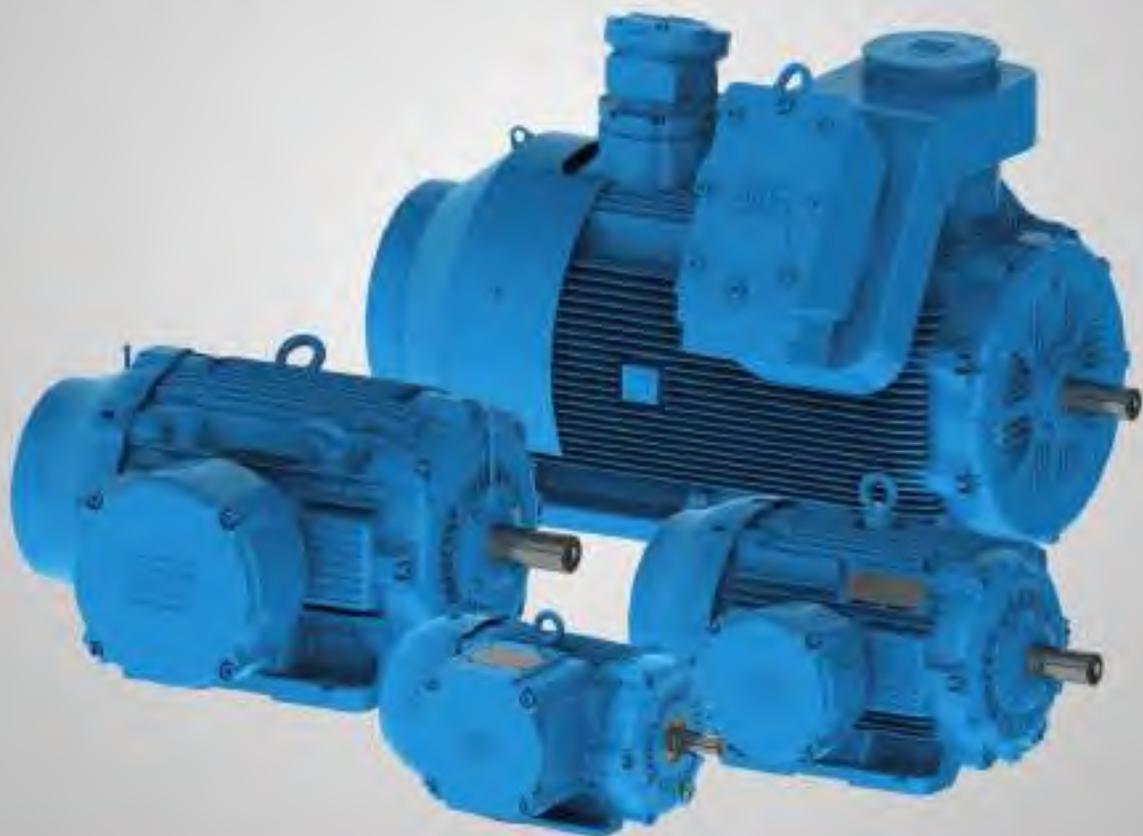
Since onshore operations face environmental hazards such as corrosion, temperature extremes, and risk of explosion, network equipment must be able to withstand hazardous environments and comply with ATEX standards.

Through a live demonstration at ADIPEC 2018, Moxa will showcase the integrated solutions

featuring secure, reliable and fast data acquisition from edge to cloud which could accelerate your IIoT application development in digital oilfield to enhance efficiency of remote monitoring and predictive maintenance. Learn about the industrial IoT (IIoT) technologies that are pushing the oil and gas industry forward.

**Stand: 13294**

# W22X SAFETY AND RELIABILITY FOR EXPLOSIVE ATMOSPHERES



## ENERGY EFFICIENT MOTORS FOR HAZARDOUS AREAS

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- IE2, IE3 and IE4 motors from 0.12 kW to 1400 kW, frame size 71 to 500
- Available in Medium and High voltage 90 kW to 7.1 MW at 6.6 kV or 5 MW at 11kV, frame size 315 to 900

### **W22Xe - Increased Safety Ex eb** for Zones 1 and 2

- IE2 and IE3 motors from 0.18 kW to 250 kW, frame size 63 to 355 M/L

### **W22Xn - Increased Safety Ex ec** for Zone 2

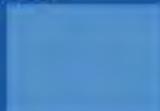
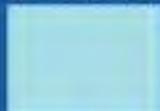
- IE2, IE3 and IE4 motors from 0.12 kW to 450 kW, frames 63 to 355 A/B

### **W22Xt - Protection by Enclosure Ex tb / Ex tc** for Zones 21 and 22

- IE2, IE3 and IE4 motors from 0.12 kW to 450 kW, frames 63 to 355 A/B

WEG manufactures, installs and commissions motor control centres, drives and soft starters for all applications within the Oil and Gas sector.

for more information visit [www.weg.net](http://www.weg.net)



## Wood expands its reach in the Middle East

WOOD, A GLOBAL leader in the delivery of project, engineering and technical services to energy and industrial markets, has recently secured new contracts and partnerships in the Middle East reinforcing its strategic focus to expand its offering in the region, particularly in downstream and capital projects.

Created following Wood Group's acquisition of Amec Foster Wheeler in October 2017, the company has leveraged its combined capabilities and global footprint to deliver key projects supporting operators across the Middle East.

Wood is leveraging its diverse downstream capabilities to support the evolution of a significant greenfield onshore facility in Saudi Arabia. The company was selected to develop the world's largest fully integrated crude oil to chemicals complex, on behalf of Saudi Aramco and SABIC, as the first project management consultancy contractor.

Delivering front-end engineering design and project management services during the engineering, procurement and construction phase, Wood is supporting the development of the complex, expected to process 400,000 barrels per day and approximately nine million



Image Credit: Wood

Wood is expanding its activity in the Middle East.

tons of chemicals and base oils annually.

In Oman, Wood is providing its market-leading fired heaters expertise at the Duqm Refinery. The company's most recent contract award, secured earlier this year, follows on from the company's successful execution of the engineering and process design phase, the technology package and licence of its SYDEC (selective yield delayed coking) technology.

With more than 3,000 people based in seven countries in the Middle East, Wood is

committed to developing in-country value and long-term economic development visions across the region. Through initiatives such as Wood's Engineer Your Future programme, which provides career development opportunities and a chance to acquire new skills and broaden horizons, the company is encouraging training and knowledge transfer to local workforces.

Mike Mair, Wood's vice president of business development in the Middle East, Russia & Caspian, said, "Wood has decades of experience operating in the Middle East and it remains a key growth area for the company."

"We have a strong presence in the region delivering operations solutions, capital projects, subsea & export systems and more recently, clean energy and automation & control services, and want to build on this success. Our recent contracts not only demonstrate our vast experience in the region but our strategic focus on broadening our capabilities and end markets."

Find out more at [www.woodplc.com/adipec](http://www.woodplc.com/adipec).

**Stand: 14250**

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# Using space technologies in oil production

Russia's IRZ is adopting an approach widely used in space hardware for its downhole monitoring systems, boosting reliability and service life.



Image credit: IRZ TEK

*IRZ employs systems widely used in space hardware.*

**F**OR SPACE PROJECTS, equipment reliability and service life are crucial, since failure of a single element can cause mission disruption and billions of dollars in losses. The same applies to artificial lift electronics, where maintenance of a downhole sensor is not possible without ESP stop and pull-out. In most cases, the ESP unit continues operating even when the sensor is down, and reduced production rate causes profit losses, especially in high flow rate wells. Moreover, the risk of ESP failure becomes extremely high.

To mitigate these risks, IRZ implements redundant electronic systems, the approach widely used in space hardware, to provide unrivalled reliability and long service life.

This year the company introduced a new redundant downhole monitoring system for ESP with induction or permanent-magnet motors. The sensor monitors temperature and pressure of reservoir fluid, motor oil or stator winding temperature, motor vibrations and current leakage and includes a hydraulic control line to monitor discharge pressure. It can be used with motor drives of any vendor, in wells with depth up to 19,500 ft, operating pressure up to 8,800 psi, and temperatures up to +150° C.

High reliability of the new downhole monitoring system is ensured

by two standalone electronic modules inside the downhole sensor: the main one being operating, whereas the standby one is off. Should the main module fail, the system can switch over to the standby module, either on the operator's command or automatically, assuring trouble-free operation of the system.

"The new product is meant to reduce economic risks of oil companies and cut costs for round-trip operations. Through the use of full redundancy, we managed to lower failure level of the sensor down to as little as three per cent within three years, even in severe operating conditions," comments Sergey Feofilaktov, chief designer of IRZ.

In addition, the standby electronic module can be used to verify measurement accuracy of the main module by comparing readings.

**“The new product is meant to reduce economic risks of oil companies and cut costs for round-trip operations”**

The new redundant downhole monitoring system has successfully passed field tests in two oil companies. The first systems installed have been in operation for more than 16 months; during this period, the main module was switched over to the standby one only to test the technology.

Highly regarded following the results of field tests, the new product is experiencing strong demand in the market; more than 50 redundant systems have been shipped as of June 2018.

IRZ is one of the first Russian companies to design and launch manufacture of downhole monitoring systems for ESP. The first system was produced in 1998; since then, the company has manufactured and shipped more than 50,000 units. The product range includes dozens of versions of downhole monitoring systems, variable frequency drives / switchboards / soft starters for electric submersible motors, and automated control systems for oil production. The equipment is used by leading oil producing and service companies, such as Lukoil, Rosneft, Surgutneftegas, Tatneft, Bashneft, Slavneft and Gazprom Neft, as well as internationally in countries including Tajikistan, Kazakhstan, Azerbaijan, China, Indonesia, India, Venezuela and South Sudan. ■

Main electronic module



Backup electronic module

Double redundant downhole sensor

Image credit: IRZ

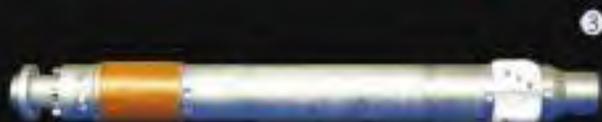
**Stand: 13240**

## IRZ — cutting-edge technologies for effective oil production!

**IRZ is the leading Russian manufacturer  
of electronics for oil production.**

IRZ offers:

- drives of various power ratings for ESP/PCP with induction and PM motors, and rod pumps ❶
- downhole monitoring systems for ESP, PCP, and rod pumps, including double-redundant downhole sensors ❷ **NEW**
- downhole anti-scaling system ❸
- downhole linear motor — the innovative solution for small flow-rate wells ❹ **NEW**



# Demonstrating capabilities in ETM methodology

Transport engineering company COORDINADORA has been working for over a year on a demanding project that has shown its capabilities and ETM (Engineered Transport Management) methodology.



Image Credit : Coordinadora

*The cargo being loaded*

**E**TM IS A methodology where the entire process of a project cargo transport planning and operation is analysed, calculated, developed and managed applying engineering techniques and processes.

After managing several airfreight transport operations for this project, at the beginning of May, COORDINADORA began the transport process of the heaviest pieces entrusted to it: five slug gas catchers of 2,008 t each. These pieces were transported from Gijón, Spain to Jubail, KSA for the Kingdom's Fadhili Gas Plant Project.

They are being carried in two shipments. Both shipments follow the same transportation plan: after travelling approximately one month by sea, they will be unloaded and carried 95 km by SPMT (Self Propelled Modular Transport) up to the Fadhili facilities.

COORDINADORA is managing the whole transportation process, making sure every

detail is being taken care of and subcontracting every supplier. The company also followed all stages of the operation on site, which required it to relocate its team to the port of destination so they could supervise the last part of the transportation up to the plant premises.

### Tackling challenges

The challenges faced by COORDINADORA included:

- To find a vessel that met the needs of this project suitable for RoRo loading.
- Calculating the mooring arrangement, considering the constraints existing at both

ports – origin and destination.

- The grillage was designed in-house by the company's specialised engineers, manufactured and installed in a record-breaking period. The design had to effectively distribute the 2,000 t weight of each piece to the strongest points of the vessel deck.
- A special and innovative sea-fastening solution had to be developed due to cargo limitations. The solution consisted of a unique combination of lashing and structural bracings.
- Due to the complexity of the operation, COORDINADORA calculated the detailed ballasting procedure for loading and unloading of the cargo on the vessel. COORDINADORA says this range of services shows its level of commitment and specialisation, and the wide scope that it covers.

“COORDINADORA is managing the whole transportation process”

**Stand: 9654**

**Who we are...** Belsim is a software and engineering company with more than 30 years of engineering expertise in Oil & Gas process modeling. VALI, our in-house developed Data Validation and Reconciliation software, is used in many industrial fields with applications spanning the industry sectors from Production Accounting to Energy Performance Monitoring.

Today's volatile and challenging business environment leaves no margin for error.

Production managers and business executives need timely, accurate and reliable process data, so they can maintain profitability, manage risks, and exploit opportunities.

BELSIM provides its customers with the solution to make it happen.



Downstream



Upstream



Power Generation

### Belsim's solutions:

#### • ValiEnergy:

VALI 5 is used in the industry to accurately calculate and monitor:

- Production & Consumption of Utilities, Auxiliary Power;
- Energy Intensity Index;
- Power Plant Performance and Efficiency, Equipment Efficiency;
- Emissions;
- Soft Sensors;

allowing global Energy Management.

#### • ValiProcessing:

In various chemical and petrochemical processes, VALI 5 accurately calculates and monitors:

- Reconciled Sensor Values;
- Process Parameters & Soft Sensors;
- Plant, Unit & Equipment Key Performance Indicators;

allowing Maintenance and Operation Management.

#### • ValiProduction:

VALI 5 offers a fully Production Accounting integrated solution. It allows to accurately calculate and control:

- Plant-wide Material Balance;
- Product Movements;
- Tank Inventories;
- Facilities Losses;

allowing mass balance closure.

#### • ValiUpstream:

VALI 5 uses the DVR to increase the production knowledge and provides accurate:

- Soft Sensors & Virtual Flow Metering;
- Production Back Allocation;
- Equipment Monitoring;

allowing better Production Management from the wells to sales.

## ValiStudio: A centralized user interface

ValiStudio is the multifunctional user interface of VALI 5, the new software version. Used to connect to and interact with the application server, it allows to manage all the different parts of an application in one single interface:

- Modeling of the process.
- Reporting of the application results.
- Workflows for online calculations.
- Last run analysis for advanced study of the reconciled results.



## Success Story: Use of ValiProduction by SATORP refinery

Saudi Aramco Total Refining and Petrochemical Co. (SATORP) has been using BELSIM's ValiProduction solution for the daily mass balance of the refinery since 2013, with a stable application that offers desired results. This solution offers us multiple advantages:

- Daily reconciled mass balance, product wise as well as unit wise, reaching 100% product balance without any gross error.
- Refinery official month end data to be used in SAP®, as well as GRM calculation.
- User friendly application reports, such as production account or unit yield reports, are automatically generated from the VALI reconciled results.
- Easy integration with historian system such as PI System™, where measurements can be read, and reconciled results written back for comparison purpose.
- Alarms on degrading or under performing sensors for corrective and condition-based maintenance.
- Flexible models can adopt any changes in the refinery configuration (addition of new product code, stream or unit).

SATORP is currently using VALI 4 and will soon upgrade the application to VALI 5 and to take advantage of its web-based reports and more user friendly user interface.

Amna A AL Fagieh - Performance Control Supervisor.



For further information do not hesitate to contact BELSIM at [www.belsim.com](http://www.belsim.com), [info@belsim.com](mailto:info@belsim.com) or at +32 (0)4 239 97 10.

HEAD OFFICE  
BELSIM INTERNATIONAL AG - REGISTRATION NUMBER CHE-200-599-440  
SWITZERLAND, Bahnhofsstrasse 30, 6300 Zug

# French Pavilion returns to ADIPEC

Business France, the national agency supporting the international development of the French economy, will be hosting more than 40 leading companies from France at ADIPEC.

**B**USINESS FRANCE WILL be hosting the French Pavilion, located in Hall 9, in partnership with RACE (special cluster for cutting-edge energy, oil and gas and renewable energy from France), Axelera (competitiveness cluster involved in chemicals, environment) and EVOLEN (French association of companies and professionals related to the oil and gas industry and energy).

France recognises that ADIPEC is one of the world's largest, most important and influential oil and gas events that brings together industry stakeholders and experts to share knowledge and exchange of ideas. In recognition of the global significance of this event, France is once again committing its support by gathering renowned French companies in a national pavilion, in addition to newcomers.

