

Oil Review

Oil · Gas · Petrochemicals

Middle East

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Advancing digital transformation with Oil & Gas 4.0

- Strategies for the energy transition
- ADNOC targets responsible production
- Improving hydrocarbon process safety
- Reliable connectivity for smooth operations
- Tackling flow assurance challenges
- The latest in corrosion protection

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Editor: Louise Waters - ✉ louise.waters@alaincharles.com

Editorial and Design team: Mariam Ahmad, Prashanth AP Fyna Ashwath, Miriam Brtkova, Praveen CP, Manojkumar K Nonalynka Nongrum, Shalaka Paradkar, Abhishek Paul Rahul Puthenveedu, Samantha Payne and Deblina Roy

Managing Editor: Georgia Lewis

Publisher: Nick Fordham

Sales Director: Michael Ferridge

Magazine Sales Manager: Tanmay Mishra
☎ +91 98800 75908

✉ tanmay.mishra@alaincharles.com

International Representatives

Nigeria **Bola Olowo**
☎ +234 8034349299
✉ bola.olowo@alaincharles.com

USA **Michael Tomashefsky**
☎ +1 203 226 2882 ☎ +1 203 226 7447
✉ michael.tomashefsky@alaincharles.com

Head Office:

Alain Charles Publishing Ltd
University House, 11-13 Lower Grosvenor Place, London,
SW1W 0EX, United Kingdom
☎ +44 (0) 20 7834 7676 ☎ +44 (0) 20 7973 0076

Middle East Regional Office:

Alain Charles Middle East FZ-LLC
Office L2-112, Loft Office 2, Entrance B,
P.O. Box 502207, Dubai Media City, UAE
☎ +971 4 448 9260, ☎ +971 4 448 9261

Production: Srinidhi Chikkars, Swati Gupta, Nelly Mendes and Arjun S
✉ production@alaincharles.com

Subscriptions: ✉ circulation@alaincharles.com

Chairman: Derek Fordham

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→ Editor's note

THE DIGITAL TRANSFORMATION of the oil and gas industry in the Middle East and North Africa continues apace, as energy companies ramp up investment in technologies supporting more efficient operations. ADNOC has been a leader in this regard (see p64). Digitalisation will be at the forefront of ADIPEC 2019, with the introduction of Oil & Gas 4.0, a new agenda developed by ADNOC and ADIPEC to navigate and embrace the opportunities enabled by the Fourth Industrial Revolution. Our ADIPEC Preview brings you highlights of the show, which is set to attract more than 2,200 exhibiting companies and 145,000 visitors, as well as news from exhibiting companies (see p92).

Our ADNOC Review looks at the NOC's activities as it puts the focus on sustainable production (p34). Other features in this packed issue cover corrosion protection (p78), satellite communications (p84), diversity (p48), process safety (p54) and flow assurance (p68). We hope to see you at ADIPEC!

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Front cover image courtesy of ADNOC / Adobe Stock
Back cover image courtesy of Soluforce

→ Executives' Calendar 2019-2020

NOVEMBER

11-14	ADIPEC	ABU DHABI	www.adipec.com
23-24	Iraq Oil & Gas Show	BAGHDAD	www.iogsiraq.com
24-25	Dubai Health, Safety & Environment Forum	DUBAI	www.hse-forum.com

JANUARY 2020

13-15	International Petroleum Technology Conference	DHAHRAN	www.2020.iptcnet.org
13-16	World Future Energy Summit	ABU DHABI	www.worldfutureenergysummit.com
19-21	Intersec	DUBAI	www.intersec.ae.messefrankfurt.com

FEBRUARY 2020

2-4	Kuwait Health, Safety & Environment Forum	KUWAIT	www.hse-forum.com
11-13	Egypt Petroleum Show	CAIRO	www.egyps.com
18-20	ME-TECH 2020	ABU DHABI	www.europetro.com
25-25	Oman Health, Safety & Environment Forum	MUSCAT	www.hse-forum.com

MARCH 2020

3-5	Middle East Energy (MEE)	DUBAI	www.middleeast-energy.com
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Readers should verify dates and location with sponsoring organisations, as this information is sometimes subject to change.

Iraq Oil & Gas Show to highlight Iraq opportunities

IRAQ IS POISED to become a powerhouse in the global oil and gas market. As the fastest-growing oil producer in the world, Iraq's potential is huge, especially during a period where markets are jolted by geopolitical conflict. Ranking as the fifth largest source of global oil supply, reserves stand at just under 150 million barrels, spread across over 70 fields. Iraq remains underexplored, with the potential for further large-scale discoveries. Iraq is ready to reassert itself as a pivotal nation on the global oil map.

While its large-scale upstream capacity is well known to the international audience, Iraq's challenges and opportunities lie in the broader hydrocarbon industry. Further development is hampered by midstream and downstream operations. Bottlenecks and a weak infrastructure prevent long-term growth in providing for domestic energy demands and international distribution. Iraq's entire hydrocarbon supply chain needs substantial investment.

The Iraq Oil & Gas Show, hosted by the Iraq Ministry of Oil, will be held from 23-24 November in Baghdad. It targets the vast opportunities and challenges that are prevalent in



Image Credit: Shutterstock

Iraq is the fifth largest global oil producer.

the hydrocarbon industry, offering unique insight into the Iraqi hydrocarbon sector. Technological innovation, supply chain management, infrastructure development and developing a midstream and downstream capacity will be discussed at length.

The event will be attended by the key players and decision-makers in Iraq's hydrocarbon industry. The official Ministerial opening will be led by The Ministry of Oil and other leading government ministries.

Speakers include H.E. Thamir Ghadhban, Deputy Prime Minister for Energy Affairs and Minister of Oil; H.E. Dr Sami al-Araji, chairman, National Investment Commission; H.E. Saleh al-Jubouri, Minister of Industry & Minerals; Haibat al-Halbusi, chairman, Energy Committee of the Iraqi Parliament; Eng. Aqeel Abdul Zahra, director general of Petrochemicals, Ministry of Industry & Minerals and senior representatives of IOCs working in Iraq.

The exhibition will provide an opportunity to showcase your services for Iraq's oil and gas industries directly to decision-makers.

For further information, see the website at www.iogsiraq.com.



Compact, Robust and Reliable Production Chokes from SAGA-Lancaster

Production chokes play a critical role in the safe and economical delivery of the world's oil and gas reserves. The demands of modern-day oilfield production dictate that safety and reliability is paramount.

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Our engineering and manufacturing processes are characterized by our commitment to innovation. Our testing and research produce important information, but our best feedback comes from our customers.

The advances in our production chokes reflect the need to accommodate increasing operating pressures while delivering outstanding efficiency and reliability.

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SAGA-Lancaster has manufacturing facilities in Houston, Texas and Samarinda, Indonesia. And, we have a service facility in Abu Dhabi in the UAE.



Come see us at ADIPEC Stand No. 7450, Hall 7 (USA Pavilion)

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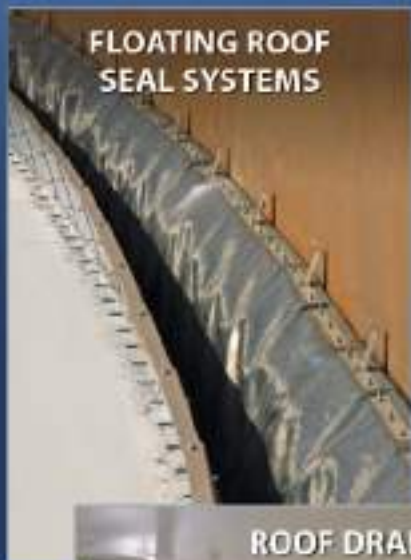
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Latest innovations showcased at KOGS

More than 6,000 global energy leaders, stakeholders and executives gathered in Kuwait from 13-16 October for the 4th Society of Petroleum Engineers Kuwait Oil & Gas Show and Conference (KOGS 2019).

THE EVENT WAS held under the patronage of the Prime Minister of Kuwait, His Highness Sheikh Jaber Al-Mubarak Al-Hamad Al-Sabah, with official support from Kuwait Petroleum Corporation (KPC) and the Organisation of the Petroleum Exporting Countries (OPEC).

His Excellency Dr. Khaled Al-Fadhel, Minister of Oil, Electricity & Water of the State of Kuwait and Hashem Sayed Hashem, deputy chairman and CEO of Kuwait Petroleum Corporation (KPC) performed the official opening ceremony for the exhibition, held at the Kuwait International Fair in Mishref, which featured more than 190 companies from 30 countries.

The exhibition featured leading stakeholders, major players, suppliers and service providers, covering all areas of the oil and gas industry. Principal regional exhibitors included KPC and subsidiaries, BAPCO, EQUATE and Delta Corporation. Also participating was a host of international powerhouses including Baker Hughes, BP, the Egyptian General Petroleum Corporation, Halliburton, Shell and Weatherford, local and regional oilfield services companies such as NESR, Al Mansoori and Gas & Oilfield Services Company, alongside independent specialist suppliers and distributors from Kuwait and around the world.

Among the innovative technologies on display were Kinetic Pressure Control's Kinetic Blowout Stopper, KBOS. Showcased on the NESR stand, the retrofittable, electrically initiated, pyro-mechanical gate valve shears and seals in milliseconds, whatever the flow and pressure in the well.

Also on display was Volant's cement swivel tool, which provides a means to introduce cement below the top drive. A trial is planned in Kuwait before the end of the year, the first trial of this product in the Middle East.

Zain showcased Huawei's 5G Robot for remote firefighting and gas leak control solution which features both optical and infrared cameras. Novomet showcased Colibri, its cable-deployed rigless ESP, which



H.E. Dr. Khaled Al-Fadhel, Minister of Oil, Electricity & Water, toured the exhibition.

it is planning to launch next year in Kuwait, and which the company says is the smallest ESP in the world. Halliburton displayed its EarthStar ultra-deep resistivity service for well logging, while Baker Hughes focused on predictive technologies. NCS displayed its pinpoint fracturing technology, for which it sees great potential in the Middle East market. The company is planning trials with regional operators.

The general feeling among exhibitors was that Kuwait represents a steady market with good prospects, although some noted a recent slowdown in business and projects.

At the conference opening on 13 October, H.E. Dr Al Fadhel Minister of Oil, Electricity and Water, State of Kuwait, highlighted the challenges facing the oil and gas industry, including developing techniques of oil production and refining, digitising product marketing, climate change, and cybercrime. "We always work on developing and bringing the latest technologies to the oil industry and seek to benefit from advanced technological methods," he said.

"Kuwait as an oil-producing country works

on adapting the oil industry to reduce greenhouse gas emissions and qualify oil operations to become environment-friendly," he added.

Hashem Sayed Hashem, deputy chairman and CEO, Kuwait Petroleum Corporation; said that KPC is focusing on enhancing oil exports and ramping up gas production as part of its 2040 growth strategy.

"We are deploying new technologies for our maturing fields for smart and efficient operations. We are moving towards an integrated value chain from our reservoirs to our petrochemicals complexes," he said, adding that KPC is also focusing on offshore oil exploration and is developing its petrochemicals industry.

Speaking at a session on Offshore Exploration, Mohammed Dawwas al-Ajmi, exploration manager at KOC, said that KOC plans to increase production capacity by targeting new territory in Kuwait's offshore reserves, describing offshore exploration as a "gamechanger for Kuwait". Kuwait is preparing to drill its first batch of exploration wells in 2020, he said. ■

Image Credit : Informa Markets

Oilfield service companies are going beyond oil

HEAVYWEIGHT OILFIELD SERVICE providers such as Saipem and Baker Hughes are diversifying beyond oil and gas development projects and are moving increasingly into renewable energy projects, Rystad Energy finds.

In 2014, non-upstream oil and gas activities accounted for 22 per cent of revenues among service suppliers. This share grew to 27 per cent in 2018. Rystad Energy expects the trend to accelerate in the next decade.

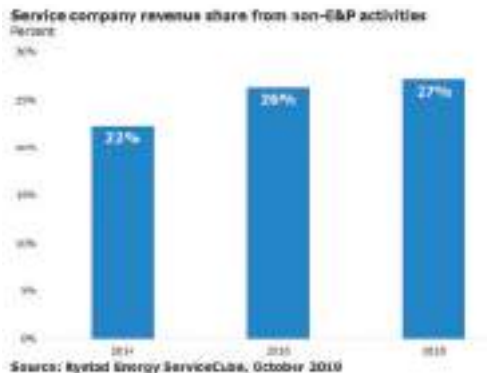
“If pure-play contractors within drilling, well services and seismic – which don’t have much to offer outside the upstream oil and gas industry – are removed from the equation, activities outside of upstream accounted for nearly 30 per cent of last year’s revenues,” says Audun Martinsen, head of oilfield services research at Rystad Energy.

This shift is driven by contractors seeking opportunities outside of exploration and development activities in oil and gas. It is the result of large budget cuts in the upstream market, which have been greater than midstream market budget cuts, shifting the overall investment profile of the market space. Baker Hughes is a notable example of this shift. After GE announced that it would reduce its ownership share from 50.4 per cent to 38 per cent, Baker Hughes rebranded itself earlier this month. Shedding its former persona as BHGE, a “fullstream company” focusing on reservoir to the refinery, the company will henceforth be known as Baker Hughes, an “energy technology company” that develops and deploys energy technologies.

“In the next decade, this trend is likely to crystallise further, with more oilfield service companies expanding into other energy services to adapt to the winds of change and to gain a first-mover advantage in the emerging clean energy service market,” Martinsen said.

Rystad Energy forecasts that the global upstream service market will decline in 2020 and grow only at a modest three per cent for the four-year period from 2019 to 2022.

“For service companies, it will be a more lucrative journey to get exposed to a fast-moving energy market, like in Asia-Pacific, where renewable capex will overtake upstream investments as soon as next year,” Martinsen remarked.



Non-upstream oil and gas share grew to 27 per cent in 2018.

South Sudan, Egypt sign agreement at South Sudan Oil & Power 2019

SOUTH SUDAN AND Egypt have signed an MoU regarding cooperation in the field of downstream oil and gas at 2019 South Sudan Oil & Power Conference (SSOP). The country will launch its first-ever licensing agreement in the first quarter of 2020 regarding 13 blocks onshore open for tender.



South Sudan announced it would launch its first ever licensing round in the first quarter of 2020, putting up 13 onshore blocks for tender.

During his opening keynote speech, minister of Petroleum of South Sudan, Daniel Awow Chuang, said, “The oil production in South Sudan has reached 178,000 bpd. We hope to reach 250,000 bpd in the near future. We are successfully reaching target thanks to extensive support from our partners and neighbouring countries.” Minister Chuang emphasised on the importance of its cooperation with Sudan, with whom a historic peace agreement was signed last September.

Several initiatives were highlighted by Chuang as well as first vice-president of South Sudan, Taban Deng Gai, showing the country’s efforts to significantly increase oil production. Earlier, Sudd Petroleum Operating Company announced it would resume oil production at the end of the year. With a capacity of 80,000 bpd, the oilfields have been shut down since 2016.

South Africa’s Strategic Fuel Fund, which signed an exploration and production sharing agreement in May 2019, announced it would launch an aerial surveying campaign of its block B2 in December.

The signing of the agreement between South Sudanese government and Egypt’s state oil company Egyptian National Petroleum Corporation (EGPC) comes a few weeks after Egyptian President Al-Sisi called upon Egyptian exploration and production companies to increase participation in African countries and urged service companies to invest in South Sudan.

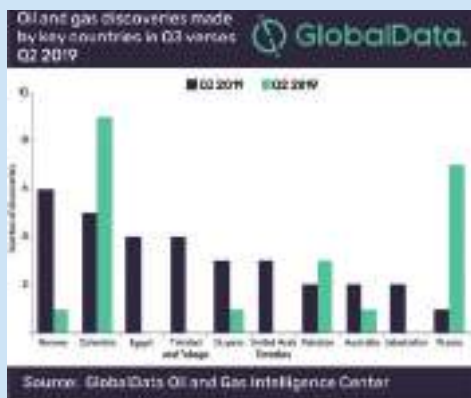
Oil and gas discoveries Q3 2019: Egypt contains four, UAE holds three

OF THE 38 global oil and gas discoveries made in Q3 2019, six were located in Norway followed by Colombia with five discoveries, Egypt and Trinidad with four each, and Guyana and the United Arab Emirates (UAE) with three each, according to GlobalData, a data and analytics company.

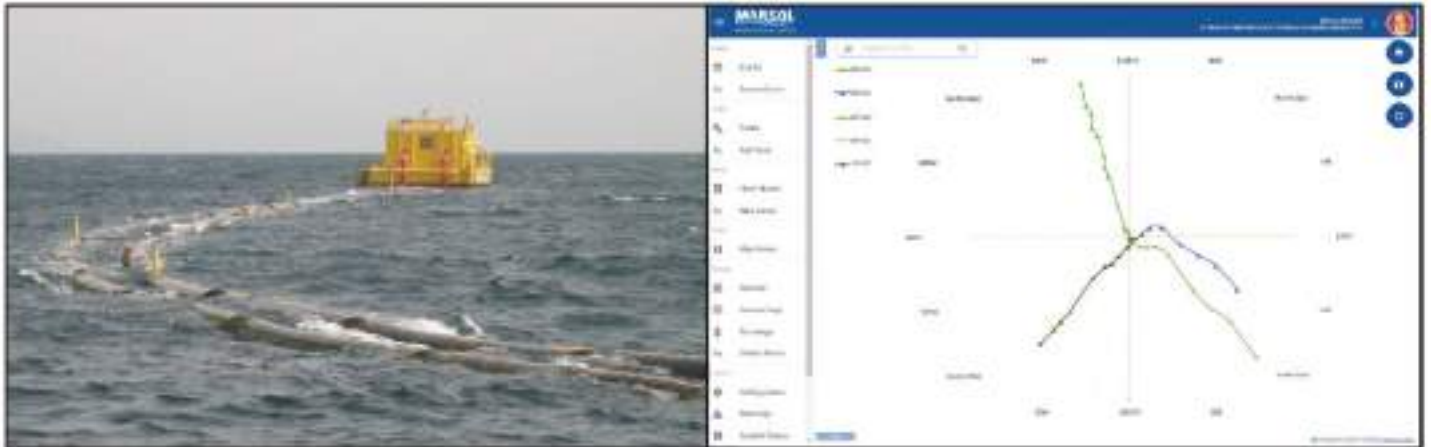
The company’s latest report ‘Q3 2019 Global Oil and Gas Discoveries Review – South America and Europe Dominate with Highest Number of Discoveries in Quarter’ notes that 21 of the discoveries made in the quarter were conventional oil discoveries, while 15 were gas. The two remaining discoveries were heavy oil and Coalbed Methane (CBM), respectively.

By region, South America and Europe led Q3 with eight discoveries each, followed by Asia and Africa with five each. The Caribbean had four discoveries, while the Middle East and the Former Soviet Union (FSU) had three each.

Among operators globally, Egyptian General Petroleum Corporation led with four discoveries in Q3 2019. Aker BP, Abu Dhabi National Oil Company, and BHP followed with three discoveries each in Q3 2019. Oil and gas development company Equinor and Tullow Oil had two discoveries each, while the rest of the operators had one each during the period.



South America and Europe dominate with the highest number of discoveries in Q3 2019.



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Presenting the latest best practices and innovations

The highly acclaimed Dubai Health, Safety & Environment Forum returns to Dubai from 24-25 November 2019, with a stellar line-up of speakers from the Ministry of Health & Prevention, UAE, Dubai Municipality, ADNOC, DEWA and Emirates Global Aluminium, as well as senior executives from leading international and regional companies.

THE UAE'S HEALTH and safety market is experiencing strong growth. The fire and rescue sector is expected to reach US\$699mn by 2021. This is due to improvements in the enforcement of fire codes in the construction sector and constant need for fire protection and life safety. There is an increased investment in more health and safety products such as jackets, shoes, helmets, and services to help ensure safety at work. Increasingly, technologies such as wearable sensors, protective exoskeleton suits and robots are finding favour in the construction industry.

Economic growth has driven the need for a robust labour force. Protecting the health and safety of this workforce is a priority for all. Despite increasingly stringent health and safety regulations and the push for better safety measures at work with the support of all stakeholders, workplace accidents do occur.

In this context, the Dubai Health, Safety & Environment Forum 2019 will present the latest innovations and best practices to help businesses deal with challenges related to occupational health and safety.

On the agenda for this year's forum are topical issues across the spectrum of health, safety and environment. With a raft of infrastructure and construction developments underway in the UAE in the run up to Expo 2020, safety and sustainability issues will be highlighted by speakers and delegates.

Taking place from 24-25 November 2019 at Habtoor Grand Resort, Autograph Collection Dubai, the Dubai Health, Safety & Environment Forum, now in its fifth year, brings together industry experts from across the region, including health and safety professionals, government regulators, policy makers and solution vendors. The Forum presents an opportunity for attendees to gain deep insights on policy, strategies and technical expertise.

Confirmed speakers include Dr. Maisoon Ali Alshaali, head of Environmental Section, Ministry of Health; Salman Dawood Abdulla executive vice president – HSSEQ, Emirates



Image Credit : Alain Charles Publishing

The Forum will provide a platform to showcase the latest technologies for health and safety.

Global Aluminium; Faeza Al Katheeri, geoscience manager, ADNOC - Al Dhafra Petroleum; Dr. Mohammed Aref, QHSE expert, Ministry of Human Resources & Emiratisation; Dr. Taufiq Omeish, senior manager HSE, Dubai Electricity & Water Authority; and Joyveer Dutt, regional manager QHSE, Al Futtaim Engineering.

construction industry safety mindset in the Industry 4.0 era; human factors vs process safety; the impact of digital transformation on workplace health and safety; mitigating work-related risks using artificial intelligence (AI); and monitoring hazardous environments with IoT (Internet of Things).

Soumen Chakraborty, event producer, Dubai HSE Forum 2019, commented, "While the UAE's vision and ambition is showcased in world-class events such as Expo 2020, there is a need to significantly strengthen the workforce by providing appropriate training in issues related to occupational health, safety and environment. The Dubai Health, Safety and Environment Forum is the perfect platform for safety professionals to explore how new technology such as AI and IoT is transforming their profession. We look forward to delivering an informative, enriching and vibrant fifth edition of the Dubai HSE Forum." ■

“The Forum is the perfect platform for safety professionals to explore how new technology is transforming their profession.”

Topics to be discussed include wellness and prevention management; challenges to occupational health and safety; changing the

For further information, see the website at www.hse-forum.com.

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WE KNOW WHAT'S AT STAKE.

NPCC signed agreements to collaborate with two Chinese energy companies

THE NATIONAL PETROLEUM Construction Company (NPCC), part of the UAE's Senaat, has signed agreements with China Petroleum Engineering & Construction Corporation (CPECC), affiliated to China National Petroleum Corporation (CNPC), and with the China National Chemical Engineering Corporation (CNCEC), to explore joint collaborative opportunities in both onshore and offshore oil and gas sectors, as well as other strategic areas of interest.

With CPECC, NPCC will explore potential opportunities to cooperate on projects that will create value for both companies, and exchange information, data and insights, where relevant, for possible cooperation on future projects in the energy sector. The agreement will enable both entities to facilitate discussions for cooperating on future projects by leveraging the strengths of the entities in building the energy ecosystem and infrastructure.

Through the MoU with CNCEC, the two parties will conduct all-round cooperation in respect of potential projects for the Abu Dhabi National Oil Company (ADNOC) and will explore opportunities for financing services on ADNOC projects in the MENA region. They will also evaluate opportunities on existing ADNOC projects in addition to leveraging mutual strengths in financial and industrial capital, technological advances, management strengths and the integration of resources to strengthen cooperation in the MENA region.

H.E. Dr. Mohamed Rashed Al Hameli, chairman of NPCC, said, "The two agreements will further drive the global ambition of NPCC to become one of the largest providers of EPC solutions for the energy sector. We have proven competencies in undertaking complex fabrication and manufacturing for onshore and offshore projects, which will add value to any potential partnership with CPECC and CNCEC. It will also enable us to expand our footprint in China, one of the largest growth markets for the energy sector."



The signing of the agreement with CNCEC.

Liu Haijun, chairman and president of CPECC said, "Our alliance will facilitate the development of businesses vertically and geographically for international business growth, as well as to provide better and comprehensive services for ADNOC. The UAE is one of the fundamental countries to the 'Belt and Road' initiatives. Under the stream of deepening the bilateral economic development between UAE and China, ADNOC and CNPC have been working together in business expansions. Our alliance underpins win-win outcomes, which support the direction of the Sino-UAE partnership."

NPCC operates in the Gulf, South Asia and South East Asia, and has plans to expand its operations to Africa and the Caspian region. It has a team of more than 1,200 engineers, based in four engineering centres in Abu Dhabi, Mumbai, Hyderabad, and La Ciotat, France.

The company provides engineering, procurement, project management, fabrication, installation and commissioning to project owners and operators. Most recently, NPCC set a new milestone with the completion of one of the world's largest oil-shore platforms, fully manufactured in its premises, for ADNOC.

Image Credit : NPCC





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11 – 14 November 2019, Abu Dhabi
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Mega Jack 300 completes 100th heavylifting jack-up

ALE'S MEGA JACK 300 has performed its 100th jack-up on the Al-Zour oil refinery project in Kuwait.

The innovative jacking system is currently working on the oil and gas complex, which is expected to become one of the largest refineries in the world. ALE is providing the full onshore heavy lifting solution for the Fluor Daewoo and Hyundai JV's module strategy, performing the jack-up, transportation and installation of 188 modules.

Named for its 300t capacity per tower, the Mega Jack 300 was launched last year and is the latest edition to ALE's Mega Jack fleet. It is a cost-effective jacking solution for any type of site condition. Its components are easy to handle, being considerably more compact and lightweight than previous models, so reconfigurations can be made quickly on site.

The Al-Zour Oil Refinery is the Mega Jack 300's debut operation. It commenced work on the project in 2018 and previous lifts have included the longest and highest module ever jacked-up and installed in Kuwait. As the modules all vary in weight and dimensions, the system's flexibility has been vital for the project. Its unique balance and low starting height have enabled it to pick up loads directly from SPMTs for this project, while the accuracy of the control systems has ensured modules can be manoeuvred safely.

Sarkis Juvelekian, project site manager, explained, "The Mega Jack 300 is an ideal lifting solution for projects like this that need flexibility and speed from onsite equipment. The system is performing well, even in conditions with high utilisation in environments as harsh as Kuwait's extreme heat and dust."

There are now more than 20 Mega Jack 300 towers in ALE's global fleet. A system of four towers is currently working at a shipyard in the UK and they will be used on bridge installation projects later this year.

The Al-Zour complex is divided into three projects and includes a refinery, liquefied natural gas (LNG) processing facilities and a petrochemicals complex. The Al-Zour Oil Refinery's completion is planned for 2020 and it is expected to deliver 615,000 barrels per day.



The Mega Jack 300

Image credit: ALE heavylift

Dragon Oil acquires BP's stake in the Gulf of Suez

AS PART OF its ongoing drive to be among regionally and globally ranked oil and gas companies, Dragon Oil Ltd – the fully owned exploration and production platform of Emirates National Oil Company (ENOC) – has acquired BP's stake in the Gulf of Suez Oil Company (GUPCO Egypt), after obtaining approval from the Egyptian ministry of Petroleum and Mineral Resources.



CEO of Dragon Oil, Ali Rashed Al Jarwan

Image credit: Dragon Oil

Under the terms and conditions of the acquisition, Dragon Oil has become the contractor with Egyptian General Petroleum Corporation (EGPC), instead of BP, in all oil production and discovery concessions in the Gulf of Suez area.

The completion of the acquisition will enhance the company's strategic production and investments in a number of regions in the world, including Turkmenistan, Iraq and Afghanistan.

This will bring the company's daily production to an estimated 150,000 barrels per day, which is considered as part of Dragon Oil's strategy to reach production of 300,000 barrels of oil per day by 2026.

GUPCO Egypt currently produces 60,000 barrels per day from 11 concessions, with a sustainable production target of 75,000 barrels by 2021.

Dragon Oil plans to boost production levels to above 75,000 barrels per day by increasing drilling and investment activities in a technical way, maintaining this level of production over the next 10 years with the utilisation of the best methods and technological practices.

The management of the development of these offshore fields will have a positive impact on the company's future productivity through an injection investment of US\$ one billion during the next five years.

Petrofac secures three engineering contracts in MENA

PETROFAC WILL PROVIDE FEED and conceptualisation studies to clients in Oman and Libya, following the award of a clutch of new contracts.

In Oman, Petrofac will support Flare to Value LLC (F2V) by producing a basic engineering package to recover gas that is currently flared at three onshore locations. Petrofac's focus will be on the fast track execution of constructible, operable and standardised solutions that maximise modularisation and minimise interruptions to ongoing operations.

In another deal, Petrofac has been awarded a contract by Waha Oil Company (WOC) to produce a Front-End Engineering Design (FEED) for its Gialo III field, onshore Libya. The work will be executed over a schedule of 41 months and will support WOC's planned programme of development over the coming years.

Petrofac has also been awarded a four-month conceptual and pre-FEED study for the rehabilitation of the Dabra Oil Field in Concession 32, onshore Libya. The scope covers upstream facilities including well sites, flowlines, process plant and export pipelines.

All three contracts will be executed by Petrofac's Engineering & Consultancy Service business in Woking, UK.



Petrofac has acquired new contracts in Oman and Libya.

Image credit: Petrofac

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Saudi Aramco signs nine MOUs with Russian companies

SAUDI ARAMCO PRESIDENT and CEO Amin H Nasser attended the Saudi-Russian CEO Forum hosted in Riyadh as part of the state visit of the Russian President Vladimir Putin. At the forum, Nasser noted the growing importance of Saudi Aramco's evolving strategic relationship with Russian companies.

After the CEO Forum, Saudi Arabia's King Salman Bin Abdulaziz Al Saud and President Putin alongside HRH the Crown Prince Mohammed bin Salman bin Abdulaziz, oversaw the signing of a confirmation agreement between Saudi Aramco, the Public Investment Fund of Saudi Arabia (PIF), the Russian Direct Investment Fund (RDIF) and Rusnano to enter into a Share Purchase Agreement (SPA) to acquire Rusnano's 30.7 per cent share in Novomet, a leading Russian service provider and manufacturer of high-tech electrical submersible pumps. The deal is expected to close early next year, subject to regulatory approvals and closing conditions.

Saudi Aramco also entered into nine additional Memorandum of Understanding (MOUs) with major Russian companies as part of Saudi Aramco's upstream strategy, which were signed with the following Russian companies: Gazprom Neft, Angara Service, Chelpipe, Galen, Integra, NKT, Technovek, PAO "TMK" and Intratool.



Saudi Aramco President & CEO Amin H. Nasser (right) noted the importance of the company's relationship with Russian businesses.

Image credit: Saudi Aramco

Oil industry can save US\$100bn on digitalisation

IN A NEW in-depth study, Rystad Energy estimates that as much as US\$100 billion can be eliminated from E&P upstream budgets through automation and digitalisation initiatives in the 2020s. Service companies are reinventing themselves to help operators unlock these savings.

In 2018, US\$1 trillion was spent on operational expenditures, wells, facilities and subsea capital expenditures across more than 3,000 companies in the upstream space. There are varying degrees of potential savings within offshore, shale and conventional onshore activity budgets, but in total, around 10 per cent of this spend can be erased through more efficient and productive operations thanks to automation and digitalisation.

"Many key industry players are setting optimistic goals, but the realisation of these initiatives largely depends on how freely data is shared among companies and how commercial strategies are deployed to drive this development. Because of this, it could be years before we see full adoption. However, based on our analysis of 2018 capital spend and operational budgets, we believe savings could easily reach US\$100 billion," says Audun Martinsen, head of oilfield services research.

Intertek expands Sharjah corrosion facility to deliver enhanced services for 'sour' corrosion testing

INTERTEK HAS ANNOUNCED the expansion of its corrosion testing at its Sharjah Laboratory Complex, which assists clients in the UAE, Saudi Arabia, Kuwait, Oman, Bahrain and Egypt. The upgrade and expansion of the Sharjah facility allows Intertek to offer enhanced local services in a laboratory devoted to the testing of corrosion inhibitors under highly 'sour' conditions; for example, fluids containing high levels of corrosive hydrogen sulphide (H₂S).

The presence of corrosive fluids can shorten the working life of pipelines and flowlines in the harsh conditions often found in upstream oil and gas production systems. To minimise the threat that corrosion poses to production assets, corrosion inhibitor chemicals are commonly used to reduce corrosion rates. Intertek's Production Integrity and Assurance (P&IA) team undertakes independent, expert assessments of these chemicals to determine their efficacy for upstream operators.

Vijitha Perera, laboratory manager at Intertek Production and Integrity Assurance, said, "Growing our service offerings comes in direct response to the needs of our regional clients who wish to maximise the lifespan of their assets and safeguard their oil and gas infrastructure."



The Sharjah facility will enhance local services in a laboratory dedicated to testing corrosion inhibitors.

Image credit: Intertek

Shell Egypt to market assets

SHELL EGYPT IS to market its current onshore upstream assets in the Western Desert in order to fully concentrate on growing its Egyptian offshore exploration and integrated gas business.

Wael Sawan, Shell upstream director, said, "Shell is proud to have worked in Egypt for more than 100 years. We remain committed to Egypt and see our future in supporting the government's energy hub vision by growing Shell positions across the offshore and LNG value chain. This is where we can best leverage our expertise, deliver the strongest added value to Egypt, and optimise our portfolio to ensure the company delivers a world class investment case."

Khaled Kacem, Shell Egypt Country chair, said, "Shell companies are progressing with new offshore activities, including our West Delta Deep Marine (WDDM) Phase 9B project, which involves



Image credit: Adobe Stock

Shell is looking for a buyer to take over its onshore assets to bring new investment into the Western Desert.

eight new development wells, and exploration in the WDDM, for which a second offshore rig has been recently mobilised, that will be followed up with exploration in Rosetta as well as the recently awarded Blocks 4 and 6."

"We are looking for a capable buyer that will bring new investment and growth into the Western Desert and build on our successful partnership with the Egyptian General Petroleum Corporation. Any sale is contingent on finding an appropriate buyer, commercial negotiations and required approvals. We anticipate the start of active engagement with potential buyers in the last quarter of 2019. During the divestment process, we remain committed to ensure continued safe and reliable operations, and will keep our stakeholders regularly informed."

Uganda offers investment opportunities for five oil blocks

UGANDA IS CONDUCTING the second licensing round for petroleum exploration, covering five prolific oil blocks in the Albertine Graben, the country's most prospective sedimentary basin.

Speaking at a roadshow in connection with the licensing in Dubai on 22 October, Hon. Eng. Irene Muloni, Minister for Energy and Mineral Development, said that Uganda hopes to embark on oil production by 2023, foreseeing the process of getting investors concluding in 2020 and making necessary arrangements needed for exploration.

"We welcome you to a long-term partnership with Uganda, providing the promise of a stable and predictable investment climate over the entire project life, clear regulatory environment and competitive returns," she added.

On the status of licensing so far, the minister explained, "We have issued nine production licenses – five operated by Tullow Oil, three by Total E&P Uganda B V and one by CNOOC Uganda. These companies have now begun field development as a precursor for commercial production. We have Armour Energy and Oranto Petroleum doing new exploration work."

Uganda issued investment licenses in an earlier licensing round that concluded in 2017 as well as in separate agreements with companies.

Eng. Muloni remarked that the environment is now good for the second round of licensing, due to high oil prices, further adding that the government of Uganda has reviewed the needs of investors to make the projects more attractive.

The minister pointed towards the peace and stability enjoyed by the country as well as its young and educated population, while highlighting the conducive environment that it offers for investment in the oil and gas sector, which supports an attractive return on investment and achievement of sustainable development of the country's resources.

She emphasised that investors will be able to look forward to the support

Hon. Eng. Irene Muloni, Uganda's Minister of Energy and Mineral Development, addressing the roadshow.



Image Credit : Uganda Ministry of Energy and Mineral Development

of the government of Uganda in providing a sound investment destination, with new laws in place for more transparency and accountability.

Uganda is now an established petroleum province with an estimated in-place volume of petroleum resources of six billion barrels of oil, equivalent to 1.4bn bbl recoverable and more than 500bn cubic feet of gas.

The opportunities provided by the country's oil and gas sector also include geoscientific surveys and studies for exploration, drilling and related services, investments in emerging infrastructure, such as the refinery project, pipelines and storage facilities as well as joint ventures and farm-in arrangements with companies holding licenses. The country has earlier held investor roadshows in Houston as well as in London.

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Middle East offshore CAPEX on the up

THE MIDDLE EAST has registered its highest level of offshore CAPEX commitments (and share of global CAPEX) in a decade so far in 2019, according to analysis from Clarksons Research, with several high value projects reaching FID.

Counting the CAPEX

The Middle East is a significant yet mature area of offshore oil production, accounting for some 28 per cent of global offshore supply from a range of fields, some of which have been producing since as early as the 1950s. A smaller part of the global offshore investment story historically, the region has become a major focus of offshore project CAPEX commitments in 2019 to date as a number of large projects have reached FID in a still challenging global offshore market.

US\$23bn worth of projects have been sanctioned in the Middle East so far this year, equivalent to 33 per cent of global CAPEX, compared to the region's two per cent share in 2014. Unlike some offshore regions, where the development of new fields is more common, most major projects receiving FID in the Middle East in recent years have concerned the expansion or rejuvenation of older fields. For example, the highest value offshore project approved so far in 2019, the US\$12bn Marjan Crude GOSP-4 Programme off Saudi Arabia, will involve the installation of some 30 platforms on a field which started up in 1973.

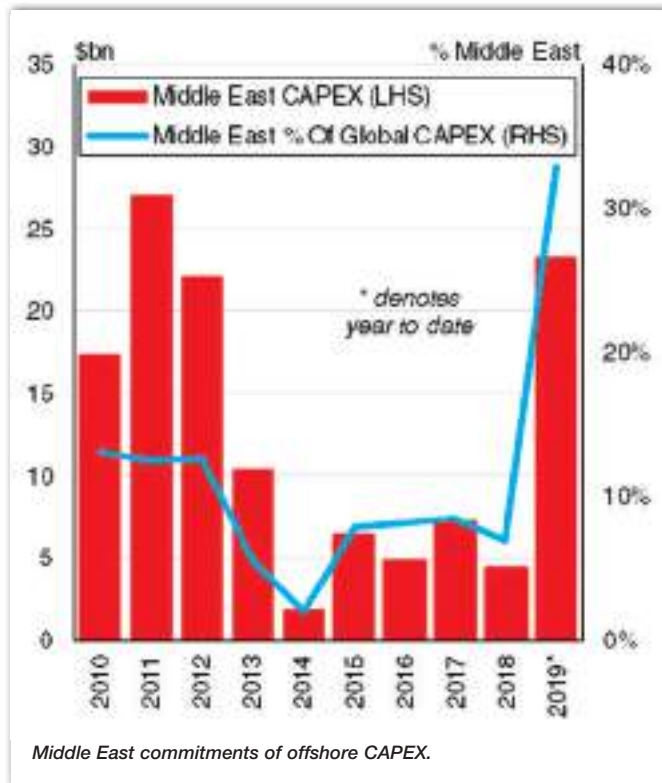
Drilling rig trends

Rising activity levels in the Middle East have contributed to an increase in the number of active jack-up rigs in the region, which stood at 122 at start October 2019, compared to 107 at start 2017 (floaters are rarely required due to the region's shallow waters). Saudi Aramco, for instance, has increased its number of units on contract by 26 per cent since start 2017 to 53 at start October. Most rigs in the area primarily drill infill or injection wells to maintain production levels, although some projects, such as the North Field expansion, do require development wells.

Rate assessments for high spec jack-ups in the region have responded to this increased activity, standing at US\$65-100,000/day at end September 2019, up 65 per cent since October 2018, albeit from a low base. The future of regional rig supply has begun to take shape, with ARO Drilling (a Valaris-Saudi Aramco JV) reportedly planning to order 20 jack-ups at a new Saudi yard (itself a JV between Saudi Aramco, HHI, Lamprell and Bahri), while numerous Chinese newbuilds are transiting into the area.

OSV activity

The OSV sector in the Middle East (427 AHTSs, 159 PSVs deployed at October 2019) has also strengthened slightly on the back of higher



regional activity levels. Total utilisation of AHTSs >4,000 BHP in the wider Middle East/ISC area, for instance, stood at 70 per cent at start October 2019, compared to 61 per cent in October 2017. Term rate assessments have also begun to respond to slightly more stable market conditions, with the benchmark for a 5,000 BHP AHTS in the Middle East standing at US\$5,750/day at end September 2019, up 51 per cent on end January 2019.

Most projects in the Middle East focus on mature fields, but local offshore players do currently seem to be benefitting from greater regional activity levels. Driven by redevelopment projects, the Middle East has been experiencing a period of significant investment in 2019.

Clarksons Research provides data and intelligence for global shipping. See the website at www.crsi.com.

McDermott awarded contract for Amiral Complex

MCDERMOTT INTERNATIONAL has been awarded a multimillion dollar contract by Saudi Aramco and Total Raffinage Chimie (Total) to provide licenses, basic engineering package, extended basic engineering, training, technical services and supply of proprietary equipment for what will be one of the world's largest mixed feed crackers.

As part of the contract, McDermott's Lummus Technology will provide licensing and engineering services for its olefins technology, low pressure recovery (refinery off-gas recovery and treating), pygas hydrotreating, CDMtbe Methyl Tertiary Butyl Ether (MTBE) (production technology using catalytic distillation), CDIB (back cracking of MTBE to produce high purity isobutylene and methanol) and the BASF NMP (N-methylpyrrolidone-based butadiene extraction process). In addition, Lummus will provide its proprietary Short Residence Time (SRT) heaters.



Saudi cracker contract goes to McDermott

Image Credit: Adobe Stock

Total to open a Digital Factory in Paris

THE DIGITAL FACTORY will be tasked with developing the digital solutions Total needs to improve its operations, in terms of both availability and cost; offer new services to customers, notably in the area of managing and controlling energy consumption; extend its reach to new distributed energies; and reduce its environmental impact.

Total's wants to generate as much as US\$1.5bn in value per year for the company by 2025 through additional revenue and reductions in operating or investment expenses.

Under the direction of Frédéric Gimenez, chief digital officer of Total and Digital Factory project manager, teams comprising developers, data scientists, architects and specialists in agile methodologies will work with operating personnel from Total's different businesses.

"I am convinced that digital technology is a critical driver for achieving our excellence objectives across all of Total's business segments. Total's Digital Factory will serve as an accelerator, allowing the group to deploy customised digital solutions. Artificial intelligence (AI), the Internet of Things (IoT) and 5G are revolutionising our industrial practices, and we will have the know-how in Paris to integrate them in our businesses as early as possible. The Digital Factory will also attract the new talent essential to our company's future," said Patrick Pouyanné, chairman and CEO of Total, during France's Best Developer contest.

The Digital Factory follows major partnership agreements with Google on artificial intelligence and geosciences with Tata Consultancy Services on Refinery 4.0.



Total is a major energy player that produces and markets fuels, natural gas and low-carbon electricity.

Image Credit: Adobe Stock

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Leading the way in the compressor business

Colin Fountain, managing director of Bauer Kompressoren GCC FZE, speaks to *Oil Review Middle East* about compressor trends and the company's Middle East offering.

Can you tell us a bit about Bauer Kompressoren?

BAUER is a German family-owned company having 22 subsidiaries and 15 branch offices worldwide. The company's focus is the manufacturing of high pressure reciprocating compressors and nitrogen generators.

I am managing director of Bauer Kompressoren GCC FZE, which is based in Jebel Ali. From this strategic location, we provide support to our 32 channel partners in the GCC region. We are the market leaders for the Breathing Air compressor business in the region, but also very focused on other industrial air and gas applications.

What benefits are your compressors designed to bring to the oil and gas industry?

Bauer compressors are designed to operate in harsh conditions with high ambient temperatures and high humidity. Space is an important concern on the platforms. Thanks are due to our engineering team for developing compact nitrogen generators and offshore breathing air compressor units. We are able to provide ABS/DNV certification for nitrogen generators. Catering to the latest requirements, we have developed ATEX units for hazardous area classification.

What are the latest technology trends and developments around compressors and compressor equipment?

Our Instrument Air system is all set to deliver low pressure air without the use of desiccant dryer. This is the future for low pressure oil free air requirements, especially for remote locations where maintenance of desiccant dryers is difficult. We use the seven stage mechanical moisture removal method to avoid the use of desiccant dryer.

What role does technology and innovation play in the development of your products and how do you ensure you keep up with the latest trends?

Everyone talks about automation today, and



Image Credit : Bauer Kompressoren GCC FZE

Colin Fountain, managing director of Bauer Kompressoren GCC FZE.

Bauer is absolutely on top of it with the latest PLC control panels used in our compressors.

Our control systems allow you to get information through message and through Ethernet using our proprietary app 'Bauer Connect'.

In addition, an IoT (Internet Of Things) option is now available on Bauer Products. With IoT, you can remotely access your compressor and check the operating parameters and performance characteristics.

What are some of the gaps that need addressing in terms of product development in the Middle East market?

Our experience in the market has taught us

that even the water-cooled units are not sufficient to work efficiently in the high temperature conditions in some cases. Our air conditioned units are helping to overcome this problem. Containerised units not only prevent overheating but prevent the entry of dust and allow easy maintenance. References are available in Abu Dhabi.

Has the oil price slump affected you and the market as a whole, and if so in what way?

Absolutely! We have seen a slowdown in terms of the number of new enquiries' and also conversion rates. Many of the big projects are on hold, which is delaying the decision-making process. The positive side to it is that companies are buying more spare parts/services to maintain existing units instead of replacing them.

You also said you are looking to focus on mid-stream oil and gas applications. Could you tell us a little bit more about that?

When we talk about midstream, we try to cover pipeline services and LNG transportation. Pipeline services require nitrogen for pigging, inerting, dewatering and drying, and pressure testing. We have developed mobile nitrogen generators to support these services in remote locations.

For high flow high pressure requirements, we can supply trailer-mounted packages and for small duration requirements, we can offer small trolley-mounted nitrogen generators.

For LNG vessels, nitrogen is primarily used for blanketing, and we can offer skid-mounted membrane type nitrogen generators.

Is there anything else that you would like to add?

We are diversifying into other industries such as plastic injection moulding, ship building and gas bottling plants.

Finally, we will always be a reliable partner in oil and gas. "Quality is our DNA". ■

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Lasers to measure weld coatability

Aegion Coating Services has introduced new laser mapping technology to confirm joint weld quality and ultimately assist in delivering a high quality corrosion prevention solution.

AEGION COATING SERVICES has an almost 30-year history of providing field joint coating and other field services throughout the world. With more than 30 robotic patents related to internal pipeline weld coating in the USA and abroad, Aegion Coating Services has coated more than two million field joints worldwide.

In the Middle East, operators face unique risks and challenges, mainly due to corrosion and erosion. This can lead to pipeline failures and ultimate replacement, not to mention production deferment and downtime through failures and replacement time. Our robotic internal field joint coatings and pipeline external field joint technologies have been used to protect all types of pipelines, including natural gas, crude oil, potable water, sewer and salt water.

The field joint coating process involves either a spray-applied (liquid epoxy) coating or powder (FBE) coating where paint particles follow a straight line from the source to the substrate using a train of self-contained robots. These self-contained robots that travel inside the pipe, find the weld and then blast clean, vacuum and coat the area. Utilising various cameras, these field joint coating robots transmit a real-time 360° video feed-back to the operator which is used for quality control and inspection.

More recognition for internal coatings

According to Bryan Kirchmer, vice president and general manager of Aegion Coating Services, “While many pipeline owners still opt for chemical treatment or corrosion resistant alloys which can be more expensive than using internal coatings, internal coatings are receiving more recognition with pipeline owners due to the strategy’s success in proving a more effective and cost-efficient strategy compared to chemical treatment alone.”

In fact, owners who have championed internal coatings for their corrosion strategy have experienced reduced operational costs versus a chemical treatment strategy. The effectiveness of the internal coatings to prevent CO₂ corrosion, H₂S stress corrosion cracking (SCC) and microbiological-induced corrosion (MIC) is dependent on the coating material and the quality of the coating application throughout the pipeline. One of the most critical challenges associated with constructing an effectively internally coated pipeline is ensuring that the internal field joints are coated with the same quality assurance attention that is given when coating the mainline pipe from the pipe mill.

“Proper girth welding (free from anomalies) is key to good quality field joint coating, which reduces the risk of failures.”



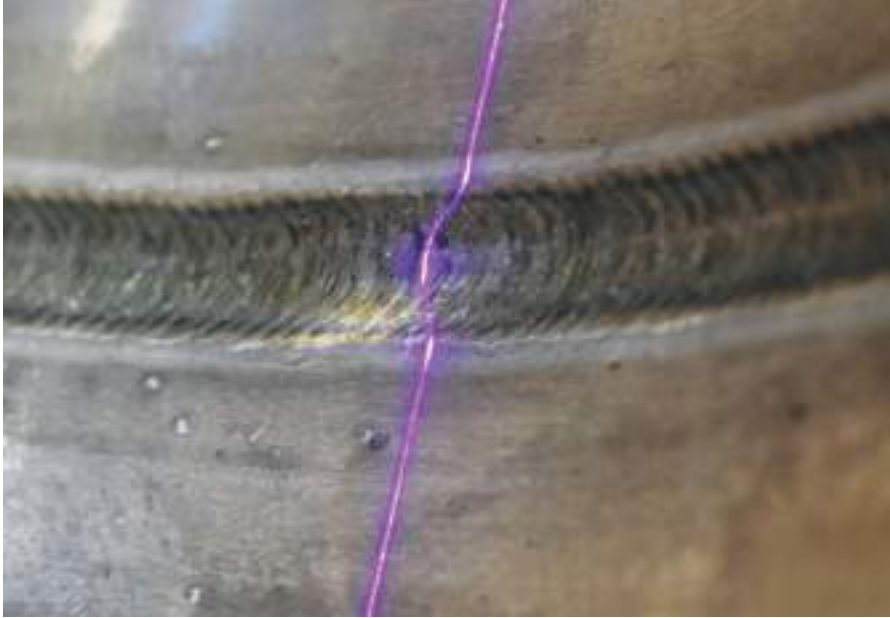
Aegion Coating Services working in the field.

Image Credit : Aegion Coating Services

Weld anomalies and other issues have the potential to cause incomplete coating coverage, which can lead to a potential corrosion site and pipeline failure. To mitigate this in the past, Aegion Coating Services has used remote cameras to visually confirm the condition of the internal field joint area prior to applying a coating. The camera image provides a two-dimensional top-down view of the area that enables the coating technician to identify anomalies and contaminants that require attention prior to coating. However, a camera does not provide information on the height or depth of anomalies, and the resulting image can only aid interpretation.

Innovative new technology

Aegion Coating Services is now offering a service to confirm the joint weld quality utilising innovative new laser scanning technology. Kirchmer added, “As part of Aegion’s commitment to delivering quality field joint coatings, our research & development team recognised the



The importance of good welding practices

Reliable field joints require good welding practices. When it comes to the construction of an internally coated pipeline, welding contractors must be aware of the need to produce joining welds that are not only structurally sound, but are coatable as well.

Poor welding procedures can result in damage to the parent pipe coating and a weld profile that is un-coatable. The welding operations vary depending on the pipeline construction contractor's preference, and results can vary widely. Whichever welding technique is used, the profile of the root pass should be free of spatter, IP/EP, contain no sharp edges, no high/low caused by pipe ovality and the penetration should not exceed 1.5mm. The entire field joint area must be free of rust or other potential defects/anomalies that prevent the internal field joint and cutback from being coated per the client specification (NACE visual standard RP0178). Any deviations from this requirement will not only lead to slower production, additional expense and unnecessary delays in the project completion, but will ultimately yield latent

problems that manifest in the form of pre-mature corrosion issues.

Aegion Coating Services with OMS is providing a laser scanning metrology service to pipeline construction contractors to analyse internal field joint areas for coatability.

need to quantify weld coatability and bring an automated inspection solution to welding and pipeline contractors. Together with Optical Metrology Services (OMS) technology, we're now able to offer this quality assurance service. This offering will ultimately assist in delivering a higher quality corrosion prevention solution to pipeline and asset owners."

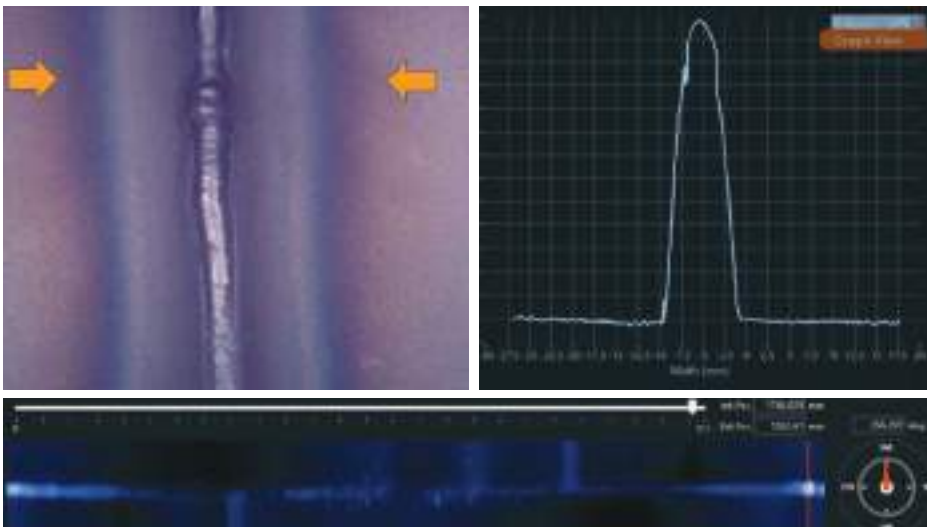
The laser scanning metrology equipment features a stripe laser to measure the height of any feature in the field joint area. This information, coordinated with an image, provides a way to automatically identify and quantify problems in the field joint area that could lead to coating holidays, a discontinuity in the surface that can serve as a conduit for corrosion. This new equipment performs a scan of the root pass shortly after it is completed and uses a fine laser beam in an optical triangulation system arrangement to acquire thousands of measurements per second, build up detailed weld geometry and generate an accurate 3-D map of the field joint area. The 3-D map of the field joint area is evaluated using an algorithm that highlights areas of concern with respect to anomalies or "coatability" of a girth weld area. This quantifiable process is automatic and eliminates possible risk due to the oversight of a coatings technician, thus removing ambiguity and the potential for missing weld anomalies and/or surface imperfections.

“ Laser scanning helps identify weld anomalies early in the construction process, thus saving costs and time.”

This service is offered at the welding front to provide a more efficient, quantifiable and repeatable coatability analysis of the field joint area prior to coating. Upon detecting uncoatable weld anomalies and/or surface imperfections, the contractor can repair the non-conforming features and make necessary adjustments to the welding process in real-time to avoid further costly disruptions to the production schedule. This service will greatly improve the quality of the coated field joints and ensure better corrosion protection during the life of the pipeline.

Kirchmer concluded that the new laser technology will help the industry to improve its practices. "We believe regarding internal field joint coating and challenges with coatable surfaces, the laser scan metrology service for the field joint area will raise the level of quality assurance and improve the quality of the internally coated field joints substantially versus current methods." ■

Figure 1 (left): The image on the left represents the two-dimensional image that is typically used to determine coatability. The image on the right is showing the dimensional data captured by the laser scan. The scan data shows that in the area highlighted by the arrows from the image on the left has more than 6mm of excessive penetration, well beyond a coatable limit.



Lining solutions for the Middle East

United Special Technical Services (USTS) is offering state-of-the-art rotational lining products in the Middle East as a result of a new partnership.

UNITED SPECIAL TECHNICAL SERVICES (USTS) is a global leader in providing high-performance polymer lining technology for the oil and gas, water, mining and industrial markets. The company's lining solutions help combat issues operators in the Middle East commonly encounter, such as corrosion. They are cost-effective for new construction, rehabilitation of pipelines and in-plant piping, providing a tight-fit solution. The system helps keep system maintenance to a minimum while also saving on operating costs in terms of chemical injection, regular inspections and possible downtime due to leaks. Additionally, with the ability to pull long sections of pipeline (generally up to 800m, with 2.4km as the longest pull to date), it can be installed in any terrain or condition.

USTS, with locations in Saudi Arabia, Kuwait and Oman, currently has projects through mid-2020 totalling more than 500km of lining of various diameter sizes in the Middle East.

According to Jonathan Hickey, general manager of USTS, "We are seeing an increase in the application of non-metallic solutions in the Middle East. And with heightened awareness of the benefits of using thermoplastic liners, more OPCOs are embracing liner technology for new and existing pipeline systems. Two types of corrosion cause the majority of problems in offshore or seawater applications – aqueous corrosion and microbiologically influenced corrosion (MIC), which stems from microorganisms in seawater that can cause corrosion and stress cracking."

USTS recently announced a technical partnership with RMB Products to offer its rotational lining (rotolining) services to help combat these types of corrosion in the Middle East. RMB has spent more than two years developing the new product to protect fluid delivery systems and fill a gap in the market for fittings such as elbows and tees. This newly inaugurated state-of-the-art plant in Saudi Arabia is the largest of



Image Credit: United Special Technical Services

its kind in the Middle East, strategically located to provide a quick turnaround even for urgent requirements.

What is rotolining?

Rotolining allows us to bond a uniform, seamless polymer layer to the interior of virtually any metallic structure, regardless of shape and complexity. In the process, granular resin is placed inside the structure to be lined. The structure is heated while simultaneously being rotated between two perpendicular axes. The resin melts and flows evenly over the entire inner surface of the structure, bonding to the metal substrate. Once cooled, the result is a monolithic corrosion and chemical resistant lining that fits with the company's Tite Liner® system.

The rotolining of fittings can be done using HDPE for standard operating temperatures and using ETFE for higher operating temperatures. ETFE rotolined fittings can also be used along the Tite Liner RT system – a raised temperature polyethylene material specifically designed for the severe conditions present in oil and gas and industrial environments. The system utilises a bimodal high-density polyethylene resin material that enhances its performance in high temperature service.

Highly engineered polymers are used in rotolining, and the selection of the polymer depends on the service conditions of the pipelines. HDPE Rotolined fittings can be used up to 82°C and ETFE up to 150°C. A combination of Tite Liner and rotolined fittings provides a complete polymer lined system. ■



Image Credit: United Special Technical Services

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United Special Technical Services (USTS) is a joint venture between United Pipeline Systems and Special Technical Services. USTS provides thermoplastic pipelining and rotational lining services with highly-engineered polymers, throughout the Middle East and Africa for pipeline protection and rehabilitation.

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Expanding capabilities in weld overlay cladding

STS Clad, a leading supplier of CRA clad products in the UAE and wider Gulf region, is strengthening its presence in Ras Al Khaimah in response to the growing demand for weld clad products and services.

“THE MIDDLE EAST oil and gas sector continues to see increasingly aggressive operating environments that place challenging demands on our clients on both process and performance, particularly in the area of corrosion resistance,” says Derek Shepherd, head of marketing and business development for STS Clad in Ras Al Khaimah. “Due to these changing demands in oil and gas exploration and transmission, it is anticipated that the need for weld clad products to combat both onshore and offshore corrosion problems will significantly increase in the coming years in the MENA region.”

STS Clad manufacturing capabilities bring together fully integrated, cost-effective solutions in CRA weld overlay clad products. Its weld overlay cladding facilities are equipped with highly innovative advanced welding automation technology, and through committed technological advancement together with continuous training, STS Clad ensures attention to the region’s environment and maintains its position as a leading supplier of CRA clad products in the UAE and wider region.

STS Clad offers all types of corrosion-resistant piping systems and oil-tool applications that meet all ASME and API 5LD standards and customer-specified project requirements. Products and services include the manufacture of clad line pipes by weld overlay starting from 6” to 50” in DRL - 12 metre lengths; clad fittings and flanges from 2” and above; ASME Code clad nozzles from 2” and above; clad spools; clad valve components up to 15,000 Psi; clad oilfield equipment; and cladding of pressure vessel shells and dished heads.

Constant innovation has been and always will be the key to the company’s success, maintains Mr Shepherd, adding, “Our customers know us not just as a reliable supplier of CRA products, but as a long-term partner with expertise in developing weld overlay technology solutions.”



Image Credit : STS Clad LLC

The STS Clad workshop in Ras Al Khaimah.

The company has through market research identified various large EPC projects in the region as having a requirement for weld clad products and services, such as the UAE’s major offshore developments.

New facility

In response to these demands, STS Clad has developed a new state-of-the-art CRA weld overlay cladding facility at Al Ghail industrial area in Ras Al Khaimah, UAE, with the main objective of supporting its key clients in the MENA region and its global expansion, as part of its long-term sales development strategy.

“There have been very limited options for EPC companies and end users with quality cladding suppliers in the region,” comments Mr Shepherd. “These will be our key focus. This investment in RAK will further support our client needs locally over the coming years, and, importantly, reduce the logistical challenges of manufacturing and importing from external sources.”

The STS Clad facility has a land area of 80,000sq/m, where 24,000sq/m will be dedicated to manufacture for specific cladding, machining and fabrication operations.

“The site development will be a phased build, with the main objective to develop the facility into the cladding supplier of choice in the UAE region for our customer base.”

He adds that with the company’s future growth and development plans it will also give a significant boost to the local RAK economy in the UAE, creating around 100 jobs by the end of 2019 and increasing to around 200 by the end of 2020. ■

“The investment in RAK will further support our client needs locally over the coming years.”

CRA ENGINEERING SOLUTIONS FOR YOUR PIPING APPLICATIONS



STS Clad LLC manufacturing capabilities bring together fully integrated, cost effective engineering solutions in CRA weld overlay clad products, and has been developed into a brand new 80,000sq/m facility in Ras Al Khaimah UAE.

STS Clad provides high-quality weld overlay clad products and corrosion system solutions that meets all ASME and API 5LD standards and customer specified projects requirements.

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- NDE / Inspection
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- Clad and Machined Oil Tool Equipment
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STORM-WORK – the new generation work basket

Reflex Marine, a global leader in offshore access, has introduced the next generation of work basket aimed at dramatically improving safety performance in this area across the lifting industry.

REFLEX MARINE HAS been at the forefront of development in marine transfer for the past two decades, providing safe methods of crane-based personnel movement, managing risks and improving safety standards in the global offshore industry.

Helping offshore workers to return home safely from their place of work is at the core of its mission. The company is best known for the FROG transfer carrier – now an industry benchmark, and Reflex Marine has a proven track record globally, 10 years without a single lost-time incident.

“Work basket design has not kept pace with industry changes and rising safety expectations.”

Reflex Marine has applied its 25 years' experience into a familiar but uncharted direction, the work basket. The latest innovation is STORM-WORK. Launched in 2019, STORM-WORK is a ground-breaking



A training session on the STORM-WORK work basket.

Image Credit : Reflex Marine

step in safety, through addressing design shortcomings in traditional work baskets. It is designed for the protection of personnel in challenging environments.

Background

Traditional work baskets are used throughout many industries, both on and offshore. Their uses vary from structural maintenance and construction/dismantling to inspection and repairs.

Work basket design has not kept pace with

industry changes and rising safety expectations.

In its efforts to redress this, Reflex Marine has been analysing and reviewing incident data on work baskets over the past 30 years.

From this, Reflex Marine has collated common causes that have led to injury or fatalities as a direct result of work basket design, pre-use checks or operational guidance. This, compiled with feedback from the industry, led the company to identify key design flaws with traditional work baskets.

Incident data

As there is not one global body that records specific incident data, Reflex Marine has compiled research from those published incidents involving work baskets from public records issued globally. Analysis of the data set produced identifies there are common themes leading to injury or fatalities such as:

- **Immersion** – When working near to shore or offshore, crane failure, wire rope failure or crane operator error can lead to an immersion event placing the occupants at a high risk of drowning.
- **Crushing and trapping injuries** – The immediacy of the work basket to the structure when working on the side of an installation generates a risk of crushing or trapping of body parts.
- **Snagging** – Tension (or slack) induced in



A dry run of the use of the STORM-WORK work basket.

Image Credit : Reflex Marine

the lifting system as a result of the basket 'catching' inadvertently during movement, can cause crushing and damage to the basket or installation, potentially dislodging the occupants.

- **Lateral impacts** – High-velocity lateral impacts can occur during lifting operations, resulting in damage to the structure or basket, and again potentially dislodging the occupants.

Safety by design

Protection from these identified risks was the continued driver during the design process of STORM-WORK.

- **Immersion** - In the event of immersion, the STORM-WORK will self-right and float at an elevation that easily keeps the occupant's airways free and thus creates a safe space for personnel to await rescue.
- **Crushing and trapping injuries** - The offset space between the buoyancy panels and the personnel creates a "safe working zone" – this creates a space to mitigate



Image Credit : Reflex Marine

The basket roof provides overhead protection.

the possibility of crushing or trapping injuries. The basket roof provides the overhead protection incorporated to protect against the likelihood of being struck by a falling object and has been



Image Credit : Reflex Marine

A dry run of the use of the STORM-WORK work basket.

designed to allow good vision throughout the lifting process.

- **Snagging** - The outer buoyancy panels – which are contoured top and bottom, stepped side panels, folded top edges and protected shackle and lifting points minimise anti-snagging risks. The lifting configuration has four anchor points, stabilising the carrier and reducing the risk of tipping.
- **Lateral impacts** - STORM-WORK's floatation panels also double as impact protection. These robust but flexible modular units are designed to absorb impact to protect the structure or asset being worked as well as the basket and its occupants. The panels are tested to absorb impacts with a fully loaded basket at up to 2m/s.

The integrity of each component of the equipment in a man basket is of course vital to personnel safety. The design of STORM-WORK maintains the concept of easy to access and visible critical components, that was developed through the FROG series of personnel carriers. This allows for ease of inspection and maintenance combined with the weld-free structure for all the components in the critical path.

“STORM-WORK has been developed with personnel safety upper-most.”

Testing and verification

STORM-WORK has been developed with personnel safety upper-most. Reflex Marine has focused on delivering a highly engineered product to ensure the highest standards of worker safety during work-basket operations. A further benefit is the build quality – all carriers are designed to last for many years of usage with all parts easily replaceable.

Additionally, the STORM-WORK basket has undergone a rigorous testing and verification programme in accordance with the legislation, standards & codes under NORSOK, NL, EU Machinery 2006/42/EC, API RP 2D, UK LOLER), and is a certified basket compliant to EN1450S2-1.

A process of operator engagement was employed during the development of STORM-WORK, with Reflex Marine working closely with industry partner Seaway 7 to gain current operational insights into the practical issues highlighted by the crews working with their own crane baskets.

Anti-snagging, crane speeds, lateral impact and the impact on the human body were among the criteria assessed. Immersion testing was carried out to ensure the carrier would float and self-right in all load conditions.

Reflex Marine utilises methodologies similar to those used to evaluate the safety performance of motor vehicles in assessing the risk of injury. The rigorous testing and verification programme confirmed that the objectives had been met.

The combination of all these design considerations has been applied throughout the development process to create the safest work basket available to date, together with a design that generates operator engagement with the device through the cost-effective inspection and maintenance procedures. ■



The STORM-WORK work basket.

Image Credit : Reflex Marine

Expanding into the Middle East

Nordic PPE company Ejendals is bringing its offering to the Middle East, with the opening of a new office in Dubai.



Image Credit : Ejendals

Ejendals specialises in high quality safety gloves and footwear.

WITH THE VISION “zero injuries to hands and feet”, Nordic PPE company Ejendals has successfully served the Nordic and European markets with high quality safety gloves and footwear for more than 70 years.

The company’s head office is in Leksand, Sweden, where Ejendals also has an R&D lab and testing facilities for their safety gloves. Ejendals has similar facilities for R&D and testing for safety footwear in Jokipii, Finland.

Ejendals has its own factory in Finland and maintains long-standing cooperation with a few selected factories in other parts of the world.

Targeting the Middle East

Now, Ejendals is bringing its offering to the Middle East, opening its first office in the region in August 2019 in Dubai. This enables the company to better serve local companies and existing customers in the region. And as always with Ejendals, it’s about offering the

best possible protection and functionality, no matter what the job entails.

Ejendals is a third-generation family-owned business focusing on strong innovation and high-quality products. This has led to a market leader position in the Nordics and a strong presence all over Europe, with Tegera safety gloves and J alas safety footwear. Ejendals offers protection and functionality for every type of work situation in any type of industry, the company says. No matter if it’s ice cold or desert hot – or anything in between.

“We know from experience that safety standards and demands are high in Dubai.

And our Nordic view on safety and functionality will fit perfectly into that thinking,” says Barry van den Hoven, chief commercial officer at Ejendals.

Looking at non-fatal injuries at workplaces, it’s a well-known fact that most of these are injuries to either hands or feet. Whether it’s cuts, bruises, strains or sprains, it often leads to absence from work. Absence that in many cases could easily be avoided through the right protective gear.

“This is both a question of unnecessary suffering for those who are injured and pure economics. These situations are often easily avoided with the right knowledge and equipment. An increasing amount of companies are coming to this realisation, especially in the Middle East region,” concludes van den Hoven.

The Ejendals Dubai office is off to a running start. The first larger clients are already signed up and a six-figure turnover is the goal for the coming years. ■

“ Safety standards and demands are high in Dubai.”

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ADNOC targets responsible production

Abu Dhabi's national oil champion is keen to lift oil and gas production, but with a keen eye on sustainability too.

THE UAE IS currently the third-largest oil producer in the Organisation of the Petroleum Exporting Countries (OPEC) – behind only Saudi Arabia and Iraq – and pumps around three million barrels per day (bpd).

Abu Dhabi's oil and gas industry continues to dominate the emirate's economic landscape, despite big moves into areas such as services and renewables. At the helm, Abu Dhabi National Oil Company (ADNOC) is the state-owned entity charged with maintaining and growing this strategically-vital sector.

The potential for further growth is strong, according to ADNOC's CEO, H.E. Dr. Sultan Ahmed Al Jaber. By 2040, three times the amount of energy consumed by all of Europe will be added to global energy demand, as other economies around the world grow and expand.

Al Jaber said recently that the company is on track to raise its oil production capacity to four million bpd by 2020 and up to five million bpd by 2030. These are projections based on a "robust" long-term outlook for global energy demand, he told an industrial conference recently. Collectively, the oil and gas industry would need investment of some US\$11 trillion

globally to keep up with projected demand, he said.

Yet the company intends to make this leap in a sensitive, sustainable way, given current high environmental concerns and the UAE's own position as something of a pioneer in renewable energy. Abu Dhabi is the world headquarters of the International Renewable Energy Agency.

“The target is to capture at least 4.3mn tonnes of CO2 annually by 2030.”

Responsible production

It underscores the significance of ADNOC and Abu Dhabi in the world's energy mix – and its forward role in meeting the demand of the future. As well as raising crude oil production, other key priorities include unlocking the nation's vast gas reserves and, at the same time, mitigating any environmental impacts.

This includes a big expansion of ADNOC's

carbon capture programme, said Al Jaber, who talks openly of “responsible production” as part of the Group's growth strategy.

At the annual London Oil & Money conference in October, Al Jaber noted that the company already produces “among the least carbon-intensive barrels”. A target has been set to capture at least 4.3mn tonnes of carbon dioxide (CO2) annually by 2030 through the expansion of the carbon capture programme, he said.

At the same time, Abu Dhabi has become increasingly receptive to private sector advances in order to reach its goals, not only in the revered upstream segment, but in infrastructure too. That might soon include a potential sale of a stake in its gas pipeline network, according to reports, a deal that could see it pocket US\$5bn. ADNOC raised a similar amount earlier this year by selling an interest in its oil pipeline business to a clutch of international investors.

In the refining sector, Italy's Eni and Austria's OMV this year acquired 20 per cent and 15 per cent shares respectively in ADNOC Refining, which refines in excess of 922,000 bpd of crude and condensate at its Ruwais and Abu Dhabi-based refineries.