"ADIPEC is the ideal springboard to introduce French oil and gas companies to the region and we are proudly supporting the exhibition by bringing a large number of industry experts and innovators to showcase their products, services and know-know. France's oil industry posts more than 90 per cent of its turnover abroad, making it the world's second-ranking exporter, tied with Norway and the United Kingdom. Bolstered by ambitious research and development programmes, the high technological expertise and innovation capacity of French companies account for the nation's stellar performance," commented Marc Cagnard, managing director of Business France in the Middle East.


**ADIPEC is the ideal springboard to introduce French oil and gas companies to the region"**

With an estimated total value of more than US\$660bn for the 2015-2025 period, France will be providing solutions and services that



The French Pavilion will host more than 40 French companies at ADIPEC.

meet operators' needs, including the optimisation of tanks, development of reserves, precision tools for wells and surface units, facility surveillance equipment and systems, environmental protection and more.

The French experts in the oil and gas industry will be at the exhibition and are looking forward to meet with potential partners and customers to further foster partnerships and create continued opportunities for growth.

During the show AUGIER Energy, the worldwide leader in energy distribution & transmission for medium voltage solutions for long distances up to 50 km, will be hosting a stand. AUGIER Energy, locally represented by FALCOR Engineering, will be revealing the company's latest advancements in design of cost-saving systems dedicated to power supply remote receptors in oil and gas sites, as well as the latest in economic and efficient solutions for all electrical power supply projects.

AUGIER Energy will also talk about their prestigious UAE projects including transformers installation for TAKREER Refinery, outdoor lighting for the 74km Ruwais Highway and the secure fencing of the Fujairah Military Airport.

"We are very excited to return to ADIPEC 2018, which is the most important international exhibition in the Oil & Gas segment. Our team of experts are eager to meet with regional colleagues and visitors to extend collaboration opportunities," said Djewed Hariz, head of International Sales, AUGIER.

The exhibiting companies are 2B1st Engineering; 3X ENGINEERING; AMACH Consulting; Améthyse; APIX Analytics; Aqseptence; AUGIER; Barriquand; Bio-Ex; Bureau Veritas Marine Offshore; CentrExpert; CHAMPALLE ALCEN; Chromatotec-Airmotec; Colas Environnement; Cryostar; CURISTEC; DG SKID; DORIS Engineering; DrillScan; Drillstar Industries; EFINOR; F2A; FEBUS OPTICS; Filtration SASU; Lafarge Middle East & Africa; Marechal Electric; Mécanic Sud Industrie; Metrolog; Nexson Group; OCEA; Onis; Openfield; POLE AVENIA; Ponticelli; Porcher; Protem; Sercel; SKF Magnetic Mechatronics; SRI; Technogenia and Telephones Le Las. ■

For more information, contact Miryem Oukas Messidi, Business France, mobile: +971 (0)55 478 32 15, email: [miryem.oukasmessidi@businessfrance.fr](mailto:miryem.oukasmessidi@businessfrance.fr)

## Oil and Gas CAPEX reduction with DORIS Fit For Purpose Engineering

DORIS ENGINEERING DEVELOPED the Fit For Purpose (FFP) methodology in response to escalating costs of oil and gas upstream projects caused by the industry's tendency to over-design and over-specify facilities, amongst other reasons.

FFP was developed as an internal initiative involving 40 DORIS engineers. DORIS worked in co-operation with more than 30 equipment vendors, in addition to shipyards, NOCs, IOCs and various independents, with a three-step approach:

1. 'Prepare': identify design rules and optimisations following an internal brainstorming session, focusing on combinations of cost-saving solutions rather than a single optimum design solution
2. 'Execute': apply findings from Step 1 on an actual detailed engineering study case with supporting documents, methodologies and design guidelines
3. 'Compare': FFP design and base case, particularly weights, I/Os, overall dimensions, and supply costs for equipment, packages and materials.

The ready-to-implement FFP methodology includes a full set of engineering and calculation tools, more than 120 supported design rules, equipment specifications, design margin analysis method. Based on industry standards, it helps assess risk and develop FEED design and specification, allowing the CAPEX of facilities to be cut.

DORIS FFP Step 3 showed a reduction of more than 30 per cent in topsides weight; 15 per cent in platform footprint; and 40 per cent in control systems I/Os number.

DORIS Engineering presented the FFP findings to various oil and gas operators planning new field developments. The first DORIS FFP



implementation was then performed early 2017, with the first large scale FEED applying FFP methodology successfully completed within six months. The benefits of DORIS FFP have therefore been confirmed, with proposed design and specification also validated by field operations, RAM study, HAZID and HAZOP reviews.

DORIS FFP Engineering can also help EPC contractors during the bidding phase, for them to propose alternative designs with lower costs. At the execution stage, the FFP design is more resilient to modifications and thereby decreases the engineering impact on procurement, ensuring a smooth transition to construction. [www.doris-engineering.com](http://www.doris-engineering.com).

Stand: 9336

# Challenging conventional thinking in today's cost driven market



[www.doris-engineering.com](http://www.doris-engineering.com)

## The way ahead for composite repair

VINCENT RIBOULEAU, Sales Manager Middle East at 3X ENGINEERING, speaks about pipeline repair using composite solutions.

### Composite repair is now established in the oil and gas industry. How can you simply describe the key features and benefits of this technology?

Indeed, our clients are using REINFORCEKIT® 4D, our composite wrapping solution, for three simple reasons. The first one is the wide type of defects which can be reinforced, such as external or internal corrosion, hole, crack but also dent or weld defect. The second reason is the advantage in terms of application, in different environments onshore, offshore or even subsea. The last one is for cost impact. Almost all our repairs are done online and under pressure. In case of shutdown for a hole reinforcement the shutdown is very limited, with in any case a simple logistics base.

### What are the new challenges for a company like 3X ENGINEERING?

Each repair is a challenge in itself. As we are complying with ISO 24.817 or ASME PCC-2, we are considering each single repair as unique with its own specifications. However, 3X ENGINEERING considers that the most



Example of REINFORCEKIT® 4D SUBSEA reinforcement.

Image Credit : 3X ENGINEERING

challenging activity remains subsea in harsh environment with limited time of application to reduce to the maximum the cost of implementation. We have given the priority in our technical development to Innovation. Today we have specific tools for subsea application, we have some partnerships with top ranking oil companies such as TOTAL and Equinor and EPCs such as Saipem for the development and the application of our composite solutions in deep sea and cold environments.

### You are talking about innovation. How is it impacting your activity?

Innovation is the key word of our company. We have developed unique solutions to seal pipe leaks online with STOPKIT® or TANKIT® for tank repair. Then we have enlarged the application of composite subsea with severe defects like the repair we made in Middle East on a 32" pipe suffering from leaking cracks at 80 bar and 70-metre depth. Deep sea is our next step but we are going even further soon with an intelligent repair: a communicating tape with impressive features in the application and data collection during the life cycle of the repair.

**Stand: 9338**



# Composite Repair Specialist

|   |   |   |   |  |   |
|---|---|---|---|--|---|
| <b>REINFORCEKIT® 4D</b><br>PIPE REPAIR<br>ONSHORE & SUBSEA                          | <b>REINFORCEKIT® PATCH &amp; TANKIT®</b><br>TANK REPAIR<br>& LEAK SEALING           | <b>STOPKIT®</b><br>ONLINE<br>LEAK SEALING   | <b>ROLLERKIT®</b><br>PIPE & SUPPORT<br>PROTECTION                                   | <b>REFLANGEKIT®</b><br>ONLINE REPAIR FOR<br>SF6 LEAKING FLANGE                       | <b>REINFORCEKIT® BEAM<br/>&amp; DKIT®</b><br>STEEL BEAM REPAIR<br>& PROTECTION        |
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## Bureau Veritas - Digital transformation for asset management

AMID THE FOURTH industrial revolution, so-called “Industry 4.0”, the digital transformation is reshaping industries worldwide.

Bureau Veritas, with 190 years of experience in the field of Testing, Inspection and Certification (TIC), is a leader in developing cutting-edge asset management services based on new technologies such as “The Digital Asset”.

This Digital Asset, as per the Bureau Veritas vision, is a means for the improvement of business processes targeting value generation and resources optimisation. It can be defined as a dynamic set of information necessary to support assets and business processes. It also mirrors the physical asset through the combination of the four following components: data, representation, intelligence and collaboration.

In order to implement this new technology, Bureau Veritas partnered with industrial majors including Dassault Systèmes and Avitas Systems (a GE Venture). The partnership with Dassault Systèmes gave birth to Veristar AIM3D, the new generation of Asset Management and in particular, Integrity Management. A state-of-the-art platform combining collaborative project management with a Digital Asset, this has as its objective to identify the ways in which facilities may fail to deliver their intended performance, and implement appropriate, effective and efficient plans to prevent those failures.

Veristar AIM3D supports comprehensive inspection and maintenance regimes (predictive and prescriptive) on both equipment and structures, thus enabling data-driven decision making for maintenance and repair activities. Bringing new data or identified inconsistencies is easy for all actors collaborating through the platform, whether through office desktop or mobile devices in connected or disconnected mode. Veristar AIM3D leverages information intelligence capabilities of the 3D EXPERIENCE platform to provide smart data through dedicated dashboarding made available for the



various roles involved and 3D visualisation of the integrity.

In parallel, Bureau Veritas partnered with Avitas Systems, a GE Venture, to bring machine learning and analytics-based inspections to the TIC market, thus elevating asset management into a new level and creating the next generation of inspection services, thanks to the Conformity 4.0 solution. This solution advances Bureau Veritas’s renowned independent inspection services with the Avitas Systems cloud-based platform, combining technical expertise, automated data collection, digital twinning and data analytics through artificial intelligence techniques. This will allow automatic recognition of asset defects and delivery of results via an online interface with user-accessible data and reporting. It also integrates technologies such as sensors, drones, and other robotics, paired with bespoke deep learning-based data analytics.

**Stand: 9256**

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## Pelican Products showcases safety lighting solutions

PELICAN PRODUCTS, THE global leader in the design and manufacture of advanced portable lighting, will be showcasing a selection of its safety certified lights at ADIPEC. The company offers more than 60 lights with European ATEX certification (Zone 0 and Zone 1) and US safety approvals.

When you're in a potentially hazardous environment, using an appropriately approved light is vital. Pelican safety torches and RALS are designed for professionals working in oil and gas refineries, offshore platforms, fire brigades, mining, petrochemical, pharmaceuticals or other high-risk industries.

### Safety approved torches and headlamps - ATEX Certified Zone 0 & 1

Pelican offers an extensive range of torches and headlamps with safety approvals. They comply with the highest standards of the ATEX Directive 2014/34/EU and meets the IEC (International Electrotechnical Commission) requirements.

From bright lamps to powerful next generation LEDs, these safety approved lights include models featuring up to 392 lumens and a run time of up to 98 hours. One of the latest additions to this range are the revolutionary 3315RZ0 and 3315RZ0-RA rechargeable LED torches with a life expectancy of over 2,000 cycles, four times more than the 500 cycles that batteries usually last.

### New 3345Z0 with automatic light sensor

The automatic light sensor in the 3345Z0 examines the ambient light/proximity and instantly adjusts its lumens to the most effective level. Now you can read pressure gauges close up or throw light hundreds of metres away - without hassling over manual power settings. The automatic

*Pelican safety torches are ideal for use in refineries and other hazardous locations.*

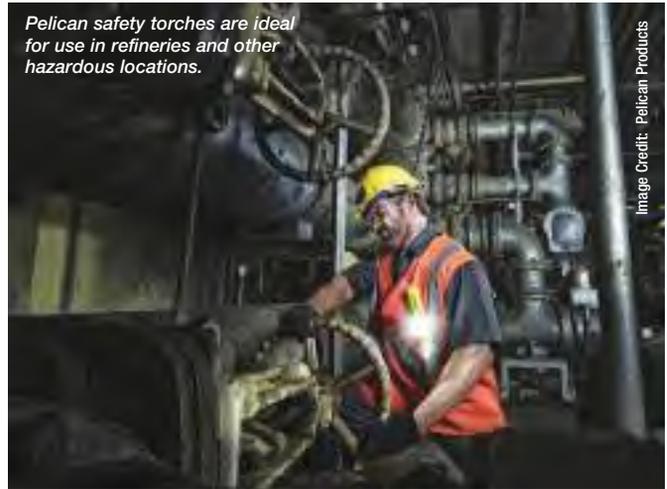
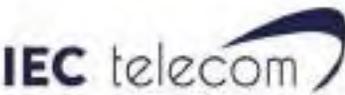


Image Credit: Pelican Products

light sensor also makes the 3345Z0 one of our most energy efficient torches, preserving power and stretching battery life. The secondary flood beam illuminates potential trip hazards like loose cables, while the primary spot beam brightens long tunnels. The integrated clip can be mounted to a safety vest for hands-free lighting. With the ATEX Zone 0 (Cat.1) safety certification and a full-time battery level indicator it is ideal for use in hazardous areas.

**Stand: CN134** (Hall concourse)







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# Good prospects for equipment rental solutions

Pat Fallon, group chief operating officer, Byrne Equipment Rental, shares his views on market prospects for the company in the Middle East.

## How do you view the rental market at present in the Middle East?

The oilfield equipment rental market in the Middle East is currently experiencing modest levels of growth, compared with the same period last year. The current oil price is helping to influence increase in demand, with oil-producing countries starting to revive postponed projects and spend on new projects, and this should reflect positively on the overall market.

Byrne are experiencing an increase in rental equipment enquiries and opportunities directly with operators and Tier 1 EPCs in support of these projects.

The outlook for the oil and gas sector is expected to be good for the remainder of 2018 and into 2019 with the rise in oil prices. There is therefore good reason to be optimistic that the year ahead for EPC contractors and oilfield service companies will be better than last year.

Against this background Byrne is busy aligning our business and equipment rental solutions to support the increase in oil and gas projects and activities across the region.

## What are your most popular products or types of products that you are finding are most in demand?

Byrne offers multiple high-quality equipment rental solutions to a broad variety of customers operating and renting our equipment for deployment into the Upstream, Midstream and Downstream sectors of the oil and gas industry across the Middle East.

Our modular camps, temporary power, tower lighting, compressed air, DNV2.7-1



Image Credit : Byrne Equipment Rental

*Byrne continues to expand its rental portfolio, offering new and technically advanced products.*

cargo containing units and ATEX low level access equipment solutions remain the most popular equipment types in our range of equipment offered to these customers.

We are also promoting, and are encouraged to see, an increase in uptake with regard to our new range of personnel welfare and safety equipment solutions such as inflatable habitats, mobile air conditioning, ATEX air fans and ATEX lighting kits.

## What are your plans for developing your business further in the region?

Byrne will continue to lead by example and maintain our position in our field by continuing to implement our Oil & Gas Growth Strategy,

which underpins the continuous incremental growth of equipment types introduced and offered to customers.

Byrne offers our existing and new customers across the region new, more operationally efficient, technically advanced and safety innovative equipment types that enable our end user customers to achieve excellent operational uptime and highest of safety performance while also realising a reduced OPEX.

## How do you hope to benefit from participating at ADIPEC?

For Byrne, ADIPEC is not only a 'must exhibit at' event but it is also a 'must visit' exhibition. ADIPEC is one of the most important oil and gas exhibitions in the world and is the largest event for oil and gas in the Middle East. The majority of Byrne's Middle East oil and gas customers, equipment OEMs and suppliers either exhibit at, or attend ADIPEC. More than 100,000 visitors to ADIPEC make this event an invaluable four days for meeting so many existing and new customers and supplier contacts.

The key benefits from participating at ADIPEC for Byrne are:

- Byrne get to showcase our complete range of equipment types, including newly introduced equipment types, to oil and gas industry customers.
- We meet with and listen to some invaluable business information from the NOCs, IOCs, drilling contractors and EPC contractors on what they are going to be doing as far as new projects, initiatives and the growth of their own businesses go across the region.
- We gain an understanding of what our customers' requirements are with regards to their OPEX and CAPEX challenges and plans, and we share with them ideas of equipment support solutions that can minimise their operating cost and maximise their operational efficiency and safety performance. ■

**Stand: 11462**

“Byrne is busy aligning our equipment rental solutions to support the increase in oil and gas projects”

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## IEC Telecom and Yahsat team up to enable affordable digital oilfield concept

MODERN CONNECTIVITY TECHNOLOGIES are continuing to transform the oil and gas industry. As oil and gas continue to become more and more scarce and expensive to extract, the industry faces unprecedented pressure on margins, and the role of connectivity has never been more essential in enabling businesses to be agile and profitable.

IEC Telecom Group and its long-standing strategic partner – Al Yah Satellite Communications Company (Yahsat) have come together at ADIPEC to launch the IEC Welfare Solution, a new technology specifically tailored to meet the requirements of the oil and gas market.