Drilling technology

And yet some things remain unchanged, with ADNOC retaining its reputation as every bit the dependable, unflappable partner on the ground. Its upstream ambitions are underpinned by its various operating subsidiaries, which themselves continue to evolve, gathering in fresh ideas and technologies from around the world.

ADNOC Drilling, for instance, recently completed its first offshore integrated drilling services (IDS) well in the Umm Lulu offshore oilfield.

It follows the completion of 14 onshore IDS wells this year, underpinning the unit's transformation into a fully integrated drilling services company that offers start-to-finish drilling and well construction operations. This was, in part, facilitated by a strategic drilling tie-up with international partner Baker Hughes.

ADNOC's upstream executive director, Abdulmunim Saif Al Kindy, said the latest work has "shown an increase in our drilling performance by about 25 per cent, resulting in considerable cost savings and increased well profitability."

This also dovetails with the company's growth plans, as it seeks to lift capacity, but control both costs and environmental impact in the process. It plans to increase its conventional drilling activity by 40 per cent by 2025 and substantially ramp up the number of unconventional wells to meet production targets. Integrating these new drilling and completion capabilities enables ADNOC Drilling to capitalise on this growth as it supports group-wide ambitions.

Market potential

At the same time, Abu Dhabi remains a ready market for overseas suppliers and services companies. That includes the recent award of multi-billion-dollar contracts for the procurement of casing and tubing for its vast well programme.

Contracts worth US\$3.6bn were awarded to Consolidated Suppliers Establishment, representing Tenaris S.A. (from Luxembourg);

Abu Dhabi Oilfield Services Company, representing Vallourec S.A. (from France); and Habshan Trading Company, representing Marubeni-Itochu Steel Inc. (from Japan). Together, the three groups will supply a combined total of one million metric tons of casing and tubing – equivalent to the distance from Abu Dhabi to Houston – over five years in support of ADNOC's accelerated drilling activities.

More is to come. The awards mark the first in a series of drilling-related procurement plans over the next five years worth a collective US\$15bn covering downhole completion equipment, wellheads, and xmas trees, liner hangers, drilling fluids, directional drilling, cementing, and wireline logging. These represent the nuts and bolts of ADNOC's huge expansion plan.

Upstream openings

Behind this are Abu Dhabi's enormous oil reserves – estimated at more than 92 billion barrels – and its highly-prized upstream sector, another segment opening up to the private sector.

ADNOC launched a second bid round earlier this year, following the successful

“ADNOC plans to increase conventional drilling activity by 40 per cent by 2025.”

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completion of a first round in March 2019. Five more blocks have been released for competitive bidding in the latest round, three offshore and two onshore. Closing date for bids is the end of November.

The blocks from both licensing rounds collectively cover almost two-thirds of Abu Dhabi's entire territory, a clear illustration of the government's intentions to secure new partners and investment.

“ADNOC also sees huge potential for growing its gas output and even exports.”

Among the successful bidders for blocks from the 2018 round were Japan's Inpex, US firm Occidental Petroleum, Indian state firms Bharat Petroleum Corporation and Indian Oil Corporation, Italy's Eni and PTT Exploration and Production Public Company Limited of



H.E. Dr Sultan Al Jaber, Minister of State UAE and CEO of ADNOC, underlined ADNOC's commitment to sustainability at the Oil & Money conference in London.

Thailand. It reflects the gradual shift eastwards, with much of Abu Dhabi's production expansion plans linked to the growth of Asia's emerging economies.

Beyond oil, ADNOC also sees huge potential for growing its gas output and even

exports. “By tapping into gas caps, undeveloped reservoirs and unconventional resources, we are on track to achieve gas self-sufficiency and, in time, become a net gas exporter,” said Al Jaber at the Oil & Money conference in October. ■

The UAE deepens energy ties with Russia

THE STATE VISIT of Vladimir Putin, President of the Russian Federation, to the UAE in October saw the signature of a number of agreements and contracts which will boost Russia's involvement in the country's energy sector.

ADNOC signed a comprehensive strategic framework agreement with the Russian Energy Agency to explore new opportunities for collaboration across the oil and gas value chain, as well as in AI and other advanced technologies. Areas for potential collaboration include Abu Dhabi's exploration and production concessions, LNG refining, petrochemicals as well as marketing, sales and trading.

Also during the visit, Awaidha Murshed Al Marar, chairman of the Abu Dhabi Department of Energy (DoE), met Alexander Valentinovich Novak, Minister of Energy of the Russian Federation, to discuss opportunities for collaboration in the conventional and renewable energy sectors. The discussion focused on the logistics of cooperation, exploring how the emirate can benefit from Russia's capabilities and the qualified workforce in the sector to train local professionals and develop their administrative, technical and operational skills.

The Abu Dhabi Government and ADNOC granted a five per cent stake of Ghasha's ultra-sour gas concession, including Hail, Ghasha, Dalma and other offshore sour gas fields, to a subsidiary of the Russian listed PJSC Lukoil Oil Company (LUKOIL).

At the same time, ADNOC, LUKOIL and the management company of the Russian Direct Investment Fund (RDIF) signed a framework agreement to explore potential future cooperation on the Ghasha concession.

His Highness Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces, and Vladimir Putin, President of the Russian Federation, witnessed the exchange of the signed concession and framework agreements.

Under the terms of the concession award, LUKOIL will invest an initial amount of US\$190mn as a signing fee for the concession. ADNOC retains a majority stake in the concession, with Italy's Eni, Germany's Wintershall Dea and Austria's OMV as further concession holders.

Gazprom Neft and the Abu Dhabi National Oil Company (ADNOC) entered into a framework agreement on strategic cooperation, whereby the



Vladislav Baryshnikov, deputy CEO, International Business Development and a member of the Management Board, Gazprom Neft, and Abdulmunim Saif Al Kindy, executive director, Upstream Directorate, ADNOC at the signing of the framework agreement between Gazprom Neft and ADNOC.

companies will explore opportunities for implementing joint projects in the upstream and downstream sectors, as well as in information technologies, artificial intelligence, and other areas.

Under this agreement, the partners will study opportunities for collaboration in sour-gas exploration and production, developing enhanced oil and gas recovery strategies, and developing innovative technologies for investigating carbonate reservoirs.

The agreement creates a platform for potential collaboration in developing production-analytical systems in hydrocarbon exploration, production, logistics, processing and sales.

The parties will assess opportunities for joint projects in geological prospecting and oil and gas field development, including concessions within the Emirate of Abu Dhabi. Further areas for potential technological cooperation include developing management systems, information technologies and artificial intelligence (AI).

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Bringing advanced technologies to the Middle East

NESR's regional knowledge and access to the latest technologically advanced solutions are proving a winning combination in the Middle East. Sherif Foda, the leading national oilfield services provider's CEO, speaks to *Oil Review Middle East*.

Can you tell us briefly about the history of NESR?

NESR started in 2017 as a Special Purpose Acquisition Company (SPAC). The SPAC was a vehicle to list an oilfield services company from the MENA region in NASDAQ. National Energy Services Reunited Corp (NASDAQ: NESR) was officially formed in June 2018, following the acquisition and merger of two leading companies: National Petroleum Services (NPS) and Gulf Energy Services SAOC. In June 2018, NESR became the first and only company from the MENA region to list on NASDAQ. Today, NESR is a leading oilfield services provider that operates in 14 countries and employs more than 4,000 people from more than 40 countries.

NESR is driven by its strong values and strict governance. The company is customer centric, socially responsible, and dedicated to the development of its people. NESR provides best in class services, expert employees, and fit-for-purpose technologies and solutions. Our experienced and diverse team is committed to meeting all our clients' needs and helping them address their challenges.

What makes companies choose to work with NESR? To what values do you attribute the company's continuous success?

NESR is the national champion of the MENA region. By combining two strong companies from the MENA region that are widely known for their impeccable services, excellent growth, and commitment to the development of local communities, and listing those companies in NASDAQ, NESR created a strong regional oilfield services company that is responsibly governed and widely trusted as a reliable local partner. From day one, NESR affirmed its commitment to increasing the local content of its operations and improving its in-country value proposition. NESR is committed to hiring, investing, and procuring goods and services locally whenever possible.

In addition to the value we bring to the local communities and economies of the

MENA region, we are proud to be a local player with international standards of QHSE, governance and service excellence. At the same time, we are accessible, very close to our customers, and responsive to their needs. Moreover, given our international presence, we have access to technologies and solutions from all around the world. Our R&D centre in the region, set to open its doors in 2020, will become an open platform that brings together technological innovators from all around the world to develop customised solutions for our clients and operations throughout the MENA region.

How do you currently view the Middle East market for your services? Are there any recent contracts/projects you would like to highlight?

Public data indicates that E&P budgets in the Middle East will grow by a minimum of 6-8 per cent in the next four to five years. We believe that the actual rate of growth will be much higher. The region is experiencing high domestic energy demand and as a result it is moving towards developing non-traditional reservoirs including un-conventionals, tight, sour fields, and heavy oil fields. Such reservoirs were previously inaccessible because of their high costs or inadequate technology available. Today, new developments in technology have refocused attention on nontraditional reservoirs to meet growing demand.

The opportunities in Kuwait and the MENA region are endless. We used to have a single business line in Kuwait but today we have

“ Our R&D centre will become an open platform that brings together technological innovators from around the world.”



Image Credit : NESR

Sherif Foda, CEO, NESR.

three. We are also planning to increase the number of product lines in Kuwait. Additionally, we are importing technology to the region as a deployment partner with full in-house maintenance setups including the groundbreaking Kinetic BOP, which will allow customers to safely access high H2S or CO2 reservoirs. Kinetic's BOP will significantly reduce risk and well control events.

The MENA market for oilfield service companies is getting bigger as fields are maturing and higher intensity of services per well are required. The investment-friendly environment of the region also allows more activity and growth. Hence, the market presents an array of different opportunities and we are uniquely positioned to access a larger part of the increasing market size.

How are you looking to develop your business further – are there any particular sectors or markets you are targeting?

In Kuwait, we have plans to grow rapidly and are committed to becoming a leading local oilfield services provider. As mentioned, we are increasing the number of services and product lines we offer and aim to become our

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customers' partner of choice in all aspects. Our local focus and ability to facilitate access to solutions that are not available in the market give us an added advantage. We are currently focused on building our capacity and heavily investing in new equipment and infrastructure to improve our offerings to our clients.

What are the main technical challenges operators are facing in the region, and how are you helping to address them?

The biggest technical challenge for most operators in the region is maturing assets with all related challenges such as: unwanted water and gas production, scale and sand production, loss of well integrity, loss of well productivity and in some cases, the total loss of production. Most services we offer in Production and Evaluation are tailored to help our customers identify the specific well challenges and provide cost-effective solutions, which can be as simple as pumping a water shut-off treatment and as complex as bringing a workover rig with all the required services. During this cycle, innovative and fit-for-purpose technologies are key to providing commercially viable solutions.

Another major challenge is producing hydrocarbons at a lower cost to stay competitive. Optimising production systems and environmental utilities on currently operating oilfields is therefore a priority for the oil industry. This maximises production efficiency, and reduces the costs of extraction and refining, thereby offsetting the exploration costs. We are a primary contributor to this optimisation through conducting efficient operations with low overhead cost and innovative solutions, and combining that with best practices and the latest fit-for-purpose technologies. We leverage our ability to combine our knowledge of the region with our access to the latest technologically advanced solutions globally.

To what extent are you introducing new technologies to the region?

For NESR, leveraging newer technologies to solve our customers' major challenges is a key driver. We have been continuously introducing new technologies in the region. From pathbreaking perforation techniques to innovative intervention tools and changing the paradigm on fracturing, NESR has been at the forefront of bringing change to the region.

In Kuwait, we introduced drilling tools and casing running tools from the very beginning. This significantly improved efficiency and performance, especially after we combined our delivery platform to bring cementing innovative solutions including gas migration preventive slurry, critical well control technology for the most severe well conditions, well integrity sealant fluids and many other carefully selected advanced technologies.



Image Credit : Adobe Stock

The MENA market for oilfield service companies is growing.

“ The market presents an array of different opportunities.”

We are currently building a state-of-the-art R&D Centre in the region, which will become an open platform for technological innovation, providing a space for innovators to develop technologies on perforation, chemical development and well control.

How do you see the growth of unconventional in the Middle East over the next few years?

We are at an early stage of the development of unconventional, which are needed for regional economic growth. The industry needs to adopt the approach of North America to get the same innovation and efficiency levels. Given the cost sensitivity of these projects, it is critical that we think creatively and learn from the unconventional development in the USA to execute these projects.

We believe we will see an exponential growth in unconventional in the Middle East to essentially fulfill the internal demand for gas in the growing economies of the region. Most countries have initiated projects in this space and are at different stages of developing these resources. Reservoirs differ, some are tight, and some are shale. NESR has an appreciable footprint now, and we believe that

our differentiated delivery is one of the key factors that will help our customers produce commercially from these reservoirs.

How important is local development and capacity building to your company?

Investing in local communities is key to NESR as the company prides itself on being the national champion of the MENA region. Corporate responsibility is also one of our key values, and we incorporate it in everything we do internally and externally. Our main internal focus is on the health and safety of our employees, the diversity and inclusion of the work environment, and the involvement of our employees and their families in community development projects through corporate volunteering.

Externally, we focus on building the capacity of local communities and the empowerment of women and people with disabilities. At the same time, we are extremely committed to increasing the local content of our business and participating in all the in-country value programmes in different countries. Whenever possible, we hire and develop local talent and procure goods and services locally. We also invest in local manufacturing and even export locally produced products to other countries, as is the case in Oman.

The environment is another big concern for us, and we are committed to reducing our environmental footprint in order to reduce the negative impact of our operations on local communities and ecosystems. ■

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Iraq - major challenges, huge potential

Although Baghdad's ambitions and plans face challenges, it is clear that Iraq remains pivotal to global energy markets and security, says Moin Siddiqi, economist.

DESPITE SEVERE HEADWINDS, Iraq has again become one of the world's fastest-growing oil regions, with production hitting nearly five million bpd during H2 2019. This represents a marked achievement for a conflict-ridden country, which today ranks as third largest global oil exporter.

The International Energy Agency (IEA) commented, "Iraq's oil sector has navigated well a very turbulent period in the last decade, managing to nearly double its output despite the war against ISIL and large swings in the oil price. As a result, Iraq has accounted for around one fifth of the net increase in global supply over this period (second only to the USA) and is now the fifth largest producer in the world."

Iraq has significantly benefitted from relative stability in the south, where the bulk of oil is produced. Iraq is positioning itself as OPEC's second most influential producer (after Saudi Arabia) – current production is large enough to swing global oil markets.

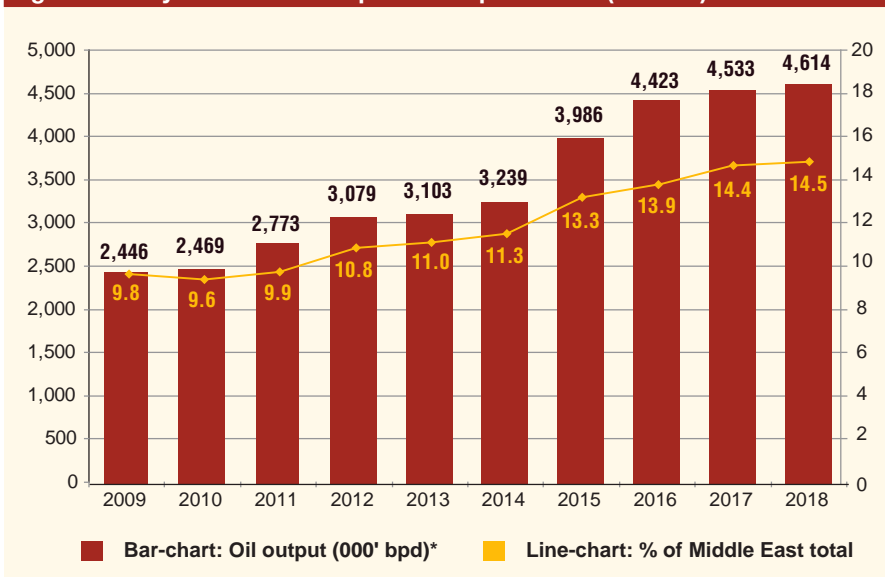
Evidently, long-term potential is tremendous but further exploration and production (E&P) growth depends on key factors, chiefly inward capital investment and sophisticated technologies of both international oil companies (IOCs) and foreign national oil companies (NOCs) for upgrading midstream infrastructure (pipeline pumping stations and storage facilities); adequate water supply for reinjection to boost output; firmer oil prices for capital expenditure; and most importantly, security and political stability. Pipeline shortages and lack of electricity in some oilfields also hinder output sustainability.

Subsurface potential

Iraq's hydrocarbons resources are deposited in three main geological formations:

- Mesopotamian Basin, which houses supergiant fields (West Qurna, Rumaila, Majnoon, East Baghdad and Zubair). The basin is separated into the 'Southern' region near Basra and 'Centre' area that incorporates the alluvial plains around

Figure 1: Ten-year trends in Iraq's total oil production (2009-18)



*Incl. condensate and natural gas liquids.

Crude oil production almost doubled between 2009 and 2018, representing an increase of 2.17mn bpd over the period. In August 2019, it averaged 4.78mn bpd, equivalent to 16 per cent of OPEC total. Foreign-operated fields account for 75 per cent of Iraq's oil output.

Source: BP Statistical Review of World Energy 2019.

- Baghdad. Around 70-80 per cent of recoverable reserves are in the Basra region.
- Northern Zagros Fold Belt, which contains the supergiant Kirkuk reservoir and smaller (though large by global standards) fields in the Kurdistan Regional Government (KRG) area.
- Widyan Basin-Interior Platform known as

the 'Western Desert' – least explored of the three basins and believed to be more gas than oil prone.

According to Iraq's Ministry of Oil (MoO), proved reserves are spread across 70-plus fields, of which Southern fields contain more than half of total proven reserves, officially estimated at 150bn barrels – making Iraq the third biggest holder of conventional oil resources after Saudi Arabia and Iran. Rumaila and West Qurna rank among the top 15 mega oilfields globally, based on remaining reserves. The other prominent fields are East Baghdad (untapped) in the centre and Kirkuk in the North. Rumaila and Kirkuk (combined) have produced 71 per cent of total cumulative production (see Table 1). Iraq has fewer oil wells (around 2,300), but they are among the

“Iraq is positioning itself as OPEC's second most influential producer.”



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The country is significantly under-explored compared to other major producers. So far, around one third of the 530 oil-bearing structures have been drilled. The probability of future discoveries is high given the application of new E&P technologies, such as horizontal drilling, 3D seismic surveys and Geostream data for more accurate assessment of untapped resources in some remote acreage. The U.S. Geological Survey (USGS) 2000 assessment and subsequent updates indicated Iraq's 'ultimately recoverable resources' at 246bn barrels of crude oil and natural gas liquids.

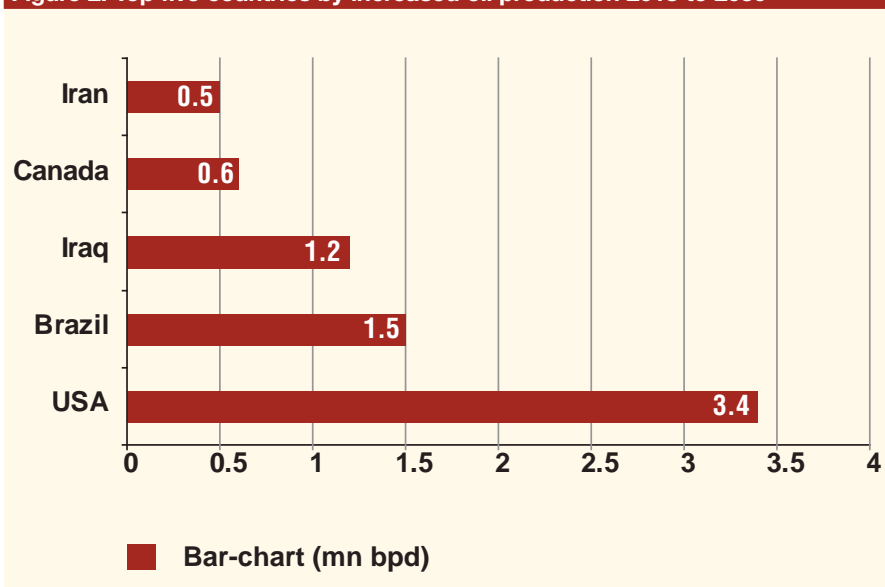
The USGS estimations excluded the KRG-controlled northern area. According to Rystad estimates, as of July 2018, KRG fields possessed around 3bn barrels in resources. In contrast, KRG's figure of 45bn barrels is substantially higher because it includes both 'probable' (unproved) reserves and disputed Kirkuk area fields. Russian oil major Rosneft reckons the KRG figure could be accurate given extensive drilling in the region.

Official targets

The Federal Government of Iraq (FGI) wants to significantly expand oil production to approximately 8.5mn bpd within a decade after infrastructure (including export terminals) has been upgraded. The expansion would include 6.5mn bpd from southern oilfields, and another 1mn bpd from Kirkuk after a new pipeline to Turkey's Ceyhan port on the Mediterranean has been constructed. More ambitious targets are 6.2mn bpd and 9mn bpd by end-year 2020 and 2023, respectively. These targets include oil output from the semi-autonomous Kurdistan region (controlled by KRG).

The MoO is also planning a mega Southern Iraq Integrated Project (SIIP) under a 30-year contract with ExxonMobil and PetroChina, which entails investments of US\$53bn and potential colossal returns for Baghdad of US\$400bn over its lifetime, according to Prime Minister Adel Abdul

Figure 2: Top five countries by increased oil production 2018 to 2030



The IEA expects Iraq to rank fourth largest producer by 2030, overtaking Canada, with total production averaging 6mn bpd.

Source: IEA, April 2019.

Mahdi. The deal (in the making for four years) seeks to increase combined output from Nahr Bin Umar and Ratawi fields from 125,000 to 500,000 bpd and processing up to 100mn cubic feet of natural gas from the two fields as well as the construction of several new export pipelines from southern fields to the coast, plus a water supply facility.

“Four major fields are undergoing major capacity increases.”

Cautious expectations

According to some analysts, official production targets are unachievable within the

expected timeline. A September 2018 report from IHS Markit suggested Iraqi oil output will only grow marginally over the next decade notwithstanding its potential capacity for 7mn bpd, not just because of domestic security issues, but rather a purely technical drawback: energy infrastructure not on levels with core Gulf producers. The IEA's latest projection at 6mn bpd by 2030 is more conservative, however, it still expects Iraq to overtake Canada as fourth largest producer by adding 1.2mn bpd through 2030, which is the third largest increase of any other producer after the USA and Brazil (see Figure 2).

Four major fields are undergoing major capacity increases – Rumaila (operator BP), currently producing 1.5mn bpd; West Qurna – split for E&P purposes into the southern part (Phase 1) led by ExxonMobil and the northern part (Phase 2) led by Lukoil – with a combined output of 850,000 bpd; Zubair (operator ENI), currently producing 475,000 bpd; and Basra Oil Company (BOC)-operated Majnoon field producing 240,000 bpd. The IEA's growth projections stand at 1.8mn bpd for Rumaila; more than 1mn bpd for West Qurna; 600,000 bpd for Zubair; and 450,000 bpd for Majnoon, by 2030.

Wider water challenges

The anticipated future hikes in Iraq's oil production depend largely on 'secondary oil recovery', whereby water is injected into the oil formation to raise reservoir pressure. Water injection helps sustain or boost output at many of Iraqi oilfields, which have relatively low recovery factors (the ratio of extracted oil to the volume of original oil in place). Around

Table 1: Iraq's oil resources by region and supergiant field (billion barrels)

Region	Proven reserves end-2017	Ultimately recoverable resources	Cumulative production end-2017	Remaining recoverable resources	Remaining % of URR
Southern Mesopotamian	113	164	25	139	85
West Qurna	47	55	3	53	95
Rumaila	17	35	16	19	55
Majnoon	13	15	1	15	96
Zubair	7	11	3	8	70
Central Mesopotamian	13	19	0	18	98
East Baghdad	9	10	0	10	98
Northern Zagros Fold Belt	23	62	19	42	69
Kirkuk	7	25	16	8	34
Western Desert	0	1	0	1	100
TOTAL	149	246	45	201	82

Sources: Iraqi Ministry of Oil; IEA databases.



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Iraq is now the fifth largest oil producer in the world.

Image Credit : Adobe Stock

four fifths of productive fields have an ultimate recovery factor of 15-40 per cent (Iraq Energy Institute data). Fields in the South and Centre rely on water injection, because the composition of the reservoirs is more suited to secondary recovery methods.

The IEA noted that having sufficient water supply for field injection is vital, as without it "production rates could struggle to climb much beyond their current levels". It estimated Iraq needs more than 8mn bpd of water (up from the current level of 5mn) to reach oil production of 6mn bpd by 2030. Secondary oil recovery is crucial to future growth at key fields, notably Rumalia, West Qurna and Zubair. ENI for the Zubair field and BP in Rumaila have built their own mini-facilities. BP's Qarmat Ali Water Treatment Plant is capable of treating 1.3mn bpd of river water. The 70-year-old Rumalia field, the world's second-largest (after Saudi Arabia's Ghawar) needs to increase production by 300,000 bpd every year to offset the natural depletion rate of over 20 per cent. Around 1.4mn barrels of water is injected daily at Rumalia to support production.

Given the urgency of water availability, the FGI in 2011 announced plans to build the Common Seawater Supply Project (CSSP) to process water from the Persian Gulf and then transporting it via pipe-lines to Southern oilfields to be used for injection, but it faced considerable obstacles. However, Basra Oil Co (NOC) took over the project and hopes to sign a final contract in the coming months.

Table 2: Iraq's crude oil output, refinery runs and oil exports (mn bpd)

	2018	2025	2030
Crude and condensate production	4.6	5.3	5.5
Refinery runs	0.6	0.8	1.1
Crude oil exports	4.0	4.5	4.4

Iraq is the world's third largest oil exporter. Asia (led by China and India) accounts for over 60 per cent of Iraqi exports with the remainder being sold to Europe and USA. The bulk of exports are shipped from southern terminals in the Persian Gulf. Southern export capacity includes 1.6mn bpd Basra Oil Terminal, the non-operational 350,000 bpd Khor al-Amaya Terminal and four single-point moorings with daily capacity of 900,000 bpd each.

Source: IEA, April 2019.

The CSSP (estimated cost US\$5bn) is likely to take three years to build, with a capacity to pipe 5mn bpd of treated seawater to fields across Basra and to Nassiriya – rising at latter stages to 7.5mn bpd. Even if CSSP comes online, an additional 4mn bpd of water would still be needed from other sources such as reusing produced water, expanding existing water treatment facilities and using industrial water to support future production targets.

"To effect any meaningful increase in Iraq production you cannot get around the fact that the CSSP [Common Seawater Supply Project] needs to be in place across the country and fully functioning, otherwise not only will Iraq not be able to effect such output improvements but also output from existing fields will be jeopardised," Richard Mallinson, head of Middle East analysis for global energy consultancy Energy Aspects, told OilPrice.com.

Appealing factors

Developing optimal reserves (including unproved reserves) demands huge capital and infrastructure upgrades in order to increase output more rapidly. UK-based consultancy, Bayphase Ltd estimated that Iraq's hydrocarbons industry, encompassing the upstream, midstream and downstream, needs US\$150bn or more.

Amid the increasingly competitive environment for upstream investment, the FGI must provide an enhanced regulatory and fiscal framework to entice oil majors, especially in support of state-operated fields. The long list of "above-ground obstacles in Iraq – political gridlock, security challenges, attracting foreign capital, and water scarcity – will be very challenging to overcome, and the assumed increases cannot be taken for granted," the IEA cautioned.

It is true that Iraq faces several unique hurdles uncommon in other large oil producers, but its huge, low-cost resource base remains a major attraction. The lifting cost in Iraq ranges from US\$2-3 per barrel, the world's lowest according to IEA, on a par with Saudi Arabia. Equally competitive on a global basis are capital costs of development, which range from US\$7,000-12,000/barrel for expansion of a supergiant field in the south, to a maximum of US\$15,000-20,000/barrel for a medium-sized field in the north.

These factors will ensure that the country will remain a hotspot for oil majors. ■

Table 3: Iraq's refinery capacity and output (2009-18), '000 bpd

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Refining capacity	853	914	935	971	823	791	763	779	779	859
Refining runs	417	520	543	579	598	487	409	440	527	596
Oil consumption	536	570	629	666	716	681	683	760	732	777

Total refining capacity is under 1mn bpd, of which 69 per cent was utilised in 2018. Output is weighted heavily towards heavy fuel oil. The mismatch between product demand and output forces Iraq to spend US\$2-2.5bn/year importing light products (gasoline and diesel). The Federal Govt of Iraq aims to boost refining capacity to 1.5mn bpd by 2021.

Sources: BP Statistical Review of World Energy 2019 and IEA analysis.



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Relishing the challenges

Exuding positivity and undaunted by challenges, Halliburton's Sarah Hayati is an inspirational role model for women in the oil and gas industry. *Oil Review Middle East* caught up with Kuwait's first female wireline and perforating field engineer at the Kuwait Oil & Gas Show, where she took part in a panel session entitled 'Capitalising on Diversity'.

WORKING AS A wireline and perforating field engineer, where tasks such as handling heavy machinery and dealing with radioactive materials and explosives are all part of the job, is an activity not traditionally associated with women. How did Sarah Hayati come to her role, and what first attracted her to the oil and gas industry?

"I started off as a health, safety and environment intern at Halliburton in my junior year at university," Sarah Hayati explains. "The oil and gas industry is a very coveted industry in the region, so that was the industry of interest for me at the time. I ended up working there for a little under a year, and what really motivated me to start my career in oil and gas was the guidance, mentorship and advice I received from my manager at the time. So near the end of my internship I was able to identify what I really wanted out of a job.

"I didn't really know much about the different services provided by Halliburton prior to joining my current position, and that was mainly because by background I'm an industrial engineer, so oil and gas was very new to me. But I knew that wireline had the reputation of being the most difficult place to work as a field engineer. I also knew they had never hired a female engineer in a field position in Kuwait before. That triggered my competitive side and made me want to test my limits!

“Challenges have never been a showstopper – more of a personality shaper.”

"So I had switched to wireline even before graduating, and in the last few months before completing my education I



Sarah Hayati, wireline and perforating field engineer, Halliburton.

would go into the office in the morning, be working hands on with the operators learning the basics, and at night I would go to my classes. I wouldn't even have time in between to switch out of my coveralls! It was a very tough and busy period, but I pushed myself early on even before I started my career because I do want to achieve something, and I felt that would be a good start."

Positive experience

What has her experience been working as a woman in a male-dominated industry, and

has she faced any challenges?

"A lot of women do have this concern," Hayati comments. "The oil and gas industry is a tough industry and requires a lot of commitment, but, to be fair, it's difficult for everyone, especially when you're out in the field."

She soon found that any concerns she had about walking on to a rigsite as a single woman with 100 men were unfounded.

"My experience has been very rewarding. It's rewarding when you're in your early 20s and in charge of complex operations which you perform successfully, and it's also rewarding when you continuously get comments about how proud people are to see not only a young professional but a female engineer performing such a complex role. I received a lot of encouragement from my peers and from society. There were times when I'd be leaving work with my coveralls on and people would stop and tell me, 'You look like you do something really hard, and we're really proud of you.' That would give me an amazing boost.

"There are many challenges, but challenges have never been a showstopper for me – more of a personality shaper. The challenges I faced when working in the field have helped me grow in ways I can't even quantify, and today I believe I have become a person who can make fast and efficient decisions under extreme stress, which is something I acquired from my job. The secret to how I tackle the challenges I face is really having confidence in myself, confidence in my knowledge and experience, and confidence in my capabilities."

While conceding that her experience may not be the same for all women, she says, "I'm a true believer that we create our own realities, and that we can succeed as long as we're willing to do what it takes. So I think my positive experience in oil and gas, especially out there in the field, is mainly a product of the reality I wanted to create."

Image Credit : Halliburton

"I'm proof of progression, not only of the equality of the sexes but also of progression of mindsets," she adds. "I'm a product of a society whose religion has taught the importance of women in society, of generations of women fighting for their place in the industry, and also a product of my own eagerness to learn."

"For several years, I've been wearing coveralls that were originally made for men. But that doesn't mean a woman can't fit into them!"

The business benefits of having an inclusive and diverse workforce, such as safer operations, increased productivity and higher employee engagement, are increasingly acknowledged. Yet women still account for only around 22 per cent of the oil industry workforce globally, and fewer than 17 per cent of senior roles.

"Continuous improvement is what this industry has been striving to achieve," says Hayati. "That requires a lot of dedication, but also diversity of talent. It's only when you are exposed to different ways of thinking that you can move forward. The industry has been keen to attract a more diverse and inclusive workforce with the realisation that

there is a pool of talent that can contribute so much more to this continuous improvement process, and we need to attract more females into the industry."

So how can oil and gas companies attract and retain more women? Sharing real life examples and experiences from women in roles where you are targeting to hire more women is critical, Hayati stresses.

“The way we empower women is by inspiring them.”

"The way we empower women is by inspiring them and by showing them they can do it. But I also think when you show them how diverse the industry really is, and how there is a place for all interests and all lifestyles, you can break down the stereotypical image that people have of working in the oil and gas industry.

"We need to create a space where women do not feel different from their

male peers, and where they are treated equally. I don't think hard-working, ambitious women are looking for an easy pass. They're just looking for a fair shot. So as long as I'm comfortable in my environment, I will always thrive."

Professionally, Hayati has found her career very rewarding. "I do find it very exciting. The discipline itself is quite intense, because as a wireline engineer you are mainly working out in the field, coping with different well conditions and surface conditions, so with every job it's a different ball game. It keeps you on your toes and it keeps you constantly thinking of ways to make your job more efficient."

Turning to her ambitions for the future, she comments, "The industry is very dynamic, and as you are exposed to new aspects of the industry, you begin to pick up new interests and to learn what roles you can fit into and grow into. That has certainly been the case for me. With every new challenge, I begin to understand what interests me, and what I'm good at. So I'd like to continue to learn, but I'd also like to bring value to whatever role I take on in the future." ■



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Buoyant times for the global catalyst market

Ekaterina Kalinenko, project director and Stefan Chapman, vice president, Euro Petroleum Consultants analyse the growth in the global catalyst market.

Image Credit: Bo Nielsen/Flickr

Refineries are utilising catalyst technology, particularly when integrating with petrochemical facilities.

CATALYTIC PROCESSES IN refining have clearly been taking the lead over other types of crude oil processing in recent years. This is partly due to technology developments in catalyst production and optimisation, which has increased their market. Also, with the recent drive toward integration between refineries and petrochemical complexes, the number of units requiring use of modern catalysts has increased significantly.

We have observed several drivers for the growth in global refining catalyst demand:

- The addition of new downstream capacities, which in turn has been generated by increased demand for fuels and petrochemicals (automotive park growth, higher quality of life, urbanisation, etc.)
- An urge to enhance resource efficiency of downstream processes: conversion level, target products yield to address market changes, energy optimisation reliability and better utilisation of all sources
- Stricter environmental and safety regulations worldwide – both for fuel specifications and composition and for environmental impact

In 2016, Euro Petroleum Consultants carried out research to establish a new and timely theme for our topic-specific conferences and arrived at the conclusion that the catalyst industry was booming. Since then the trend has not shifted – the global catalyst market is forecasted to grow at CAGR of 4.6 per cent by 2024 – and further expansion is expected

with developments in refining, petrochemicals, chemicals and evolving environmental factors increasing demand for more performant catalysts, and investments in R&D to help provide the required characteristics. Even though 2016's forecast of global catalyst market demand reaching US\$33bn by 2018 was slightly optimistic (the actual figure was close to US\$25bn), in reality there is no sign of a slowdown in the near future.

Unsurprisingly, the largest consumers of refining catalyst are North America (40 per cent of global share in 2018) and the fast-growing Asia-Pacific region (26 per cent). Before 2015, the USA was foreseen as the major contributor to catalyst demand growth, but then strategic plans were announced and currently the leading analysts predict that the 'bright future' will be supported by China and India, followed by the Middle East.

US demand used to shape the market to the wider use of catalysts for conversion of heavy crude into lighter products, especially diesel, which is a primary fuel for the country. However, since a number of initiatives in Europe and other regions were applied to restrict the use of diesel-fueled cars, the focus shifted to other options: e.g., in the CIS region one of the most requested processes lately for licensing has been the one with higher on-purpose olefin yield. The highest demand is for cat-cracking and hydroprocesses.

The fluid catalytic cracking (FCC) process is a well-known refinery technology that has been developing for decades to be able to process different feedstock blends, sustain

optimal working parameters and stability of gasoline quality and yield. The FCC unit boom has subsided, but there are still quite a few projects under development or planned, especially in the abovementioned promising regions. Some forecasts say that the FCC catalyst market will be worth more than US\$3bn by 2025 (currently the share is close to 50 per cent of all refining catalysts). The International Maritime Organization (IMO) regulations that will significantly increase low-sulfur fuels demand post-2020 will create a surge in the market for FCC catalysts as refineries aim to produce maximum middle distillates.

Catalysts that currently dominate the market are zeolite catalysts, which account for around one third of all catalysts currently in operation; metals (especially those containing precious metals); and chemical compounds. The latter type is predicted to be the fastest growing during the next five to seven years, not forgetting enzymes and bio-catalysts, which accounted for nearly 20 per cent of global sales – thanks to significant growth in bio-refineries that are now being evaluated by large European and African companies, and the increased importance of clean process chemicals for the industry.

The main characteristics that customers look for in process catalysts for both their existing and new units are:

- Longer catalyst cycle lengths
- Higher selectivity
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- Simple process scheme
- Feedstock processing flexibility

The catalyst market is defined by a high level of competition and this business requires a well-developed scientific and technical platform as well as long-term investment sources into innovative developments, R&D, testing and modification. Another core factor of competitiveness is a strong brand identity that secures product credibility.

We could also see a trend in cooperation in the catalyst business (as seen in engineering and construction globally) as numerous M&As over the past years aimed to strengthen and integrate the supplier activity structure of companies. To ensure global market positions, catalyst providers are developing partnerships with competitors, feedstock suppliers, consumers and independent R&D organisations – Haldor Topsøe has been one of the leaders in this area for many years.

The role of strategic alliances in stimulation of innovation activity is seen as positive as it allows partners to consolidate resources, exchange information and allocate risks efficiently. For instance, W.R. Grace & Co. founded a specialised company together with Chevron (ART) to develop hydroprocessing catalysts. Albemarle cooperated with Honeywell UOP on hydroprocessing catalysts, and with Axens – on isomerisation. The Criterion Catalysts brand has recently been merged into Shell Catalysts & Technologies and will support their licensed technologies both in-house and to external customers. They have been also working with Zeolyst International – feedstock suppliers, which is a wise strategic decision that is to bring long-term benefits to both parties (and BASF – the largest global chemical company – chose Sumitomo Metal Mining to optimise catalyst feedstock costs in the future).

It is critically important to be ready and flexible in regards to feedstock market volatility (especially metals used for catalyst manufacturing) and to supply tailored catalysts as a team with key clients to meet their specific project demands.

Effective catalyst management helps to reach higher levels of operational excellence, thus meeting margin improvement targets. A couple of cases prove this statement. ADNOC implemented a Refining Catalyst Management programme, where the objective was to optimise company catalyst inventory (5400 t, ~100 references) while reducing costs and improving performance. One of the main findings was spent catalyst treatment strategy:

- Disposal of spent catalyst means 5 per



Image Credit: Kai Voet van Vormzele/Flickr

Increased urbanisation has been a factor in the growing demand for refined hydrocarbon products.

cent additional cost (OPEX)

- Recycling – 5-10 per cent saving
- Reutilisation and reactivation – up to 75 per cent saving

Petronas put efforts into optimising Catalyst Bed to achieve best in class reliability performance; without disclosing technical details, we learned that they managed to increase process reliability of the hydrocracking complex consecutively from 91 per cent to 99 per cent in only three years and in parallel, decrease the amount of losses tenfold (from 10 kte and US\$10mn to 1/1, accordingly).

According to an analysis by hte, the possible margin increase via optimised catalyst system is significant:

Hydrocracking

- 1-2 per cent volume gain (basis 50,000 bbl/day)
- Margin uplift 10-15 \$/bbl
- As a result, up to \$5.25mn margin increase

Reforming

- One per cent volume gain (basis 40,000 bbl/day)
- Margin uplift 0.75-1.3 US\$/oct-bbl
- Up to US\$6.37 mn. margin increase

All the major refining catalyst manufacturers have opened representative offices and branches in strategic markets such as Asia and Middle East – this allows for close cooperation with clients, and optimising transportation outsourcing costs. Catalyst plants and catalytic technology R&D centres are not necessarily physically integrated into refining and petrochemical clusters, for the most part, catalyst manufacturing exists outside the territories. Some countries are implementing catalyst import substitution programmes – Chinese suppliers are active not exclusively inside the country, but in adjacent markets, seeking partnerships with downstream companies. A strategic market

for them is Russia, which now has Chinese investments in several leading O&G integrated companies (i.e. SIBUR). We expect to see China entering the catalyst market in Russia, which is now mainly dominated by nine leading international suppliers (Axens, ART/Grace, ExxonMobil, Albemarle, BASF, Shell, UOP, Haldor Topsoe and Johnson Matthey) – for major refining processes, the share of import catalyst varies from around 50 to 90 per cent.

Russia plans to decrease this level via developing its own catalyst business. Unlike the global market, in Russia there are several small-scale independent plants that supply certain types of catalysts.

The size of the market itself is relatively small (by 2020 one-time catalyst charge at all local hydroprocessing units – more than 130 – will reach 21 ktons, and up to 2030 the growth is expected at a rate of around 25 per cent per annum). Russian majors Gazprom Neft and Rosneft, along with local catalyst company KNT Group plan to increase production of FCC, HD and isomerisation catalysts in the next few years, and some types have already been successfully tested and put into operation.

Catalyst suppliers can assist with optimising refining processes that deal with sour and high-viscosity crudes, but, there is no universal solution to avoid limitations, reach goals of asset integrity and revenue maximisation combined with budget savings (each configuration is different).

The viability of catalytic processes fully depends on the specific requirements of the customer and customising existing schemes to fit the project framework.

Today, we see that catalytic processes are the heart of all refineries and petrochemical complexes and that the developments and innovations in catalysts are helping to create a brighter future for the industry. ■



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Continuous inspection and maintenance programmes are vital.

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Improving hydrocarbon process safety

Matt Powell-Howard, NEBOSH head of strategy, looks at five key steps that organisations can take to improve hydrocarbon process safety, with inputs from qualified and experienced safety professionals.

WHEN YOU THINK about ‘safety’ it’s easy to think of simple steps that can be taken to prevent a reasonably foreseeable accident. For example, placing a guard on a machine to protect its operator or having clear separation of pedestrians from vehicle traffic. However, hydrocarbon process safety tends to be more complicated because of the potential for major catastrophic incidents.

So, developing a series of simple hydrocarbon safety steps is not straightforward. To help organisations make improvements I spoke to three qualified process safety practitioners from the oil and gas industries about what they believe are the key steps, in the broadest sense, to achieve better process safety management.

Step 1: Leadership

Jassim Darwish is safety, security, health

and environment manager at Bahrain’s Gulf Petrochemical Industries Company (GPIC), which contributes almost US\$300mn to the Kingdom’s economy every year. He said, “Leadership draws a path for the group; where to go, and how to do it. So it is crucial to have leaders raising the flag for safety and telling everyone to go in the right direction.

“Setting the safety culture isn’t limited to top management.”

“At the very top of GPIC we have the strongest advocate for safety,” Jassim added. “Our President, Dr Abdulrahman Jawaheryall, is a global ambassador for NEBOSH, and he

has greatly influenced our approach here. This has led to the achievement of international standards and more recently a chemical industry sector award from RoSPA for outstanding performance in health and safety. This of course inspires high level commitment to process safety and operational excellence from top management, positively influencing overall culture through engagement, stewardship and of course, accountability.”

A significant aspect of leadership is ensuring that process safety is adequately resourced from a human, financial and physical perspective. In other words, having the right people with the right skills and experience, suitable budgets and the correct equipment, infrastructure and facilities. While no operation can run on an unlimited level of resource, the financial consequences of hydrocarbon process safety failures must be considered.

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Step 2: Competence

Darwish went on to highlight the importance of a commitment to safety at all levels.

“Setting the safety culture isn’t limited to top management,” he explained. “It’s important to build trust and empower employees and contractors to share in and drive sustainable day-to-day behaviour and attitudes towards safety.”

Often this boils down to competence. Competence is a combination of practical and thinking skills, experience and knowledge. It results in a workforce that is able to take on responsibilities and carry out activities to a recognised standard. What is important is defining the process safety critical tasks which need to be performed that are routine, non-routine and emergency in nature. Examining these tasks, including the potential for human error, then looking at the required capabilities, should help to develop a competence management system for process safety.

“Establishing a competence management system supports recruitment, the identification of skills-gaps, training needs, overall ownership in emergency situations and of course, continuous improvement,” said Jassim.

Step 3: Management of change

Rustam Sadykov is health, safety, security and environmental (HSSE) lead with Shell in Qatar. Originally from Ufa in Russia, he holds a NEBOSH National Diploma in Occupational Health and Safety and has worked in process safety within the oil industry throughout Europe and the Middle East for more than 15 years. Rustam highlights that management of change is a critical aspect of hydrocarbon process safety.

“There have been several examples in our industry where not applying a management of change process has led to catastrophic events,” he said. “It may sound simple, but to manage change properly, it is important to realise there has been a change. Changes in process include changes to equipment, hardware, process control and process conditions. So, mechanical changes to the plant, its equipment or configuration, materials of construction, software systems, firefighting facilities and so on.

“The next step is ensuring all pertinent company personnel have been notified of any proposed change. Then it is a matter of validating and completing the change process documentation, identifying design flaws, health, safety, or environmental risks, business risks, consequences of the proposed change, specifics of documentation, communication and training requirements. There then needs to be a checkpoint for senior management to approve, stop or recycle the proposed change, and only then can the change be implemented through documented sign-off of both the change itself and the established controls.”



Oil and gas operations are by their nature hazardous.

Image Credit : wirthajai/Adobe Stock

Step 4: Risk management techniques

There are a range of techniques available for managing process risk, from the Health and Safety Executive’s (HSE) simple qualitative ‘five steps’ approach to the more technical HAZOP based approach; an advanced risk assessment first used by ICI in the 1960s. HAZOP involves a multi-disciplinary team of designers, engineers, safety professionals, operators and other specialists chaired by a HAZOP leader. It would be wrong to be prescriptive and say one technique, e.g. bowtie risk assessment, is better than another. Indeed, a mix of techniques is often adopted, depending on the type of process involved, its complexity and any number of other relevant factors.

“Asset management and maintenance work hand-in-hand for effective process safety.”

Muhammed Nasim P.M is a senior process safety engineer with global oil and gas consultancy and support services provider Applus+ Velosi (Velosi Asset Integrity division), based in Abu Dhabi, UAE. He is one of the most highly qualified and recognised process safety engineers in the region and was also amongst the first to take the NEBOSH HSE Certificate in Process Safety Management, launched in 2018.

He said, “I always recommend hierarchical risk management techniques where layers of protections are arranged in order of priorities.

“For example, I would start with prevention as top priority, to either completely remove the hazard or substitute it with something less hazardous. The next priority layer could be detection – using hydrocarbon detectors for example. Thirdly, I would focus on control, such as using engineering controls – emergency shutdown valves are a good example here – or administrative controls such as the Permit to Work system. Fourth level priority would be

mitigation, which could mean using active and passive fire protection devices. Then finally, emergency escape processes. This kind of hierarchical risk management technique ensures that hazards are well-managed, in my view.”

Being well-versed in a variety of risk management techniques is a crucial part of overall competence and is a significant area of study in its own right, he added.

Step 5: Asset management and maintenance

The final key step to improving hydrocarbon safety is all about equipment, plant and systems. Everything should be fit for purpose, which means considering design standards, technical information and legal requirements. Continuous inspection and maintenance programmes are vital to prevent incidents arising from damaged, worn or defective equipment.

Darwish commented, “Asset management and maintenance work hand-in-hand for effective process safety. Within maintenance, there are many programmes and initiatives to ensure reliability and safety. The main approach is to ensure jobs and repairs are carried out with reference to OEM (Original Equipment Manufacturer) and to standards. Maintenance programmes such as PM (Preventive Maintenance), CM (Condition Monitoring), PdM (Predictive Maintenance), RCM (Reliability Centred Maintenance) and others help to optimise maintenance cost and effectiveness. Housekeeping is another crucial factor for early identification of hazards. Inspection regimes and RBI (Risk Based Inspection) programmes are important inputs for life assessment and reliability and need to be taken seriously.”

Hydrocarbon process safety is a comprehensive subject. In truth, it is impossible to tackle it in just a few stages, but following these five key steps is a great starting point. ■

The NEBOSH HSE Certificate in Process Safety Management covers the issues discussed in greater detail and more, and is designed not just for health and safety personnel, but for anyone working in the process industries. For further information, see the website at www.nebosh.org.uk.



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Transforming safety with technology

The latest flame and gas detection devices typically offer the ability to log performance and environmental data. However, translating that into tangible learnings is not always easy.

IMPROVING SAFETY IS not just about reducing workplace risks within industrial and process environments; it's also about safeguarding neighbouring communities. Matt DeLorenzo, business director for Safety.io, an MSA Safety company, explains how technology is improving safety by transforming the way safety devices are managed, and how operator safety is monitored while at work.

Improvements in safety, both in practice and equipment, have essentially always stemmed from one thing: the availability of good information. In the past, that learning was often observational, based on talking to individuals, or derived from scrutiny or analysis of historic written and pictorial hard copy records.

Today, thanks to the advances in digital data capture and recording by sensors and devices, information is a commodity that is not in short supply. The seamless connectivity driving the Internet of Things is already touching workplaces globally. The latest flame and gas detection devices typically offer the ability to log performance and environmental data. But translating that into tangible learnings is not always easy.

The Big Data challenge

Processing and intelligently analysing large data volumes, particularly when gathered from “real-time” streams, is now one of the safety industry's biggest challenges. For data to be meaningful, it has to provide real insight. That starts with being able to automatically detect, highlight, interrogate and share those events that are most relevant and significant to the operation of a device, or the ability of an operative to complete his or her work safely.

Recent advancements of AI-enabled automated reporting tools allow safety managers to look beyond just managing safety compliance towards changing how workplace safety really works. The ability to analyse and review historic logged data and extract actionable information to reduce risk and improve workplace safety, is transformative.

Insight to plan ahead

Data analysis and proactive maintenance can help to streamline the day-to-day monitoring of equipment, eliminate potential risk of human error, and free up time for safety managers to concentrate on driving meaningful behavioural safety improvements. Automatic notifications, for instance, can highlight when equipment components are likely to



Image Credit : Safety.io

Data streaming can provide safety controllers with situational awareness, physical status and the ability for workers to issue alarms.

require maintenance or replacement, allowing pre-emptive action. Worker safety is improved, and costly downtime or operational delays minimised.

Gas detectors, for example, rely on sensors that have a finite lifetime. Analysis of usage data can automatically highlight that a sensor's end-of-life is approaching, and a replacement should be ordered. Similarly, correct detector operation is verified by using bottled gas testers before use. If the gas runs out, detectors cannot be tested. Safety protocol dictates that operatives cannot work. Yet by providing automated alerts about remaining capacity, spare cylinders can be ordered in good time. The ability to instantly track equipment and its location digitally, without resorting to lists on clipboards, also offers significant savings in time and loss of assets.

An essential record

Historically, daily data would remain on each device and be routinely overwritten, unless an event prompted a sporadic download, or a written report. Today, maintaining historic central archives of detection device data – sometimes spanning decades – provides companies with an invaluable record. Any exposure incidents or toxic breaches can be thoroughly analysed and documented.

For workers, the advent of real-time monitoring during operations via live feeds is revolutionising safety. Data streaming can provide safety controllers and colleagues with situational awareness, physical status

“ Processing and analysing large data volumes are some of the safety industry's major challenges.”

and the ability for workers to issue individual or team evacuation alarms and even mobilise first responders should a situation arise.

Engineering value, not innovation, first

Developing next-generation safety technology is of course hugely dependent on innovation, but truly listening to and understanding customer needs and feedback to engineer the necessary hardware and software functionality is of equal importance. It is by listening carefully to customers’ feedback and applying those learnings in an innovative way that produces next-generation safety technology.

Adoption will stand or fall on the ability of solutions to add value to multiple stakeholders without completely changing the way safety management and procedures work. Seamless integration and easy, intuitive operation only comes from extended testing by everyone involved – from safety managers to supervisors to operatives. Of course, innovation is meaningless unless the underlying outcome offers a real-world, practical benefit.

Expect the best

There is no doubt that technological advances are having huge impact

“Data analysis and proactive maintenance can drive meaningful behavioural safety improvements.”



Image Credit : Safety io

Technological advances are revolutionising worker safety.

on the world as a whole. All things considered, the health and safety industry should embrace the opportunities new technologies provide to keep workers connected, thus providing an additional layer of safety through technology.

MSA’s mantra is certainly to encourage the industry to ‘expect more’ from gas detection programmes. The whole reason behind the creation of Safety io is to pioneer technology advancements, with the ultimate goal of improving decision making, reinforcing best practices and pursuing a safety-first, injury free workforce. It’s too good an opportunity to miss. ■



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Maintaining ageing assets with the aid of technology



Image Credit : Jim/Adobe Stock

Asset integrity is critical for profitability and reliability.

MAINTAINING THE INTEGRITY of assets throughout the energy sector – from entire rigs and pipelines, to parts and other components – is integral to profitability and reliability. It is also a crucial determinant of safety.

This area has come under increased scrutiny in recent years amid cost-cutting measures in the wake of subdued oil prices. It becomes especially significant in ageing oil and gas assets, both onshore and offshore, where production has been ongoing possibly for several decades.

A recent whitepaper from DNV GL entitled ‘The State of Safety’ notes that almost half of senior industry professionals believe that too little has been invested in safety in recent years. Despite this, less than a third intended to increase safety spending, at least during 2018. The paper also reports that less than four in 10 professionals reckon safety management is effective and does not need to change. In a climate where firms are under heightened scrutiny to avoid accidents and near misses, yet where budgets are squeezed, it is a problem. While there are regional variations in spending, almost half of the respondents agree that the industry has invested too little in inspection and maintenance of installations and equipment in recent years.

One solution, however, is the increased use of technology and digitalisation, which may help to compensate for human error. In the same paper, 40 per cent of respondents in the survey, said that digital tools and technologies had already improved safety over the past few years, even where cutbacks had been widespread. Going forward, this seems to be an area where there is a strong consensus view, in terms of boosting asset maintenance and safety: three quarters of respondents in the whitepaper reported that they planned to invest more in the area of digitalisation.

Oil and gas firms have long produced large amounts of data, but new digital technologies are now helping to use this beyond mere reporting compliance, and to provide critical insight that helps the industry better understand potential hazards and to make decisions. Despite the increased use of digital tools and technology to monitor assets, there remains a potential gap as the industry recovers from the oil price collapse some years ago.

“There is always a lag between periods of underinvestment and any associated safety impact,” notes Graham Bennett, vice president, DNV GL – Oil & Gas. The greater shift to technology presents a clear direction to recover lost ground. Where the industry has traditionally relied on mechanical and hydraulic safety barriers, it seems it may increasingly rely on more efficient and cost-effective digital barriers in the future.

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Shaping a safer work environment with innovation

Desert areas have specific fire protection needs, which can be addressed with technological solutions.

Image Credit : Bureau of Land Management/Flickr

The latest fire protection technology for oil and gas operators seeks to make the industry a secure place to work, and it is bringing in some heavyweight backers. Martin Clark reports.

MANY OF THE risks facing operators today are the same all across the world — they include fire. In any oil and gas industry setting, from downstream petrochemical sites to offshore drilling platforms — from Africa to the Americas — this is one of the single greatest threats.

Fire protection technology continues to evolve, however, to create a safer working environment for employees, from protective suits and breathing apparatus to fire fighting equipment, bringing with it new standards and higher performance.

And, as big a threat as fire is to the safety of oil and gas operations, it is also big business.

The global fire safety systems market is expected to grow at more than 7.5 per cent a

year through to 2024, one market research report stated recently.

Similarly, it is an area that is being supported by some powerful allies, including a number of US government departments and agencies.

One US-based company, HMA Fire, says it has developed a “better way to fight fires” using an ultra-high pressure water system.

Ultra high pressure is defined by the National Fire Protection Agency in the US as pump pressures above 1100 psi.

The firm’s origins date back to working alongside space agency NASA, developing propulsion systems which resulted in a greater understanding of high pressure fluid flows through nozzles dealing with extremely high temperatures and rapid cooling.

HMA Fire says by flowing water at these

pressures, 10 times the surface area is created by breaking down conventional water droplets into 64 smaller droplets allowing for at least a fifth of the water usage.

While that might not be an issue offshore where water is abundant, it could be critical in hot, desert-like environments.

Smaller droplets, the firm says, equals a bigger outcome: the greater surface area means more contact with the fire and more efficient heat absorption.

When the water droplet absorbs heat, it converts to steam, displacing oxygen, removing heat from the superheated environment and extinguishing the fire.

The company continues to be at the forefront of developing technologies and apparatus that make fighting fires safer and more efficient, with potential ramifications for the oil and gas sector and indeed many other industries.

The US Department of Defence (DoD) is also funding research into fire fighting which could, in time, yield technologies that benefit the oil and gas industry.

The DoD is currently exploring fluorine-free firefighting foam and alternatives to aqueous film-forming foam (known as AFFF) — a foam

“The global fire safety systems market is expected to grow at more than 7.5 per cent a year through to 2024, one market research report stated recently.”

Image Credit : John Fowler/Flickr



Fire will always be a risk on oil and gas rigs, but it can be reduced.

that quickly extinguishes fuel fires on ships and airplanes — because of concerns about adverse health effects.

AFFF is typically used as part of fire suppression systems and in emergency responses at chemical plants, oil refineries and rigs as well as in aviation operations. The DoD says there are concerns that the fluorine in these chemicals may have adverse health and environmental effects, so is seeking new technologies that can do the job without fluorine.

“MSA Safety Incorporated has unveiled LUNAR — a small, wireless, cloud-ready device designed to provide higher levels of protection for firefighters”

Technology is being used in other ways too to improve firefighting response. Another US tech pioneer, MSA Safety Incorporated, recently unveiled LUNAR — a small, wireless, cloud-ready device designed to provide higher levels of protection for firefighters through enhanced vision, improved situational awareness and connectivity.

It includes features such as person-to-person ranging, which enables firefighters to find each other using distance and directional data, even when one may be incapacitated,

GPS location, and personal thermal imaging. Nish Vartanian, the firm’s president, says the goal is to improve the notion of the ‘Connected Firefighter’ through technology and R&D.

While fire will never cease to be a threat on any rig or other oil installation there is a huge movement to improve firefighting technology aimed at keeping everyone safe. ■



Image Credit : MSA Safety

LUNAR is a wireless, handheld device that includes thermal imaging, firefighter ranging, motion alarm and cloud technology with GPS.

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Driving digital transformation with Oil & Gas 4.0

“To boldly go where no-one has gone before”. The Star Trek mantra aptly sums up the digital transformation journey of the Abu Dhabi National Oil Company (ADNOC), the cornerstone of which is its futuristic Panorama Digital Command Centre.



Image Credit : ADNOC

ADNOC's Panorama Digital Command Centre.

THE UAE HAS been a global leader in harnessing Fourth Industrial Revolution technologies. And nowhere have the opportunities of the Fourth Industrial Revolution been more wholeheartedly embraced than at ADNOC, which brings cutting edge Industry 4.0 technologies into the oil and gas domain in a concept it terms Oil & Gas 4.0.

Speaking at the AVEVA World Summit held in Singapore in September on ADNOC's digital transformation story, Abdul Nasser Al Mughairbi, ADNOC's SVP Digital, described how ADNOC is using big data technologies, artificial intelligence (AI), IIOT and advanced visualisation to help extract maximum value from its assets and resources and achieve its business and operational targets.

Al Mughairbi explained that driving ADNOC's digital transformation was its “visionary” CEO, H.E. Dr. Sultan Ahmed Al Jaber. The gateway to the company's digital transformation, the state-of-the-art Panorama

Digital Command Centre, was the brainchild of Al Jaber in his quest for a ‘single version of the truth’.

Based on AVEVA technology, Panorama is a unified operations centre featuring around 200 dashboards from which unified real-time data across ADNOC's entire value chain is available on a single platform, captured, analysed and incorporated into decision making. It enables ADNOC to gain insights, unlock efficiencies, and identify new pathways to optimise performance.

Panorama uses AVEVA's System Platform

and InTouch Operations Management Interface (OMI) as the foundation of the display, enabling integration across various ERP, business and IT applications and providing actionable insights. AVEVA's Unified Supply Chain Management solution enables complete value chain optimisation to improve collaboration, efficiency and profitability, while its Predictive Asset Analytics solution empowers the team to reduce unscheduled downtime and prevent costly equipment failures.

Paradigm shift

Al Mughairbi pointed out that ADNOC produces three million bpd of oil and 9.8bn scf gas/day and comprises a group of 14 integrated companies operating across the hydrocarbon value chain.

“ADNOC's operations across the entire value chain are vast and varied, and the Panorama Digital Command Centre gives us unified live data access across all our

“ The ability to visualise everything in one location opened up a whole new world for us.”

- ☛ Oil Spill Response Services & Training Centre (OSRC)
- ☛ Hazardous & Noxious Substances (HNS) Spill Response Services & Training Center



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Safety Equipment Services



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HNS Spill Response



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operations and business units," he said. "Modelling, simulations and analytics have also allowed ADNOC to drive greater production efficiencies across the board." More than 200,000 data points have been brought into the location, he noted.

"For the first time, ADNOC had a full report of its production – oil, gas and petrochemicals, refined products, a full infantry including how much we have above ground, not just in our storage facilities in the UAE, but also in India and Japan.

"The ability to visualise everything in one location and be able to know in real time what's happening everywhere, using data analytics and AI to predict 'What if?', that really brought a shift in our organisation and opened up a whole new world for us.

"It took us into an era when all of a sudden visibility was there. Data is now available to everyone in real time, with access on their mobiles as well. The production of Bu Hasa, one of the most remote plants in the desert, is now visible. Flaring is now visible. Energy consumption is visible, KPIs are visible.

"This visibility and transparency are important, because that's the cultural shift we are looking for, with everything out in the

open. It created a paradigm shift in our culture and digital transformation."

It also had the effect of getting ADNOC's management and people buying into the digital transformation journey, he added, and stimulating new ideas from the ADNOC team as well as from visitors to the centre. This is critical, as Oil and Gas 4.0 is not centred around technology alone – it is also centred around people, he pointed out.

"It's about how we adopt the technology, how we get our people to get involved in this journey, adopt this technology, use it, trust it, work with it. It's about using technology to solve our problems and bring our people along with us."

Discussing how ADNOC's operations are being transformed, Al Mughairbi was keen to stress that digitalisation is not an end in itself, but an integral part of ADNOC's business strategy.

"Adapting technology means changing the way you work. Unless I change the way I work, I have not made use of this technology, not impacted my bottom line. We cannot control oil prices, cannot control the market, but we can control our costs, our efficiency, the way we work and do business. That is


how digital is helping us as part of the overall ADNOC business strategy. So digital is not an independent strategy within ADNOC – it fits under the banner of the UAE vision, the company vision and the company strategy for the next 20 years or so.

"The journey has just started. The first part of the journey was bringing everything together. All the information in one location and visualising it. That was critical. It brought a paradigm shift in understanding of the information flow within ADNOC. It started breaking the silos. Now we are working in a more collaborative environment, rather than in step by step processes, so it speeds up things.

"We are supporting the business to take the right decisions, supporting them with information and with technology. We see digital and AI helping to create the workforce of the future, which will allow information to be delivered at the right time to the right person to support their decisions and actions."

He continued, "We're using data and machine learning to optimise production, improve efficiency, reduce risk and de-risk multibillion dollar projects."

One of the areas where a significant




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impact has been seen is in predictive maintenance, where ADNOC has one of the largest predictive maintenance platforms in the world. “We have more than 10 million tags, or sensors, around our facilities,” Al Mughairbi said. The predictive maintenance platform will host more than 700 compressors.

HSE has also been a focus. “HSE is in our DNA,” stresses Al Mughairbi. “With the implementation of the health, safety and environment management system, we saw the shift from personal safety to process safety to overall environmental awareness, and ADNOC has been going through regular transformation in this regard. So with our digital transformation we are focusing on enhancing our safety and putting a predictive element into behavioural safety, understanding the behaviour of people and the end result. Ninety per cent of all incidents are a result of human error. Even if there is a failure in the processes or systems, it all comes down to the human factor.”

ADNOC uses multiple technologies to support health and safety, and Al Mughairbi sees potential for increased use of augmented reality training programmes in the future.



Image Credit : ADNOC

Abdul Nasser Al Mughairbi, SVP Digital, ADNOC.

“We use a lot of cameras and sensors to monitor plants, and now we are using cameras and computer vision to do some concepts on how to predict behaviours, for security and HSE,” he said.

Another groundbreaking application is the

use of blockchain for hydrocarbon accounting and speeding up transactions, Al Mughairbi noted, pointing out that ADNOC companies interchange products continuously on a daily basis.

“Now, people know exactly how much product has gone from one company to another, in real time, and there is no need for verification because it is there on blockchain,” he said. This raises interesting possibilities. “Can we track a module of hydrocarbons from the wellhead to the customer? Can we stamp it with its carbon footprint, its HSE record, can we verify its quality? That’s just the beginning. A lot of new ideas are being generated as people come to Panorama to see how it is working.

“Digital transformation is a continuous process, and the road is still ahead. There is no end to the journey, there is no end to efficiency or optimisation, there is always something more to do.

“When we built Panorama, it took ADNOC to a place where no company has gone before. We are charting new territories. ADNOC is a beacon of technology and advancement in the UAE, which we want to continue to be,” Al Mughairbi concluded. ■

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Flow assurance issues are a major issue in offshore developments.

Image Credit : Kovalenko / Adobe Stock

Tackling flow assurance challenges



Image Credit : Dragon Oil

Dr. Amir Alwazzan, production assurance & technology advisor at Dragon Oil (an ENOC Company), discusses flow assurance issues and how to tackle them.

What is flow assurance and what does it entail?

Flow assurance is an engineering discipline that utilises in-depth knowledge of several discrete science and engineering subjects to ensure safe, reliable and economic production operations.

Flow assurance domains cover the entire journey of produced fluids from pore to port to evade production impediments caused by either production chemistry and/or thermal-hydraulic behaviours of the produced fluids.

“ In several cases, late identification of flow assurance issues has resulted in a complete halt in production.”

Flow assurance engineering is based on a holistic approach, bridging a wide gamut of engineering disciplines, and encompasses several specialised subjects.

Why do flow assurance incidents occur?

Production impediments caused by flow assurance-related issues have long been identified in both onshore and offshore developments. Welling & Associates conducted a survey in the early 1990s in which more than 100 oil and gas companies concurred that flow assurance-related issues are the major technical problem in offshore developments.

Incidents take place due to one or more flow assurance issues. For example, solids' deposition may cause severe reduction in production or even a complete halt due to partial or complete clog of the stream. Other issues, such as severe slugging, emulsion and scale deposition, could cause process upset

Dr. Amir Alwazzan, production assurance & technology advisor at Dragon Oil.

and/or complete shut in of receiving and processing facilities. Shortfalls and drawbacks in the deliverability of the production system are the consequences of inadequate flow assurance engineering and analyses. These issues could also affect the mechanical integrity of the production system in different ways, such as erosion, corrosion, vibration, rupture and collapse of flowlines.

Such incidents take place due to one or more of the following:

- Lack of proper planning to integrate the flow assurance process into field development activities during the early phases of projects. Such plans leave no option to operators but to adapt reactive modes to combat emerging Flow

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Assurance issues, leading to higher CAPEX and OPEX expenditures. In several cases, late identification of flow assurance issues has resulted in a complete halt in production;

- Absence of sufficient understanding of the nature, properties and behaviour of produced fluids under different conditions. This could be attributed to lack of reliable data due to improper samples/lab analyses, fast-track analyses (ignoring key parameters) or utilisation of inexperienced teams;
- Incorrect risk analysis while operating the production systems. Human errors, logistical constraints and severe limitations caused by harsh environments are the main culprits. For example, operators who need to maintain high production profiles may cross some of the red lines set in the operability envelope to avoid production interruption.

How can flow assurance-related technologies help to tackle complex issues and enhance production?

Flow assurance technologies can be classified as per the nature of their introduced solutions. For example, to prevent and/or mitigate issues caused by low temperatures, e.g. wax and hydrates, the focus is on the advancements in thermal solutions (passive and active). The provision of these solutions is essential to ensure clog-free flow, minimise down-time and optimise CAPEX and OPEX costs.

Passive thermal technologies include dry and wet insulations, trenching, Pipe-in-Pipe (PiP), vacuum insulation and Thin Film Multi-Layer (TFML) insulation, while active thermal solutions consist of Direct Electrical Heating (DEH) and Bundle Hybrid Offset Riser (BHOR). Some of these techniques, like thermal insulations, are mature and have been successfully deployed in several developments worldwide. Other technologies, such as the Electrically Heat-Traced Flowline (EHTF) are being introduced with promising outcomes but still have room for optimisation. API RP 17N is the industry's reference to identify the Technology Readiness Level (TRL) of any of these technologies.

Generally, state-of-the-art technologies in real time data acquisition, lab analyses, software capabilities, chemical and non-chemical solutions and hardware (multiphase separation/processing/boosting, SURF and pigging) are key enablers for flow assurance engineers to precisely and promptly identify potential issues and to develop the most efficient design and management strategies.

The above said, deployment of new technologies in ageing fields may turn out to be a real challenge, mainly due to constraints and limitations in the existing infrastructure and facilities. To combat this challenge and achieve development objectives, operators need to

foster innovation to transform their facilities and operating strategies to resilient status and to promote feasible industrialisation.

How would the flow assurance discipline benefit from today's trend towards digitalisation and AI?

As a dynamic business, the oil and gas industry has grown and been shaped based on advances in technology. Fourth Industrial Revolution technologies are being leveraged in this industry fairly well with promising outcomes to return to the era of superior returns.

However, the prolonged and sharp drop in oil prices crises which started in 2014 has forced the industry to initiate some different concepts to optimise cost. Some of these concepts included reducing the stringency and strictness of flow assurance requirements and design. This has raised the flag within the flow assurance community on the necessity to develop alternative trustworthy approach(es) to maintain the integrity of production systems.

Given it is all about data and this discipline has evolved from using qualitative guidelines to exploiting quantitative practices, digitalisation, clouding, AI, machine learning and autonomous machines will provide a great platform for flow assurance engineers to adapt risk-based decision concepts rather than conventional techniques. These technologies will spearhead a revolutionary transformation in data science, resulting in a higher level of consistency, accuracy and cross-correlation of data needed to make more informative and robust decisions. This approach is a key enabler to increase confidence in expanding the operability envelopes of the fields, extending the nature and range of feasible technical solutions and, consequently, optimising cost without jeopardising the efficiency and integrity of production systems. Data-driven management strategies can also reduce the HSE impact on production systems.

Needless to say, oil and gas companies have to adjust their cultures, philosophies and mindsets to get "acclimatised" to the rapid advancements and to the potential of technological disruptions.

How important is collaboration between service companies and operators for effective development, qualification and deployment of new technologies?