Powered by Yahclick and enhanced by IEC Telecom, the unique fully integrated solution allows companies to combine a controlled welfare link and a secure corporate link in one solution.



*IEC Welfare offers a number of benefits for crew.*



IEC Welfare provides 360-degree support for corporate applications, equipped with 24/7 budget control tools and around-the clock customer support. The new solution provides advanced online reporting on network usage and helps control allocations of crew's credits.

In parallel, IEC Welfare provides your hard-working crew with high-quality on-demand data access via scratch cards. Scratch cards can be purchased individually in 1, 5, 10 GB data bundles or provided by companies as a part of their social package. Access to messaging apps and social media has never been easier and more affordable.

**Stand: 410**



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## Parker to showcase products and systems underpinning safety while optimising productivity and ensuring asset integrity

PARKER HANNIFIN, THE global leader in motion and control technologies, will be demonstrating its latest products and system solutions that help drive increased productivity and profitability in the oil and gas industry at this year's ADIPEC. With many decades of experience and materials science expertise, Parker's solutions are optimised for the corrosive environments and harsh conditions typical of applications within the sector.

Parker's close to one million innovative, safe, strong and lightweight products solve engineering challenges in key focus areas such as filtration and instrumentation for upstream, midstream and downstream stages in the sector. The company, and its unrivalled, knowledgeable distribution network, partners with OEMs, Engineering Procurement Companies (EPCs) and distributors. This ensures the optimisation of designs and product selection and supply for efficiency, reliability and asset integrity that helps maximise productivity and minimise costly, and sometimes safety compromising, downtime. Parker's product experts will be available at the show to discuss applications and real-world engineering challenges.

Amongst the many exhibits featured at ADIPEC will be Parker's autoclave products that include needle and ball valves, pipe fittings and liquid pumps for low, medium and high pressures (up to 160,000 psi). Also included will be the A Lok® fittings range that underlines the company's expertise in anti-corrosion solutions for oil and gas. Cost reduction and low maintenance optimisation will be exemplified by products like the CDAS and OFAS units that provide clean, dry, and oil-free compressed air to the most stringent industry standards.

Following Parker's acquisition of Clarcor and its subsidiary PecoFacet in 2017, the company's range of oil and gas filtration and separation solutions and knowhow has been significantly extended. Many of these will also be on display at ADIPEC underlining Parker's breadth of capabilities to support efficient oil and gas production. Regional specialist distribution partner GASOS will also be present with Parker at the show demonstrating the local support and customer service available.

Stand: 4410

Parker Hannifin will demonstrate its latest products at ADIPEC.

Image Credit: Parker Hannifin



## CALGAVIN to demonstrate heat transfer solutions

CALGAVIN, A LEADING global heat transfer consulting engineering company, will be again exhibiting at ADIPEC, this time on the Arab Development stand.

Martin Gough, managing director at CALGAVIN explains, "For more than 35 years CALGAVIN has built up an unrivalled expertise in the thermal design and analysis of process plants. Our engineering team have extensive knowledge of thermodynamics, heat transfer and fluid flow phenomena, combined with global experience providing improvement solutions to hundreds of plants worldwide."

The company was founded on the development and sale of the tube-side heat transfer technology hiTRAN Thermal Systems. This success has led to the broadening of the company's activities to provide a wide range of products and services, all focused on heat transfer optimisation for production whilst minimising both energy use and maintenance costs. The company will be discussing in detail its services in the area of heat transfer enhancement:

- Analytical Engineering – heat transfer solutions for performance improvement
- Design Services
- Air cooler troubleshooting
- CFD – Tool for identifying problematic conditions.

Stand: 5210

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## GustoMSC progresses development of the LJ43 jack-up rig

EARLIER THIS YEAR International Maritime Industries (IMI) and their drilling client, Saudi Aramco Rowan Offshore Drilling Company (ARO Drilling), selected the LJ43 modern drilling jack-up design jointly developed by Lamprell and GustoMSC as the basis for their new building programme of drilling jack-ups which are to be built at the new IMI yard in Ras Al-Khair, eastern Saudi Arabia. ARO Drilling has announced plans to order at least 20 drilling jack-up rigs for construction at the new IMI yard.

Currently GustoMSC is preparing the basic design of the LJ43, obtaining class approval and supporting Lamprell in their detailed engineering process. Once rig fabrication commences, GustoMSC will provide continued support to Lamprell and the International Maritime Industries yard up to and beyond delivery of the jack-up to ARO Drilling.

This LJ43 jack-up is targeting the highest level of safe, efficient and reliable drilling operations and is specifically tailored to operate in the Middle East region without compromising worldwide operations. This drilling rig combines the robust and advanced technology of GustoMSC cantilever jack-up designs, as well as Lamprell's marine and drilling system integration capability, detailed engineering expertise and construction experience.



Image Credit: GustoMSC

The LJ43 jack-up rig

The rig is a further development of the well-established CJ46 and CJ50 worldwide operating drilling jack-ups, and is tailored to the local footprint dimensions and designed to operate in water depths up to 200 ft. It features GustoMSC's field proven sturdy X-bracing leg design, jacking systems and the X-Y cantilever system, providing a high combined load across the entire drilling envelope of 75x30 ft. The variable load capacity of the unit is 11,000 kips and offers a free working area of 28,400 sq ft. The high capacity cantilever accommodates a new innovative BOP handling system, increasing rig drilling efficiency significantly.

The further developed X-Y cantilever is raising the entire cantilever approximately 12 feet above deck by use of four high capacity skid boxes. This eases the logistics on the main deck. By also arranging drag chains between hull and cantilever for all essential fluids, it ensures continuous connections independent from any skidding operation or position. The arrangement, first shown on the Maersk Innovator in 2003, has now become a standard for the modern rigs recently supplied to the industry.

Stand: 11230



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# Making hay while the sun shines: **supply chains**

With oil prices on the up again, now is the time for Middle East operators to maximise efficiency along entire value chains. By Andrew Robins, controls director at EnerQuip.



Image Credit: philippe leoyer/flickr

*Operators in the Middle East face technical challenges posed by running facilities in extreme heat.*

**F**or the Middle Eastern oil and gas sector, there's a palpable sense of making hay while the sun shines.

The prolonged price dip is over, and potential future headwinds relating to economic diversification and climate change have yet to have major impacts on the region. So, with the market in a relatively good place, the overriding sentiment is that now is the time to maximise production efficiency and revenues while investing in the future to make sure the good times can continue.

But what does that entail exactly? Investment in new production facilities and field exploration for sure – just look at Bahrain's recent find that the Khaleej al-Bahrain basin may contain more than 80 billion barrels of shale oil and around 13.7 trillion cubic feet of natural gas.

However, it's not all about strike-it-lucky headlines. The region's national oil companies

(NOCs) and their oilfield service partners also need to keep a tight rein on production, maximising uptime and minimising downtime of assets to optimise revenues and profits. This is easier said than done, requiring close scrutiny of thousands of different pieces of equipment and processes.

“Many operators are screening suppliers so only the best make the approved vendors list”

Many operators are finding that one of the surest guarantees of best practice is paying close attention to screening suppliers across the business so that only the best make the approved vendors list. So, what does that mean in practice?

## **Excellence in short supply**

Simply put, operators and service companies need to be able to rely on suppliers for two key things: technical and business excellence.

Take our niche of torque machines as an example. These units are used to make up and break out of threaded tubular connections. It's an intricate process that requires finesse and extremely precise application of torque to get right. A loose or overtight connection could cause problems down the line, resulting in unnecessary downtime for remedial works. A seemingly minor process in the grand scheme of things can thereby result in costs and lost revenue numbering in the hundreds-of-thousands.

Previously this was a manually and time-intensive task with significantly variable accuracy. Older iterations of torque machines lacked the fine-control to handle connections with low torque requirements. More modern technology has improved accuracy, added



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*Saudi Aramco is a company that has a reputation for demanding high standards along the value chain.*

Image Credit: Saudi Aramco

that finesse and in doing so saved operators time and money.

Equally important is familiarity with the particular technical challenges the region offers. The Middle East can be a harsh environment, with temperatures commonly tipping north of 50°C.

Equipment built for benign environments may not fare as well here.

With torque machines, for example, it's always safer to locate power packs outside the main factory floor to reduce noise and avoid the operator standing over pressurized hoses and valves. However, older units often couldn't cope with the heat, cutting out and forcing operators to wait for them to cool. Modern hydraulic power packs are far more heat tolerant.

The improved oil price has allowed operators to invest in new equipment, as well as spare parts for existing equipment. The net result is greater reliability and optimised production. This hasn't been possible over the last couple of years, when operators were in an unenviable position between a rock and a hard place. When oil prices languish in the twenties and thirties per barrel, underinvestment in technology can impact the bottom line, but the bottom line rightly precludes investment, with all eyes fixed on staying operational.

### Worthy partners

Now, with those constraints lifted, operators are driving a boom in investment across the

supply chain, which allows suppliers to invest in improving the technology they offer. A virtuous cycle has replaced a vicious one.

The other ingredient in a successful supply chain relationship though, relates less to what business is being done than how it is done.

A transactional relationship with the cheapest supplier, based purely on price, may seem good business at the time.

“With investment in improved technology, a virtuous cycle replaces a vicious one”

However, with complex engineering applications, it is inevitable that certain things will eventually go wrong. Parts may wear and require replacement, unplanned maintenance may be required, or misuse may cause mechanical failures.

At this point, faced with the prospect of downtime and lost revenue, the quality of supply chain partners comes to the fore.

If at all possible, remote technical assistance should be used to help the operator's onsite engineering teams to resolve the issue and restart operations – especially important for often-remote Middle Eastern desert operations. However, standard call centre customer service won't cut it – it has

to be an expert engineer on the other end of the phone too.

Then, if remote assistance isn't possible, how responsive will the supplier be? Will they be on the next flight to the customer along with any necessary spare parts? Do they have the right understanding of the region in terms of sanctions and geopolitical tensions to navigate all of this smoothly? Or will it be a case of placing an order and waiting days or weeks, all the time haemorrhaging revenue?

These considerations, not just around what's being sold but the business practices of the company selling it, are coming increasingly to the fore as Middle Eastern operators look to make hay while the sun shines. NOCs such as Saudi Aramco are becoming ever more exacting in what they expect from their approved suppliers. As they should be.

Whether it's torque machines, valves or any other apparently niche part of the equation, success hinges on getting the supply chain right.

As the Middle East looks to press its advantage, make the most of the natural resources it has been endowed with and invest for the future, operators are increasingly scrutinising their supplier relationships to make sure they're not just getting the right product but dealing with the right partner. Getting either wrong risks downtime and loss of revenue. ■

**Stand: 1210**



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# Screw pumps for asphalt in tank terminals & pipelines

Sven Olson, senior consultant, Leistritz Advanced Technologies Corp., Allendale, NJ, USA, discusses the benefits of screw pumps for safe and successful operations in the growing asphalt market.



Image Credit: Leistritz

*The Leistritz L2 and L5 asphalt pumps.*

ONE OF THE more used and traded commodities in the world is asphalt and varieties of asphalt, which has wide use in infrastructure and industrial applications. As the world's population grows, and standards of living continue to improve, it is expected that the demand for asphalt products for building construction, road construction and transportation infrastructure improvements will accelerate.

In addition, there will be a growing supply available when other users of heavy hydrocarbons (such as fuel in the marine and power generation industries) switch to natural gas and distillates in order to comply with more restrictive emission standards. The manufacture, storage and distribution of asphalt products will follow the demand, which in turn should encourage manufacturers of equipment such as pipe, insulation materials, heaters and pumps. This article will focus on the pumping aspect and review technologies that can help to improve safe and economic handling of asphalt products in pipelines and terminals.

## Asphalt pumping

The term asphalt used in this article should be understood also to cover related or overlapping products such as bitumen, pitch, residue, tar and asphalt emulsion. They have many similarities and have all derived from petroleum production either as products coming off the crude oil refining process or as raw bitumen direct from well extraction

or from mining. The density of asphalt products is close to that of water and in most cases behaves as a Newtonian fluid, which means its dynamic or flowing viscosity is related to temperature. However, some bitumen can appear as a non-Newtonian fluid when emulsified with water or air, when it is called bitumen froth. This is contrary to Newtonian fluids, as agitation and shearing of the liquids will cause a change in dynamic viscosity.

“ The characteristics of asphalt and related products require pumps designed to efficiently transfer and circulate the liquids ”

The characteristics of asphalt and related products require pumps that are designed to efficiently transfer and circulate the fluids, often with very challenging operating conditions. The typical pumping scenario can require the pump to handle fluids with high temperature (often in excess of 200°C) high viscosity during cold start, entrainment of air and gas in the pump flow, solids and impurities and slugs of cold product. The requirement to safeguard continuous and reliable



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operation, complying with all HSE related aspects, together with demand for low energy and maintenance costs, limits the choice of pump technology for the operator. In some installations rotodynamic (centrifugal) pumps are used, typically because of the low purchase price. However they can entail higher energy and operational costs.

### Positive displacement pumps

The use of rotary positive displacement pumps such as screw pumps, gear pumps or vane pumps is more common. Gear and vane pumps have operational limitations, however, they are economical when used in smaller sizes where they can operate directly connected to an electric motor without a speed reducer. Once the pump size gets larger, the pump speed must be reduced (typically by installing a gearbox) in order for the pump to operate properly. They are also limited in suction pressure and, since the rotors are not hydraulically balanced, wear plates are used to protect against axial thrust, which increases maintenance. Broken gears or vanes due to cold start when the pump is filled with asphalt are not uncommon.

The positive displacement technology represented by the screw pump is the best suited for handling asphalt and related products. The pumping principle of the screw can be visualised as a pump having a “piston” with infinite stroke. The screws drive the liquid continuously without pulsation, agitation or shear against the backpressure generated by the flow resistance in the piping system and the static lift. In the screw pump, the liquid enters the suction end of the screw profile and fills the cavities formed as the screws rotate. The rotation of the screws then gently moves the liquid trapped in the cavities axially from suction to discharge to meet the discharge pressure. The internal velocity of the screw pump is low and the closing and opening of each cavity is gradual, which contributes to a smooth flow without pulsations and also a lower sound level. It also contributes to the very high suction lift capability with viscous fluids, and means no stripping time is lost when emptying tanks and pipelines, even if air or gas is present in the suction line.

“ It has always been a demanding task to provide durable pumps for this difficult application”

The two models mostly used by Leistriz for asphalt pumping are shown in the illustrations on p.104. Both these screw pumps are very simple in design, with few moving parts and an efficient hydraulic balancing system eliminating the needs for wear plates or thrust bearings. The rotors are in rolling contact with each other as opposed to sliding contact, which saves on wear and maintenance. The support of the rotors is done by bushings where a positive flow of liquid from high to low pressure areas efficiently lubricates and cools the bushings.

Additionally, spiral grooving of the bushings is done to add to the liquid wedge supporting the rotor. The rotors are made carbon steel, which is finished ground and hardened using gas nitration for wear protection. Contrary to twin-screw pumps with external bearings, only one shaft seal is used instead of four seals. Depending on markets and applications, different types of seal arrangements are used. Not uncommon in asphalt applications is the heated and jacketed stuffing box, which is simple to maintain and less stressed in a cold start. However many operators prefer the mechanical seal option, also with heating jacket and in some cases in double seal configuration with a heated seal flush API plan 53 B or C option. Standard with the pumps is an integral relief valve for over pressure protection and jacketing and heat tracing of the pump body and seal area.

### Installation and operation

The driver is in most cases an inverter duty electric motor connected to a variable speed drive. As the speed is directly related to the flow of the



leistrizimage Credit : Leistriz

Typical installation with heaters.

pump, this arrangement helps the operator to control pumping with pumps running in parallel and to optimise the flow during cold start or line and tank stripping. Other features include steam or hot oil jackets for keeping the pump heated when idle. A heat traced pack box or mechanical seal is often used to facilitate cold start up. Monitoring is traditional with temperature and pressure alarm protection. Vibration monitoring is sometimes a good complement to detect an early problem. An important lesson is to run the piping without causing unwanted stress on the nozzles and pump casing. This is often done using expanders or flex joints on the suction as well on the discharge piping. The alignment of the driver and flexible shaft coupling is essential to relieve any harmful radial load on the pump or motor bearings. The coupling manufacturer’s permissible misalignment instructions should be followed while doing cold, as well as the more important hot, alignment.