Service companies and technology providers are our partners in our campaign for growth and sustainability. These enterprises are driven by developing innovative technical solutions to resolve the emerging difficulties being faced by their clients (operators). Their proprietary technologies and know-how capabilities should be feasible and reliable to achieve both economical and technical success. This trend is not risk-free, especially in today's stubborn

“ It is imperative for technology providers and operators to develop a new form of partnership.”

relatively low oil price environment. Therefore, it is imperative for technology providers and operators to develop a new form of partnership and integration across the supply chain to share risk and optimise projects. This partnership should be based on achieving the desired recovery improvement, not cost "squeezing". Furthermore, most operators prefer to have turnkey solutions for their technical difficulties rather than "modularising" them. This should motivate and drive service providers for more collaboration (and probably amalgamation) among themselves.

What role can academia-industry collaboration play in attracting talented engineers to the industry?

One of the direct consequences of the recent downturn in the oil and gas industry is that many talented students and graduates have turned away from petroleum courses and industry. Understanding the differences in mindsets, interaction and ushering in collaboration between academia and industry are indispensable to overcome this serious challenge. Joint projects among academia/governments/industry, research consortia, R&D centres of excellence and internship/scholarship/sponsorship programmes all are vital initiatives to prepare and qualify the new generation of industry professionals. These initiatives can unleash enormous value for all parties and provide examples of how to advance innovative technology development and qualification. There are good leads here in the MENA region, but we still have long way to go to reach our ultimate objectives. ■

Dr. Amir Alwazzan has more than 30 years of corporate, technical and managerial experience acquired through working for different E&P, services and EPCI companies and academia at different locations worldwide. He authored and co-authored 24 technical papers and has been serving as a technical reviewer of two International Journals in the field of Petroleum Engineering, Science and Technology. Dr. Alwazzan is a Chartered Engineer accredited by the Energy Institute and the UK Engineering Council and a registered EUR-ING with FEANI. He holds a PhD degree in Transient Multiphase Flow from the University of Malaya and MSc and BSc in Petroleum Engineering from Baghdad University.



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Reforms were brought in to counter the practice of dumping drilling waste into the sea.

Addressing the challenge of drilling waste

Image Credit : Mike Mareen / Adobe Stock

Robbie Pond and Pierre-Marie Hinden, TWMA, describe how the company's technology to process and recycle drill cuttings at source has delivered tangible cost savings, exceeded environmental regulations and helped to optimise drilling programmes.

IN THE MID-1990S the UK government introduced regulatory reforms for offshore discharges through the OSPAR agreement, where 15 governments and the EU cooperate to protect the marine environment of the North-East Atlantic.

These reforms were brought in to counter the practice of dumping all drilling waste into the sea or legs of the platforms. It was estimated that there was as much as 80,000Mt per annum of Non-Aqueous Drilling Fluid (NAF) drilling waste disposed of in this way since North Sea drilling began.

This legacy disposal is considered a massive financial burden on the operators, who bear the cost of removing the drill cuttings piles or paying significant penalties if that is not possible during the decommissioning phase in the project lifecycle.

Technological development

Working in partnership with a major international oil operator, TWMA commenced a joint development programme to develop, evaluate and commercialise equipment to treat NAF drill cuttings and comply with the targets outlined in the OSPAR convention.

TWMA selected an existing principal, the Thermomechanical Cuttings Cleaner (TCC)

and commenced development of the technology. This formed a key part of a fully integrated offshore processing system to include collection, transfer storage and treatment of NAF drill cuttings. By removing the hydrocarbon content on cuttings to below one per cent, the cuttings can be discharged at source while recovering the valuable base oil for re-use in fresh drilling mud.

“By removing the hydrocarbon content on cuttings to below one per cent, the cuttings can be discharged at source.”

Once the concept had been field-proven and commercialised onshore, the next stage of development was to engineer a system capable of being situated directly on an offshore installation. The key elements were to meet and exceed <1 per cent hydrocarbon on drill cuttings, modularisation of the plant, weight and footprint, meet zoning requirements and achieve processing throughput in line with drill

cuttings generation rates.

Most importantly there were to be no emissions from the process to the atmosphere, and the recovered oil would be suitable for reuse in the active drilling fluids.

From operation of the first unit, which provided 132kW power into the mill chamber and achieved a throughput of up to 0.75Mt per hour, continual development has led to the present day situation whereby TWMA designs, manufactures, owns and operates a fleet of units. These units can deliver power up to 1400kW, achieving field proven throughput of 10Mt per hour of drill cuttings.

The units have been deployed in contrasting geographical locations, including remote operating sites on land and sea, with varying temperatures from -15°C in North Dakota to 55°C in Abu Dhabi with 100 per cent humidity.

The thermal processing technology

TWMA utilises its TCC RotoMill technology for the recovery of the base oil within the NAF drill cuttings, allowing the recovered solids and water to be disposed of at source (subject to each country's own regulations and legislation). The TCC RotoMill constitutes Best Available Technology (BAT) and Best

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Environmental Practice (BEP) for the treatment of NAF drill cuttings.

The technology uses a cylindrical mill that grinds a bed of solids within the mill chamber, causing kinetic energy creating heat through friction. Once the mill reaches a pre-determined temperature set to suit the evaporation properties of the particular base oil in use, the NAF drill cuttings are fed into the chamber causing the liquids (hydrocarbon and water) to flash evaporate from the solids.

The resulting gases then exit the mill and pass through a cyclone, where any fine solids particles are removed prior to gases travelling to the oil and steam condensers respectively, before the liquids are recovered as base oil and water from the condensers. Solids are collected from the mill and cyclone during the process and disposed of along with the recovered in accordance to local legislation.

The TCC RotoMill is fed using a hydraulically operated positive displacement piston pump, into the mill process chamber. This transfer is always controlled by the TCC RotoMill PLC control system to ensure that the optimum conditions are maintained throughout the process. The PLC monitors and regulates critical temperatures and pressures using data from temperature thermocouples and pressure transducers, ensuring an even process flow. The control system also stores historic trends from the process, for reporting and evaluation.

The throughput of the TCC RotoMill is proportional to the amount of energy that is imparted into the bed of solids within the mill chamber. The more energy applied to the solids, the greater volume of liquid content is evaporated. This in turn increases the throughput of the NAF drill cuttings. Throughput is also governed by the physical properties of the NAF drill cuttings such as the oil/water/solids ratio, rock formation type and temperature of the feed material.

The TCC RotoMill produces three distinct outputs:

Oil - The recovered hydrocarbon is the base oil which is reused in the drilling fluid system, as it retains the physical properties found in the original drilling mud due to the pre-determined temperature within the mill chamber.

Water - The recovered water is discharged at less than 30ppm and is typically <20ppm hydrocarbon content, although can be reduced further if required for discharge purposes. The water is mixed with the solids and discharged of in line with local legislative requirements.

Solids - The recovered solids have a hydrocarbon content of less than one per cent and typically less than 0.1 per cent. These solids are disposed of in line with local legislative requirements.

Middle East deployment

While considering options as part of the planning process for a new field, a full review of drilling



A Middle East operator engaged with TWMA for a fully integrated drilling waste management programme.

Image Credit : TWMA

waste management options was considered by a Middle East operator to evaluate the best method of collecting, transporting, storing and treating all drilling waste.

Through the Environmental Impact Assessment (EIA), the directive was to achieve a drilling programme which discharged zero material to sea. The decision was taken to use cuttings reinjection (CRI) and drill dedicated disposal wells for the sole use of receiving drilling waste, which once full would be capped.

It was decided to complement CRI and treat the NAF drill cuttings prior to re-injection to eliminate their long-term environmental liability exposure and extract the valuable base oil from the drill cuttings.

The operator engaged with TWMA to engineer a fully integrated drilling waste management programme which covered all elements of collection, transportation, segregation and treatment of the drilling waste generated offshore.

“ All drilling waste was contained and processed on-site.”

TWMA installed four TCC RotoMill units to treat the volume of NAF drill cuttings produced. It was designed and specified for this project to segregate and treat the drilling waste accordingly prior to compliant material being transferred to the cuttings re-injection phase.

All drilling waste was contained and processed on-site, which eliminated the logistical and operating costs, efforts and risks related to transferring the drilling waste offsite.

Since installation, TWMA has successfully collected, transported and stored over 1.4mn bbl of drilling waste using its cuttings handling system across the field, using equipment and processes designed and engineered in-house.

The remaining hydrocarbon on solids

during that time has been on average approximately 0.15 per cent by weight, which is significantly lower than the one per cent requirement that the operator had stipulated. On average, the hydrocarbon content of the recovered water is 20ppm, which again is well within the 300ppm stipulated discharge limits.

By collecting, transporting, processing and disposing of all drilling waste on-site, TWMA has diverted significant volumes from onshore disposal routes. The total volume of inert re-injected material since project inception has been 3.070m bbl (including seawater overflush).

During the six-year campaign, the TCC RotoMill has recovered 94,701 bbl of base oil with an estimated recovery value of US\$12,677,450, reducing the fluids spend for the operator by the same amount.

Conclusions

All drilling waste generated from the field, one of the largest in the world, has been successfully collected, transferred, stored and processed, further validating the application of the TCC RotoMill technology as an integral part of a fully integrated drilling waste management programme.

The US\$12.7mn value in recovered base oil shows tangible cost saving on fluids spend through effective recovery. Environmentally, the project has achieved the aim of meeting and exceeding the environmental regulations set out by the operator.

There has been no mainstream drilling waste sent for disposal or landfill, and the operator has been able to optimise its drilling programme by avoiding potential rig non-productive-time (NPT) caused as a knock on effect to logistical challenges to remove the drilling returns from the site, such as vessel or trucking delays.

The results from this project have demonstrated that using an integrated, at source solution to treat drilling waste is not only viable, but also highly successful. Tangible cost savings, exceeding environmental regulations and optimising the drilling programme have contributed to this success. ■

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Corrosion monitoring solutions for efficiency & profitability

Global research and consulting firm Frost & Sullivan highlights some trends in the corrosion monitoring solutions market.

CORROSION MONITORING PLAYS a vital role in a number of industries, assisting in raising productivity and decreasing downtime. More than 80 per cent of the total corrosion monitoring market revenue is derived from the oil and gas industry. The Middle East is an important market, and there are significant growth opportunities in the region, with Saudi Arabia and the UAE the most important markets for both intrusive and non-intrusive corrosion monitoring. Given that the investment in oil and gas infrastructure has decreased significantly, there is an opportunity for corrosion monitoring solutions companies to leverage.

Within oil and gas, downstream oil and gas is the largest segment, followed by the upstream and midstream segments. Midstream infrastructure such as pipelines both onshore and offshore; pipelines that connect oil wells with the gathering station or the tank battery, along with the transmission lines connecting the gathering stations to the refineries and distribution lines are monitored on a continuous basis.

“A clear shift to non-intrusive techniques has been witnessed.”

Monitoring is also critical in downstream infrastructure. In the downstream segment, non-intrusive corrosion monitoring is also being used for process control and to



Oil and gas pipelines are prone to corrosion.

Image Credit : Shutterstock

increase profitability of operations. The feedstock used in refineries and petrochemical complexes can be extremely corrosive in nature. The cheaper the cost of feedstock, the higher is its corrosivity. Non-intrusive corrosion monitoring can be used to assess the corrosion of a pipe for a particular grade of feedstock. As a result, refineries can run a lower grade of feedstock if their pipes can handle corrosion and thus can increase profit margins significantly.

In the upstream segment there are applications for corrosion monitoring in risers, floating production, storage, and offloading (FPSOs), subsea pipelines, and offshore platforms. This segment is expected to grow at a healthy rate of around 20 per cent in the next few years in the Middle East.

Globally, the revenue for intrusive and non-intrusive corrosion monitoring market is

estimated at 60:40. Due to the inherent disadvantages related to safety in intrusive corrosion monitoring, a clear shift to non-intrusive corrosion monitoring techniques has been witnessed, and the trend is expected to reverse.

Non-intrusive corrosion monitoring and its benefits

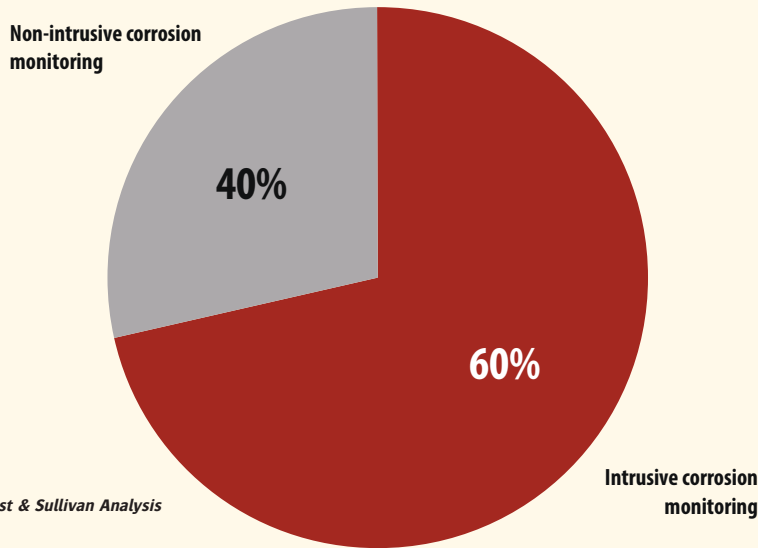
Some of the driving factors for corrosion monitoring are as follows:

- Maximising the profitability of existing assets is expected to increase the demand for corrosion monitoring solutions
- The need for high efficiency and longevity for corrosion-related assets has triggered the need for continuous monitoring rather than the traditional testing methods
- Increasing awareness about corrosion monitoring driven by high-profile corrosion-

Table 1: Adoption of non-intrusive corrosion monitoring and its benefits

	Intrusive	Non-Intrusive
Primary needs	<ul style="list-style-type: none"> • Increased safety of installation and operation • Enhanced data analysis software capabilities 	<ul style="list-style-type: none"> • Enhanced data analysis software capabilities • Reliability and resolution as no process data is collected
Price sensitivity	<ul style="list-style-type: none"> • High 	<ul style="list-style-type: none"> • Medium
Purchase influencers	<ul style="list-style-type: none"> • Hardware robustness • Brand equity • Cost of solution 	<ul style="list-style-type: none"> • Safety of installation and operation • Wireless capabilities • Scalable solution
Demand for innovation	<ul style="list-style-type: none"> • High for hardware, medium for software 	<ul style="list-style-type: none"> • High for hardware and for software

The non-intrusive corrosion monitoring solutions market vs. the intrusive corrosion monitoring solutions market



Source: Frost & Sullivan Analysis

Success factors

Some of the key success factors that Frost & Sullivan recommends to corrosion monitoring companies are the following:

Investment in new infrastructure projects, especially in the oil and gas industry, has taken a back seat globally, so end users are maximising profitability of existing assets, and corrosion monitoring companies can grow well

Clear shift from intrusive corrosion monitoring to non-intrusive corrosion monitoring solutions, so solution providers should focus more on non-intrusive solutions

Progression from periodic testing to continuous monitoring, which is taking place in the oil and gas industry and will also be witnessed in other industries, such as power generation, pulp and paper, and mining. Solution providers should focus more on these industries

Vendors should have a strong presence to provide support on new techniques

Corrosion monitoring solution providers must include value-added services as part of their offerings and utilise their expertise to solve the day-to-day problems of customers

Source: Frost & Sullivan Analysis

“ End users are maximising profitability of existing assets.”

related asset failures boosts demand for new solutions

- Use of corrosion monitoring data to not only assess corrosion progression but also control processes enhances the addressable market. ■

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Graco's EcoQuip vapour abrasive blasting equipment has been approved by ADNOC as a surface preparation solution for Zone 1 areas on Das Island.

DAS ISLAND IS a small island in the Persian Gulf, located around 100 miles (160 km) north-west of the mainland of the UAE. Oil production began here after prospecting during 1956-1960, since when the island has become a major centre for the oil and gas industry in the region, exporting crude oil and LNG by tankers as far as Japan and Europe.

The Abu Dhabi National Oil Company (ADNOC) has a major presence on Das Island. ADNOC's commitment to environmental protection, continually assessing and actively managing environmental risks and impacts, falls in line with the UAE's commitment to meeting its ecological responsibilities. Great emphasis is placed on the identification and mitigation of Health, Safety and Environmental (HSE) risks. Like ADNOC's various business units, its LNG unit and Corrosion & Detection Department (C&D) operating on Das Island are required to pass a stringent Health, Safety and Environmental Impact Assessment (HSEIA).

Addressing the problem of Corrosion Under Insulation

Corrosion Under Insulation (CUI) is a particularly prevalent problem for the oil and gas industry in hot and humid marine environments. It refers to the type of corrosion that occurs due to a moisture build-up on the external surface of insulated equipment. This can be caused by a number of factors, but commonly leads to galvanic, chloride, acidic or alkaline corrosion. If undetected, the results of CUI can lead to the shutdown of a process unit or an entire facility, and in rare cases it may lead to a process safety incident.

The management of CUI on a live working oil and gas refinery is therefore a constant challenge for ADNOC's asset maintenance teams. Keeping CUI under control requires the removal of previous coatings. Traditionally, this is carried out utilising conventional dry abrasive blasting systems.

However, the environmental impact that these systems are having on the marine life around the Das Island refinery has become a cause for concern.

ADNOC's corporate paint and insulation inspector, Lee Wilson, author of *The Paint Inspectors Guide*, therefore had a challenge on his hands. Not only was he looking to evaluate alternative surface preparation methods to dry abrasive blasting, but he wanted to reduce waste management and adopt a surface preparation system that maintains ADNOC's standard operating procedures and environmental compliance as stipulated by the HSEIA.

Vapour abrasive blasting considered

Wilson's evaluation process led him to shortlist Graco's EcoQuip vapour abrasive blasting equipment as a possible solution for ADNOC. The Graco team were delighted at the opportunity to work with Wilson, who took time out of his busy schedule to travel to the company's European headquarters in Maasmechelen, Belgium. Here, Graco's Peter Bloem



Vapour abrasive blasting is an effective method of removing Corrosion Under Insulation (CUI), as well as offering additional benefits.

Image Credit: GRACO

led the introduction and evaluation process of EcoQuip. Various live demonstrations and tests were carried out to assess EcoQuip's capabilities as an alternative surface preparation method.

Wilson concluded that EcoQuip demonstrated its capabilities as the ideal solution for the projects he manages for ADNOC on Das Island.

"I found vapour abrasive blasting exceptional as a means to remove Corrosion Under Insulation. It's the ideal solution to blast sweating and iced lines while maintaining our standard operating procedures with regards to minimum and maximum cleaning requirements," he said.

Additionally, he was impressed at the multiple benefits offered by EcoQuip VAB compared to dry abrasive blasting. "Vapour abrasive blasting will dramatically improve ADNOC's waste management and abrasive containment issues across Das Island. Moreover, EcoQuip's ability to remove soluble salts is an additional performance benefit, as it increases the longevity of coatings."

Consequently, Graco is proud to announce that the Abu Dhabi National Oil Company LNG C&D has approved Graco's EcoQuip vapour abrasive blasting unit for on-site implementation directly and by approved contractors. ■

To find out more about vapour abrasive blasting with Graco's EcoQuip, contact AFTD product marketing manager stephan.rindfleisch@graco.com or visit the website at www.graco.com/blasting.

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A versatile solution for CUI maintenance

AkzoNobel's universal pipe coating based on alkylated amine epoxy (AAE) technology provides a versatile solution for CUI maintenance work.

CORROSION UNDER INSULATION (CUI) costs industry millions of dollars annually. Moisture ingress into conventional insulation materials usually results in accelerated corrosion of the underlying steel surface, which can result in structural failure of the pipe, vessel or other insulated item. If left unchecked, CUI can result in leakage from pipes and vessels as a result of localised corrosion. If such equipment is operating under high pressure, this increases the potential for catastrophic failure.

CUI is generally a risk in the temperature range of -4°C to 175°C (25°F to 347°F), but the highest corrosion rates are normally experienced in operational conditions between 60°C to 120°C (140°F to 248°F). Under these conditions, corrosion rates of between 1.5-3.0mm per year have been reported, and the potential for corrosion doubles for every 15-20°C increase in temperature between 0-100°C (32-212°F).

Refineries and petrochemical plants use a variety of process conditions, inevitably including both continuous and cyclic high temperatures. Service conditions can be extremely harsh, imposing a high degree of stress upon coatings which can result in a loss of physical properties. Steam-out cleaning and short but severe temperature spikes can also create cyclic conditions which accelerate corrosion.

Traditionally, insulated pipework operating at elevated (or very low) temperatures has been coated using epoxy phenolic technology; this provides robust corrosion protection during downtime and excellent heat resistance in service. However, this traditional technology does come with some widely-recognised limitations from a quality assurance and productivity viewpoint at the point of application. Costs are driven higher by dry film thickness sensitivity and potential for in-service cracking, as well as slow drying/curing speeds, particularly at lower temperatures <10°C (50°F). This is especially challenging for maintenance engineers as pitted steel substrates are non-uniform surfaces, increasing the coating stress and



Harsh service conditions in refineries and petrochemical plants can impose a high degree of stress upon coatings.

Image Credit : AkzoNobel

potential for cracking.

Interbond 2340UPC is a universal pipe coating based on alkylated amine epoxy (AAE) technology which provides a versatile solution for CUI maintenance work. Temperature resistant from -196°C (-321°F) to 230°C (446°F), a high cross link density coupled with a flexible chain modification grants AAE excellent resistance to CUI, alongside improved tolerance to overapplication by up to 300 per cent. This improves overall coating performance in maintenance conditions as the coating is much more likely to be within specification limits, while minimising overall application costs. The high dry film thickness (DFT) tolerance greatly reduces the potential

for cracking in service, helping to ensure excellent resistance to CUI and aggressive cyclic conditions in service.

AAE technology has also been proven to surpass the traditional barriers of low temperature cure and long minimum overcoating intervals inherent of epoxy phenolic technology, forming a robust film that can cure rapidly down to -5°C (-23°F). A rapid, low temperature cure can allow applicators to double their productivity vs conventional solutions for CUI maintenance, greatly increasing turnaround speed.

AAE technology delivers the right balance of superior properties for both the applicator and the asset owner, allowing for easy application all year round and greatly reducing the risk of CUI. Delivering superb ambient temperature ISO12944-9 resistance, Interbond 2340UPC is a truly 'universal' pipe coating, allowing simplicity of specification and application, resulting in increased confidence for asset protection and improved application flexibility vs traditional coating solutions. ■

“ AAE technology delivers superior properties for both the applicator and the asset owner.”

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The use of satellite solutions can help in reducing exploration costs.

Image Credit : Adobe Stock

Digitalisation and connectivity for improved operations

Reliable connectivity helps smooth operations and reduce production costs, says Nabil Ben Soussia, vice president – Maritime, IEC Telecom Group.

WITH THE RISING usage of renewable energy sources and the penetration of innovations such as electric vehicles (EVs) in the mainstream market, it is high time for the oil and gas business to adopt operational changes to stay sustainable and competitive.

Renewable sources are expected to provide 30 per cent of total electricity demand by 2023, according to the International Energy Agency (IEA). Similarly, the number of electric cars has been growing fast over the last decade. The stock of EVs reached five million in 2018, up 63 per cent from 2017, according to an IEA report.

At the same time, oil producers and exploration companies are facing challenging market conditions and slower demand growth.

The Organisation of the Petroleum Exporting Countries (OPEC) has revised down its outlook for oil demand by 40,000 bpd to 1.10 million bpd in 2019.

The US Energy Information Administration also lowered its price forecasts by 2.7 per cent to \$63.39 in 2019, and by 4.6 per cent to \$62 next year.

Digitalisation is the future

All these facts are driving the oil and gas industry towards a logical conclusion that digitalisation is the only way forward to remain sustainable and competitive.

The oil and gas industry can save up to

US\$73bn within five years in exploration and production by adopting the latest technology, according to energy consultancy Wood Mackenzie.

The rapid advances in technology and new applications provide them the opportunity to digitise, optimise, and automate processes that save time, money, and increase safety. Technologies like OneGate by IEC Telecom offer a virtual environment, enabling the operator to monitor, update and upgrade the site network from headquarters. It also segregates the corporate environment from the staff network, increasing cyber security by eliminating unintentional cyber risks posed by mail usage on personal devices.

Connectivity is key to success

Usage of satellite solutions can help in reducing exploration costs as well as boosting success rates. A lot of exploration sites are based in areas where telecommunication infrastructures are often unreliable or unavailable. Moreover, the constant change in

locations and the challenging site conditions mean that implementing terrestrial communications can be both costly and impractical. Satellite solutions enable digitalisation even in the most remote areas and provide reliable back up for GSM-connected in-land sites. The digital oilfield is no longer a concept, but a reality, opening new horizons for the industry.

Exploration using technology

The exploration of oil and gas fields is both immensely complex and expensive. Energy businesses looking for deposits of oil and natural gas first survey significant areas before test-drilling. Connectivity allows timely exchange of accurate data, helping with better decision-making.

According to a Wood Mackenzie report, the adoption of technology and digitalisation could reduce the annual exploration spending to US\$35bn, down from US\$50bn now. It could also enhance the discovery success rate to almost 45 per cent from the current rate of 35 per cent.

On-site productivity and decision-making

Mobile solutions for voice and data connectivity ensure that instructions are promptly passed on to the site, allowing the head office to provide instant feedback from diagnostic tests running thousands of kilometres

“ Satellite solutions enable digitalisation even in the most remote areas.”



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away. Daily productivity is improved as field staff can send and receive emails and text messages, make phone calls, and even join video conferences while working at distant sites.

M2M systems and remote maintenance

Reliable connectivity allows you to send specific measurement data automatically and then monitor usage of your critical infrastructure remotely, avoiding costly and unnecessary site visits. Machine-to-machine (M2M) transmissions result in significant cost reductions and improved asset management. While remote monitoring and asset management can handle a wide variety of issues on rigs, human counselling is still very important. Solutions with Augmented Reality (AR) enable offsite experts to guide the hands and see almost as if through the eyes of onsite technicians.

Safety and real-time location

When workers on site are equipped with satellite phones and other health trackers, it becomes easy to monitor their real-time location and check biometric data. In this way, whatever occurs, the location of on-site staff



Image Credit : IEC Telecom Group

Nabil Ben Soussia, vice president – Maritime, IEC Telecom Group.

will always be known, allowing for a prompt response in the case of an emergency.

Retain and attract the right talent

High-speed connectivity can also help retain the right people and attract the best talent. With millennials joining the workforce, connectivity becomes a deciding factor for employment. The benefits of equipping staff with data connectivity extend far beyond socialisation. In the modern fast-paced environment, self-education has become a part of the day-to-day life, impacting both personal and professional growth.

Remote surveillance

Video intelligence helps to secure consistent performance at remote exploration sites. It offers a way to track inviolability of business facilities and an oversight of human operations onsite. Key functionalities of remote surveillance include:

- 24/7 monitoring of business operations, both fixed and mobile
- Smart intrusion detection
- 3D enhanced interpretation

Reliable, fast-speed and secure connectivity not only helps in the whole process of digitalisation and automation, but also supports the remote monitoring, maintenance and enhanced security and safety of operational fields. ■

Marlink reports growth in oil & gas sector connectivity demand

MARLINK HAS REPORTED a significant boost in demand for more bandwidth and new installations from new energy sector customers, and increased activity from its existing customer base at sea and on land.

Strategically important markets such as the Middle East, America, Africa, Northern Europe and Gulf of Mexico are regions in which Marlink is expanding both in terms of number of activated terminals, satellite connectivity and managed network and IT solutions, as well as onsite resources such as sales or in country field service teams.

The increased demand and activity is coming from diverse customers including National Oil Companies and oil majors as well as rig operators and companies providing exploration and production (E&P) services.

Key customers have been looking for increasingly sophisticated hybrid connectivity and IT solutions for onshore and offshore operations to drive the digital transformation of oil rigs, drilling and offshore supply vessels, production platforms and FPSO vessels, the company reports. Marlink's portfolio of flexible and scalable satellite connectivity as well as IT solutions are providing a cost-efficient means to enable the monitoring of complex operations as well as improving welfare for remote workers and improving operational performance.

Additionally, with more processes being performed digitally and remotely than ever before, interest in high-throughput and low-



Image Credit : Marlink

Marlink has reported a significant boost in demand for more bandwidth and new installations from new energy sector customers, and increased activity from its existing customer base at sea and on land.

latency hybrid connectivity solutions is growing. These include the projected use of future LEO satellite constellations to further enable cloud-based applications and integrated SD-WAN networks for remote operation.

"Marlink's energy customers require solutions that support them to optimise efficiency and reduce operational costs," said Erik Ceuppens,

CEO, Marlink Group. "More operators are seeing cloud-based and digital operations as a way to maximise performance when fewer assets and experts are available due to challenging market conditions, which is reflected in the growing demand for our future-proof, managed network infrastructure, the technology we use and services we provide."

Explore South Africa!



Petroleum Agency SA was established in 1999 by Ministerial directive and is mandated through the Mineral and Petroleum Resources Development Act, 2002 (Act No.28 of 2002) (MPRDA) together with the National Environmental Management Act, 1998 (Act No.107 of 1998) (NEMA).

These Acts provide for Petroleum Agency SA to evaluate and promote oil & gas potential exploration and production activities in South Africa, to regulate oil & gas exploration and production industry and to archive all geotechnical data produced through oil & gas exploration.

The Agency acts as an advisor to the government on issues regarding oil & gas exploration and production, and carries out special projects at the request of the Minister.



Our Vision

A diverse upstream industry contributing to energy security through sustainable growth in exploration and development of oil and gas.

Our Mission

To promote, facilitate and regulate exploration and sustainable development of oil and gas contributing to energy security in South Africa.

Petroleum Agency SA, based in Bellville, Cape Town, is responsible for the promotion and regulation of exploration and exploitation of oil and gas (petroleum) resources.

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Setting the agenda for the Fourth Industrial Revolution

ADIPEC 2019, which takes place from 11-14 November at the Abu Dhabi National Exhibition Centre (ADNEC) is set to attract more than 2,200 exhibiting companies and 145,000 visitors from 136 countries, featuring 29 international county pavilions and 51 IOCs and NOCs.

ADIPEC PROVIDES ONE of the most important platforms for the oil and gas industry to do business and exchange information, attracting energy ministers, global CEOs and leading decision makers across four days of business discussions and knowledge exchange.

Held under the patronage of the President of the UAE, H.H. Sheikh Khalifa Bin Zayed Al Nahyan, and organised by the Global Energy Division of dmg events, ADIPEC is hosted by the Abu Dhabi National Oil Company (ADNOC) and supported by the UAE Ministry of Energy & Industry, Abu Dhabi Chamber and the Abu Dhabi Tourism and Culture Authority.

Global energy demand increases

Oil, gas and petrochemical projects valued at more than US\$859bn, are underway or planned in the Middle East and North Africa, as the region gets ready to meet the forecast increases in demand for energy over the next two decades.

According to industry forecasts, global oil demand will increase by at least 10mn bpd by 2040, while natural gas demand is set to grow by 40 per cent and petrochemicals by 60 per cent. The expansion in demand for petroleum and petrochemicals in particular, says dmg, is driving downstream investment

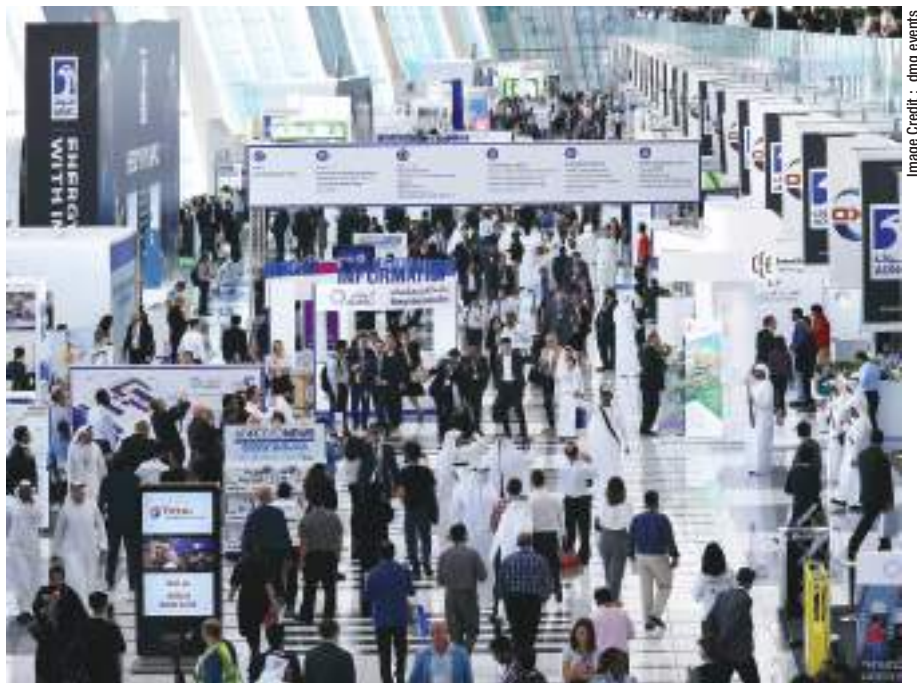


Image Credit : dmg events

The busy exhibition floor at ADIPEC.

“While producers in the Middle East continue to maximise value from existing fields, there is heightened interest in developing new resources, both offshore and onshore, as well as investing in upgrading and diversifying both infrastructure and products downstream to create new products lines and revenue streams.

“ADIPEC 2019 will be a catalyst for future growth and prosperity in the oil and gas industry, not only providing companies across the hydrocarbons value chain with a forum to gather first-hand knowledge of the dynamic changes taking place in regional oil and gas investment decisions, but also enabling them to make the connections necessary to forge new partnerships and tap into the emerging commercial opportunities those investments are creating,” Hudson added.

ADIPEC provides one of the most

comprehensive conference programmes in the world. World class industry experts will share their insights through more than 160 conference sessions, industry panel sessions, ministerial sessions and global business leaders sessions involving more than 1,000 speakers.

Distinguished speakers include HE Dr Sultan Ahmed Al Jaber, Minister of State, UAE and CEO of ADNOC Group; HE Dr Sultan Al Mazrouei, Minister of Energy & Industry, UAE; and energy ministers from countries including Egypt, Jordan, Oman, India, Iraq, Senegal, Pakistan, Uganda, Kenya, Equatorial Guinea and Sudan. Also participating will be CEOs and senior executives from regional NOCs and IOCs including BP, Total, Eni and Lukoil. Other big names include HE Mohammed Barkindo, secretary general of OPEC; Condoleezza Rice, Secretary of State 2005-2009, USA; Sebastian Thrun, CEO of the Kitty Hawk Corporation,

“ADIPEC 2019 will be a catalyst for future growth and prosperity in the oil and gas industry.”

across the MENA region.

Christopher Hudson, president – dmg events, said, “Breakthrough technologies, the growing global population and rising consumer spending are all combining to create new demand for energy, much of which will continue to be met by the oil and gas industry up to and beyond 2040.



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chairman and co-founder of Udacity and formerly VP of Google; and Greg Cross, AI pioneer, serial entrepreneur, co-founder and chief business officer, Soul Machines.

Accelerating the digital transformation

The oil and gas sector is already taking advantage of what is being called the Fourth Industrial Revolution.

Digital transformation of the oil and gas industry in the Middle East and North Africa continues to be fast tracked, as energy companies across the region ramp up investment in technologies supporting faster and leaner exploration and production and optimisation of costs.

Ranging across artificial intelligence (AI), blockchain technology, big data, machine learning, automation, cloud computing, cyber-security, edge computing, robotics, and unmanned vehicles, these tech megatrends are profoundly changing oil and gas operations, and the professional skills required for sustainable growth.

In the past five years the MENA region has seen a tight focus on cost reduction, as oil and gas companies have responded to changes in the energy market, with much of the industry's research and development spend focused on technologies to enhance the efficiency of new and existing projects.

According to management consultants McKinsey, effective use of digital technologies, such as cloud, the Internet of Things (IoT), mobility, artificial intelligence (AI), virtual reality (VR), big data and analytics could cut capital expenditure by up to 20 per cent. At the

“Digitalisation will be at the forefront of ADIPEC 2019.”

same time, it forecasts that total cash flows will improve by US\$11 per barrel across the offshore oil and gas value chain, adding US\$300bn a year by 2025.

The industry is seeing rapid growth in machine learning, making insights into plants and equipments available faster to decision-makers, while visualisation and analytics provide simple interfaces and insights into data.

Oil & Gas 4.0

Given its role as the key to the future growth and increased efficiency of the oil and gas sector, digitalisation will be at the forefront of ADIPEC 2019.

Oil & Gas 4.0, a new agenda developed by both ADNOC and ADIPEC to navigate and embrace the opportunities enabled by the Fourth Industrial Revolution, will see itself thoroughly embedded in the conference



Image Credit : dmg events

ADIPEC provides a global platform for oil and gas dialogue.

programmes.

From digital innovation and its transformative impact across the oil and gas value chain through to how the industry attracts new millennials, implements total management solutions and creates new strategic partnerships, ADIPEC 2019 Conferences and Oil & Gas 4.0 will provide the fundamental knowledge blocks for a new era of oil and gas, bringing forth dialogue, insight and thought leadership from across the industry landscape.

In the Digitalisation Zone, a dedicated area that will provide a platform for companies at the forefront of today's technology trends, new technologies will be showcased, while discussions and debates will focus on the implications of digitalisation for the industry and the best ways emerging technologies can be utilised.

Businesses can witness the entire spectrum of digitalisation, in order to gain the best insights into their potential and evaluate what works best for them to optimise efficiency and increase revenue.

“The impact of technology is a major focus for our delegates and exhibitors, changing the way the industry works, which is clearly visible from the increasing range of tech-focused products exhibited at ADIPEC, with digitalisation now a large component of both the exhibition and conference,” said Hudson.

Exclusive LIVE sessions

ADIPEC Oil & Gas 4.0 will be launching new and exclusive LIVE sessions gathering leading moderators, taking stage alongside global influencers and disruptors in an informal setting.

An exclusive question-answer format aims to get the audience closer to leading global figures transforming the economic and energy

landscape. Topics will evolve around politics, megatrends and energy dynamics, as well as how these renowned leaders have disrupted the global arena in their respective fields.

Topics include inclusion and diversity, responding to the energy transition, Egypt, transforming the global gas and LNG landscape, digital humans, space exploration, geopolitics and cyber security.

ADIPEC 2019 introduces seven exclusive, closed door roundtables, solely attended by CEOs and C-level executives, not only from leading international oil and gas companies, but also from the leading technology companies, which are spearheading disruptive innovation in the industry globally.

White Papers will be published following the roundtables, detailing the actionable outcomes and insights from each of the seven conversations, which range from the progressive influence of big data in the petroleum industry, to energy trends and human/machine collaboration.

Organised by the Society of Petroleum Engineers, the ADIPEC Technical Conference is the place to sharpen knowledge and share best practices with industry peers. Spanning the upstream, midstream and downstream value chain, the 111 technical sessions are set to attract around 11,000 delegates.

ADIPEC 2019 sees the return of features such as the Offshore & Marine Exhibition and Conference; Heavy Industry Zone; Inclusion and Diversity in Energy conference; C-Suite dialogues; Downstream Technical Conference; Young ADIPEC; and the Middle East Petroleum Club, an exclusive knowledge sharing platform for top decision makers and influencers. ■

For further information, visit the website at www.adipec.com.

Monitoring of odorants, VOCs and sulfur species in gas or liquid matrices

CHROMATOTEC GROUP, SPECIALIST in the manufacturing of process gas analysers for online monitoring, is entering the world of liquid sample analysis through the development of a simplified enhanced liquid sampling system (XXvalveLPG), specifically designed to extract representative samples from the liquid phase.

The extracted liquid sample is vapourised and injected in continuous mode into the column of the auto-GC analyser with speciation of more than 16 sulfur compounds or 123 Volatile Organic Compounds (VOCs), according to the configuration type.



Image Credit : Chromatotec Group

Chromatotec Group has developed a simplified enhanced liquid sampling system.

In sulfur compounds, H₂S, mercaptans such as tert-butyl mercaptan (TBM), dimethyl sulfide (DMS) and/or Total Sulfur (TS) can be analysed in Liquid Propane Gas (LPG), Liquefied Natural Gas (LNG) and other liquid samples such as crude oil, diesel, fuel, oil, water and condensates at very low concentration levels (ppb and/or ppm) in automatic routine mode.

This is very useful to control the effectiveness of the odourisation process of LPG, as it is usually odourised with DMS and TBM to alert in case of leakage. Chromatotec's liquid valve allows the analyses to be performed directly from the liquid phase to overcome the problem of lack of uniformity of the odourised liquid vapours due to the different boiling points of the species when associated with auto-GC with a MEDOR sulfur specific electrochemical detector, such as energyMEDOR analyser.

It is available with dedicated configuration for safe and hazardous areas: ATEX, IECEx, CSA and CSA international certifications for its application in refineries and petrochemical plants.

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When is digital transformation money well spent?

Mohamad Awad, vice president – Middle East, North Africa and Pakistan from AVEVA, discusses the benefits of digitalisation in the oil and gas sector and how C-suite leaders can ensure maximum impact and optimum ROI by following a set of simple principles.

DIGITAL TRANSFORMATION IS the buzzword across the Middle East, as organisations across the board seek to leverage its benefits.

Whether it is smart governments or capital-intensive industries such as manufacturing and aviation, the opportunity to streamline operations and deliver enhanced returns has become evident as the benefits of new technology become apparent.

The region's oil and gas sector is no different. For an industry that has played a pivotal role in effecting change across societies, digitalisation offers significant advantages. Data intelligence and optimisation, for example, can catch asset failures before they have a chance to wreak significant damage. In a major utility with more than 60 plants in six states, including coal, simple cycle combustion turbines, combined cycle and integrated gasification combined cycle plants, Predictive Asset Analytics software can flag up a single early warning of a crack in a turbine rotor, saving more than US\$7.5mn.



Image Credit : AVEVA

Mohamed Awad, vice president – Middle East, North Africa and Pakistan, AVEVA

But even as the promise of digital transformation becomes apparent, decision makers are faced with a bewildering array of emerging technologies. Pivotal technologies such as cloud computing, the industrial Internet of things (IIOT), digital twins, and augmented and virtual reality are presaging the next industrial revolution, each offering significant advantages and enterprise benefits.

In such scenarios, how can producers in the upstream market, pipeline operators in the midstream market and refineries in the downstream market ensure they make the right technology investments for their business? And the reality is that digital transformation doesn't always succeed. McKinsey research highlights that 70 per cent of complex, large-scale change

programmes do not reach their stated goals because organisations are unaware of just how to effect lasting conversions.

Successful digital transformation could become the norm

Success doesn't have to always involve an engineering degree. There are four simple technology pillars that can forecast the impact of a new solution and ensure optimum ROI when taken together.

1. A comprehensive value chain

Modern digital platforms must deliver returns across the entire value chain of the enterprise. Technology investments must enable the digital integration of engineering, planning and operations, control, visualisation, information and asset performance solutions to create a 360° view, from the shop floor to the top floor. Solutions that deliver only partially should be considered in the context of the business unit they benefit and not confused with broad-based applications.

2. Open and system agnostic solutions

Interoperability and cross-platform support accelerate a path towards continual process improvement. Rapidly sharing big data and insights across multiple platforms including cloud, mobile, augmented and virtual reality requires open, system agnostic technology solutions that augment rather than rip and replace existing asset investments. An open, system agnostic approach to digital transformation drives long-term value and lowers total cost of ownership (TCO).

3. Digital ecosystems

Technology investments should be backed by a multidisciplinary ecosystem of knowledge partners. Such networks should include capabilities of planning, design, development, delivery, maintenance and support of industry-specific solutions on a global scale. Ecosystem partners may include software developers, technical

“ Decision makers are faced with a bewildering array of emerging technologies.”

Digital transformation pays for itself many times over, particularly in an economic environment where capital budgets and overheads are constantly being reduced, even as new competitors enter the market and energy producers are faced with spiralling manufacturing costs and lower margins. Not only does digitalisation power new and better customer experiences, but it exploits value creation across asset and operations lifecycles – improving profitability, maximising shareholder value and offering an enhanced competitive edge.

distributors, system integrators, OEM providers and technology partners, all of whom must be focused on extending value and driving innovation across industries.

4. Flexible and agile implementation

Adapting to unforeseen events becomes automatic through flexible technology implementation options. True digital transformation platforms provide the ability to choose between several deployment options, including on-premise, cloud or hybrid rollouts. Agility in procurement options allows organisations to obtain the required tools through several options, including perpetual licensing or subscription-based services. Solutions for implementing technology on an as-needed, staged


Digital transformation is part of a constant journey towards continuous process improvement.”

Digitalisation offers significant advantages in the oil and gas sector.



Image Credit - AVEVA

approach help reduce upfront costs and decrease the time-to-value of new investments, while accelerating a path toward increased profitability.

Digital transformation is part of a constant journey towards continuous process improvement that involves the

collaboration of people, processes and assets through new technology. When correctly deployed, it bridges the operations and knowledge gap to yield enterprise-wide efficiencies and increase capital returns. ■

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Highlighting Africa's oil and gas investment potential

Africa's energy industry will have a strong presence at ADIPEC.

AS AFRICA'S ENERGY revolution accelerates, African energy officials from governments and the public and private sectors are joining ADIPEC to send a strong message on the continent's potential and ambitions for the coming years.

Taking the lead on representing Africa at the world's largest oil and gas event, the African Energy Chamber has signed an agreement with ADIPEC and is officially endorsing the conference and exhibition and inviting all its partners to join the African delegation participating in ADIPEC.

"The good news for Equatorial Guinea and many African countries is, we have the resources. African countries have many untapped reservoirs of oil and natural gas that have regrettably been underexplored. We need to attract investment in our oil and gas industry, explore, supply the market and also develop our countries.

"ADIPEC is a great place to meet potential investors. We have a unique relationship with the UAE through OPEC and the GECF. We have worked closely on various oil matters under the leadership of H.E. Suhail Al

Mazrouei and the Ministry of Energy and Industry," stated H.E. Gabriel Mbagha Obiang Lima, Minister of Mines and Hydrocarbons of Equatorial Guinea.

"In the same ways as we push for a stronger African representation within global organisations such as OPEC, we need to have Africa better represented within global investment shows like ADIPEC where major deals and contracts are being discussed," declared N.J. Ayuk, executive chairman of the African Energy Chamber and CEO of the Centurion Law Group. "The conference's focus on technology and the oil & gas sector 4.0 is especially relevant for Africa as the continent seeks to fully embrace digitalisation and the latest technologies to leapfrog into next-generation energy initiatives and developments."

Growth in investment and cooperation

ADIPEC will take place against the background of tremendous growth in investment and cooperation between the UAE and Africa this year, marked by the recent acquisition by ADNOC of Kosmos Energy's



Image Credit : APO

N.J. Ayuk, executive chairman, African Energy Chamber.

stakes in Senegalese and Mauritanian offshore licenses. As interest for Africa picks up from Middle Eastern markets and global companies, ADIPEC offers the perfect stage to promote additional opportunities for such deals across African oil jurisdictions.

The conference will see the official launch of "Billions At Play: The Future of African Energy and Doing Deals", the book by AEC Chairman N.J. Ayuk that paves the way for the development of Africa's energy sector. On this occasion, the Chamber will be organising a high-level African oil and gas panel with ministers and executives from across the continent to shed the light on the biggest trends shaping the future of the continent's energy industry.

African oil ministers from Egypt, Senegal, Uganda, Kenya, Equatorial Guinea and Sudan will be addressing the ADIPEC Conference. ■



Image Credit : APO

The Equatorial Guinea Gas Hub.

Raccortubi Middle East: a partner, not just a supplier

RACCORTUBI MIDDLE EAST, the UAE subsidiary of Raccortubi Group, is exhibiting at ADIPEC for the seventh year to strengthen relationships with existing customers and establish new contacts.

Raccortubi Middle East is a stockist and supplier of piping materials for critical applications such as chemical and petrochemical plants, oil and gas applications, power plants, shipyards, fertilizer and desalination plants. It has a significant stock availability of pipes, tubes, fittings and flanges in austenitic stainless steel, duplex, superduplex, 6Mo, nickel alloys and titanium.

“We’ve been now exhibiting for seven years at ADIPEC,” said Sunzeev Swami, managing director of Raccortubi Middle East FZE. “While the first editions were driven by the need to increase our brand awareness, we now believe we’ve consolidated our position in the market and wish to strengthen our relationships with existing customers as well as building new contacts with potential ones.”

This year also marks the 70th anniversary of the Group, whose long history of experience and reliability makes it a partner, rather than just a



Raccortubi Group's business model benefits from the synergy arising from being both a manufacturer and a distributor.

Image credit: Raccortubi

supplier, the company says. Raccortubi Group’s business model benefits from the synergy arising from it being both a manufacturer (with its Italian mills, Tecninox and Petrol Raccord) and a distributor at the same time (with its global presence in Italy, Brazil, Dubai, Singapore and UK).

As a producer, Raccortubi can offer technical expertise, competitive prices and minimisation of quality costs given its proven quality system. As a distributor, it is able to guarantee customers a

single contact with whom to manage the whole order – including both Raccortubi-manufactured products and other related items. Thanks to this unique structure, Raccortubi Middle East is able to fulfill project packages quickly and cost-effectively, directly from its local warehouse in Dubai (Jebel Ali Free Zone).

“Thanks to our local presence, we are able to provide door-to-door piping solutions,” Mr Swami highlighted. Added value is also given by the wide range of personalisation options, including colour coding, marking, extra testing and special packaging, on top of products manufactured to the customer’s design. The on-demand production of butt weld fittings from ½” to 56”, together with continuous stock replenishment from the Group’s integrated manufacturing plants located in Italy, means that the company can offer customers complete, tailored piping solutions to short lead times.

Raccortubi Middle East will be pleased to welcome visitors and customers to its stand in Hall 1.

Stand: 1250

Showcasing gas and flame monitoring products

TELEDYNE GAS AND Flame Detection will be showcasing its wide range of fixed and portable gas and flame monitoring products and services at ADIPEC. The company will be highlighting several products of interest to experts in measurement and control instrumentation.

“Our depth and breadth of experience, reliable gas detection products and end-to-end custom system design services ensure that we have the right monitoring solution for every application,” said Sudhakar Karkera, Teledyne Gas and Flame Detection’ regional sales manager for Gulf region.

Teledyne Gas and Flame detection provides a portfolio of fixed and portable industrial gas and flame detection instruments used in a variety of industries. The Oldham, Simtronics, GMI and Detcon brands bring together over 100 years of industry experience across a wide range of standard products and customised solutions. These rugged trace gas analysers feature fast response time, intrinsically-safe sensors and satisfy multiple international certification standards.

The Teledyne Gas and Flame Detection team will be available for individual meetings on the stand, which is located in Hall 9.

Stand: 9415



Image credit: J. Stephen Conn / Flickr

Teledyne gas and flame monitoring products are used in a wide range of industries, including oil and gas.



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Increasing the potential of jack-ups

JACK-UP PLATFORMS HAVE been a backbone of the offshore industry since its beginnings. The understanding of the use and the potential application of jack-ups have developed greatly over the years and have allowed an ever-expanding envelope of possible uses of this type of offshore unit.

In recent years the envelope has been expanded into ever deeper waters. This has culminated in developments such as the Cat-J rigs. However, as an industry we have also been working to expand the envelope of existing units in operation today and creating new designs and equipment that will improve their economics in a challenging market.

- The possibilities of jack-ups can be increased by engineering support such as field or area-specific assessments of the capabilities of a jack-up, to allow them to function in reduced water depth, for example. Or with spudcan add-ons to reduce bearing pressure in poor soil conditions. In particular, specific assessments offer interesting opportunities to expand the envelope without significant conversion, and the associated investment, of the jack-up.
- Another interesting opportunity comes into play when we can store, connect and intelligently analyse the data that jack-ups generate. With the new GustoMSC Operator Support System (OSS) this data becomes valuable information for operators, enabling them to work more safely and efficiently. When we for instance couple real-time foundation loads and the crane operation, the full potential of the jack-up can be used. This way, the OSS is unlocking interesting expansion possibilities for jack-ups without significant conversion and associated investments.
- New-build jack-up designs such as the GustoMSC NG-1800XL can also widen the potential applicable area. This multi-purpose jack-up design addresses the developing requirements for operations in all areas of the Middle East. It features a shallow draught of 3.7 m, reduced spudcan pressure and a water-depth capability of 55m that provides usability over a large area of the region, meeting all requirements of the oil companies in the region today.
- Named after a crab's claw, Chela is a unique piece of equipment that can play a distinctive role on a drilling-jack up. Designed to achieve a high level of safety, this multifunctional arm offers an extra hand in operations. Due to its crablike motion characteristics, it can reach below the cantilever as well as elevate towards the main deck, providing access to an area traditionally blocked by the drilling cantilever. Chela thus significantly reduces the total well construction time.

As the industry moves forward and continually redefines future ambitions, it is up to technology providers to increase their understanding of the use and the potential application of jack-ups. By supporting the industry in its ambitions, the jack-up will remain the backbone of the offshore industry.

Stand: 11230



E2S focuses on hazardous area integrated warning device assemblies



The new E2S range.

E2S WARNING SIGNALS is featuring its new range of integrated signalling at ADIPEC. Available with pre-configured solutions, the new E2S range eliminates the associated cost of on-site assembly operations whilst guaranteeing the connections and cabling between devices meet the relevant hazardous area approval requirements and ensuring all signals are fully tested and certified. Class I/II Div 1 and IECEx/ATEX Zone 1/21 approved signals are available in multiple configurations of up to seven devices, featuring products from the D1x, GNEx and STEx families.

Stand: 8620

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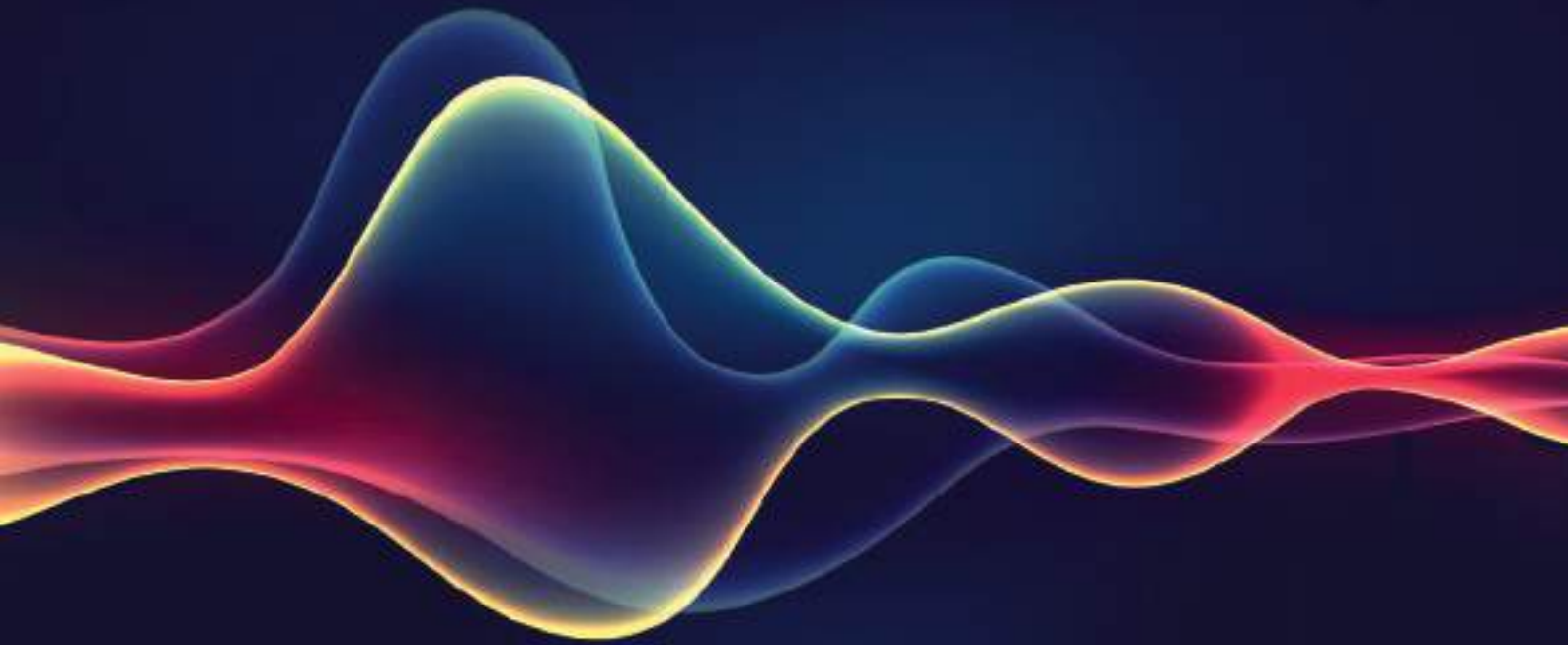
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Expanding the geoscience presence

Jalal Khazanehdari, senior business & technology development manager, Geoscience, EAME at CGG, discusses the company's activities in the Middle East and the expansion of its Abu Dhabi centre into a Regional Geoscience Centre.



Image Credit : CGG

The CGG team at the company's expanded Abu Dhabi Regional Geoscience Center.

CGG Geoscience seems to be very busy in the Middle East right now. Can you tell us about some of your ongoing projects?

We currently have a wide variety of activity across the Middle East, with several seismic processing projects underway in Kuwait, Saudi Arabia and the UAE and, of course, our continued strong and long-term presence in Oman where we operate a dedicated subsurface imaging centre for PDO. We are also providing geological, and reservoir engineering expertise to a number of key clients to support their exploration and field development projects. Most recently, we successfully delivered a multi-year integrated geoscience study to KGOC to identify resource growth potential in the mature, onshore Partitioned Zone.

How do you see CGG's future in the region?

In the short term, we are seeing renewed interest in our seismic processing and geological expertise and technologies, as illustrated by ADNOC's recent selection of CGG for a record-breaking multi-year OBN processing contract, the largest ever awarded. I also expect to see growth in our collaboration with NOCs and IOCs across the region, particularly on the part of our Geology & Reservoir teams who can support them with

the geological and reservoir complexities of their exploration and field development projects.

Over the last few years, we have invested heavily in developing our offering of geological and reservoir products and technologies, which are fully integrated with our seismic technologies. As a result, we are now uniquely positioned to provide integrated solutions and support for a number of technical challenges faced by our clients across the region, such as digital transformation and data management, exploration for stratigraphic traps and unconventional resources, to name just a few.

What will be the focus of your attendance at ADIPEC?

CGG will be showcasing all of its activities and presenting several technical papers. The big news for us will be our announcement of the expansion of our Abu Dhabi centre into a Regional Geoscience Center. Many of our clients had been asking us to have a stronger geoscience presence in this important region. We have therefore increased the centre's compute power, relocated some of our best geoscientists and brought in the latest equipment, such as geological instruments like RoqScan for mineralogical and rock type analysis, as well as our full suite of E&P software and support.

How will the Regional Geoscience Center benefit oil and gas players in the region?

Our Abu Dhabi center now offers much more than our renowned excellence in seismic imaging. It brings our integrated geoscience offering for exploration, field development and production optimisation directly to the doorstep of national and independent oil companies operating in the Middle East. We see it as a strategic technology centre where they can engage directly with our highly experienced geoscientists to address their technical challenges and business needs. For the first time, they can interact locally with our specialists, such as carbonate sedimentologists, structural geologists and petrophysicists as well as reservoir engineering and geomechanics experts from our Geology & Reservoir teams. We have Satellite Mapping and Multi-Physics Imaging experts available locally too. In addition, oil and gas companies can now benefit from our GeoTraining capability to develop their in-house talent with customised geoscience learning path programmes. We therefore have a wide range of expertise on offer to meet all the geophysical, geological and reservoir needs of our clients across the region. ■

Stand: 9252

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IEC Telecom drives digital transformation with the latest communications solutions

LEADING GLOBAL PROVIDER of managed network communication solutions, IEC Telecom Group is all set to showcase its latest connectivity solutions at this year's ADIPEC to meet the needs of the oil and gas industry.

The global energy companies are rapidly adopting digitalisation to stay sustainable and competitive by reducing their production and exploration costs. The industry can save up to US\$73bn within five years in exploration and production by adopting latest technologies, according to Wood Mackenzie.

Oil and gas firms in the Middle East are also increasing their investments on digital transformation to scale up their output. According to a BP Energy Outlook 2019, the Middle East remains the largest oil producing region and the second largest gas producer, with 36 per cent of global oil and 20 per cent of gas output.

Digital transformation in the oil and gas industry has spurred demand for reliable, secure and high-performance connectivity.

In this backdrop and to meet changing customer needs, IEC Telecom Group will display its latest solution OneGate Energy. This satcom solution is designed to meet the requirements of remote units on land. OneGate provides access to a virtual platform that stores critical applications. This enables the technical team to maintain, update, and upgrade onsite infrastructure remotely, saving time and money on logistics. The actual terminal is a single and compact server rack that is easy to transport in case the exploration team needs to shift from one site to another. OneGate also separates corporate environment from staff network. This segregation ensures that e-operations and classified data remain safe, eliminating cyber threats.



Image Credit: IEC Telecom

OneGate Energy is designed to meet the requirements of remote units on land.

Satcom solutions are playing a significant role in the energy industry, improving efficiency by automating key manual processes and ensuring vastly improved data visibility over critical assets. These solutions also help in supervision of machinery through remote monitoring/maintenance.

Visitors to ADIPEC can learn more about new trends and solutions by visiting the IEC Telecom's stand at ADIPEC Hall 4, Stand No 410.

Stand: 410

Separation technologies.



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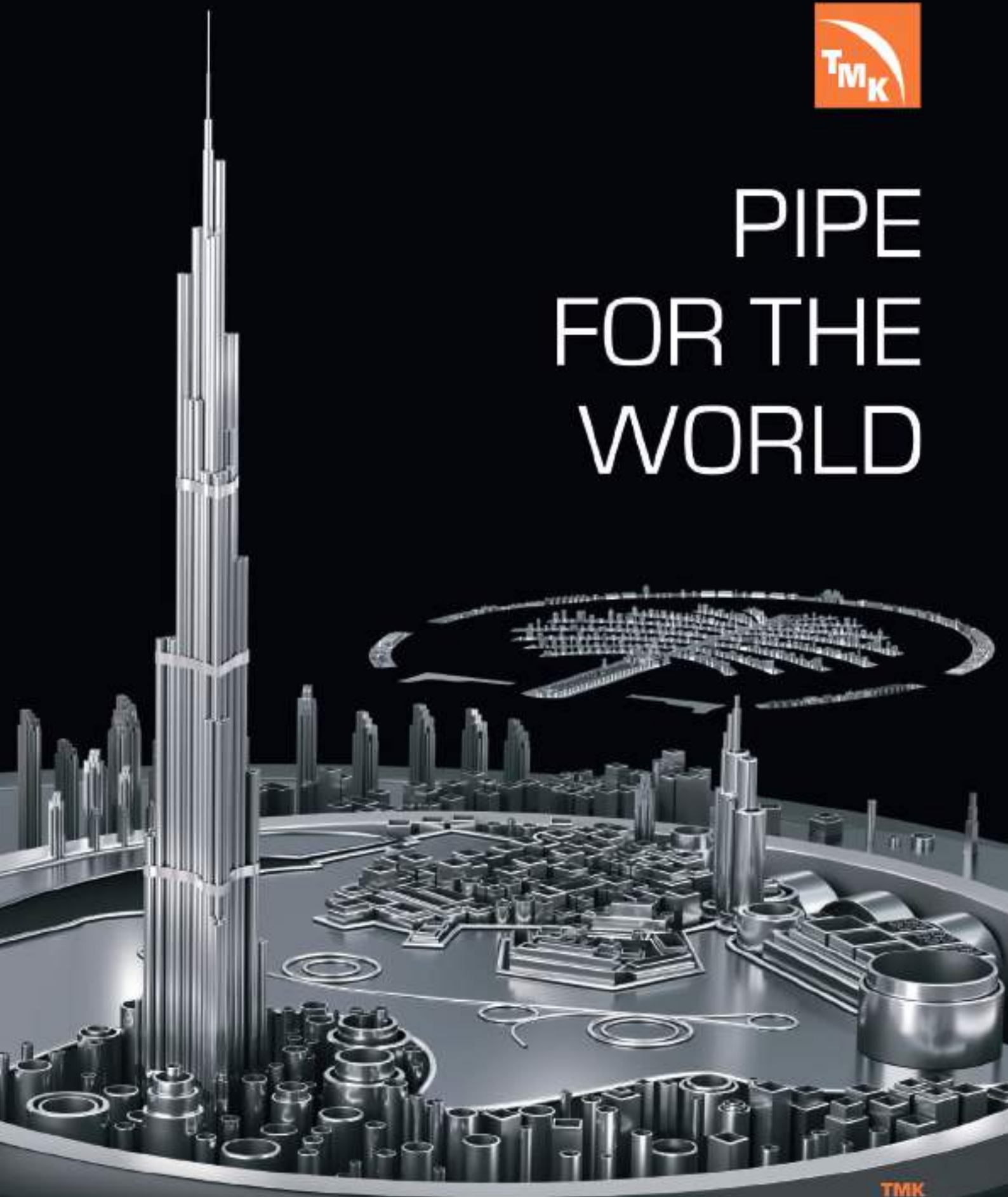
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Focusing on digitalisation and cybersecurity

HONEYWELL HAS BEEN supplying technologies to support the global oil and gas industry for more than 100 years.

“Our broad portfolio of solutions and services help upstream, midstream and downstream customers discover more value in their operations by delivering unprecedented control and efficiency at every point in the supply chain,” said Norm Gilsdorf, president for Honeywell, High Growth Regions, Middle East, Russia and Customs Union.

“The major focus area for Honeywell at ADIPEC 2019 will be the advancement of digitalisation across the Middle East’s oil and gas industry. At the show, we will debut a new enterprise-level analytics platform for the first time in the region – Honeywell Forge for Industrial.

“This solution is a new category of software that improves the way companies collect, analyse and act on data from their operations. It converts massive quantities of data from processes, assets, and people into actionable insights and enables top-to-bottom visibility into how operations are performing from a single screen.

“This new Enterprise Performance Management software leverages predictive analytics to help identify maintenance issues before they happen, enables workers to be more productive and safe, and reduces costs while increasing productivity.

“Another key topic we are addressing at ADIPEC this year is cybersecurity. We will showcase new software that simplifies, strengthens and scales cybersecurity for asset-intensive businesses and critical infrastructure facing cyberthreats.

“The Honeywell Forge Cybersecurity Platform improves cybersecurity performance at a single site or across an enterprise through increased



Image Credit : Honeywell

Norm Gilsdorf, president for Honeywell, High Growth Regions, Middle East, Russia and Customs Union.

visibility of vulnerabilities and threats, risk mitigation, and improved cybersecurity management efficiency across industrial environments.

“The new platform safely moves data from one site to another and uses operations data to strengthen endpoint and network security, and improves cybersecurity compliance. The platform also delivers a scalable software solution to better address cybersecurity pain points in OT (Operational Technology) and IIoT (Industrial Internet of Things) environments.”

Stand: 7310



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Pelican Products presents its latest innovations at ADIPEC

PELICAN PRODUCTS, A global leader in the design and manufacture of advanced portable lighting systems, and an expert in UL/FM and ATEX safety certified lights, will showcase its large range of +35 safety lights at ADIPEC, including one of its latest innovations, the 9455Z0 RALS.

Pelican Products offers a full array of safety certified lights for professionals working in high-risk industries, with the highest safety certifications. The company offers +35 lights with European ATEX Certification (Zone 0 and Zone 1) and US (UL/FM) Safety approvals.

Pelican safety torches and floodlights (RALS) are designed for professionals working in oil and gas refineries, offshore platforms, fire brigades, mining, petrochemical, pharmaceuticals or other high-risk industries. A selection of these solutions will be showcased at ADIPEC.

PELICAN 9455Z0, the world's first portable floodlight with three global safety certifications

To illuminate larger work areas, confined spaces or potentially hazardous zones, Pelican introduced the 9455Z0 RALS - the world's first portable floodlight with three global safety certifications: ATEX European Zone 0 (Cat.1), IECEx ia and CI, D1.

Built with versatility in mind, the 9455Z0 is a compact 7.3 kg portable lighting system, fully portable (hand carry) and easy to set up. Its powerful LEDs radiate 1.600 lumens in high and 800 in low mode, which extends the run time up to 10 hours. Powered by a maintenance-free rechargeable battery, the system offers a wide beam spread of 125° of clean energy that illuminates the entire area. It also features a



Image Credit : Pelican Products.

The Pelican 9455Z0 RALS is ideal for illuminating larger work areas, confined spaces or potentially hazardous zones.

telescoping mast that extends to 80 cm, a 360° articulating light array and a wide handle for easy gloved grip and transport.

Pelican's Remote Area Lighting Systems (RALS) provide fully portable, powerful, energy-efficient and rechargeable lighting without the use of a generator. These LED floodlights make working in remote areas easy, are self-contained and extremely easy to set up, offering a safe, economic and convenient alternative to generator powered lighting.

For more information on Pelican 9455 lighting system visit the website at:

<https://www.pelican.com/us/en/product/remote-area-lights/9455>. For more information on full Pelican and PELI ranges, visit: www.pelican.com and www.peli.com or visit Pelican Products at ADIPEC.

Stand: Booth CN134.

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Portable filter unit for hydraulic systems

Stauff has developed a compact portable filter unit for mobile filtration of decentralised hydraulic systems. Tobias Schneider, product manager Filtration Technology, Stauff, reports.

DRILLING EQUIPMENT AND valve actuators: these are just two examples of equipment in refineries or land-based oil and gas exploration which can be driven and controlled by decentralised hydraulic systems. In offshore exploration and transport vessels or working ships, winches, gates, steering gears and loading systems are applications for compact and long-lasting hydraulic drives. In all these cases, the use of mobile filter units can be necessary during maintenance work or for a temporary support of the integrated stationary filters.

Stauff has developed the filter units type SMFS-P-015 specifically for these applications. They feature very compact dimensions and are portable rather than on wheels, as transport across several levels or through hatches and space saving storage can be crucial criteria on ships and confined spaces.

The high-quality gear pumps in the units have good suction behaviour to pump fluid media through the Stauff filter element, with a viscosity between 10 and 400 centistokes. The pumps are driven by energy efficient three-phase motors (class IE2). A pressure switch prevents damage to the components, e.g. when lines become blocked. To provide best possible protection of the pump against the negative effects of coarse contamination, a washable stainless-steel mesh filter is used in the suction line.

The portable filter devices are available with two different motor/pump units: the 50 Hz version is suitable for power supply on land, e.g. in refineries or oil and gas exploration fields, while the 60 Hz drives can be supplied by the on-board electric systems of ships. In both cases, the combination of compact dimensions and high performance provides the basis for universal and highly flexible use on board, especially as the units can be equipped with all common spin-on cartridges from the Stauff range with Micron ratings from three to 125 micrometres. The visual contamination indicators on the filters allow the filter elements to be replaced as required.

“ A suitable filtration system is also useful for filling hydraulic systems with fresh oil.”

The units can be used to efficiently clean hydraulic systems as well as lubricating systems based on mineral oil. They are not only suitable for preventive maintenance and servicing of the ship hydraulics – they can be used during maintenance work, for temporary support of the integrated filters or as bypass filters on large-volume systems. Equipped with a suitable blank filter element, they are also used for draining and transferring container contents.



Image Credit : Stauff

The mobile filter unit SMFS-P-015 was developed especially for use on ships. Its features include the portable design and the choice of 50 Hz and 60 Hz drives.

A suitable filtration device is also useful for filling hydraulic systems with fresh oil. This is because fresh oil cannot usually be designated as pure, as it is rarely fine filtered during production and processing and particles can additionally be introduced during filling, transferring and transport (e.g. in reconditioned barrels).

This provides service personnel and maintenance service providers on-site, on ships or offshore equipment with a highly flexible system for point-of-use purification of hydraulic and lubricating oil systems. The robust design of the filter units ensures a long service life even under high strain. ■

Stand: 13458



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Recognising excellence in the oil and gas industry

Innovation and digital ingenuity lead the way in this year's ADIPEC Awards.