### Applications

The pump can be used in many different applications in plant, tank storage and pipeline systems, such as loading/unloading of rail cars, barges and ships. In the plant the uses include forwarding, heating, circulating and transfer of market grade asphalt as well as of pitch, residue and bitumen in different grades as finished product. Some pump installations are tailored for trunk and lateral pipelines handling diluted/heated bitumen connected to over 1MW size drivers. The biggest challenge here is to get a pipeline flowing again after being shut in or having suffered a loss of heating. The screw pump offers the flexibility and ruggedness needed to make this happen time after time.

The expected growth in demand for asphalt and related products is welcome for pump producers as well as other suppliers of equipment for pipelines and terminals. It has always been a demanding task to provide durable pumps for this difficult application, and with today’s stricter requirements for safe, reliable and economical operation, it has become even more challenging. The positive displacement pump, and especially the screw pump, has the inherent technical features to meet the demand. The simplicity and ruggedness of the Leistriz L2 and L5 series pumps, which are unique in the pump market, can be an essential contributor for successful operation in the upcoming growing asphalt market. ■

**Stand: 8734**



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## HTL Group return to ADIPEC

HTL GROUP, A global manufacturer of controlled bolting solutions, are bringing their UK designed and manufactured portfolio to ADIPEC. The Group will be showcasing their premium quality controlled bolting solutions including the latest digital calibration solution – i-Calibrate. Exhibiting alongside will be Hands Free Bolting with its range of safety accessories.

The UK-headquartered manufacturer continues to expand its portfolio of solutions to meet industries' ever evolving demands. With ADIPEC's vast global market attendance, this exhibition is the ideal

platform to meet both customers and like-minded potential partners based in the region to represent HTL Group, all sharing a strong commitment to impeccable levels of service to industry.

Paul Storey, Group managing director, HTL Group comments, "ADIPEC is a key fixture in HTL's annual calendar with the extensive range of industry stakeholders in attendance; we're delighted to be exhibiting on the EIC UK Pavilion this year. Being a part of the UK Pavilion gives us the opportunity to bring everything controlled bolting to the Middle East marketplace, as well as

the chance to share knowledge and exchange ideas on the future of the energy sector.

"We are looking forward to presenting our digital calibration solution i-Calibrate, which our team will demonstrate throughout the show. As a manufacturer, we consistently strive to innovate and develop solutions that ultimately make customers' lives easier, ensuring they receive the most cost effective, safe and efficient solutions on the market."

**Stand: 8434 (EIC UK pavilion)**

## Polycon invests in cutting edge technology for polymer lining

POLYCON, THE ROTO molding specialist, has invested in new infrastructure to improve its roto lining capabilities.

Roto lining is a unique process that has significant advantages in complexity and material performance. This technique allows for a uniform and seamless polymer lining to be applied to the interior surface of hollow metal structures such as carbon steel pipe spools, fittings, metal vessels, tanks or other complex components.

The seamless construction without weld joints ensures increased resistance to permeation, provides corrosion protection and resistance to chemicals, acids, alkalis, oxidizers and solvents. The result is a dramatic reduction in wear and tear and an increased life cycle of the products using roto lining as compared to other 'spray-in' liners.

Polycon's new high tech roto lining machine features the latest PLC control systems, offering the facility to control industrial carriage movement. With the availability of six stations, it offers maximum flexibility, making the machine ideal for roto lining. The high end touch screen interface facilitates precision control on every aspect of the cycle from the processing cycle and visualisation to setting of the oven temperature, processing time and control of all other functions. The design of straight and offset arms enables the roto lining of a wide range of heavy pipes and fittings.

The highly insulating wall structure of the oven maximizes energy-saving, while the doors with modular panels thermally performed and heating with high velocity forced air circulation in closed circuit maintains the required temperature into the oven, thus the lining material is melted easily and adheres uniformly onto the inner wall of steel substrate with the rotation of the carriage arms. This increases productivity and achieves higher quality than any other conventional machine.

The superior cooling system featuring high-efficiency blowing fans which work with air or water mist spray and hot air extractor, results in a better



The new roto lining machine.

Image Credit: Polycon Gulf

surface finish and less warpage on the roto lining surface.

The machine features the latest safety measures, including electronic safety barriers complete with photocells for safe operation and elimination of direct access while machine is in operation. A visual and acoustic alarm circuit attached to the machine panel will start to buzz in case of any deviation during operation.

It also offers simultaneous running of different articles, and provision of air pressure inside the mould for shrinkage control.

**Stand: 12102**



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# Leading the market in pipeline services

UAE-based Trans Asia Pipeline Services is experiencing an upturn in project business, and is building on its success in the pipeline services industry to explore opportunities in new areas.

**H** EADQUARTERED IN ABU DHABI, UAE, and having an equipment manufacturing and engineering base at Sharjah, UAE, Trans Asia Pipeline Services is the leading provider of pipeline and process services to oil and gas, petrochemical and power industries. With more than 300 employees, the company has a presence in 14 countries across the world, meeting the needs of clients in pre-commissioning, commissioning and process services in what can be a volatile market.

The privately-owned company primarily operates across Asia, from its UAE hub, with physical branches in most of the GCC countries, India and Singapore. In each region of operation, the same quality standards are delivered across all services.

Receiving repeat clients on a regular basis, the longevity of positive relationships formed in the sector is testament to Trans Asia's success, the company says. Its ability to provide innovative engineered solutions and ensure that project schedules are met in a safe and environment-friendly manner has helped Trans Asia to be viewed as a dependable company by EPC contractors and oil and gas companies.

The success across the pipeline services industry has helped the company to explore new opportunities within the industry, and Trans Asia has very recently acquired equipment and technology for plant shutdown and turnaround, providing services such as hydromilling, catalyst loading and change of services.

Commenting on the Middle East market for pipeline development, Surendranath Dhaneekula, the company's managing director, says, "After a prolonged slowdown from 2014 until 2017, the industry in the last 12 months or so has shown positive signs, and several greenfield and brownfield projects are now on the anvil. All across the GCC and Middle East a number of projects are ongoing and under bid.

"On our part we are also seeing this growth trend in the last 10-12 months, and at present we have several projects ongoing in the GCC, and in particularly in the UAE and Saudi Arabia. We are working with almost all the offshore LTA contractors in Saudi Arabia,



Surendranath Dhaneekula,  
managing director

Image Credit : Trans Asia Pipeline Services

offering them various pipeline services such as cleaning, flushing and decommissioning of old pipelines as well as pre-commissioning and commissioning of new pipelines. We have been particularly busy in the Eastern Province of Saudi Arabia with a number of pipeline projects, as well as process services such as nitrogen-helium leak testing and chemical cleaning services.

“ Trans Asia is committed to adopting the most advanced technologies ”

"Recently we have won a large project in Saudi that is strategically important for natural gas production for the country. There are in total approximately 600 km of pipelines from six to 36 inch sizes where we will be working with the main EPC Contractor and supporting them with precommissioning and ILI inspections of these new pipelines, as well as offering nitrogen leak testing services for seven platforms."

Turning to the main challenges the company faces in executing pipeline projects in the region, he remarks, "Being a knowledge-based service company, Trans Asia operates in

an industry where experience, knowledge, work safety and quality matters the most, and it has always remained challenging to enhance employees' knowledge base and their skills level to empower them.

"With a global workforce of more than 300 employees of diverse nationalities, Trans Asia has overcome these challenges, and has constantly invested in training and skills upgrading programmes for its workforce."

Noting the increased focus on pipeline integrity, he adds, "With the entire industry adopting advanced technologies in recent times there has been a tremendous push from the oil companies to contractors and subcontractors to deploy such technological measures in place in each contract. For the past couple of years we have been seeing that all new pipeline projects are mandatorily deploying advanced in-line inspection technologies to monitor corrosion and integrity of the pipeline networks. Pipeline integrity management is already one of the crucial fields within the oil and gas industry, and the market for solutions in integrity management is growing every day.

"For our part, Trans Asia is committed to adopting the most advanced technologies to monitor pipeline integrity, and offer our clients only the best solutions." ■

**Stand: 7152**

## Good market for drive and control applications

ENGINEERING AND ELECTRONICS specialist Robert Bosch sees good prospects for its business in the Middle East.

“We have been present in this market for decades and we have managed to have a huge installed base, thanks to our innovative products and solutions which have made us the market leader for drive and control applications,” says Tariq Adaileh, business development manager, Marine & Offshore, Oil & Gas.

“We see big potential for us in the market; a lot of projects are being tendered and executed, with promising plans for growth. EPC projects in the pipeline announced by ADNOC, for example, are giving us the momentum for a stronger presence over here.

“All of our standard hydraulic and electrical drive and control are in demand. I should highlight in particular IoT and “Industry 4.0 ready” products, as this the new trend in the industry and we as Bosch are leading this shift.”



Image Credit: Robert Bosch

Tariq Adaileh, business development manager, Marine & Offshore, Oil & Gas, Robert Bosch

The company is introducing a number of new solutions to the market in the maine and offshore space. These include:

- Hydraulic / electrical jacking system
- Heave compensation systems
- Winch systems
- Drilling systems
- Thruster systems
- Skidding systems
- Crane systems
- Steering gear systems
- Heave compensation
- Subsea solutions.

“We are also committed to the after sales and service business to our customers, and this is a strong focus,” stresses Adaileh.

“It is crucial to have an attractive and loyal customer base, to maintain a strong and recognised brand and develop our distribution channels further,” he adds.

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## Honeywell beefs up cybersecurity services in response to industry demand

AT THE HONEYWELL Users Group EMEA conference in October, the company launched new cyber security services designed to address the growing cyber threat to industry and the skills shortage in the industrial cyber security space. The Honeywell CyberVantage Security Consulting Services portfolio includes Penetration Testing, providing active “white-hat” hackers who exploit customer defenses in order to fix them. It offers System Hardening to reduce software vulnerabilities

and safely comply with global Center for Internet Security industry benchmarks. These new offerings have been added to Honeywell’s services including assessments and audits, remediation, connected plants, digital transformation and Industrial Internet of Things (IIoT).

Marty Israels, Honeywell’s director of product marketing for Industrial Cyber Security Solutions, explained that the new services are being added in response to the



Image credit: Honeywell

*A cyber security skills shortage is imminent.*

increase in the frequency and sophistication of attacks over the last 12-18 months, with many targeting critical infrastructure and the process industries.

“Planning an attack on industrial controls systems (ICS) is now easier than ever, with malware that can be used to attack an individual or company easily accessible on the dark web,” he commented. “Organised crime and individuals looking to do harm are taking advantage of this. That is one of the reasons why we have seen an increase in ransomware attacks over the last couple of years.”

A PwC survey found that Middle East businesses suffered larger losses than other regions last year due to cyber incidents. Around 18 per cent of respondents in the region reported more than 5,000 attacks, but the global average is nine per cent.

Another challenge is a skills shortage, with a global shortfall of 3.5mn cyber security jobs forecast by 2021, according to Cybersecurity Ventures, while the move to connected operations is further driving demand for industrial cyber security and expertise.

“Fifty one per cent of organisations report a shortage of cyber security skills. The feedback from our customer advisory board indicates there is a need for industrial security expertise,” said Israels.

“In response to this we are building a strong cyber security service portfolio to complement the software and technology we provide. Over the past year and a half we have put a focused effort into strengthening our industrial cyber security capabilities and increasing the level of services, driven by a multi-site defence in depth approach, complemented by the ability to do multi-vendor cyber security management. With our CyberVantage security consulting services we can bring expertise on-site, offering various services to increase customer defences. This is complemented by software that offers secure remote access, through a single pipe into a control network, providing advanced industrial security protection.”

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## Carrington to exhibit range of multipurpose fabrics at ADIPEC

CARRINGTON TEXTILES IS set to exhibit a range of multipurpose fabrics at ADIPEC. The company will present several fabrics which have ideal properties for potentially hazardous environments including the oil and gas industry. All fabrics on display are UVPF 50 protected and are available with splashgard water and oil repellent finish, if required.

The event is an opportunity for Carrington to meet customers in the Middle East, where they recently embarked upon a joint venture with Lal's Creations. Based in Sharjah UAE, the partnership will allow Carrington to enhance its current distribution capabilities, working with an on-the-ground partner to satisfy customer demand.

The fabrics Carrington will showcase include the popular Stretch range, as well as Alba 2, Satori, Teredo, Delta, Tomboy and the durable, yet eco-friendly, Coolcel 200 Plus. Carrington will also be presenting their award-winning Flameban Max 310 FC, which is a midweight, flame-retardant (FR) fabric with the added protection of superior electric arc (16.0 cal/cm<sup>2</sup>) and flash fire performance. Also on display from Carrington's FR range will be Flameshield 230, a lightweight FR product



Image Credit : Carrington

*Carrington fabrics are ideally suited to potentially hazardous environments.*

with added moisture control – ideal for those working in hot and humid environments.

Another exciting fabric that will be on show is Carrington's Flametuff AS. This incorporates

high tenacity nylon into the blend to give a significant increase in abrasion resistance and tear strength, while retaining the essential comfort properties of cotton. This gives enhanced performance characteristics that include: Abrasion Resistance tested to (12kPa) 80,000 rubs min; NFPA 2112 and EN 11612 compliant (100 wash flame retardant guarantee); and ARC rating according to ASTM F1959 = 13 Cal/cm<sup>2</sup>. Flametuff AS is also available with Splashgard chemical splash and oil protection to EN 13034, if required.

Richard Cumpstey, Carrington's export sales executive states, "The launch of this exciting new range of fabrics is the result of an extensive and lengthy research and development programme. We are delighted to be able to offer industry leading fabric solutions such as industrially launderable stretch, lightweight yet comfortable flame retardant options and Flameban 310 Max Hi Vis Orange, our unique flagship inherent flame retardant solution designed for comfort and safety."

**Stand: 8454**



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**Rexroth**  
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## A new era in gas detection

3M GAS & Flame Detection, a new product portfolio under 3M's Personal Safety Division, has debuted its gas and flame solutions, product breadth and innovative technologies as a unified front. The new group is formed from 3M's 2017 acquisition of Scott Safety and its Detcon, Oldham, Simtronics and GMI brands.

"By unifying our expanded portfolio of brands into 3M Gas & Flame Detection, we're providing the POG, industrial, hazmat and commercial communities with a single source for a broad line of safety equipment, including an enhanced offering of gas and flame detection system solutions," said Mel Gerst of 3M Gas & Flame Detection.

The products from 3M Gas & Flame Detection are well recognised for being designed for harsh environments and tough applications and appreciated for their user-friendly portables and large fixed selection. They help keep personnel and plants safe from hazards thanks to a wide range of sensing technology, including electro chemical, catalytic bead, metal oxide sensor, infrared and other optic solutions for gas and flame detection.

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Logos: DETCON, OLDHAM, SIMTRONICS, GMI

The new group is formed from 3M's acquisition of Scott Safety and its Detcon, Oldham, Simtronics and GMI brands.

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## Stainless steel pipes and tubes specialist continues to expand in global markets

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An ISO-9001, 14000, BS OHS 18001 certified company, Suraj supplies its products in various sizes, specifications and grades, and also tailored to customer requirements, in



Image credits: Suraj

Suraj pipes and tubes

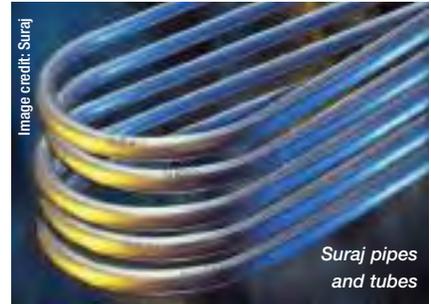


Image credits: Suraj

Suraj pipes and tubes

### Suraj flanges



Image credits: Suraj

austenitic, ferritic, duplex and super duplex stainless steel. The company specialises in heat exchangers, heating elements, surface condensers, automotive digestors, instrumentation tubing and fluid piping. Its products are used in various applications including refineries, petrochemicals, LP and HP heaters, food, pharma, fertilisers, oil and gas, breweries, sugar, and ship building.

Suraj also holds various certificates for quality in accordance with AD2000 MERKBLATT W0 and Pressure Equipment Directives [PED] 97/23/EC from TUV, NORD,

and supplies its products under all national and international third party inspection authorities. Suraj also have their own testing laboratories to undertake various tests such as hydro, eddy current, PMI, IGC, UT, RT, spectro analysis, mechanical properties and many others, as per customer and specification requirements.

For more details, please email: [suraj@surajgroup.com](mailto:suraj@surajgroup.com), tel: +91 79 2754 0720/21, fax: +91 79 2754 0722 or see the website at [www.surajgroup.com](http://www.surajgroup.com).