Image Credit : DMG Events

THE ADIPEC AWARDS have attracted more than 600 submissions from more than 50 countries for the 2019 edition, an increase of 92 per cent compared with 2018, demonstrating the depth of professional talent and range of opportunities available in today's oil and gas industry. For some categories, the number of entrants more than doubled.

The six award categories in 2019 recognise technological innovation, ground-breaking research on alternative methods of harnessing fuels, and organisations successfully evolving through digital transformation

"The Awards Jury members and I congratulate the finalists of the ADIPEC Awards 2019, which highlight the oil and gas industry response to global economic and technological trends," Fatema Al Nuaimi, ADIPEC Awards chair, and chief executive officer, ADNOC LNG. "We are looking forward to announcing the winners at the awards ceremony in Abu Dhabi on 11 November."

The industry's transformation, with its emphasis on digitalisation and advanced technology, is one of four core focuses for ADIPEC through 'Oil and Gas 4.0', the event's revised strategic conference.

Under the theme of Excellence in Energy, the 2019 ADIPEC Awards include an all-new category for 2019, the 'Oil and Gas Inclusion and Diversity Company of the Year Award'. The new award recognises

organisations excelling in their efforts to promote inclusion and diversity within the industry, which is increasingly seen as vital to recruiting new talent to oil and gas.

Comprising 29 leading energy experts and analysts from across the industry, the judging panel includes representatives from NOCs IOCs, as well as market intelligence firms and oilfield service providers.

Finalists in the ADIPEC Awards 2019 include: Breakthrough research of the year

- **Eni SpA – Italy:** E-REMM (Eni-Reservoir Electro-Magnetic Fluid Mapping)
- **King Abdullah University of Science and Technology (KAUST) – Saudi Arabia:** Futuristic smart pipe joint employing low-cost and printed IoT based leak detector
- **Qpinch – Belgium:** A chemical heat pump converting waste heat energy into process heat
- **Saudi Aramco and Wireless Instrumentation Systems – Saudi Arabia:** Thru-tubing Retrievable Intelligent Completion System (TRICS)

Breakthrough technological project of the year

- **Jebco International Ltd – Canada:** UltraClad Technology

- **Petronas Research SDN BHD – Malaysia:** Monetising CO2 to High Value Carbonates via Supercritical CO2 Mineral Carbonation Technology
- **Saudi Aramco – Saudi Arabia:** Innovative Approach to Recover Flared Gas from Gas Oil Separation Plants GOSPs
- **Worley – Australia: CAROL -** The World's First Catalyst Removal Robot

Digital transformation project of the year

- **ADNOC Onshore – United Arab Emirates:** Transforming ADNOC Onshore Assets - Data Driven Digital Twin for Production Optimization
- **Eni SpA – Italy:** Digital Lighthouse Project on Upstream Industrial Asset
- **Petroleum Development Oman, iINNOVATEQ – Oman:** Digital Transformation of PDO's Wells, Reservoirs, & Facilities Management Through Nibras
- **SparkCognition – United States of America:** Aker BP & SparkCognition Improve Production: Machine Learning Success on Unmanned Offshore Platform

Oil and gas inclusion and diversity company of the year

- **ABB Inc – Switzerland:** ABB, The Place To Be
- **ADNOC LNG – United Arab Emirates:** ADNOC Driving Diversity and Inclusion
- **Halliburton – United States of America:** Halliburton Diversity and Inclusion; Breaking Barriers
- **Petroleum Development Oman – Oman: PDO:** Embedding a Diversity and Inclusion Culture in Business Strategy – A Step Change

“ The ADIPEC Awards have attracted more than 600 submissions from more than 50 countries.”

Social contribution and local content project of the year

- **ADNOC – United Arab Emirates:** ADNOC In-Country Value (ICV) programme - Contributing to the UAE's economic growth
- **Borealis, Borouge and NOVA Chemicals - Austria:** Project STOP
- **PTT Exploration and Production Public Company Limited - Thailand:** The Crab Hatchery Learning Center Project
- **Shell International B.V. – Netherlands:** Shell LiveWIRE: Boosting local skills and enterprises

Young technical professional of the year

- **ADNOC Onshore – United Arab Emirates:** Shamma Saeed Alshehhi
- **Petronas Group – Malaysia:** Irene Lock Sow Mei
- **Saudi Aramco – Saudi Arabia:** Tasneem T. Al Sharif
- **Saudi Aramco – Saudi Arabia:** Ayrat Gizzatov

The ADIPEC Awards are sponsored by Mitsui & Co, Arab Development Establishment (ARDECO), NPCC and ExxonMobil. Winners will be announced during the ceremony and gala dinner on the opening night of ADIPEC. ■

Two Petroleum Development Oman (PDO) projects announced as finalists in the ADIPEC Awards 2019

TWO PETROLEUM DEVELOPMENT Oman (PDO) projects have been announced as finalists in the prestigious ADIPEC Awards 2019.

The shortlisted entries are the company's Diversity and Inclusion Programme, a finalist in the Oil and Gas Inclusion and Diversity Company of the Year category; and the Digital Transformation of PDO's Wells, Reservoirs, and Facilities Management through the Nibras platform, in the Digital Transformation Project of the Year section.

PDO's diversity is evident in its staff demographics. The company employs 8,600 staff, 13 per cent of whom are non-Omanis drawn from 67 nationalities. Due to this diversity combined with employing around 1,000 females, PDO recognised that developing an inclusive culture was crucial to business success.

To support this focus, a comprehensive programme was rolled out, incorporating a broad range of initiatives. These included a focused approach in attracting and recruiting female local talent, especially in technical areas, and providing the infrastructure to enable them to work in the field and a work-life balance programme (Maktabi), which allows staff to work from home. The D&I approach is embedded throughout the company with full and active endorsement by the executive team and an appointed D&I Officer.

The second finalist is the Digital Transformation of PDO's Wells, Reservoirs and Facilities Management through the Nibras platform. This allowed the company to embark on a



PDO is a finalist in the Inclusion and Diversity category.

transformational journey to its wells, reservoirs, and facilities management by adopting Lean continuous improvement business methodology. This has resulted in the streamlining of processes and digitalisation as a means to proactively manage its assets. Nibras, a web-based solution, is used to integrate all the processes, proactively identify

issues by exception and automate workflows.

The ADIPEC Awards Jury is now in the process of selecting this year's group of winners, who will be announced during the ceremony and gala dinner at the St. Regis Saadiyat Island Resort, Abu Dhabi on Monday, 11 November – the opening night of ADIPEC.

Image Credit : PDO

Solutions for increased productivity and profitability

PARKER HANNIFIN, THE global leader in motion and control technologies, will be demonstrating its latest products and system solutions as the solution provider to drive increased productivity and profitability in the oil and gas industry for downstream, upstream and midstream stages of the sector 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, fluid and gas handling, hydraulics and process control. The company partners with OEMs, Engineering Procurement Companies (EPCs) and distributors. This ensures the optimisation of designs and

Image Credit : Parker Hannifin



The CDAS compressed air dryer.

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.

Among the many exhibits featured at ADIPEC will be Parker's dissolvable and degradable products that replace traditional composite plugs in downhole applications. They are developed to meet precise application needs and then dissolve completely, eliminating the need to drill down and retrieve the plug after use.

Also included will be the SmartFluxx nitrogen gas membrane modules designed to optimise the highest nitrogen capacity and lowest feed-air consumption, keeping the modules the smallest available on the market. Cost reduction and low maintenance optimisation will be exemplified by products such as the CDAS



Image Credit : Parker Hannifin

Parker's dissolvable and degradable Fracballs.

(Clean Dry Air System) ATEX (ATmosphères EXplosibles) and OFAS (Oil Free Air System) units that provide clean, dry, and oil-free compressed air to the most stringent industry standards.

Parker will also be presenting its range of high pressure, high temperature process control technologies that are enhancing customer's asset integrity programmes. The technology on show includes a range of close coupled process to instrument valves that eliminate the need for complicated hook-ups, and a portfolio of solenoid valves that ensure accurate control of instrumentation lines.

Stand: 4410

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Churchill Drilling Tools to showcase stuck pipe solution at ADIPEC

OILFIELD SERVICES COMPANY Churchill Drilling Tools has announced four successful drill-string severers using its HyPR HoleSaver, following stuck pipe events across the Middle East, including two in the UAE.

Churchill's HyPR is a safe, simple stuck pipe solution, pre-placed in the string, that enables operators to reinstate operations rapidly. The technology, unlike traditional stuck pipe methods such as explosives or chemicals, requires no additional topside equipment or personnel.

Over the last six months, four drilling teams from three major Middle East operators deployed the HyPR stuck pipe solution. All successfully cut their drill-strings in a matter of hours, a 100 per cent success rate. One UAE operator severed its drill-string in a record-breaking 60 minutes, after getting stuck due to heavy losses.

Nicholas Kjaer, Churchill's general manager in the Middle East and Asia, said, "Stuck pipe usually halts drilling operations until the pipe can be freed – adding millions of dollars to the cost of a drilling campaign. Operators no longer need to incur days or even weeks of delay while specialist equipment and personnel are mobilised. The HyPR now enables operators to sever their drill-string in a matter of hours, which means drilling teams can get back on track quickly and safely at low cost."

As a result of this success, operators are increasingly adopting the HyPR as their primary contingency against stuck pipe, the company says.

Kjaer added, "The HyPR's first four severers took place in the Middle East, which reflects our operators' willingness to push the boundaries of innovation and lead the industry. Recognising the significant savings the HyPR HoleSaver can deliver, demand in the region continues to increase, further establishing Churchill as the industry's leaders across downhole circulation."

The '60-minute HyPR cut' will be on public display for the first time at ADIPEC on the Churchill Drilling Tools stand.

Stand: 8531

Intelligent information systems for digital transformation

RHYTON SOLUTIONS GMBH puts the software, artificial intelligence, and data science to facilitate agility and intelligence in oil and gas.

The company provides enterprises and businesses with intelligent information systems to achieve digital transformation. To do so, it brings together all the people, data, and systems into one place for a digitally-connected business and gathers all organisational activities, processes, competencies, and models in one platform. This integrity empowers the companies to manage effectively and gain detailed insights and consistency of operations.

The combination of its solutions and experience helps organisations harness the power of digital technology without the immense complexity associated with digital transformation, the company says.

For its second participation in ADIPEC, Rhyton will be introducing its signature product Rhyton Project ERP, integrated software to manage EPC projects in the oil and gas industry. It will also be showcasing



Image Credit: Rhyton

The Rhyton team at ADIPEC 2018.

Rhyton Intelligent EHS, its cutting edge solution, which uses Artificial Intelligence to detect and notify unsecure construction conditions and activities from video streams.

Rhyton will also introduce two other new

products to the GCC market for the first time. To learn more about Rhyton Solutions GmbH, see the website at www.rhyton.de

Stand: 14420


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The benefits of the Belsim VALI DVR solution

Have you considered Data Validation and Reconciliation (DVR) technology for your project? Belsim's VALI software suite transforms process data into consistent, accurate and reliable information and is used in many applications throughout industry.

BELSIM IS A software and engineering company with more than 30 years of engineering expertise in oil & gas process modelling. VALI, its developed Data Validation and Reconciliation (DVR) software is used in many industrial fields with applications spanning the industry sectors from production accounting to energy performance monitoring.

Belsim's VALI software suite uses DVR and state-of-the-art modelling techniques to transform process data into consistent, accurate and reliable information, that can help to operate processes correctly, detect problems in time, and eliminate inefficiencies. VALI automatically computes key performance indicators with a high level of accuracy and reliability. Users can add their constraints, rules and equations to the process model in a user-friendly way. When process parameters cannot be measured directly, VALI uses a soft sensing system to calculate their value.

“ VALI computes key performance indicators with a high level of accuracy and reliability.”

It is imperative and mission-critical to account for mass and energy in processing facilities for accounting, financing, safety and efficient operations. Mass balance or accounting for yield and production is a direct profit metric for any organisation. Energy management enables the efficient operation of the plant and reduces the overall operating cost of the unit, respecting the reliability and safety of the process. Every engineer is chasing this objective with a variety of handles and solutions. Owing to decades of research and experience, VALI has developed a niche area by demonstrating technical supremacy in the area of DVR.



ValiStudio display.

Image Credit : Belsim

Leading the field

In the decision support systems domain VALI leads the field through features such as gross error detection and elimination, reactions and thermodynamics participation in reconciliation for additional constraints, leaving no room for assumptions or static coefficients for performance monitoring. The most commended feature in VALI is the reconciled uncertainty and measurements' gain that signifies the trust imparted on to each measurement through reconciliation. The VALI solution is acclaimed to be self-critical of its results through the global χ^2 and individual penalty tests, offering users confidence on the results.

For energy management solutions, VALI soft sensors and in-built KPI calculations provide insight into the equipment performance that cannot be measured or

quantified by direct means. Energy optimisation is fortified with VALI reconciliation as the data uncertainty is eliminated during optimisation. With inherent thermodynamic and momentum balances VALI energy balances are always consistent irrespective of the utility form – steam, fuel or power. The continuous energy management system with minimal user intervention provides insight into the utility imbalances and facilitates to plug energy losses when and wherever they occur.

Production accounting has not been a significant focus for many companies until recent years. Once the financial impact of accurate accounting has been realised, the area has been quintessential in manufacturing solutions. With multiple varieties of crude feeds and more than 50 varieties of products, blends and intermediate products, the

hydrocarbon accounting engineer is often perplexed facing a variety of problems. VALI offers an innovative yet simple and efficient way to tackle multiple tanks, blends, products, movements within the refinery with minimal intervention from the user. This ensures product-wise balance and easily comprehensible model for any user as opposed to having an over-complicated system with too many repetitive steps to arrive at a consistent balance across the system. Loss management, emissions and maintenance advisor are nonetheless valuable byproducts of the solution.

“ VALI accounts for the production of each well or node and reduces the investment in expensive measuring equipment.”

The Upstream industry is the industry with the highest uncertainties. This is because there is a small set of measurements and the assets are remote to monitor and maintain. Through virtual flow and back allocation features, VALI accounts for the production of each well or node and reduces the investment in expensive measurement equipment such as multiphase flowmeters and the lifetime cost of their maintenance.

Furthermore, VALI does not aim to displace other engineering solutions but to complement and multiply the value proposition by eliminating the garbage in the input data.

VALI provides coherent process data to the end users.

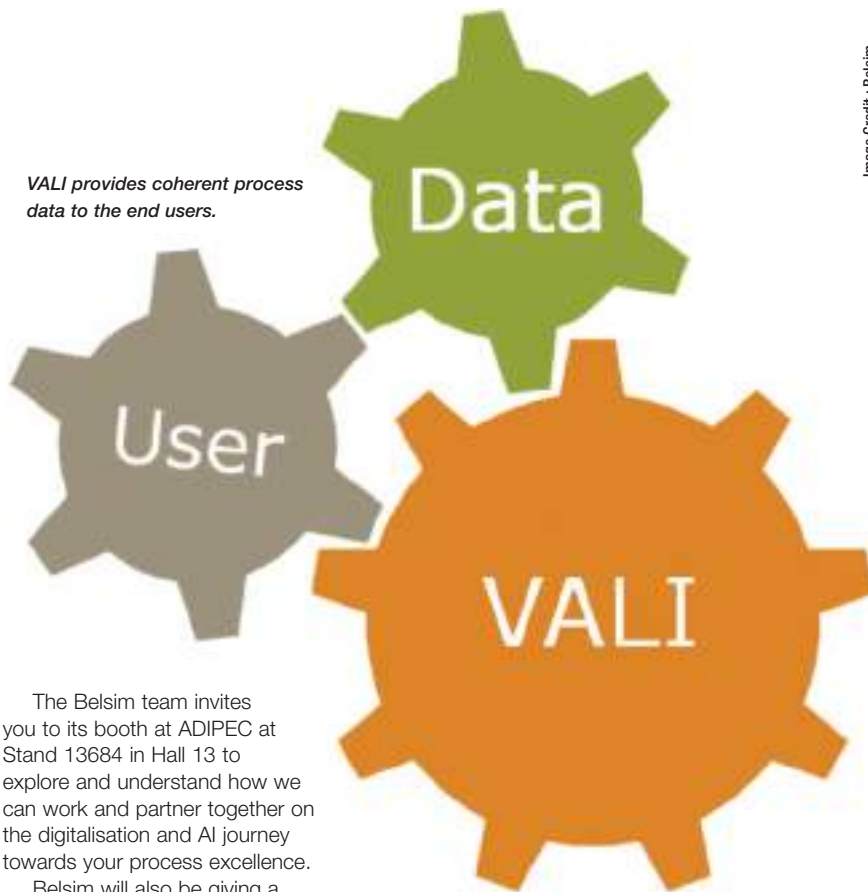


Image Credit : Belsim

The Belsim team invites you to its booth at ADIPEC at Stand 13684 in Hall 13 to explore and understand how we can work and partner together on the digitalisation and AI journey towards your process excellence.

Belsim will also be giving a presentation (ADIPEC code: SPE-197526-MS) about technological advances in maintenance scheduling, on Wednesday November 13, 2019, from 9.30 AM at Capital Suite 14. The presentation, “*Condition based maintenance for oil and gas industry based on data reconciliation techniques*”, is showcasing the everyday benefits of deploying a

reconciliation solution in a refinery, with an example on the crude pre-heat train performance (fouling) monitoring.

You will also have the opportunity to meet our experts, Ionel Craciun and Suryaprakash Digavalli, who would be more than happy to address any questions you may have with respect to our Data Validation and Reconciliation solution and its potential. ■

For further information tel: +32 (0)4 239 97 10 (Belgium), +971 56 724 0640 (UAE); email: info@belsim.com; www.belsim.com.

Stand: 13684

Benefits of VALI

- Fully integrated process modelling interface
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- Windows AD support
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- Three highly efficient solvers
- Unique Gross Error Elimination techniques
- Dedicated Production Accounting reports
- Comprehensive thermodynamic library
- Seamless integration of mass and energy balance modelling
- KPI calculation inside the model along with their uncertainties



It is mission critical to account for mass and energy in processing facilities.

Image Credit : VanderWorff/Adobe Stock

100 per cent British-made tools from HTL Group

FOR THE THIRD year running, HTL Group will be showcasing its 100 per cent British-made product range of controlled bolting tools and equipment at ADIPEC.

The UK is one of the most open economies for exporting its goods and services, with the Middle East region, accounting for 40 per cent of the world's proved reserves, being one of the most important global markets. It is important for industries in the UK, connected to the oil and gas sector, to engage and network with trading partners in the region.

HTL will be providing live demonstrations of its new asset management software iCalibrate 2.0 and showcasing its OEM range of controlled bolting premium tools. Included with this equipment is the Working at Height product range that provides customers with ultimate operator safety, preventing dropped objects, increasing efficiency and durability with tools such as the DSX hydraulic torque wrench.

ADIPEC provides a platform for companies such as HTL Group to engage with other likeminded companies as well as sharing

innovative industry knowledge. Most importantly to HTL, it provides the opportunity to establish potential partnerships within the region and build a customer base that aims to improve their controlled bolting processes with innovatively manufactured torque wrenches and tensioners.

For further information, visit HTL on Stand 8432, Hall 8 at ADIPEC or contact us before the event to arrange a meeting. www.htlgroup.com/contact.

Stand: 8432

Trelleborg to showcase fire protection solutions at ADIPEC

TRELLEBORG WILL BE showcasing Elastopipe, its fire-resistant, flexible piping system. This corrosion-free, explosion, impact and jet fire resistant flexible piping system is key to protection and safety on offshore platforms, where it has been used for more than 20 years.

Ole Bjørn Rasmussen, sales manager with Trelleborg's offshore operation, said, "The Elastopipe system can be used across several key applications including deluge and sprinkler systems, utility and drain water systems, as well as nitrogen distribution systems. Installation requires no hot work and once fitted, it is virtually maintenance free."

Safety is a crucial aspect to operations in demanding offshore environments. Trelleborg's offshore operation will showcase an extensive selection of passive fire protection solutions including Vikodeck and Firenut. These products have been carefully designed using Trelleborg's Firestop, a certified rubber-based material with the ability to protect structures from exceeding critical temperature limits.

Vikodeck is designed to offer surface protection against blast, jet and pool fire in harsh offshore oil and gas environments. It provides excellent corrosion protection and anti-fatigue damping support for the comfort and safety of employees.

Firenut is a jet fire protection for bolted connections to extend service life in the event of a fire. It is tailor-made to accommodate almost any size of bolt and resists both jet fire and pool fire. A rigid and tough design means that Firenut has extremely good resistance to mechanical damage when installed.



Image Credit : Trelleborg

Vikodeck offers protection against blast, jet and pool fire.

Morten Kristensen, business group director with Trelleborg's offshore operation, said, "Trelleborg focuses on being flexible to support the ever-evolving offshore industry. There is currently a great emphasis on offshore safety. As this is becoming more widespread, the global need for fire and corrosion resistant materials is increasing."

Stand: 9152



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Compressors for the Middle East market

Rajesh George, regional director at Sullivan-Palatek, discusses how the company's compressors are addressing market needs.

How do you view the market for your compressors in the Middle East, and how are you looking to expand your business in the region?

The air compressors market in the Middle East is a billion-dollar market and ever increasing. Known as the fourth utility, compressed air usage and appropriate applications are expanding every day. It is safe, economical and requires less maintenance and shutdowns. It is used in all type of industries such as oil and gas, construction, drilling, mining, production, service facilities, painting and blasting etc. Hundreds of Sullivan-Palatek machines are in operation throughout the region. We are actively looking for strong distributors for our wide range of products in both the portable and industrial electric divisions.

Customers in the region are attaching more importance to quality, service and dependability these days. Stock, service and spare parts are the most important factors in this market. Our products are renowned for their high quality. Sullivan-Palatek offers the best warranty terms for their machines, with extended warranties up to 10 years available in electric models. All warranties offered are for unlimited hours, which demonstrates our confidence in our product.

Another part of meeting our customer's growing needs for reliable power, is continuing to introduce new and innovative products into the marketplace. Sullivan-Palatek has redesigned its entire line of Tier 4 portable air compressors. These units boast ease of maintenance, heavy-duty construction, low shutdown rates and reasonable cost for machine and parts, making them a popular option for rental companies. We also offer an expanded Tier 3 product line for export markets.

Are there any products that you are looking to promote in the region, or that are particularly suitable for conditions in the region?

We offer a full line of portable diesel and



Image Credit : Sullivan-Palatek

Hundreds of Sullivan-Palatek compressors are in operation throughout the Middle East.

Industrial electric air compressors available for export markets, in particular, the Middle East. Upfitted with oversized coolers and air ends, these units are not only more efficient but more reliable in harsh environments. For extra protection, our unit exteriors boast a durable galvanneal enclosure with a powder coated finish for rust and corrosion resistance. The

portable range consists of models from 110 to 1800 CFM, 100 to 500 PSI 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 D350PDCA portable compressor is a versatile and efficient unit, delivering 350 CFM at 150 PSI. At its core, the model features a 126 HP CAT Tier 3 engine and a large 127mm 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

“ Customers are attaching more importance to quality, service and dependability these days.”

a durable galvanneal 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. A cooled and filtered option available for this model as well.

The Sullivan-Palatek DR750-D900PHCA wagon portable series is highly versatile and a good choice for reconstruction, blasting, drilling, and mining projects. Offered with a CAT Tier 3 engine, these models are 750-900 CFM and 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



Image Credit: Sullivan-Palatek

The DH1600 series in the field.

maintenance. For better data gathering, the Sullivan-Palatek Electronic Controller (SPEC) provides digital readouts on everything from fuel level, service and engine needs.

Are there any developments or trends in the compressor market you are seeing?

Other than the introduction of Tier 4 final and the increased electronic controls needed to run those units, the biggest change we have seen in the market has been the use of

telematics. Remote monitoring of units in the field has been a huge asset to manufacturers and customers alike, often helping customers discover problems with their units before they go down and require servicing. Telematics is something Sullivan-Palatek offers our customers and has seen much success on the service side of our business. Understanding the conditions our compressors are running in and how they perform, has only helped us improve our products and their capabilities.

What do you think is the secret of your success?

One of the factors that makes us stand out amongst our competitors, is our ability to customise our equipment to meet specific application needs. Many of our competitors offer only standard configurations, while we as a smaller manufacturer have the ability to be flexible and build a unit with specialty equipment without slowing production.

Another is our service team. When you call Sullivan-Palatek, you do not get an electronic voice answering machine. You get a real service technician willing to work to solve whatever issue arises. ■

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The maritime industry is growing rapidly in the Middle East.



Image Credit : Foresight Group Ltd

Positive environment for shipping

Dr. Ravi K. Mehrotra, executive chairman, Foresight Group International discusses Middle East prospects.



Image Credit : Foresight Group Ltd

Dr. Ravi K. Mehrotra, executive chairman, Foresight Group Ltd.

How do you view the Middle East as a market for your shipping business?

FGIL's operating headquarters in Dubai is well placed in the MENA region, as the emirate ranked first regionally and fifth globally among the best maritime centres in the world for 2019. It provides a strategic platform to enhance the convergence, communication and interaction between maritime industry leaders, and share international best practices that will advance the maritime industry to a new level of growth and sustainability.

The port and terminals sector has seen rapid growth, e.g. DP World's Jebel Ali terminal handles more than 19 million TEUs today, creating a hub and spoke model for the container logistics industry in the entire MENA region.

To what extent are you benefiting from the growth in offshore exploration and development in the Middle East?

Foresight Offshore Drilling/Affiliates have made a significant investment over the past couple of years in clients acquisition in the Middle East and have achieved reasonable success by bagging long-term contracts. As oil supply growth has eased off, demand is robust, and inventory levels have begun to finally erode.

The timing of Foresight's entry into the Middle Eastern market and its ambitions to bring more offshore jack-up rigs is aligned with National Oil Companies' strategies to increase their offshore spending to boost exploration and production activities.

“IMO 2020 is a big hurdle for shipowners.”

What are the main challenges you are experiencing?

IMO 2020 is a big hurdle for shipowners. Even with moderate projections, the bills for ship owners are indicated to be hefty, running to tens of billions of dollars extra a year for the sector. Uniform policies regarding scrubber discharge are not adopted among the coastal states yet. Trade wars between the USA and China have impacted drastically on the shipping industry.

Geo-political tension in the Middle East Gulf region has heightened the security issues of late, and thus the operating cost has increased in terms of insurance premiums and keeping additional security personnel on board.

How important are technology and innovation to your business?

Foresight is using technology and innovation to build its strategies that best fit its needs and goals, and keep its services relevant to its customers. Foresight Group, with its diversified businesses located globally, is adapting to the digital transformation to stay agile, competitive, and relevant by analysing performance and customer satisfaction metrics that allow businesses to optimise their strategies and processes for delivering better results.

What do you think is the secret of your success and continued growth?

Our values are the most powerful compass to guide and direct our decisions. We are a 35-year-old young organisation with a working culture of a "Start-up", led by highly skilled and dynamic leaders and talented teams who focus on delivering customer-centric solutions with excellence. ■



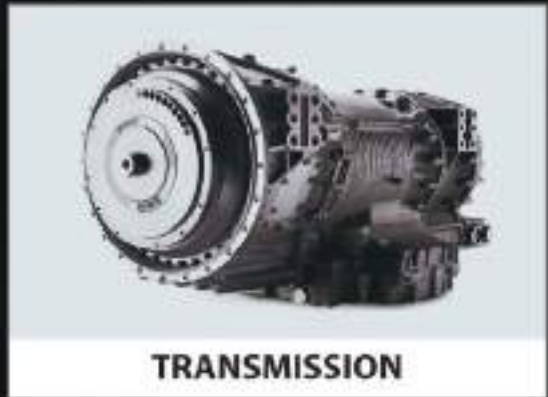
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An efficient and effective hose changeout system

WHEN IT COMES to managing the cost of a Single Point Mooring (SPM) terminal, an important element of both capital expenditure (CAPEX) and operational expenditure (OPEX) is the marine hoses. The hose changeout solution is an essential component of a comprehensive hose life cycle initiative. The procedure requires specialised and experienced personnel, combined with proven methodologies to ensure a safe, efficient and cost-effective hose changeout. The solution should be designed for each client and their specific location, with the endorsement of hose manufacturers, to ensure that no undue stresses and loads are imposed on the hoses during the change out that could compromise the hose integrity and reduce the operating life.

Oil and gas marine hoses complete the fluid path for offshore product transfer between the tanker and the facility. These critical components constitute a major investment, often with long lead times, and are the most vulnerable link in the distribution chain. They are exposed to harsh environmental and operating conditions, require high levels of availability and must comply with exacting QHSE standards. Oil spillage, reduced reliability, reduced asset integrity and unplanned shutdowns constitute major QHSE, reputation and economic impacts for the asset owner, stakeholders and the environment.

The design parameters and assumptions should be aligned with the actual onsite operating conditions. This includes the observation of the floating hose behaviour and annual profile measurements of the subsea hose strings.

At Marsol, we gather and assess data on the whole lifecycle of the



Image Credit: Marsol

The Marsol hose deployment system seen in action.

system, from design through to operations and maintenance, inclusive of hose changeouts and testing activities. This gives us the unique ability to provide not only cost-effective solutions, in compliance with design parameters, but also implement long-term integrity management programmes for not just the hoses but the complete SPM facility.

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Stainless steel pipes and tubes specialist continues to expand in global markets

SURAJ LIMITED, LEADING manufacturers and exporters of stainless steel seamless pipes, tubes, 'U' tubes, instrumentation tubes, flanges, fittings and electro polished finish products, continues to strengthen its presence in the global markets, serving more than 70 countries worldwide.

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 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, tel: +91 982 5015137, fax: +91 79 2754 0722 or see the website at www.surajgroup.com.



Suraj pipes, tubes and fittings.



Image Credit : Suraj

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New horizons on the Middle East energy landscape

As the world energy mix transforms in response to climate change, Abu Dhabi is a regional leader in clean energy.



Abu Dhabi has long been involved in alternative energy initiatives, such as the Solar Challenge.

Image Credit: Agoria Solar Team/Flickr

AT THE 24TH World Energy Congress hosted by the UAE capital in September 2019, a panel discussion on 'Abu Dhabi Energy Transition:

Future Scenarios and Implications for Security and Economic Growth', explored local energy perspectives in conjunction with the views of international experts to gain insights into global trends that help guide its transition.

International Energy Agency (IEA) executive director, Dr Fatih Birol, emphasised the urgent need for diversification away from oil and gas, for the region, urging that it is now time to broaden the economy.

Outlining the pivotal role of energy efficiencies and renewables in savings of cumulative carbon dioxide emissions in the sustainable development scenario, he said, "Carbon capture and storage is a very important technology."

He commented that 2018 was a remarkable year for energy, but global carbon dioxide emissions also reached a historic high.

Dr Birol confirmed that emerging countries, mainly China and India are the drivers of renewable energy growth.

"In the last five years, in many countries, more coal was replaced by natural gas," he added. "Coal plants alone are responsible for

large carbon dioxide emissions," he said.

However, Dr Birol explained the need to work with various technologies together, to see results in fighting climate change.

"Today, Africa is the region which contributed the least to carbon dioxide emissions but is worst hit by climate change," he quoted an example.

He also went on to add that natural gas will continue to play a major role but the right regulations need to be in place to counter the problems such as methane leakages.

As a part of the panel discussion, H.E. Mohammed Bin Jarsh Al Falasi, Undersecretary, Abu Dhabi Department of Energy (DoE), shed light on UAE's priorities, commenting that an integrated policy framework will serve as a base to develop specific policy elements, together with stakeholders.

“ If Abu Dhabi does not move with the energy transition, we may be left behind.”

The UAE is laying out ambitious plans to diversify its domestic energy mix and boost clean energy while simultaneously aiming to reduce its carbon footprint, over the next three decades.

As part of Abu Dhabi's concerted efforts in driving energy transformation, the DoE is developing a projection of the emirate's potential energy futures until 2050.

Commenting that energy transition for any country is complex, Al Falasi added, "To support the integrated policy framework, we have developed an Integrated Energy Model to capture the Abu Dhabi demand/supply ecosystem.

The study presents several possible scenarios where the achievement of the main objectives comes with both trade-offs and opportunities and also supports the UAE's commitment to the 2015 Paris Agreement.

Al Falasi reaffirmed that by implementing all the various initiatives, the DoE is expecting a savings of 22 per cent in electricity and 32 per cent in water consumption, by 2030.

"If, in Abu Dhabi, we do not move with the trend of energy transition, we may be left behind," he remarked. ■

Strategies for the energy transition

At Energy Intelligence's 40th Oil & Money conference, held in London in October, global energy leaders shared their thoughts on how the oil and gas industry can respond to the challenges of the energy transition and act in collaboration with government and other stakeholders to meet climate change targets.

THE DANGER OF marginalising gas's vital role in a low carbon future was the subject of BP CEO Bob Dudley's speech. He highlighted the benefits of gas as the cleanest hydrocarbon, making it an ideal partner for renewables, providing back-up to solar and wind energy. It's abundant, affordable, flexible, easily transported, energy-rich and an efficient energy store, in a way that batteries cannot replicate at the moment, he said.

"Gas has a vital role to play in the energy transition. And not just in the transition, but in the destination – the net-zero economy we must achieve in the decades ahead."

Dudley made the point that gas will need to be decarbonised – and can be, setting out four recommendations for the way forward – the first two for the energy industry, and two others for governments:

- Demonstrate that carbon capture, use and storage (CCUS) can decarbonise gas through creating projects at scale.
- Produce gas in a cleaner way by cutting down on methane leaks and flaring.
- Implement meaningful carbon pricing
- Get the infrastructure and industrial processes ready for hydrogen.

Last year, BP set itself a goal to limit operational methane intensity from its Upstream operations to 0.2 per cent out to 2025, and it has a US\$100mn fund for new emission reduction projects.

"A month ago, we announced a global first," said Dudley. "We'll now continuously measure methane emissions in all our new major oil and gas sites. We're using drones, cameras, and lasers to detect leaks that would previously have been invisible."

"It's a global first, but it needs to become the global norm."

Saudi Aramco president & CEO, Amin H. Nasser, stressed that both existing and new energy sources will be needed to satisfy the planet's needs for energy and economic development, while concurrently promoting climate protection. In his speech, he discussed the need to have a more realistic,



Bob Dudley, group chief executive, BP speaking at the 40th Oil & Money conference.

comprehensive and inclusive strategy to make greenhouse gas (GHG) emissions management more effective.

“It’s a global first, but it needs to become the global norm.”

He said, "We could consider four key strategies that have the potential to make the global effort for GHG emissions management much more effective – going beyond electric power generation and light duty passenger transport; extending clean R&D and technology funding to include existing energy resources; moving toward a circular economy; and taking advantage of the greenhouse gas reduction synergies across economic sectors offered by the circular economy. Without a doubt, oil and gas will be here for many decades to come. But there can also be no question that climate change is among the most significant challenges facing humanity."

Nasser shared Saudi Aramco's achievement in carbon intensity which is among the lowest globally at 10 kilograms of CO₂ equivalent per barrel of oil equivalent, as

well as the company's methane gas intensity of 0.06 per cent, one of the lowest levels in the industry.

He pointed out that Aramco has a long history of reducing all emissions, even well before climate change was identified as a global challenge. The elimination of flaring in its Master Gas System has resulted in CO₂ reduction of some 100 million tons every year, he said.

"In addition, we are emphasising cogeneration in our operations, achieving more than 70 per cent thermal efficiency."

Nasser highlighted some of Saudi Aramco's other achievements in this area, including higher-mileage and lower-carbon integrated engine-fuel systems; Carbon Capture, Utilisation & Storage (CCUS) and clean hydrogen from oil as a key energy source to fuel a potential future hydrogen economy.