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## Innovative power-from-shore solution for North Sea field

THE NORWEGIAN MINISTER of Petroleum and Energy, Kjell-Børge Freiberg, officially opened the power-from-shore solution on 9 October which will provide the Johan Sverdrup field in the North Sea with electricity for more than 50 years. Power from shore was officially switched on around a year before production start-up. With electric power supplied from shore, operations can be run without the use of fossil fuels, making it one of the most carbon-efficient fields worldwide.

The Minister switched off the temporary generators which had supplied the field with electricity during the first months of the installation campaign offshore.

“This is an important day for Equinor and the Johan Sverdrup partners,” said Jez Averty, senior vice president for operations in the south of the North Sea.

“With estimated resources of up to 3.2bn barrels, and a production horizon of more than 50 years, it is key that Johan Sverdrup production is as effective as possible with the lowest possible emissions. Low carbon production is a key element of the company’s strategy and fully aligned with our roadmaps for climate and for the Norwegian continental shelf,” he added.

Johan Sverdrup full-field production is estimated to reach 660,000 bpd at plateau, with a break-even of less than US\$20 per barrel, and with CO<sub>2</sub> emissions of only 0.67 kg per barrel. Power from shore to Johan Sverdrup will help reduce emissions by an estimated 460,000 tonnes of CO<sub>2</sub> per year, equivalent to the emissions of 230,000 private cars each year.

Working closely with partners and suppliers, Equinor has taken initiatives to enable the supply of power from shore already in the commissioning phase offshore. With several energy intensive operations planned prior to production start-up – including the tieback of the eight predrilled production wells – the early supply of electricity from shore helps further reduce the carbon footprint of the project.

The Johan Sverdrup partnership has also, in collaboration with the supplier Master Marine, taken steps to ensure that the temporary accommodation is also supplied with power from shore during the remainder of the project



Image credit: Ole Jørgen Bratland / Equinor ASA

The Norwegian Minister of Petroleum and Energy, Kjell-Børge Freiberg, officially opened the power-from-shore solution to Johan Sverdrup.

finalisation stage.

“Johan Sverdrup has in many ways become known for its focus on continuous improvement, also in terms of our focus on reducing our climate footprint and finding more environmentally sustainable solutions. As soon as power from shore became part of the Johan Sverdrup development concept, we’ve worked hard with our partners and suppliers to capture the full potential of this solution,” said Trond Bokn, senior vice president for the Johan Sverdrup development.

“Another important benefit of power from shore is that the working environment for the almost 900 workers offshore also improves significantly. Noise offshore is significantly reduced as are local emissions, so it is a win-win all around,” he added.

In phase 1 of the Johan Sverdrup development the power-from-shore solution has a capacity of 100 MW, based on a production capacity of up to 440,000 bpd. Several suppliers across several countries, both onshore and offshore, have been involved in developing and delivering the chosen solution for power from shore to Johan Sverdrup phase 1.

“While this is primarily known technology, the size of Johan Sverdrup increases the complexity of

this. Seamless collaboration across the project has been key to the success of Johan Sverdrup so far – also as regards power from shore,” said Bokn.

ABB delivered the HVDC equipment for the two converter stations, onshore at Haugneset close to Kårstø and offshore at the Johan Sverdrup field centre. Aibel was responsible for all construction related to the onshore converter station at Haugneset, Aker Solutions was responsible for the engineering and Samsung Heavy Industries built the riser platform including the converter module where the HVDC equipment is placed offshore. NKT was responsible for fabrication and installation of the 200 km power cables from Haugneset out to the Johan Sverdrup field centre offshore.

In Johan Sverdrup phase 2, with start-up expected in Q4 2022, the power from shore capacity will be expanded with 200 MW, giving a total capacity of 300 MW. This enables Johan Sverdrup to facilitate access to power from shore to the other fields at Utsira High. The expanded power capacity will also be needed for the added Johan Sverdrup production capacity of 220,000 bpd, and the total full field production capacity of 660,000 bpd.

## Atlas Copco expands range of air compressors

ATLAS COPCO HAS expanded its range of air compressors for utility trucks with the launch of three models weighing below 500 kg. As a result, operators requiring compressed air at flow rates of up to 2.8 m<sup>3</sup>/min are able to reduce the overall weight of their vehicles and save space due to the small footprint of the compressors. At the forefront of the new additions to the 8 Series Utility range is the U110 PACE compressor, which features an innovative controller allowing for multiple pressure configurations between 5-10.5 bar.

Hendrik Timmermans, vice president, marketing for Atlas Copco’s Portable Air division commented, “We launched our 8 Series Utility range last year with the promise of providing customers with lightweight and versatile compressors that could be easily and securely integrated into their utility trucks. We have now taken that commitment

one-step further with the introduction of our three latest models. Not only do they weigh below 500 kg, but all compressors in the Utility Air range now offer enhanced industry-leading service intervals.”

In addition to introducing three new lightweight compressors, Atlas Copco has enhanced its top of the range U190 PACE model. Thanks to its PACE (Pressure Adjust through Cognitive Electronics) system, operators are able to choose from the widest operating pressure range currently available for a truck-mounted air compressor. With the PACE electronic regulation system, operators use a simple-to-use digital controller to adjust the pressure with pinpoint accuracy depending on their application need. This means that with the U190 PACE compressor any theoretical combinations from 5 up to 10.5 bar is achievable.



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## Systematically innovative enclosures

AFTER FIVE YEARS of development work, Germany-based Rittal, a leading global provider of solutions for industrial enclosures, power distribution, climate control and IT infrastructure, as well as software and services, unveiled its new VX25 large enclosure system at the 2018 Hanover Trade Fair.

The company says it is the first enclosure system that has been fully developed to meet the requirements for increased productivity in control and switchgear manufacturing and along Industry 4.0 value chains. With the "SYSTEM PERFECTION" slogan, Rittal is promising a major innovative leap, which has been made possible by depth of experience and intensive customer dialogue.

"The market needs an enclosure that cuts throughput times in engineering and assembly, reduces complexity and that finds a place for itself as a full-grown module in the megatrend of digitisation," said Dr. Thomas Steffen, managing director Research and Development at Rittal. "The new Rittal large enclosure has now become 100 per cent Industry 4.0-capable," he went on. "With the combination of a real enclosure and its digital twin, the new development will meet every future digitisation need – from online configuration and engineering to assembly, as well as automation, logistics and maintenance."

### Study: observe, listen and learn

Intensive dialogue with Rittal customers was crucial in developing the new large enclosure system. During a large-scale, scientifically based usability study, researchers used words, images and moving film to document the everyday working life of control and switchgear manufacturers, covering ten companies in Germany, eight in the USA and six in China, including small, medium-sized



Joseph Najjar, managing director, Rittal Middle East

and large companies. "This user analysis was an eye-opener. In some cases, we spotted problems that the customers themselves hadn't yet identified," said Dr Steffen. As a result, 150 systematically recorded and specific requirements for a new enclosure emerged, providing developers and product managers with a robust guide for the actual development work. Rittal also used the findings of the customer advisory council to complement this.

### Customer benefits

The development culminated in the new VX25 large enclosure system. VX25 stands for the versatility of options, the fulfilment of customer requirements and for perfect symmetry through a consistent 25-mm pitch pattern. "The VX25 matches the way the

control and switchgear manufacturer thinks and works – both in functions and processes," said Dr Steffen.

Customer benefits along the entire value chain of control and switchgear manufacturing can be summarised in three key points: maximum data quality and a constant supply of data; reduced complexity and time savings; and safe assembly.

### High degree of innovation

The heart of the innovation is the newly developed frame section. It determines the installation space, the efficiency in engineering and assembly, the expansion options, the stability and thus the reliability and flexibility in the customer's workshop. With the new large enclosure system, it has been possible to maintain all the important and established product features of the existing, worldwide TS 8 large enclosure system and to expand them significantly with a multitude of new functions and customer benefits.

More than 25 registered patent and trademark applications demonstrate the high level of innovation involved.



Image Credit: Rittal

*The VX25 offers the highest possible quality and consistency of data, reduced complexity and time savings, as well as safe assembly.*

### Production: maximum quality

For Rittal, SYSTEM PERFECTION also involves high-tech manufacturing. It has invested in new state-of-the-art production facilities in order to manufacture the new frame section of the VX25. New and fully automatic profiling systems and volume production lines with a total of 31 welding and handling robots are witness to maximum quality combined with precision and stability. The result is that the frame section of the VX25, which has a consistent 25-mm pitch pattern, is clearly more stable than its TS 8 predecessor, although the weight is the same. "The VX25 product is a great product from Rittal to its customers and partners," said Joseph Najjar, managing director, Rittal Middle East. "This innovation and offering elevates our commitment to the region in providing reliable products and solutions."



Image Credit: Rittal

*After five years of development work, Rittal unveiled its new VX25 large enclosure system at the 2018 Hanover Trade Fair.*

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## New Emerson corrosion monitoring solution enhances management for remote pipelines

EMERSON HAS INTRODUCED the Roxar FSM Log 48 Area Corrosion Monitor, a new pipeline integrity management system that provides remote, continuous online corrosion and erosion monitoring, enabling operators to track localised corrosion and ensure cost-effective pipeline health even in challenging environments.

The Roxar FSM Log 48 – with 48 referring to the number of pins in the sensing pin matrix – is a large-area, real-time remote pipeline monitoring solution capable of distinguishing between localised and generalised corrosion, a feature that helps reduce the need for pigging and other costlier inspection methods. The Roxar FSM Log 48 has a total cost of ownership of just one typical smart PIG run of up to 10km (although this can vary according to the PIG technology).

“Localised corrosion, when undetected, can cause pipeline failures that lead to reduced transportation availability and fines or penalties, not to mention repair costs,” said Chuck Miller, director, Global Midstream at Emerson Automation Solutions.



Image credit: Emerson

**Roxar FSM Log 48 Area Corrosion Monitor detects both localised and generalised corrosion.**

## Drilling Systems launches new technology to revolutionise training for Jack-up rigs

ADVANCED SIMULATOR DEVELOPER, Drilling Systems, has launched new technology which will revolutionise the way drilling crews are trained for Jack-up rigs, helping to raise competency and drilling standards across the world.



Image credit: Drilling Systems

**OTR simulator system: revolutionising the way drilling crews are trained for Jack-up rigs**

The cutting-edge technology comprises state-of-the-art software, which mirrors all the operations of a Jack-up rig, and is used in conjunction with Drilling Systems' unique On-the-Rig (OTR) simulator system. OTR is a mobile simulator with the capabilities of a full-size simulator, which can be easily transported into the field and used at the worksite, regardless of how remote the location. It can also be fully customised to any rig or operating system and used with or without an instructor.

This innovation means simulator training and assessments for Jack-up rig operators can take place on the rig for the very first time, considerably reducing travel time and overall training costs.

The functions and graphics of the software replicate the actual conditions and systems onboard a Jack-up rig and include all elements of operations, from well control to drilling operations and crane lifting.

This means crew members can train and practise in a safe, risk-free environment to better prepare them for the real thing.

As well as allowing training in everyday operations, the system enables operators to practice high-risk and emergency scenarios rarely seen in real life such as freeing a stuck pipe or landing a blowout preventer (BOP). This type of training is significantly improving competency and in turn contributing to higher safety levels within the industry.

Drilling Systems' OTR is already being used extremely successfully in the field helping to prepare crews for rig reactivations and assuring competency levels.

## Schlumberger introduces HyperBlade hyperbolic diamond element bit

SMITH BITS, A Schlumberger company, has launched the HyperBlade hyperbolic diamond element bit that reduces drilling costs by improving the rate of penetration (ROP), while maintaining steering response and directional tracking in soft and plastic rock formations.

“The HyperBlade bit expands our three-dimensional cutting elements bit portfolio and addresses operational challenges by reducing drilling time and eliminating unnecessary bit trips,” said Kristi Vilay, president, Bits & Drilling Tools, Schlumberger. “With the introduction of this technology, operators can improve ROP and achieve further gains in drilling efficiency.”

The new technology incorporates the distinctive geometry of Hyper hyperbolic diamond cutting elements that cut 20 per cent deeper into rock compared with conventional polycrystalline diamond compact (PDC) cutters. A thicker, precision-molded diamond table makes the Hyper element tougher and more durable for drilling soft and plastic rock formations, while armored cutting edges withstand high-impact transitions. Additionally, bit balling is mitigated by the chip-breaking profile at the centre of the element, which improves cuttings removal during drilling.

## Ale's jacking innovation demonstrates strength and stability in the Middle East

ALE'S LATEST JACKING innovation, the Mega Jack 300, has demonstrated its time efficiency, increased stability and ability to work within a restricted project site to jack-up pipe rack modules more than 5m high in Kuwait.

This is part of the wider Al Zour Refinery Project EPC 2 and 3, where ALE is providing the full onshore heavylifting solution for one of the largest refineries in the Middle East. ALE is receiving pre-assembled pipe rack modules from barges at the project's construction dock, where they are transported on SPTs over 4km to a staging area. Once at staging, the modules are required to be raised to various heights to suit the finish foundations on site, where ALE has provided the Mega Jack 300 system.

The project comprises modules of varying weights, sizes and foundation heights, requiring flexibility and speed in terms of the transport and jacking equipment. A total of 188 modules will be delivered to site, measuring as large as 40m in length and weighing up to 2,100t.

The components of the Mega Jack 300 system are compact and easy to handle on site, meaning that re-configurations are made in as little time as possible. In addition, the jacking time has been vastly reduced during the development phase, resulting in jack-up operations taking one or two hours.



Image credit: ALE

**ALE's Mega Jack 300 jacking-up a 615t pipe rack module 5.9m using 15 bases with SPMTs underneath.**

## Compressors for sand blasting applications

SCREW COMPRESSORS ARE inherent part of sand blasting applications. ROTAIR, a 57-year old company based out of Italy, specialises in the design and manufacture of portable screw air compressors for various industries, of which sand blasting is an important customer segment.

It is a demanding application, both on the compressor and on the operator due to the demand for continuous moisture-free air, high pressure and the hot and dusty environment.

ROTAIR, with its indepth understanding of the industry, offers a



Image Credit : Rotair

The MDVS 255 compressor.

complete solution.

Rightly sized engines that deliver rated speed for 24/7 operation, heavy duty two-stage filtration and a tropicalised cooling system for hotter working conditions are all critical for trouble-free operation.

In addition to the above features, ROTAIR offers specially designed sand blasting units, in parallel with the standard line. These units feature a purpose-designed after-cooler and condensed air separation system. Moisture is removed and superior quality air is delivered for efficient sand blasting. Compressed air outlet temperature is maintained around ambient +15 deg C.

Some of the advantages of these units are:

- In-built and rightly sized after-cooler and moisture separation filter to suit each compressor's free air delivery and operating pressure
- Compact design
- Easy to transport
- Included in ROTAIR's standard warranty.

### Popular models for sand blasting:

#### MDVS 120 P10

Free Air Delivery: 388 CFM;  
Operating pressure: 10 bar;  
Airend: manufactured in-house;  
Engine: Perkins, UK

#### MDVS 255 D10

Free Air Delivery: 802 CFM;  
Operating pressure: 10 bar;  
Airend: manufactured in-house;  
Engine: Deutz, Germany.

#### Globally local

ROTAIR has been present in the Middle East since 2000 and currently operates in 70 countries.

The compressors are made in Italy and the models offered in the Middle East are

customised for the region. Mechanical engines, tropicalised cooling system and heavy-duty filtration are standard in the Middle East version.

#### Comprehensive range

- Diesel driven models: 25 to 900 cfm / 7 to 15 bar
- Petrol driven models: 25 to 75 cfm / 7 to 13 bar
- Hydraulic driven models: 40 to 250 cfm / 7 to 13 bar

#### Tips for enhancing compressor life

- Adhere to recommended operational procedure
- Perform daily checks and scheduled maintenance
- Use of genuine parts and recommended oil
- Use of authorised / trained service personnel for service



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## Sullivan-Palatek redesigns portable air compressors

A LEADER IN the design and manufacture of air compressors, Sullivan-Palatek continues to introduce new and innovative products into the marketplace to meet its customers' growing needs for reliable power, and has redesigned its entire line of portable air compressors.

Headquartered in Michigan City, Indiana, Sullivan-Palatek offers a wide range of electric and portable rotary screw air compressors. Since its establishment in 1984, the company has grown from providing engineering services to existing clients, to a privately owned company that manufactures the most rugged and reliable machinery available in the market. As the industry grows more competitive, Sullivan-Palatek continues to stay true to its ability to build packages and provide air power that meet customers' needs.

The portable range consist of models from 185 to 1800 cfm, 100 to 500psi with CAT Engines. All models are offered in offshore packages including Zone II. A large number of oil rigs working in the Middle East have had Sullivan Palatek portable and electric air compressors installed for many years.

The D375PDCA portable compressor is a versatile and efficient unit, delivering 375 CFM at 150 psi. At its core, the model features a 126 hp CAT Tier 3 engine and a large 127 mm twin screw air end engineered and manufactured by Sullivan-Palatek. Other features include a full containment frame, remote drains, large 40 gallon fuel tank, large full length tool boxes on each side with lockable handles, and an exterior that boasts a durable galvalneal enclosure with a powder coated finish for rust and corrosion resistance. The compressor is also equipped with everything from fuel level gauge to engine water temperature gauge, as standard instrumentation. After cooled and filtered option available for this 375 model as well.



Copyright Sullivan-Palatek

**Sullivan-Palatek offers a wide range of electric and portable rotary screw air compressors.**

The Sullivan-Palatek DR750-D900PHCA wagon portable series is highly versatile and the best choice for construction, blasting, drilling, and mining projects. Offered with a CAT Tier 3 engine, these models are 750-900 cfm up to 150 psi. The D750-D900 models are engineered with large twin screw air ends for high efficiency, and carry an exclusive three-year air end warranty. The enclosure itself is made with sound deadening material that ensures quiet operation and provides extra protection while working in the toughest environments.

Sullivan-Palatek's largest portable compressor is the D1300-D1800 portable series. This redesigned range is bigger and better than ever, producing 1300 at 150, 1600 at 125 and 150 and 1800 at 100 and 125 psi. The full line is built with dual axle running gear, a full containment base, a four-

point lifting bale, and large service doors for ease of maintenance. For better data gathering, the Sullivan-Palatek Electronic Controller (SPEC) provides digital readouts on everything from fuel level, service and engine needs.

The ease of maintenance and heavy-duty construction with lowest shutdown rates and reasonable cost for machine and parts makes it the preferred air compressor for rental companies.

Sullivan Palatek offers the best warranty terms for their machines, with extended warranties up to 10 years available in electric models and all warranties providing for unlimited hours.

*For more information on Tier 3 offerings and the new SP16 Series of air compressors, call +97150 6268709.*

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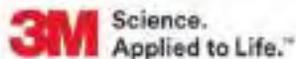
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# Project Databank

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| Project  | City      | Facility                         | Budget (\$ US) | Status                    |
|--|-----------|----------------------------------|----------------|---------------------------|
| ADMA-OPCO - SARB Offshore Oil Field Development - (Overview)                                   | Abu Dhabi | Oil Processing Facility          | 2,000,000,000  | Construction              |
| ADMA-OPCO - SARB Offshore Oil Field Development - Package 2                                    | Abu Dhabi | Oil & Gas Field                  | 500,000,000    | Construction              |
| ADNOC & Borealis - Borouge 4 Complex   | Abu Dhabi | Petrochemical Plant              | 4,000,000,000  | Pre-FEED                  |
| ADNOC & Borealis - Polypropylene (PP) Plant  | Abu Dhabi | Polypropylene                    | 550,000,000    | Engineering & Procurement |
| ADNOC & Cepsa -Ruweis - Linear Alkyl Benzene (Lab) Facility                                    | Abu Dhabi | Linear Alkyl Benzene (LAB)       | 600,000,000    | FEED                      |
| ADNOC & MASDAR- Carbon Dioxide Capture and Storage - Phase 2 (Pipeline Network)                | Abu Dhabi | Carbon Dioxide                   | 300,000,000    | Feasibility Study         |
| ADNOC - Haliba Oil Field   | Abu Dhabi | Oil Field Development            | 500,000,000    | Construction              |
| ADNOC - LNG Import Terminal  | Abu Dhabi | LNG Storage Tanks                | 1,000,000,000  | Feasibility Study         |
| ADNOC - Ruweis Complex Upgrade - New Refinery  | Abu Dhabi | Refinery                         |                | FEED ITB                  |
| ADNOC Distribution - Bateen Executive Airport- Jet Fuel Depot                                  | Abu Dhabi | Oil Storage Tanks                | 80,000,000     | Construction              |
| ADNOC Gas Processing - Taweelah - Gas Compressor Station                                       | Abu Dhabi | Gas Processing                   | 70,000,000     | Construction              |
| ADNOC Gas Processing- Asab 1- Control System Upgrade   | Abu Dhabi | Distributed Control System (DCS) | 55,000,000     | Construction              |
| ADNOC Gas Processing- Habshan 4- CO2 Recovery & Injection                                      | Abu Dhabi | Carbon Dioxide                   | 80,000,000     | EPC ITB                   |
| ADNOC Gas Processing- Integrated Gas Development (IGD) - Expansion (Onshore Pipeline)          | Abu Dhabi | Gas Production                   | 7,100,000,000  | Commissioning             |
| ADNOC Gas Processing- Integrated Gas Development - Expansion (42 Inch Pipeline)                | Abu Dhabi | Oil Field Development            | 450,000,000    | Construction              |
| ADNOC Gas Processing- Ruweis - Train 1 & 2 Process Cooling Fire Water Pumps Replacement        | Abu Dhabi | Gas Processing                   | 80,000,000     | Construction              |
| ADNOC LNG- Integrated Gas Development (IGD) - Expansion (Overview)                             | Abu Dhabi | Gas Field Development            | 1,570,000,000  | Construction              |
| ADNOC LNG- Integrated Gas Development (IGD) - Expansion (Phase 2)                              | Abu Dhabi | Gas Field Development            | 450,000,000    | EPC ITB                   |
| ADNOC Offshore - Lower Zakum - Oil Lines Replacement (Phase 1)                                 | Abu Dhabi | Pipeline                         | 850,000,000    | Construction              |
| ADNOC Offshore - Nasr Full Field Development - (Overview)                                      | Abu Dhabi | Oil Field Development            | 1,700,000,000  | Construction              |
| ADNOC Offshore - Nasr Full Field Development - Phase 2 (Package 2 - Platforms)                 | Abu Dhabi | Oil Field Development            | 195,000,000    | Construction              |
| ADNOC Offshore - Nasr Full Field Development - Phase 2 (Package 3)                             | Abu Dhabi | Oil Field Development            | 200,000,000    | Construction              |
| ADNOC Offshore - Umm Al Lulu Field Development - (Overview)                                    | Abu Dhabi | Oil Field Development            | 2,500,000,000  | Construction              |
| ADNOC Offshore - Umm Al Lulu Field Development - Package 1                                     | Abu Dhabi | Oil Field Development            | 800,000,000    | Construction              |
| ADNOC Offshore - Umm Al Lulu Field Development - Package 2                                     | Abu Dhabi | Oil Field Development            | 170,000,000    | Construction              |
| ADNOC Offshore - Umm Shaif Infield Pipelines Replacement                                       | Abu Dhabi | Oil Field Development            | 500,000,000    | EPC ITB                   |
| ADNOC Offshore - Upper Zakum Full Field Development - 750 Project - Surface Facilities - EPC 2 | Abu Dhabi | Oil Production                   | 4,200,000,000  | Construction              |
| ADNOC Offshore - Zirku Facilities Capacity Enhancement   | Abu Dhabi | Oil Field Development            | 400,000,000    | Engineering & Procurement |
| ADNOC Offshore- 750 West Region- Capacity Expansion & Sulphate Reduction Plant- EPC 3          | Abu Dhabi | Oil & Gas Field                  | 300,000,000    | Construction              |
| ADNOC Offshore- Nasr Full Field Development - Phase 2 (Package 1 - Wellheads and Pipeline)     | Abu Dhabi | Oil Field Development            | 900,000,000    | Construction              |
| ADNOC Offshore- Upper Zakum Full Field Development - 750 Project - Surface Facilities - EPC 1  | Abu Dhabi | Oil Field Development            | 1,300,000,000  | Commissioning             |
| ADNOC Onshore - Buhasa Integrated Facilities Project   | Abu Dhabi | Oil Production                   | 3,000,000,000  | EPC ITB                   |
| ADNOC Onshore - Mender Field Development   | Abu Dhabi | Oil Field Development            | 350,000,000    | Construction              |

| Project   | City      | Facility                    | Budget (\$ US) | Status                    |
|---|-----------|-----------------------------|----------------|---------------------------|
| ADNOC Onshore - North East Bab (NEB) - (Al Dabbiya) ASR                       | Abu Dhabi | Oil Production              | 2,500,000,000  | EPC ITB                   |
| ADNOC Onshore - North East Bab (NEB) - Phase 3 (Al Dabbiya)                   | Abu Dhabi | Oil Production              | 2,300,000,000  | Construction              |
| ADNOC Onshore- Bab Gas Compression Phase 3                                    | Abu Dhabi | Gas Compression             | 270,000,000    | EPC ITB                   |
| ADNOC Onshore- Bab Integrated Facilities Project- Expansion                   | Abu Dhabi | Oil Field Development       | 2,000,000,000  | Construction              |
| ADNOC Onshore- Buhasa- Wellhead Automation                                    | Abu Dhabi | Oil Field Development       | 100,000,000    | FEED                      |
| ADNOC Onshore- Qusahwira Field Development - Phase 2                          | Abu Dhabi | Oil Field Development       | 550,000,000    | Engineering & Procurement |
| ADNOC Onshore- Rumaita, Shanayel and Northeast Bab Tie In                     | Abu Dhabi | Oil Field Development       | 350,000,000    | EPC ITB                   |
| ADNOC Onshore- South East Asset- Tie-in Project (A,B, C & D)                  | Abu Dhabi | Oil Field Development       | 650,000,000    | Engineering & Procurement |
| ADNOC Refining- Carbon Black Plant  | Abu Dhabi | Gas Processing              | 200,000,000    | Commissioning             |
| ADNOC Refining- Crude Flexibility Project (CFP)                               | Abu Dhabi | Oil                         | 3,100,000,000  | Engineering & Procurement |
| ADNOC Refining- Crude Receiving Facility                                      | Abu Dhabi | Refinery                    | 100,000,000    | FEED ITB                  |
| ADNOC Refining- Gasoline and Aromatics Project                                | Abu Dhabi | Aromatics                   | 2,500,000,000  | FEED                      |
| ADNOC Refining- Ruwais Refinery East- SRU Replacement                         | Abu Dhabi | Sulphur Recovery            | 100,000,000    | Engineering & Procurement |
| ADNOC Refining- Ruwais- LPG Recovery  | Abu Dhabi | Crude Oil Distillation Unit | 40,000,000     | EPC ITB                   |
| ADNOC Refining- Waste Heat Recovery   | Abu Dhabi | Petroleum Oil Refinery      | 263,000,000    | Construction              |
| ADNOC Refining-Ruwais East Refinery- Air Emission Measurement System          | Abu Dhabi | Petroleum Oil Refinery      | 40,000,000     | FEED                      |
| ADNOC Sour Gas - Dalma Field  | Abu Dhabi | Oil Field Development       | 800,000,000    | FEED                      |
| ADNOC Sour Gas- Hail and Ghasha Megaproject                                   | Abu Dhabi | Oil & Gas Field             | 15,000,000,000 | FEED                      |
| ADNOC Sour Gas- Shah Field- Expansion   | Abu Dhabi | Gas Network                 |                | EPC ITB                   |
| ADNOC- Bu Haseer Field  | Abu Dhabi | Pipeline                    | 155,000,000    | Construction              |
| ADNOC- Bu Haseer Field Development Package 2 & 3                              | Abu Dhabi | Oil Field Development       | 800,000,000    | Project Announced         |
| ADNOC- Fujairah- Mandous Field  | Fujairah  | Oil Storage Tanks           | 2,200,000,000  | Construction              |
| ADPC & Al Gharbia Pipe Company - KIZAD- Pipeline Factory                      | Abu Dhabi | Oil                         | 276,000,000    | Commissioning             |
| ADPC - Fujairah Port Expansion - Container Terminal                           | Fujairah  | Oil Storage Terminal        | 60,000,000     | EPC ITB                   |
| ADPC - Fujairah Port Expansion - Service Harbour                              | Fujairah  | Port                        | 100,000,000    | Construction              |
| ADPC - Fujairah Port Expansion-Overview                                       | Fujairah  | Oil Storage Terminal        | 180,000,000    | EPC ITB                   |
| Borouge- Borouge 3 - Ethylene Plant Expansion                                 | Abu Dhabi | Ethylene                    | 800,000,000    | Construction              |
| Borouge- Ruwais - Polypropylene Plant 5 (BPP5)                                | Abu Dhabi | Polypropylene               | 575,000,000    | Engineering & Procurement |
| Borouge- Ruwais Pelletizing Plant - Bagging Lines Addition                    | Abu Dhabi | Polymers                    | 100,000,000    | EPC ITB                   |
| Dolphin Energy - Northern Emirate Pipeline (NEP)                              | Sharjah   | Gas Pipeline                | 150,000,000    | EPC ITB                   |
| DUGAS-IG Petrochemicals-Maleic Anhydride                                      | Dubai     | Maleic Anhydride            | 3,000,000,000  | Feasibility Study         |
| EGA & Shaheen Chem Investments LLC - Ethylene Dichloride & Caustic Soda Plant | Abu Dhabi | Caustic Soda                | 1,000,000,000  | Project Announced         |
| ENOC & Horizon Terminals - Jebel Ali Refinery Capacity Expansion              | Dubai     | Petroleum Oil Refinery      | 1,000,000,000  | Construction              |
| ENOC- Al Maktoum Airport- Jet Fuel Pipeline Expansion                         | Dubai     | Jet Fuel Pipeline           | 250,000,000    | Construction              |
| GASCO - Yas - Mina Zayed Gas Pipeline   | Abu Dhabi | Gas Processing              | 45,000,000     | Construction              |
| Gulf Petrochem - Fujairah - Bitumen Refinery                                  | Fujairah  | Bitumen                     | 300,000,000    | Feasibility Study         |
| IL&FS Prime Terminals FZC- Fujairah Oil Terminals- Phase 2                    | Fujairah  | Oil Storage Terminal        | 80,000,000     | EPC ITB                   |
| Port of Fujairah - Dibba Port   | Sharjah   | Oil Storage Terminal        | 100,000,000    | Feasibility Study         |
| Saif Al Khaili & KIZAD - Emirates Chemical Plant                              | Abu Dhabi | Caustic Soda                | 80,000,000     | Construction              |
| SNOC- Onshore Acreage Exploration (Areas A, B and C)                          | Sharjah   | Exploration                 | 1,000,000,000  | Project Announced         |
| SNOC- Sharjah LNG Terminal  | Sharjah   | Liquefied Natural Gas (LNG) | 200,000,000    | EPC ITB                   |
| Star Energy Group- JAFZA Expansion 7A   | Dubai     | Oil Storage Tanks           | 200,000,000    | Construction              |

# Project Databank

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## Project Focus

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### Project Summary

|                                |   |
|--------------------------------|---|
| <b>Project Name</b>            | ADNOC Refining- Gasoline and Aromatics Project            |
| <b>Name of Client</b>          | TAKREER - Abu Dhabi Oil Refining Company / ADNOC Refining |
| <b>Estimated Budget (US\$)</b> | 2,500,000,000   |
| <b>Facility Type</b>           | Aromatics   |
| <b>Status</b>                  | FEED  |
| <b>Location</b>                | Abu Dhabi   |
| <b>Project Start</b>           | Q1-2016   |
| <b>End Date</b>                | Q3-2021   |
| <b>FEED</b>                    | WOOD  |
| <b>Award Date</b>              | Q2-2019   |

### Background

With the continuous growth strategy of ADNOC, TAKREER announced plans to carry out a gasoline and aromatics project that will add 4.2 mtpa of gasoline and 1.6 mtpa of aromatics. Once completed and production starts, TAKREER plans to expand production of gasoline to 9.4 mtpa by 2022. Abu Dhabi Oil Refining Company (TAKREER) will now trade as ADNOC Refining.

### Project Status

| Date     | Status   |
|----------|--|
| Oct 2018 | Technical bids are going to be submitted at the end of October. The EPC contract award is likely to occur in Q2 2019. Initially, the commercial bids submission is expected in November, however dates are yet to be confirmed. The final investment decisions are also expected in the beginning of 2019. |
| Mar 2018 | The tender is expected to float this year although no confirmation on this part is available yet. So far FEED is being carried out until further notice.   |

### Contractors

| Contract Type   | Bidders   | Awarded  |
|-----------------|---|--|
| EPC             | <ul style="list-style-type: none"><li>GS Engineering &amp; Construction</li><li>Hyundai Engineering &amp; Construction</li><li>Petrofac</li><li>SK Engineering &amp; Construction</li><li>Tecnicas Reunidas</li><li>Samsung Engineering Company</li><li>Tecnimont</li></ul> | -  |
| FEED            | -   | <ul style="list-style-type: none"><li>WOOD</li></ul>                                   |
| Sub-Contractors | -   | <ul style="list-style-type: none"><li>Axens</li><li>Jacobs Engineering Group</li></ul> |

### Project Scope

Construction of the following will be implemented:

- Light and Heavy Naphtha Hydrotreater units
- Two Heavy Naphtha Reformer units
- Paraxylene unit
- Light Naphtha Isomerization units
- Aromatics Extraction Unit
- Benzene unit

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# RIG COUNT ←



## Middle East & North Africa

The Baker Hughes Rig Count tracks industry-wide rigs engaged in drilling and related operations, which include drilling, logging, cementing, coring, well testing, waiting on weather, running casing and blowout preventer (BOP) testing.

| Country            | THIS MONTH |           |            | VARIANCE        | LAST MONTH |           |            | LAST YEAR  |           |            |
|--------------------|------------|-----------|------------|-----------------|------------|-----------|------------|------------|-----------|------------|
|                    | Land       | OffShore  | Total      | From Last Month | Land       | OffShore  | Total      | Land       | OffShore  | Total      |
| <b>Middle East</b> |            |           |            |                 |            |           |            |            |           |            |
| ABU DHABI          | 37         | 17        | 54         | -4              | 38         | 17        | 55         | 35         | 15        | 50         |
| DUBAI              | 0          | 2         | 2          | 0               | 0          | 2         | 2          | 0          | 2         | 2          |
| IRAQ               | 59         | 0         | 59         | 2               | 57         | 0         | 57         | 55         | 0         | 55         |
| JORDAN             | 0          | 0         | 0          | 0               | 0          | 0         | 0          | 0          | 0         | 0          |
| KUWAIT             | 50         | 0         | 50         | 0               | 50         | 0         | 50         | 53         | 0         | 53         |
| OMAN               | 53         | 0         | 53         | 0               | 53         | 0         | 53         | 55         | 0         | 55         |
| PAKISTAN           | 25         | 0         | 25         | 0               | 24         | 0         | 24         | 26         | 0         | 26         |
| QATAR              | 4          | 5         | 9          | 0               | 4          | 5         | 9          | 4          | 6         | 10         |
| SAUDI ARABIA       | 98         | 29        | 127        | 6               | 100        | 21        | 121        | 99         | 18        | 117        |
| SUDAN              | 0          | 0         | 0          | 0               | 0          | 0         | 0          | 0          | 0         | 0          |
| SYRIA              | 0          | 0         | 0          | 0               | 0          | 0         | 0          | 0          | 0         | 0          |
| YEMEN              | 0          | 0         | 0          | 0               | 0          | 0         | 0          | 0          | 0         | 0          |
| <b>TOTAL</b>       | <b>326</b> | <b>53</b> | <b>379</b> | <b>5</b>        | <b>326</b> | <b>45</b> | <b>371</b> | <b>327</b> | <b>41</b> | <b>368</b> |

### North Africa

|              |           |          |           |           |           |          |           |           |          |           |
|--------------|-----------|----------|-----------|-----------|-----------|----------|-----------|-----------|----------|-----------|
| ALGERIA      | 49        | 0        | 49        | 0         | 49        | 0        | 49        | 50        | 0        | 50        |
| EGYPT        | 20        | 3        | 23        | -6        | 24        | 5        | 29        | 18        | 5        | 23        |
| LIBYA        | 7         | 2        | 9         | 1         | 7         | 1        | 8         | 0         | 1        | 1         |
| TUNISIA      | 2         | 1        | 3         | 0         | 2         | 1        | 3         | 0         | 0        | 0         |
| <b>TOTAL</b> | <b>78</b> | <b>6</b> | <b>84</b> | <b>-5</b> | <b>82</b> | <b>7</b> | <b>89</b> | <b>68</b> | <b>6</b> | <b>74</b> |

Source: Baker Hughes



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اليدوي. وهذا يكلف الوقت والمال، وفي بيئة خطيرة، يتسبب في درجة غير ضرورية من المخاطرة على فريق الفحص. في الواقع، يمكن أن يؤدي وجود تدفقات بيانات التآكل المباشر وبيانات سمك جدار الأنابيب إلى الحد بشكل كبير من الحاجة إلى نظام فحص على الإطلاق. ويصبح رصد العيوب مشكلة تلقائية، وستصبح فرق الفحص الاستثناء وليس القاعدة، مما يقلل من المخاطر والتكلفة.

وفي هذا الحالة، يمكن للنظام الذي حقا نشر التعلم الآلي والتحليل الكير للبيانات لاكتشاف الأنماط في مجموعات البيانات، والتنبؤ على الأنماط المخفية والارتباطات التي يمكن أن تقلل من المخاطر وتحسن الرقابة.

### مناجج الشراء الجديدة

مع التكنولوجيا والتوجه الجديدين تأتي أيضا الفرصة لإيجاد وسائل تجارية وشرية جديدة. ولا شك أن أي مهندس سيكون على دراية بالتحوّل الرقمي وإترنت الأشياء الصناعي (IIOT)، ولكن ماذا يعني هذا في سياق رصد التآكل وإدارته؟

حسنا، مع تكامل أنظمة المراقبة التدخلية وغير التدخلية، أصبح من الواضح أكثر من أي وقت مضى أن القيمة الحقيقية للمشغلين تكمن في المعلومات وليس أجهزة الاستشعار نفسها. ونتيجة لذلك، يعتمد الموردون إلى طرح نماذج مثل التأجير، ويقدمون بشكل فعال نظام رصد التآكل والتعريّة كخدمة مقرّنة بحزمة رعاية شهرية للإبلاغ والتحليل.

وهذا أكثر من مجرد نماذج للعمل، ويمكن أن تحدث فارقا كبيرا لمهندسي التآكل في محاولة لتحويل حالة الأعمال لنظام رصد أفضل في فئتها، فعادة ما يتم تصنيف شراء عدد كبير من أجهزة الاستشعار على أنها نفقات رأسمالية، ويمكن التحول إلى نموذج تأجير مهندسي التآكل من شراء الأنظمة من النفقات التشغيلية، وغالبا يسرعون ويسهلون العملية.

من خلال القيام بذلك، يتأهب مهندسو التآكل لاجتي فوائد نظام حديث ومبتكر يجمع بين مزايها أنظمة الرصد التدخلية وغير التدخلية. وعلى عكس الاعتقاد الخاطئ الشائع، فإنها أنظمة متكاملة، وليست اندفاعا نحو التحول إلى أنظمة غير تدخلية بحتة، والتي ستؤدي إلى تحقيق أكبر قدر من العوائد. ومن المهم رصد السبب والتأثير بنفس القدر، وإبقاء العين على كليهما، يمكن للمشغلين أن يكونوا أكثر ذكاء وأكثر استجابة، وهذا يعني - في نهاية المطاف - توفير الأموال وتقليل المخاطر وحماية الأصول.

يشبه الحصول على صخور حينما تحتاج إلى حبيبات ذات مستوى دقيق من الرمل. فبعد رصد مستوى معين للقلق لفقدان المعادن، قد يقوم المشغل بضبط مستويات مانع التفاعل الكيميائي، ولكن قد يستغرق ذلك أسبوعا أو شهرا قبل أن يصبح تأثير التغيير واضحا على جدار الأنابيب، ويحدث المزيد من الضرر في الوقت نفسه.

بدلا من ذلك، من الأوفق قياس السبب ذاته، إذ يمكن للمجسات التدخلية الموضوعية أن ترصد مباشرة تآكل السائل المتدفق عبر الأنابيب، وتغذي البيانات إلى مهندس التآكل في الوقت الفعلي. وهذا بدوره يسمح للمهندس بأن يقوم على الفور بضبط مستوى المادة الكيميائية المانعة للتآكل المستخدمة، وضبطها دون الحاجة إلى الانظار كل مرة لرؤية التأثير النهائي. وهذا ليس فقط يوفر المادة الكيميائية المانعة للتفاعل، بل يقلل من المخاطر ويحسن الرؤية والتحكم أيضا.

ينظر البعض إلى أنظمة الرصد التدخلية مثل هذا على أنها خطر على الصحة والسلامة لأنها تنطوي على اختراق جدار الأنابيب. ومع ذلك، فإن تحسين عملية إدارة التآكل يعد في الواقع تعمة كبيرة على الصحة والسلامة، ويمكن تركيب أجهزة الاستشعار بأمان من قبل مهندسين مدربين في معظم المواقع. ولن تمثل مشكلة سوى المواقع التي يصعب الوصول إليها غالبا والتي تشكل مخاطرة عالية.

### نظام متكامل - أكبر من مجموع أجزائه

إذن يجب أن يكون جليا أن التقنيات المستخدمة تفهم بشكل أفضل على أنها خيارات متكاملة، وليست حصرية بصورة متبادلة. فكل منها يوفر قوة لا يستطيع الآخر توفيرها ويعوض عن نقاط ضعف نظيره. ومع ذلك، فإنه يدمج كل من نوعي أجهزة الاستشعار في نظام واحد. تكون المرابا أكبر من مجموع تلك المذكورة أعلاه. لماذا؟ لأن كل ذلك يكمن في البيانات.

فمن خلال امتلاك المجموعتين من البيانات التي يتم تغديتها لاسلكيا في نظام ذكي يقوم بتحليل كل من تدفقي البيانات، يمكنك الرجوع إلى البيانات واستخدام كل منها للتحقق من صحة البيانات الأخرى. على سبيل المثال، إذا اكتشفت أجهزة الاستشعار غير التدخلية انخفاضا حادا بشكل خاص في سمك جدار الأنابيب في موقع معين، يمكن أن يكون ذلك مرجعا لمعطيات جهاز الرصد التدخلي. وإذا كان مستوى التآكل مرتفعا أيضا، فسيتم تأكيد البيانات ويمكن تصحيح المشكلة.

ومع ذلك، إذا كان للمهندس يعتمد على نظام واحد أو آخر، فإن التحقق من الصحة سيتطلب الفحص

الأرواح. من المنطقي إذن، أن المشغلين يرغبون في رصد وقياس هذا الفقدان في المعادن. ومن خلال الاستمرار في تعقبه، يمكنهم أن يكونوا استباقيين في توفير الإصلاحات وتقليل المخاطر. غير أن ذلك لم يكن ممكنا في الماضي. صحيح أنه يمكن أن توفر الكيوبونات، التي يتم إدخالها في مجرى التدفق، قراءة بديلة لفقدان المعادن. لكن هناك - ببساطة - العديد من المتغيرات حتى تكون دقيقة تماما.

لهذا فإن التطورات الحديثة في أجهزة الاستشعار بالموجات فوق الصوتية، كانت بمثابة اكتشاف لهذه الصناعة، فأصبح بالإمكان تركيب أجهزة الاستشعار هذه على السطح الخارجي لجدار الأنابيب. دون الحاجة إلى اختراقه وبالتالي ليس هناك زمن توقف عن العمل. ويمكن لهذه الأجهزة استخدام الموجات الصوتية لقياس سمك جدار الأنابيب مباشرة في موقع معيّن - حيث لا توجد قراءات بديلة نائية، ولا توجد تقديرات - بل هناك بيانات محددة.

وهذا يمنح للمشغلين شيئا لم يكن لديهم من قبل. والأكثر من ذلك، فإن حقيقة كونها غير تدخلية تعتبر بمثابة إضافة كبيرة، إذ يمكن تثبيتها بسهولة في البيئات القاسية عالية الخطورة وتغذية البيانات لاسلكيا لمهندسي التآكل. وبعد قياس فقدان المعادن بشكل مباشر أفضل خيار لرصد التعرية أيضا.

### السبب: للمجسات الموضوعية

إن هذه القدرة على الرصد مباشرة للاث التآكل والتعرية قد أدت فعلا إلى الكثير من الإثارة في هذه الصناعة. ومع ذلك، ففي بعض الأوساط، شهدت الحماسة بعض المبالغة في تقدير حالة أجهزة الاستشعار غير التدخلية، حيث اعتريتها بدلا عن كونها مكملا للتكنولوجيا التدخلية القائمة. وسيكون ذلك لرصد التأثير دون رصد السبب. في حين أن كلا منهما أمر حيوي.

في حالة التآكل، غالبا ما يقوم المشغلون بدمج المواد الكيميائية المانعة للتآكل في خط التدفق من أجل تقليل معدلات التآكل وحماية سمك جدار الأنابيب. وهذه عملية حساسة تتطلب أن تكون مستويات المواد الكيميائية متوازنة بشكل دقيق. فإذا كانت قليلة جدا، لا يمكن رصد التآكل، وإذا كثرة جدا، فأنت لا تفقد فقط المواد الكيميائية المانعة (والمكلفة جدا)، ولكن هذا يمكن أن يؤدي بصورة عكسية إلى زيادة التآكل.

وإذا كان للمشغل يقوم فقط بقياس سمك جدار الأنابيب - أي التأثير - فإنه حينئذ يترك لإجراء استنتاجات حول التآكل - أي السبب. وهذا ممكن نظريا لكنه

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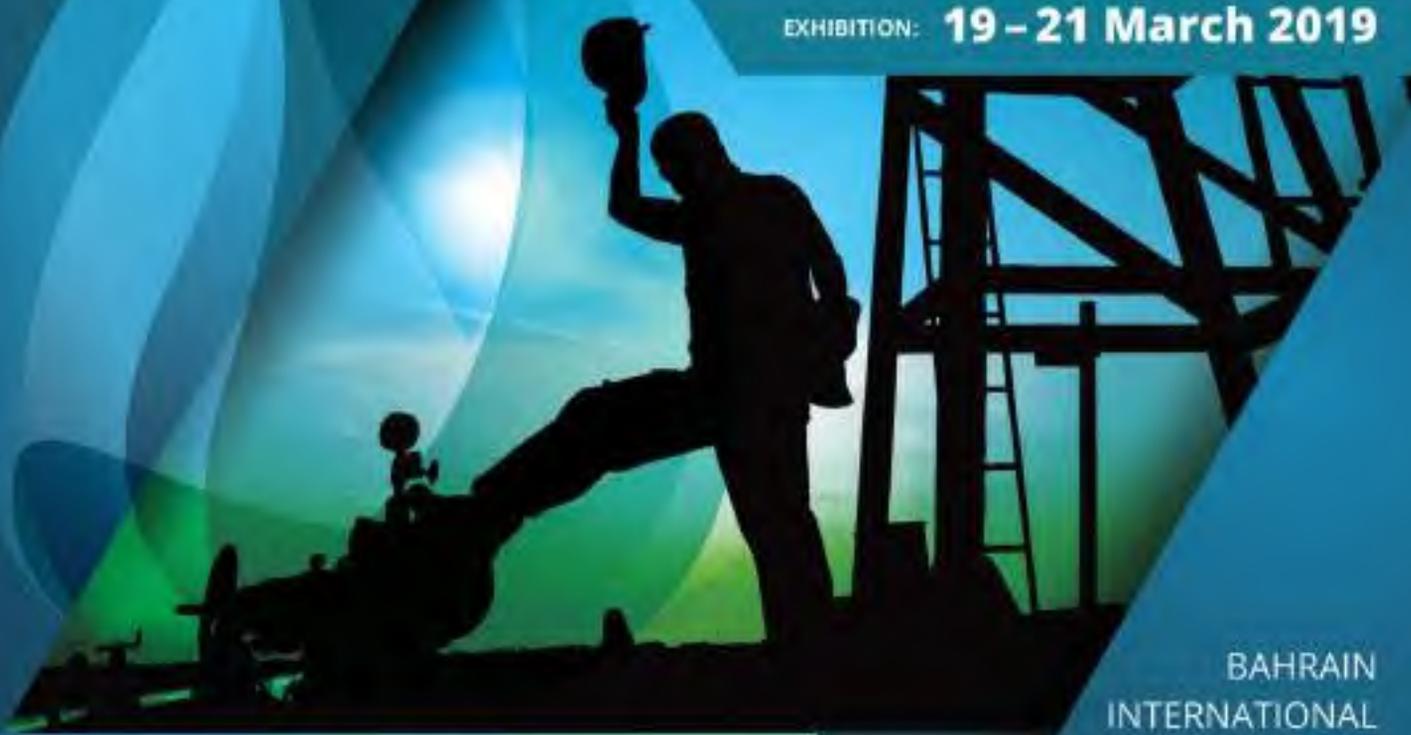
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اليديوي. وهذا يكلف الوقت والمال، وفي بيئة خطيرة، يتسبب في درجة غير ضرورية من المخاطرة على فريق الفحص. في الواقع، يمكن أن يؤدي وجود تدفقات بيانات التآكل المباشر وبيانات سمك جدار الأنبوب إلى الحد بشكل كبير من الحاجة إلى نظام فحص على الإطلاق. ويصبح رصد العيوب مشكلةً تلقائية، وستصبح فرق الفحص الاستثناء وليس القاعدة، مما يقلل من المخاطر والتكلفة.

وفي هذا الحالة، يمكن للنظام الذي حققه التعلم الآلي والتحليل الكبير للبيانات لاكتشاف الأنماط في مجموعتي البيانات، والتغلب على الأنماط المخفية والارتباطات التي يمكن أن تقلل من المخاطر وتحسن الرقابة.

### لهادج الشراء الجديدة

مع التكنولوجيا والتجهج الجديدين تأتي أيضا الفرصة لإيجاد وسائل تجارية وشرية جديدة. ولا شك أن أي مهندس سيكون على دراية بالتحوّل الرقمي وانتزعت الأشياء الصناعي (IIOT)، ولكن ماذا يعني هذا في سياق رصد التآكل وإدارته؟

حسنا، مع تكامل أنظمة المراقبة التداخلية وغير التداخلية، أصبح من الواضح أكثر من أي وقت مضى أن القيمة الحقيقية للمشغلين تكمن في المعلومات وليس أجهزة الاستشعار نفسها. ونتيجة لذلك، يعتمد الموردون إلى طرح نماذج مثل التأجير، ويقدمون بشكل فعال نظام رصد التآكل والتعربة كخدمة مقترنة بحزمة رعاية شهرية للإبلاغ والتحليل.

وهذا أكثر من مجرد نماذج للعمل، ويمكن أن تحدث تارفا كبيرا لمهندسي التآكل في محاولة لتحويل حالة الأعمال لنظام رصد أفضل في هئتها، فعادة ما يتم تصنيف شراء عدد كبير من أجهزة الاستشعار على أنها نفقات رأسمالية. ويمكن التحول إلى نموذج تأجير مهندسي التآكل من شراء الأنظمة من النفقات التشغيلية، وغالبا يسرعون ويسهلون العملية.

من خلال القيام بذلك، يتأهب مهندسو التآكل لاجني فوائد نظام حديث ومبتكر يجمع بين مزاي أنظمة الرصد التداخلية وغير التداخلية. وعلى عكس الاعتقاد الخاطن الشائع، فإنها أنظمة متكاملة وليست اندفاعا نحو التحول إلى أنظمة غير تداخلية بحتة، والتي ستؤدي إلى تحقيق أكبر قدر من العوائد. ومن المهم رصد السبب والتأثير بنفس القدر، وإبقاء العين على كليهما، يمكن للمشغلين أن يكونوا أكثر ذكاء وأكثر استجابة. وهذا يعني - في نهاية المطاف - توفير الأموال وتقليل المخاطر وحماية الأصول.

يشبه الحصول على صخور حينما تحتاج إلى حبيبات ذات مستوى دقيق من الرمل - فيعد رصد مستوى ملح للقلق لفقدان المعادن، قد يقوم المشغل بضبط مستويات مانع التفاعل الكيميائي، ولكن قد يستغرق ذلك أسبوعا أو شهرا قبل أن يصبح تأثير التغيير واضحا على جدار الأنابيب، ويحدث المزيد من الضرر في الوقت نفسه.

بدلا من ذلك، من الأوفق قياس السبب ذاته. إذ يمكن للمجسات التداخلية الموضوعية أن ترصد مباشرة تآكل المسائل المتدفق عبر الأنابيب، وتتغذى البيانات إلى مهندس التآكل في الوقت الفعلي. وهذا بدوره يسمح للمهندس بأن يقوم على الفور بصقل مستوى المادة الكيميائية المانعة للتآكل المستخدمة، وضبطها دون الحاجة إلى الانتظار كل مرة لرؤية التأثير النهائي. وهذا ليس فقط يوفر المادة الكيميائية المانعة للتفاعل، بل يقلل من المخاطر ويحسن الرؤية والتحكم أيضا.

ينظر البعض إلى أنظمة الرصد التداخلية مثل هذا على أنها خطر على الصحة والسلامة لأنها تنطوي على اختراق جدار الأنابيب. ومع ذلك، فإن تحسين عملية إدارة التآكل يعد في الواقع نعمة كبيرة على الصحة والسلامة، ويمكن تركيب أجهزة الاستشعار بأمان من قبل مهندسين مدربين في معظم المواقع. ولن تمثل مشكلة سوى المواقع التي يصعب الوصول إليها غالبا والتي تشكل مخاطرة عالية.

### نظام متكامل - أكبر من مجموع أجزائه

إذن يجب أن يكون جليا أن التقنيات المستخدمة تفهم بشكل أفضل على أنها خيارات متكاملة. وليست حصرية بصورة متبادلة. فكل منها يوفر قوة لا يستطيع الآخر توفيرها ويعرض عن نقاط ضعف نظيره. ومع ذلك، فإنه يدمج كل من نوعي أجهزة الاستشعار في نظام واحد، تكون المرآيا أكبر من مجموع تلك المذكورة أعلاه. لماذا؟ لأن كل ذلك يكمن في البيانات.

فمن خلال امتلاك المجموعتين من البيانات التي يتم تغذيتها لاسلكيا في نظام ذكي يقوم بتحليل كل من تدفقي البيانات، يمكنك الرجوع إلى البيانات واستخدام كل منها للتحقق من صحة البيانات الأخرى. على سبيل المثال، إذا اكتشفت أجهزة الاستشعار غير التداخلية انخفاضًا حادا بشكل خاص في سمك جدار الأنابيب في موقع معين، يمكن أن يكون ذلك مرجعا لمعطيات جهاز الرصد التداخل. وإذا كان مستوى التآكل مرتفعا أيضا، فسيتم تأييد البيانات ويمكن تصحيح المشكلة.

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### السبب: المجسات الموضوعية

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في حالة التآكل، غالبا ما يقوم المشغلون بضح المواد الكيميائية المانعة للتآكل في خط التدفق من أجل تقليل معدلات التآكل وحماية سمك جدار الأنابيب. وهذه عملية حساسة تتطلب أن تكون مستويات المواد الكيميائية متوازنة بشكل دقيق. فإذا كانت قليلة جدا، لا يمكن رصد التآكل، وإذا كثرة جدا، فأنت لا تفقد فقط المواد الكيميائية المانعة (والمكلفة جدا)، ولكن هذا يمكن أن يؤدي بصورة عكسية إلى زيادة التآكل.

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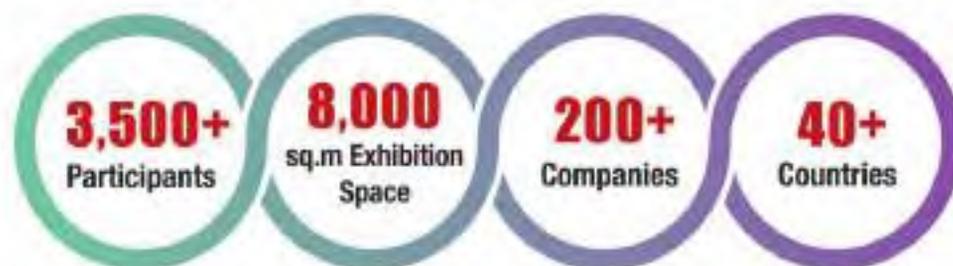
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## نهج متكامل للتحكم في التآكل

في هذا المقال، يرى رولان أندرسون، نائب الرئيس التنفيذي لشركة كوساسكو Cosasco، أن أكثر الأساليب فعالية للحماية من التآكل يجمع بين مزاي كل من أنظمة الرصد التدخلية وغير التدخلية. فطالما كانت هناك صناعة نفطية، كان هناك تآكل وتعبية، وقد سعى مشغلو صناعات التنقيب والإنتاج، وصناعات النقل وخطوط الأنابيب، وكذلك الصناعات التحويلية - باستمرار - إلى إيجاد طرق أفضل لحماية أصولهم وحماية كل من الصحة والسلامة وخط الاحتياطي.

الأثر النهائي: أجهزة الاستشعار غير التدخلية سواء كانت المشكلة تآكل أو تعبية، فإن الغاية النهائية، في نهاية المطاف، تكمن في تقليل فقدان المعادن. ويمكن أن يصبح فقدان تدريجي لسمك الأنابيب خطراً هاملاً، مما يهدد بفقدان المحتوى المحتجز، وزمن التوقف والتعطيل الكبير، بل وحتى - في أسوأ سيناريوهات الحالة - وقوع إصابات أو خسائر في

الحصص. إنه التقدم، ولكن سيكون من الخطأ قراءة هذا الأمر كقصة لكل تقنية بسيطة تحل محل الأخرى. في الواقع، يتمثل النهج الأكثر فعالية في الجمع بين المسابر التدخلية وأجهزة الاستشعار غير التدخلية ضمن اتفاقات شراء جديدة. لإعطاء منظور متكامل أكبر من مجموع أجزائه، ونفهم كيفية ذلك، فإننا نحتاج إلى فصل السبب والنتيجة.

قديماً، كانت هناك كويونات تعمل بمثابة بديل لفقدان المعادن. ويعد ذلك كانت هناك أجهزة استشعار موضعية قادرة على رصد التآكل. أما الآن فهناك أجهزة استشعار غير تدخلية تعمل بالموجات فوق الصوتية قادرة على رصد سمك جدار الأنابيب مباشرة. ويتمثل هذا الاتجاه في استخدام مزيد من أجهزة الاستشعار، والمزيد من البيانات والمزيد من الرصد على حساب

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## نهج متكامل للتحكم في التآكل

في هذا المقال، يرى رولان أندرسون، نائب الرئيس التنفيذي لشركة كوساسكو Cosasco، أن أكثر الأساليب فعالية للحماية من التآكل يجمع بين مزاي كل من أنظمة الرصد التدخلية وغير التدخلية. فطالما كانت هناك صناعة نفطية، كان هناك تآكل وتعبية، وقد سعى مشغلو صناعات التنقيب والإنتاج، وصناعات النقل وخطوط الأنابيب، وكذلك الصناعات التحويلية - باستمرار - إلى إيجاد طرق أفضل لحماية أصولهم وحماية كل من الصحة والسلامة وخط الاحتياطي.

الأثر النهائي: أجهزة الاستشعار غير التدخلية سواء كانت المشكلة تآكل أو تعبية، فإن الغاية النهائية، في نهاية المطاف، تكمن في تقليل فقدان المعادن. ويمكن أن يصبح فقدان تدريجي لسمك الأنابيب خطراً حاثلاً، مما يهدد بفقدان المحتوى المحتجز، و زمن التوقف والتعطيل الكبير، بل وحتى - في أسوأ سيناريوهات الحالة - وقوع إصابات أو خسائر في

الفحص. إنه التقدم، ولكن سيكون من الخطأ قراءة هذا الأمر كقصة لكل تقنية بسيطة تحل محل الأخرى. في الواقع، يتمثل النهج الأكثر فعالية في الجمع بين المسابر التدخلية وأجهزة الاستشعار غير التدخلية ضمن اتفاقات شراء جديدة، لإعطاء منظور متكامل أكبر من مجموع أجزائه. ونفهم كيفية ذلك، فإننا نحتاج إلى فصل السبب والنتيجة.

قديماً، كانت هناك كويونات تعمل بمثابة بديل لفقدان المعادن. وبعد ذلك كانت هناك أجهزة استشعار موضعية قادرة على رصد التآكل. أما الآن فهناك أجهزة استشعار غير تدخلية تعمل بالموجات فوق الصوتية قادرة على رصد سمك جدار الأنابيب مباشرة. ويتمثل هذا الاتجاه في استخدام مزيد من أجهزة الاستشعار، والمزيد من البيانات والمزيد من الرصد على حساب

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# المحتويات

## القسم العربي

- ٤ صناعة البتروكيماويات الأكثر طلباً على النفط
- ٤ تقدم هائل لخط أنابيب أدنوك الجديد للكوييت
- ٧ «أمارينات» تحصل على عقد بالعراق
- ٧ اتفاقية مشتركة لاستئناف التنقيب عن النفط الليبي

## تجليات

- ٩ نجاح متكامل للتحكم في التآكل
- ١٣ مواجهة تهديدات الأمن السيبراني في قطاع النفط والغاز

## ملخص محتويات القسم الإنجليزي

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## ADVERTISERS INDEX

| Company   | Page | Company  | Page | Company   | Page   |
|---|------|--|------|---|--------|
| 3X Engineering S.A.M.                             | 94   | Gas & Oil Field Services Co (GOFSCO)                         | 87   | PAO TMK   | 73     |
| Aarvi Encon Ltd                                   | 42   | Genavco  | 71   | Polycon Gulf Ltd                                | 109    |
| Abu Dhabi Ship Building PJSC                      | 7    | GPT Industries (Garlock Pipeline Technologies)               | 63   | Protton Engineering                             | 128    |
| AES Arabia Ltd                                    | 67   | GustoMSC   | 51   | Reflex Marine Ltd                               | 23, 25 |
| Aggreko (Middle East) Ltd                         | 43   | Hi-Force Ltd   | 47   | Rittal Middle East FZE                          | 119    |
| Aggreko (Middle East) Ltd                         | 43   | IEC Telecom Safa UAE   | 96   | Robert Bosch Middle East FZE                    | 118    |
| Airmotec AG                                       | 101  | IIR Exhibitions (MEE Dubai 2019)                             | 143  | Rock Flow Dynamics                              | 2      |
| AkzoNobel UAE Paints L.L.C.                       | 55   | IRZ Tek  | 89   | Rotair Spa                                      | 35     |
| All World Exhibitions (MEOS 2019)                 | 137  | Jan De Nul Group (Sofidra SA)                                | 19   | Saudi Steel Pipe Company                        | 77     |
| AYM Events Ltd (PetroEnvironment 2019)            | 141  | Kaesar Kompressoren FZE                                      | 147  | SFL Industries Stopaq B.V.                      | 83     |
| Bell Energy                                       | 54   | Kallman Worldwide Inc.                                       | 135  | ShawCor Ltd                                     | 113    |
| Belsim Engineering SA                             | 91   | Karcher FZE  | 31   | Shree Steel Overseas FZCO                       | 12     |
| Bureau Veritas S.A. Dubai                         | 95   | Kerry Project Logistics Middle East LLC                      | 100  | Sullivan Palatek                                | 78     |
| Byrne Equipment Rental LLC                        | 41   | Kumars Forge & Valves Pvt Ltd                                | 69   | Suraj Limited                                   | 29     |
| Cal Gavin Ltd                                     | 11   | Leistritz Pumpen GmbH  | 65   | Tendeka   | 116    |
| Circor Energy                                     | 99   | MABI AG  | 6    | The Caldwell Group, Inc.                        | 46     |
| CMP Products Ltd                                  | 86   | Magnetrol International N.V.                                 | 57   | Tianjin Lilin Petroleum Machinery Co. Ltd       | 120    |
| Coordinadora Freight Services Middle East LLC     | 121  | Malaysia External Trade Development Corporation              | 13   | Total   | 81     |
| Cryostar SAS                                      | 97   | Mammoet FZE  | 27   | Trans Asia Pipeline Services FZC                | 103    |
| Doris Engineering                                 | 93   | Master Tech Company (MTC) FCZ                                | 33   | Triplefast Middle East Ltd                      | 105    |
| Dubai Cable Company (Private) Ltd                 | 125  | ME3 - Middle East Energy Events FZ LLC (EMET & ME-SPEC 2018) | 139  | Triveni Turbine Ltd                             | 21     |
| Eilbeck Cranes                                    | 53   | Mokveld Valves BV  | 9    | TUBACEX Middle East                             | 117    |
| Expo Centre Sharjah (15th Edition Steel Fab 2019) | 112  | MSA Middle East FZE  | 39   | Universal Inspection Co. Ltd                    | 123    |
| Fairdin S.p.A.                                    | 111  | NAFFCO   | 59   | Urtim Kalip Ve Iskele Sistemleri San.Ve Tic.A.S | 17     |
| Fairdeal Marine Services LLC                      | 49   | NETZSCH Pumpen & Systeme GmbH                                | 115  | Van Beest BV                                    | 102    |
| Frigmaires Engineers                              | 70   | NPS Energy DMCC  | 37   | Vishal Rubber Technologies Pvt Ltd              | 127    |
| Fronius Middle East FZE                           | 61   | OHL Gutermuth Industrial Valves GmbH                         | 82   | WEG Middle East FZE                             | 85     |
| Gardner Denver FZE                                | 107  | Oldham SAS   | 15   | Wood (Production Services Network Emirates LLC  | 5      |

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