"Our industry is fully committed to further lightening the greenhouse gas footprint of oil and gas. We are backing our words with concrete action. By the same token, I urge governments around the world to work closely with us to develop pragmatic policy solutions to deliver ample, reliable, safe, affordable and at the same time sustainable energy to the world," he concluded. ■

Image Credit : BP

Halliburton introduces automated drilling telemetry service

HALLIBURTON HAS RELEASED QuickPulse Automated Directional Gamma Service, a new measurement while drilling (MWD) technology that provides quick and reliable downhole information at extended depths to deliver wells faster. This capability helps operators drill longer laterals, make improved geosteering decisions and reduce well time.

The QuickPulse system combines directional, vibration and gamma-ray sensors

with a strong transmission signal that overcomes most downhole interference. It automatically prioritises critical vibration, tool face and downhole inclination measurements, enabling rapid drilling decisions. It transmits data in intervals as fast as three seconds and full survey measurements in as little as 24 seconds.

Lamar Duhon, vice-president of Sperry Drilling, said, "As operators drill longer

laterals, obtaining quality data at greater depths can be difficult because of noise and interference. We designed the QuickPulse system with advanced sensors that detect and automatically transmit data so operators can drill faster and more accurately."

The system also has a small footprint for up to 70 per cent faster rig-up time, and the fully automated signal detection helps increase rig efficiency.

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New ESP safety valve

ABERDEEN-BASED PRAGMA HAS developed an advanced downhole safety valve to create an improved well control solution for cable deployed Electric Submersible Pumps (ESPs) retrofitted to production wells.

The valve is integrated within the lower portion of the ESP assembly and is deployed and retrieved through the production tubing in the same run as the ESP. It offers wellbore closure below the ESP control lines. By installing the valve between the ESP and ESP packer, the valve does not rely on the integrity of aged well completion components.

The valve's functionality is based on a novel pressure differential, or lift actuated design, requiring no pressurised chambers, hydraulic control lines or electrical power, which safeguards reliability. The valve will fail-safe close when the ESP is switched off and can be opened and closed as many times as required. The technology can also be applied to alternative artificial lift systems including capillary strings, gas lift velocity strings, progressive cavity pump and jet pump systems. A high temperature version is also available.

Pragma technology manager, Matt Manning, said, "Our valve uses the ESP's lifting capability to open or close it in line with production. The unique design advantages of this technology, combined with its compact nature, not only provide greater safety and reliability assurances to the operator, but also lower installation, operation and retrieval costs. The technology has been developed in-house and we are conducting prototype testing, with field trials and API 14A certification planned later this year."



Image credit: Pragma

The new downhole safety valve.

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Hawke presents seven gland innovations

HAWKE INTERNATIONAL HAS unveiled a range of 28 new glands featuring seven innovations.

Manufacturer of glands for harsh and hazardous environments has developed a special conversion kit which enables Hawke's Universal 501/453 cold flow compliant cable gland to be easily converted into a barrier gland.

Hawke has unveiled a patented tightening guide which is integrated into all Hawke glands, as standard. The guide reduces the chance of glands being over or under tightened – a major health and safety issue for companies within harsh and hazardous environments.

Punched Seal Glands (PSGs) are another product development in the Exd barrier gland world. Hawke has increased the number of cores that can be passed through its PSG. It has developed a cost-effective, space efficient cable clamp which can be applied within 50mm of a gland.

The company has turned its attention to the overall ingress protection rating across all its glands. The protection ratings it now offers include IP66, which withstands high waterjet pressure and IP67/68, which tests the product when submersed in water.



Hawke has unveiled a patented tightening guide.

Image Credit: Hawke International

TAI, Modumetal to manufacture nanolaminated alloy product

TOYOTA TSUSHO AMERICA (TAI) and Modumetal have announced an agreement of a non-binding memorandum of understanding (MOU) for the establishment of a joint venture to manufacture Modumetal's nanolaminated alloy product, NanoGalv globally for industrial fastener and bolting applications.

"We are very pleased to partner with Modumetal to bring its nanolaminated alloy technology to industrial markets," said Arthur Harrison, senior vice-president and leader of the metals division of TAI.

The joint-venture company ModuTAI will set up a new production facility in Houston, Texas. The facility will extend the existing NanoGalv capacity in the market over ten times, bringing more than 100 tonnes per month of capacity into the market upon startup. The ModuTAI would initially serve existing customers of the NanoGalv products in the energy sector, with plans to expand quickly into further industrial segments, including construction, marine and transportation markets. Modumetal has deployed licenses for NanoGalv production to existing oil and gas fastener suppliers in Houston, Texas, Singapore and Aberdeen, Scotland.

Sercel launches next-gen land nodal system WiNG

SERCCEL HAS LAUNCHED WiNG, a fully integrated wireless nodal acquisition system that combines optimum field operational efficiency with the high-level of data quality available to support the precise imaging needs of the land seismic industry.

Leveraging the high performance of QuietSeis, Sercel's broadband digital sensor, WiNG is the next-generation land nodal system of choice for data acquisition companies looking to achieve the efficient and productive seismic surveys.

Pascal Rouiller, Sercel CEO, said, "Sercel has established its market-leading reputation on its commitment to delivering the best seismic data quality in the industry. We have launched WiNG in response to consultations with our customers and the latest projections for the requirements of tomorrow's geophysics. Sercel's new nodal technology will boost survey productivity while delivering unprecedented data quality."

Sercel represents the equipment business of CGG, which is a geoscience company providing geological, geophysical and reservoir capabilities to its customers primarily from the global oil and gas industry.



The new WiNG fully integrated wireless nodal acquisition system from Sercel.

Image Credit: Sercel

Sulzer's VIEC solution to boost oil-water separation

SULZER CHEMTECH HAS developed a solution that enhances separation performance in the challenging oilfields.

Sulzer's vessel internal electrostatic coalescer (VIEC) is equipped with fully insulated electrodes. It can be installed in new separators or retrofitted in existing vessels and forms a cross-sectional wall that forces emulsions through a high-voltage electrical field. As a result, while gas leaves the separator from the top, the water droplets merge together and fall to the bottom of the separator. At the same time, oil flows through the vessel for subsequent processing.

By fully insulating the VIEC's electrodes, Sulzer has built flexibility and robustness into its solution, allowing the VIEC to withstand any concentration of water and gas. This is the case even when the feed contains very high volumes of water. Therefore, it can be installed in the early separation stages to remove most of the water in the emulsion, as opposed to conventional electrostatic coalescers, which do not tolerate high amounts of water and gas.



VIEC is a technology for enhancing liquid-liquid separation.

Image Credit: Sulzer

Sulzer's solution can deliver crude oil with purities comparable or higher than systems featuring gravity separators, coalescers and dehydrators. Consequently, upstream facilities can greatly streamline their processes, reducing the size of conventional oil separation trains and the number of stages. This leads to lower capital expenditures and noticeable improvements in overall separation efficiency.

The VIEC allows the separation process to run at lower temperatures, characterised by higher viscosity fluids, and reduces the volumes of demulsifying chemicals needed.

Water droplet aggregation is promoted by the electrical field, leading to faster growth rates and settling times. Upstream oil and gas companies can therefore benefit from substantial savings in operating expenses. By introducing this new technology to existing systems, VIEC can increase separator's capacity by enhancing the oil-water separation process.

SPX FLOW presents FLS 15 hydraulic flange spreader for tough applications

SPX FLOW BOLTING Systems has introduced the FLS 15 single-acting hydraulic flange spreader. It uses an integrated wedge concept with a very small closed nose, making it suitable for inspection of flange faces, replacing gaskets and valve removal – even where gaps are very narrow.

The unit is light weight and has a slim-line design, making it easy to use while offering power to meet tough

applications. Its corrosion resistance makes the tool capable for offshore use with long life and reliability. The FLS 15 is flexible, with quickly interchangeable serrated or stepped shoes, and requires no special tools for maintenance.

Its high strength means it can remove stubborn, corroded or heat-seized nuts without damage to the stud (a blade witness mark may be left). It is attractive for blind studs/captive stud-bolts, typical in valve and heat exchanger applications.

As with other Bolting Systems solutions, the ENS is designed for flexibility and low total cost of ownership, with an interchangeable head to enable the splitting of different nut sizes, up to 5.3/8"/130mm across the flats. The triangular blade design increases operation efficiency by having three cutting edges and an easy removal facility.



Image Credit : SPX FLOW

The FLS 15 requires no special tools for maintenance.

Fieldbit adds AR data visualisation feature

FIELDBIT HAS ANNOUNCED the addition of real-time data visualisation (spatial computing) to its multi-source knowledge platform. Spatial computing empowers field service technicians and operators to easily navigate in a crowded, multi-asset environment and to maintain, operate, and resolve issues effectively.

Technicians and operators servicing oil rigs, refineries, and other process plants, can now easily locate specific devices or components via colour-coded status alerts, operational instructions, data and IoT information on their mobile devices. Using smart glasses, tablets or smartphones, technicians, operators, and even off-site managers can access real-time data and IoT information about machines - even when they are out of view and located behind or inside other equipment.

Spatial computing adds a layer to the Fieldbit enterprise augmented reality platform and strengthens its ability to provide industrial asset manufacturers and asset owners with additional tools to overcome the challenges.

Septentrio unveils GNSS/INS receiver for unmanned aerial systems



Image Credit: Septentrio

Septentrio's introduction of AsteRx-i S UAS builds on their existing UAV products.

SEPTENTRIO HAS INTRODUCED a GNSS/INS receiver designed specifically for unmanned aerial vehicles (UAVs). The on-board inertial sensor allows a compact design aimed at quick set-up and integration. Light weight and low power consumption optimise UAV battery life resulting in longer flight times.

AsteRx-i S UAS combines GNSS technology with industrial-grade inertial sensor to provide high-accuracy, reliable positioning and 3D orientation (heading, roll, pitch) to aerial drones and other compact robotic systems.

Septentrio's introduction of AsteRx-i S UAS builds on their existing UAV products, AsteRx m2 and m2a UAS. Its optimised SWaP (size, weight and power) increases UAV battery life, resulting in longer flight times and improved productivity. This credit card sized receiver is designed for easy integration into any unmanned aerial system (UAS) and is compatible with popular autopilots such as Pixhawk and ArduPilot.

It is a single-package GNSS/INS product, with an on-board inertial measurement unit (IMU) and standard connectors, allowing flexibility of sensor choice.

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Progress is Life

Forum's remotely operated vehicle completes sea trials

FORUM SUBSEA TECHNOLOGIES' new remotely operated vehicle (ROV), the XLe Spirit, has successfully completed sea trials in Norway. Smallest in the new range, ROV is capable of performing subsea maintenance and repair work. Additionally, it is suitable for the aquaculture market and capable of tasks such as net and tank inspection.

Working with its Norwegian partner, Innova AS, Forum tested the XLe Spirit at a fjord with a 500m water depth. The standard equipment function testing was confirmed utilising all ancillary equipment, including cameras, lights, altimeters and sonars. The XLe Spirit benefits from an optional electric or hydraulic five-function manipulator arm. The self-regulating power feature compensates for tether losses ensuring a constant and stable power delivery to the vehicle, regardless of tether length.

The vehicle is the first observation class ROV to utilise Forum's integrated control engine to bring greater functionality, commonly only found in larger work-class vehicles.

The advanced control electronics pod fitted to all Forum XLe observation class vehicles enables superior connectivity and expansion capabilities. Ethernet interfacing allows for seamless integration with other industry sensors.



The XLe Spirit can maximise its stability for use as a sensor platform.

Image Credit: Forum Energy Technologies

Schlumberger introduces armor cladding alloy for drill bits

SCHLUMBERGER HAS INTRODUCED Aegis armor cladding that significantly improves bit body design flexibility and erosion resistance, increasing rate of penetration (ROP) and bit durability for longer runs.

Composed of a proprietary tungsten carbide material, Aegis cladding increases bit erosion resistance by 400 per cent and strength by 40 per cent when compared to conventional matrix polycrystalline diamond compact (PDC) bits.



Aegis armor cladding technology leverages material science to improve bit body design flexibility and erosion resistance.

"Our new armor cladding technology combines innovative materials science with an electron-beam additive manufacturing process," said Kristi Vilay, president, Bits & Drilling Tools, Schlumberger. "This new manufacturing approach allows us to integrate a new proprietary material into our customised, fit-for-basin bits, providing a differentiated technology to improve our customers' overall drilling performance."

In addition to improving erosion resistance, Aegis cladding enables bit designs with taller blades and optimal nozzle placement.

Aegis cladding has undergone extensive field testing across five shale basins in North America. The technology has been field tested in Europe, the Middle East and South America for both onshore and offshore applications.

In Oklahoma's Anadarko Basin, two steel-bodied bits with Aegis cladding were deployed for an international oil and gas company in eight wells for a total of eight bit runs.

Schlumberger says the use of Aegis cladding enhanced the fit-for-basin bit design with taller blades and optimal nozzle placement. This increased ROP by 36 per cent compared with direct offset runs of matrix PDC bits and saved the customer an estimated 179 hours of drilling time across the eight runs.

Image Credit: Schlumberger

3D printing assures enhanced operational efficiency for oil and gas industry

THE USE OF additive manufacturing, or 3D printing, is gradually increasing in the oil and gas industry. Currently accounting for less than 0.1 per cent of the overall global manufacturing market, which is currently valued at US\$12.7trillion, it is estimated that the 3D printing market will be worth US\$32bn by 2025 and over US\$60bn by 2030, says GlobalData, a data and analytics company.

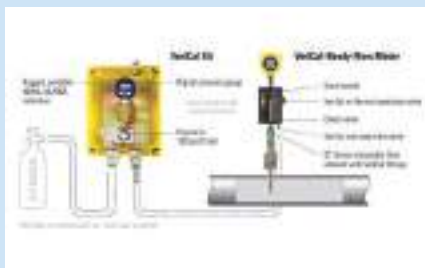
GlobalData's thematic report, '3D Printing in Oil and Gas', states that 3D printing has emerged as one of the crucial enabling technologies in driving industrial productivity. Over the years, 3D printing technology has become prominent in different industries and has significantly influenced automotive and aerospace manufacturing. In the oil and gas sector, some of the technology's applications include manufacturing spare parts on site, testing new product designs and simplifying inventory management to save costs. The vital benefit of 3D printing technology lies in reducing the time it takes to produce complex prototypes.

FCI's VeriCal system eases meter calibration verification

FLUID COMPONENTS INTERNATIONAL (FCI) has developed the VeriCal In-Situ Calibration Verification System for the ST00 Series Flare Gas Flow Meter to eliminate the cumbersome task of traditional flow meter calibrations. The ST100 Flow Meter is now available with either an optional integral VeriCal System or a Kit System, which can be used for retrofitting installed meters. This calibration verification system keeps installed meters at work for flare gas management in production, refining, storage and distribution applications.

Many flare meter installations, either per plant edict or for compliance with environmental regulations, require regular validation of calibrations, which require shutting down the line, pulling the meter, installing a spare and sending the meter out to a lab to help meet air quality management regulations. Traditionally, this has required a tedious and costly project to remove the meter from service and return it to a lab.

FCI's VeriCal option eliminates the need for unnecessary de-installation. The VeriCal system provides a simple-to-use tool to verify the FCI flow meter is still within calibration without extracting the meter from the pipe. The system consists of a special VeriCal ready flow sensor, a portable VeriCal Kit (which can be used with any number of VeriCal-ready ST100 flow meters) and an benchmark calibration document to which field verification samples are compared.



VeriCal option eliminates the need for unnecessary de-installation

Image Credit: FCI

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System enclosures to meet the demands of digitalisation

THEY CAN BE found everywhere, whether in the nacelles of wind turbine systems, on the edge of rocky track beds, in the depths of caves or all over the place in production facilities: millions of small or compact enclosures from Rittal protect sensitive control electronics systems, ensuring that repetitive processes run smoothly.

Rittal, the inventor of industrial enclosure technology, has completely revised its product range, taking into account the new demands arising from digitalisation. The new AX compact and KX small enclosures not only offer customers numerous assembly advantages; as part of the Rittal system, they open up new perspectives with regard to continuous digital value creation.

The demands placed on enclosures for use in electrical engineering have changed fundamentally over recent years. Digitalisation plays a decisive role here. One well-known example is that machines and components are being equipped with more sensors, actuators, as well as interfaces. These, in turn, need networking or a connection to their higher-level controllers. This increases the number of components to be mounted in the enclosure, and so leads to a larger number of cables to be routed via the gland plate. The AX, for example, with a gland plate that is up to 35 per cent larger, does meet these changed requirements. At the same time, the packing density in each enclosure is rising, as the components themselves become more compact.

The demands for a better use of space, for more comfortable and faster handling and, above all, combined with the availability of high-quality data for use throughout the whole manufacturing process, have therefore been taken up by the Herborn-based company. The small



Image credit: Rittal

With its AX and KX series, Rittal has relaunched its complete range of compact enclosures, including small enclosures, and significantly developed it further into a system.

and compact enclosures product range has been completely revised. One of the most important goals of the new development has been the reduction in complexity along all customer processes from engineering to order processing, machining, assembly and customer service.

Small enclosures of 60 different sizes direct from stock

The new AX compact enclosure and KX small enclosure ranges offer a solution for any need. KX products, in sizes from 150mm x 150mm x 80mm, are suitable for housing a small number of components. Both KX and AX enclosures are supplied in a variety of dimensions, depending on the size and quantity of parts. AX enclosures are available with depths between 210mm and 400mm, and in a maximum size of 1,000mm x 1,400mm. In all, the new KX is available in around 60 different sizes; the AX has around 40 variants. For most models, there is a choice of spray-finished sheet steel or stainless steel. This allows users to select the enclosure that best meets their requirements.

All the series enclosures are available from stock. Rittal's new manufacturing plant in Haiger, Germany, ensures that stock levels increase in line with demand on request from the neighbouring Global Distribution Center.



Image credit: Eni/Flickr

Rittal's compact enclosures can be found in many different environments, including production facilities.

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Project	City	Facility	Budget (US\$)	Status
ADNOC & Al Yasat Petroleum - Bu Haseer Field Development Package 2 & 3	Bu Haseer	Oil Field Development	300,000,000	Construction
ADNOC & Borealis - Borouge 4 Complex	Abu Dhabi	Petrochemical Plant	4,500,000,000	FEED
ADNOC & Borealis - Polypropylene (PP) Plant	Abu Dhabi	Polypropylene	550,000,000	Construction
ADNOC - Dalma Field - Offshore Package	Dalma	Oil Field Development	750,000,000	EPC ITB
ADNOC - Fujairah Mandous Field	Mandous	Oil Storage Tanks	2,200,000,000	Construction
ADNOC - Haliba Oil Field - Phase 1	Abu Dhabi	Oil Field Development	500,000,000	Commissioning
ADNOC - Replacement of Flowlines & - Wellheads Installation Overview	Abu Dhabi	Oil & Gas Field	150,000,000	EPC ITB
ADNOC - Umm Shaif - Long Term Development - Phase 1	Umm Shaif	Oil Field Development	5,000,000,000	EPC ITB
ADNOC Distribution - Bateen Executive Airport - Jet Fuel Depot	Abu Dhabi	Oil Storage Tanks	80,000,000	Commissioning
ADNOC Gas Processing - Asab 1 - Control System Upgrade	Asab	Distributed Control System (DCS)	55,000,000	Commissioning
ADNOC Gas Processing - Bu Hasa Debottlenecking & Associated Pipeline	Bu Hasa	Gas Production	200,000,000	EPC ITB
ADNOC Gas Processing - Habshan 4 - CO2 Recovery & Injection	Abu Dhabi	Carbon Dioxide	80,000,000	EPC ITB
ADNOC Gas Processing - - Expansion (Onshore Pipeline) Integrated Gas Development (IGD)	Abu Dhabi	Gas Production	710,000,000	Commissioning
ADNOC Gas Processing- Ruwais - Train 1 & 2 Process Cooling Fire Water Pumps Replacement	Ruwais	Gas Processing	80,000,000	Construction
ADNOC LNG- Integrated Gas Development (IGD) - Expansion (Phase 2)	Das Island	Gas Field Development	450,000,000	Engineering & Procurement
ADNOC LNG- Integrated Gas Development (IGD) - Expansion - Overview	Das Island	Gas Field Development	1,370,000,000	Construction
ADNOC Offshore - 750 West Region - Capacity Expansion & Sulphate Reduction Plant - EPC 3	Abu Dhabi	Sulphur Recovery	300,000,000	Construction
ADNOC Offshore - Bu Haseer Field	Bu Haseer	Oil Pipeline	155,000,000	Construction
ADNOC Offshore - Lower Zakum - Oil Lines Replacement (Phase 1)	Zakum	Oil Pipeline	850,000,000	Commissioning
ADNOC Offshore - Nasr Full Field Development - Overview	Nasr Field	Oil Field Development	1,700,000,000	Construction
ADNOC Offshore - Nasr Full Field Development - Phase 2 (Package 1 - Wellheads and Pipeline)	Nasr Field	Oil Field Development	900,000,000	Construction
ADNOC Offshore - (Package 2 - Platforms) Nasr Full Field Development - Phase 2	Nasr Field	Oil Field Development	195,000,000	Commissioning
ADNOC Offshore - Umm Al Lulu Field Development - Overview	Umm Al Lulu	Oil Field Development	2,500,000,000	Commissioning
ADNOC Offshore - Umm Al Lulu Field Development - Package 2	Umm Al Lulu	Oil Field Development	1,700,000,000	Commissioning
ADNOC Offshore - Umm Shaif & Zakum - Application of DOF on Brownfield Towers	Abu Dhabi	Oil Field Development	120,000,000	EPC ITB
ADNOC Offshore - Umm Shaif Gas Cap Condensate Development	Abu Dhabi	Oil & Gas Field	2,000,000,000	FEED
ADNOC Offshore - Umm Shaif Infield Pipelines Replacement	Abu Dhabi	Oil Field Development	500,000,000	EPC ITB
ADNOC Offshore - Upper Zakum Facilities Expansion - Phase 1	Abu Dhabi	Oil Field	8,000,000,000	FEED
ADNOC Offshore - Upper Zakum Full Field Development - 750 Project - Surface Facilities - EPC 2	Zakum	Oil Production	3,840,000,000	Commissioning
ADNOC Offshore - Zirku Facilities Capacity Enhancement	Zirku	Oil Field Development	410,000,000	Construction

Project	City	Facility	Budget (US\$)	Status
ADNOC Onshore - 1.8MBPD Development - Bab Artificial Lift Wells	Abu Dhabi	Artificial Lift	100,000,000	EPC ITB
ADNOC Onshore - Asab Full Field Development II - Overview	Asab	Oil Field Development	450,000,000	Engineering & Procurement
ADNOC Onshore - Asab Full Field Development II - Stage 1	Abu Dhabi	Oil Field Development	100,000,000	Engineering & Procurement
ADNOC Onshore - Asab Full Field Development II - Stage 2	Asab	Oil Field Development	350,000,000	EPC ITB
ADNOC Onshore - Bab Gas Compression Phase 3	Abu Dhabi	Gas Compression	270,000,000	Engineering & Procurement
ADNOC Onshore - Bab Integrated Facilities Project	Bab	Oil Field Development	3,000,000,000	Construction
ADNOC Onshore - Bab Sustainable Facilities	Bab	Pipeline	250,000,000	EPC ITB
ADNOC Onshore - Buhasa - Wellhead Automation	Abu Dhabi	Oil Field Development	100,000,000	FEED
ADNOC Onshore - Buhasa Integrated Facilities Project	Bu Hasa	Oil Production	3,000,000,000	Construction
ADNOC Onshore - Mender Field Development	Abu Dhabi	Oil Field Development	350,000,000	Commissioning
ADNOC Onshore - North East Bab (NEB) - (Al Dabbiya) ASR	Abu Dhabi	Gas Processing	350,000,000	EPC ITB
ADNOC Onshore - Qusahwira Field Development - Phase 2	Abu Dhabi	Oil Field Development	600,000,000	Construction
ADNOC Onshore - Rumaitha, Shanayel and Northeast Bab Tie In	Abu Dhabi	Oil Field Development	350,000,000	Construction
ADNOC Onshore - South East Asset - Tie - in Project (A,B, C & D)	Asab	Oil Field Development	650,000,000	Construction
ADNOC Refining & Cepsa - Ruwais - Linear Alkyl Benzene (Lab) Facility	Ruwais	Linear Alkyl Benzene (LAB)	600,000,000	FEED
ADNOC Refining - Crude Flexibility Project (CFP)	Ruwais	Oil Pipeline, Refining	3,100,000,000	Construction
ADNOC Refining - Gasoline and Aromatics Project	Abu Dhabi	Aromatics	2,500,000,000	EPC ITB
ADNOC Refining - Ruwais - LPG Recovery	Abu Dhabi	Crude Oil Distillation Unit	40,000,000	EPC ITB
ADNOC Refining - Ruwais Complex Upgrade - New Refinery	Ruwais	Refinery	45,000,000,000	Pre-FEED
ADNOC Refining - Ruwais East Refinery - Air Emission Measurement System	Abu Dhabi	Petroleum Oil Refinery	40,000,000	EPC ITB
ADNOC Refining - Ruwais Refinery East - SRU Replacement	Ruwais	Sulphur Recovery	100,000,000	Construction
ADNOC Refining - Waste Heat Recovery	Ruwais	Petroleum Oil Refinery	263,000,000	Construction
ADNOC Sour Gas - Dalma Field - Gas Processing Facility	Dalma	Gas Processing	200,000,000	EPC ITB
ADNOC Sour Gas - Dalma Field - Onshore Package	Dalma	Oil Field Development	750,000,000	EPC ITB
ADNOC Sour Gas - Dalma Field - Overview	Dalma	Oil Field Development	2,000,000,000	EPC ITB
ADNOC Sour Gas - Hail and Ghasha Megaproject - Overview	Abu Dhabi	Oil & Gas Field	14,000,000,000	EPC ITB
ADNOC Sour Gas - Hail and Ghasha Megaproject - Package 1	Hail	Oil & Gas Field	4,000,000,000	EPC ITB
ADNOC Sour Gas - Hail and Ghasha Megaproject - Package 2	Ghasha	Oil & Gas Field	1,000,000,000	EPC ITB
ADNOC Sour Gas - Hail and Ghasha Megaproject - Package 3	Ghasha	Oil & Gas Field	2,000,000,000	EPC ITB
ADNOC Sour Gas - Hail and Ghasha Megaproject - Package 4	Ghasha	Oil & Gas Field	6,000,000,000	EPC ITB
ADNOC Sour Gas - Shah Field - Expansion	Shah Field	Gas Network	110,000,000	Commissioning
ADOC - Hail Oil Field - Water Injection System	Hail	Water Injection	200,000,000	EPC ITB
Al Yasat Petroleum - Belbazem Oil Field	Abu Dhabi	Oil Field Development	1,000,000,000	FEED
Borouge - Ruwais Pelletizing Plant - Bagging Lines Addition	Ruwais	Polymers	100,000,000	Feasibility Study
Borouge - Ruwais Polypropylene Plant 5 (BPP5)	Ruwais	Polypropylene	575,000,000	Construction
BPGIC - Fujairah Oil Terminal - Marine Bunkering	Fujairah	Oil Storage Terminal	200,000,000	Engineering & Procurement
BPGIC - Fujairah Oil Terminal - Phase 2	Fujairah	Oil Storage Terminal	200,000,000	Construction
Dolphin Energy - Northern Emirate Pipeline (NEP)	Sharjah	Gas Pipeline	150,000,000	EPC ITB
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
Port of Fujairah - Dibba Port	Fujairah	Oil Storage Terminal	100,000,000	EPC ITB
RAK Gas - LPG Storage Terminal - Overview	Ras Al Khaimah	Liquefied Petroleum Gas (LPG)	300,000,000	EPC ITB
Shaheen Chem Investments LLC - Ethylene Dichloride & Caustic Soda Plant	Taweelah	Caustic Soda	1,000,000,000	EPC ITB
SNOC & ENI - Onshore Acreage Exploration (Areas A, B and C)	Sharjah	Exploration	1,000,000,000	Engineering & Procurement
SNOC - Sharjah LNG Import Terminal	Sharjah	Floating Storage Regasification Unit (FSRU)	800,000,000	EPC ITB
SRS Middle East FZC - Tank Farm Terminal - Phase 1	Hamriyah	Bulk Storage	43,560,800	Construction

Project Databank

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Project Focus

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Project Summary

Project name	ADNOC - Fujairah Mandous Field
Name of Client	ADNOC - Abu Dhabi National Oil Company
Estimated Budget (US\$)	2,200,000,000
Facility Type	Oil Storage Tanks
Status	Construction
Location	Mandous
Project Start	Q1-2017
End Date	Q4-2023
FEED	Geostock ADCO - Abu Dhabi Company for Onshore Oil Operations
Main Contractor	SK Engineering & Construction
Subcontractors	Al Hasoun Arabian Group China Petroleum Pipeline Engineering Corporation - CPPE
Award Date	Q4-2017

Background

Abu Dhabi National Oil Company (ADNOC) is planning to develop an underground crude oil storage system in the form of three underground mined rock caverns to store three different types of crude, as well as provide integration with the MOT Fujairah Facilities which already exist. The three types of crude involve Murban, Das and Upper Zakum which will be stored in the caverns, whereby Murban will be fed from ADCOP pipeline, and Das and Upper Zakum will be fed from offshore.

Project Status

Date	Status
Sep 2019	Construction is ongoing for the underground caverns. The commissioning phase is tentatively scheduled for Q3 2023.
Aug 2019	Civil works are still taking place for the Mandous field. The completion is scheduled for Q4 2023.
Jul 2019	SK Engineering is carrying out the civil works for this project.

Project Scope

The project's overall scope of work includes:

- Pipeline network will be constructed to transport the three types of crude
- Three underground caverns will be constructed
- Surface facilities will be implemented
- Relevant civil, mechanical and other engineering and construction will be carried out
- SK Engineering's scope of work also includes:
 - Construction of water tunnels (7m and 5m) in a D-shape
 - Construction of boreholes and access tunnels
 - Construction of compressor units
 - Construction of access roads
 - Installation of temperature control machinery
 - Installation of safety systems

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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 From Last Month	LAST MONTH		
	Land	OffShore	Total		Land	OffShore	Total
Middle East							
ABU DHABI	44	21	65	4	41	20	61
DUBAI	0	2	2	0	0	2	2
IRAQ	77	0	77	0	77	0	77
JORDAN	0	0	0	0	0	0	0
KUWAIT	46	0	46	-1	47	0	47
OMAN	53	0	53	0	53	0	53
PAKISTAN	22	0	22	-4	26	0	26
QATAR	3	9	12	0	3	9	12
SAUDI ARABIA	95	19	114	0	96	18	114
SUDAN	0	0	0	0	0	0	0
SYRIA	0	0	0	0	0	0	0
YEMEN	0	0	0	0	0	0	0
TOTAL	340	51	391	-1	343	49	392

North Africa

ALGERIA	42	0	42	-2	44	0	44
EGYPT	28	3	31	9	19	3	22
LIBYA	14	2	16	0	14	2	16
TUNISIA	2	0	2	0	2	0	2
TOTAL	86	5	91	7	79	5	84

Source: Baker Hughes

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E-mail: comms@technicalreview.me
 Web: www.alaincharles.com
www.technicalreview.me

ماهر جاد الله: كيف تتعامل مع التهديدات السيبرانية



الهجوم المتزايد إذا كانت مؤسستهم تهدف إلى تخفيف مخاطر أعمالهم.

• كيف تساعد شركتك في مواجهة التهديدات السيبرانية؟

• • تُعد منصة تينابل سايفر إكسبوزر Tenable's Cyber Exposure أول من يوفر حلاً في هذا المجال لإجراء تقييم شامل لمخاطر الإنترنت وإدارتها وقياسها عبر كامل نطاق الهجوم الحديث. كما توفر المنصة الخاصة بنا، بشكل فريد، نطاقاً منسجماً للرؤية لمخاطر الإنترنت عبر بيئات تكنولوجيا المعلومات والسحابة وإنترنت الأشياء وتكنولوجيا التشغيل وعمق التنجيبات لقياس مخاطر الإنترنت والتوعية بها من حيث الأعمال التجارية لاتخاذ قرارات استراتيجية أفضل.

ونحن لا نمكّن العملاء من اكتشاف كل الأصول للثقافة عبر بيئات الحوسبة الخاصة بهم فحسب، بل يمكننا أيضاً تقييمها لمعرفة مواطن الضعف والتكوينات الخاطئة. كذلك يحل ابتكارنا الرائد في تحديد الأولويات التنبؤية، بيانات القابلية للتأثر المستقرة، جنباً إلى جنب مع بيانات نقاط الضعف الخاصة بجهات خارجية، وذلك التهديدات واستشارات أمن الباحثين التي تستخدم علم البيانات للتنبؤ باحتمالية استغلال الثغرات الأمنية في المستقبل القريب. إن نتائج تقييم نقاط الضعف الناتجة (VPR) تتصف بالديناميكية وتتغير مع بيئة التهديد، مما يعمل على تسليح فرق الأمن بنظرة ثاقبة لمستوى حقيقي من مخاطر الأعمال.

في هذه المقابلة، يجيب ماهر جاد الله، المدير الإقليمي لمنطقة الشرق الأوسط في شركة تينابل، عن الأسئلة التي تتعلق بما يمكن القيام به لتخفيف من التهديدات الإلكترونية التي تواجه شركات النفط والغاز. وهو يقول إن التهديد السيبراني، الذي تتعرض له شركات النفط والغاز، حقيقي للغاية، وأنه من الضروري أن يفهم المتخصصون في تكنولوجيا المعلومات وتكنولوجيا التشغيل نطاق الهجوم المتزايد إذا كانت مؤسستهم تهدف إلى تخفيف مخاطر أعمالهم.

• • غالبية الانتهاكات الحديثة هي نتيجة مباشرة لإدارة نقاط الضعف غير الفعالة في الواقع. وقد ذُكرت 34 في المائة من المؤسسات التي تم اختراقها أنها كانت على دراية بنقاط الضعف التي أدت إلى الهجوم قبل وقوعه. المشكلة هي أن لدينا الكثير من المعلومات وليس ما يكفي من الذكاء.

في عام 2018، تم الكشف عن 16500 نقطة ضعف جديدة وصنف نظام نقاط الضعف الشائعة (CVSS) الألبية بأنها عالية أو حرجية. ومع تزايد نقاط الضعف، نحتاج المنظمات إلى أن تكون قادرة على تحديد تلك النقاط التي تشكل خطراً حقيقياً وليس افتراضياً. على الشركة حتى تتمكن من التركيز على معالجة نقاط الضعف الأكثر أهمية. لا يمكن أن يتحمل الموظفون المسؤولون عن أمن تكنولوجيا التشغيل التركيز على نقاط ضعف تكنولوجيا التشغيل فقط. حيث يعني تقارب تكنولوجيا المعلومات وتكنولوجيا التشغيل أنه يمكن استغلال كل من ثغرات أنظمة التحكم الصناعية وتكنولوجيا المعلومات لمهاجمة البنية التحتية الحيوية. لذلك، فإن عرض كلا النظامين معاً غير منظور واحد هو الطريقة الوحيدة لعرض المخاطر بشكل شامل.

• إلى أي مدى تعتقد أن شركات النفط والغاز تدرّك تهديدات أمن البيانات والحاجة إلى تنفيذ تدابير لحماية أصول المعلومات الخاصة بها؟

• • إن التهديد الذي تواجهه شركات النفط والغاز حقيقي للغاية، كما يتضح من عدد من الهجمات الإلكترونية الكبيرة على القطاع. بالإضافة إلى ذلك، حذرت الحكومات في جميع أنحاء العالم من أن تهديد البنية التحتية سيزداد سوءاً بدلاً من أن يتضاءل، مع تعرض قطاع النفط والغاز بشكل خاص للهجمات المستهدفة. وهناك مسألة تقول إن طريقة إيجاد حل لأي مشكلة تبدأ بشؤون المشكلة. من الضروري أن يفهم المتخصصون في تكنولوجيا المعلومات وتكنولوجيا التشغيل نطاق

• كيف ترى مشهد تهديد الأمن السيبراني في قطاع النفط والغاز في الشرق الأوسط؟ ما هي أهم التهديدات التي تواجهها المنظمات اليوم والعوامل التي تساهم فيها؟

• • كما هو الحال مع العديد من الصناعات، تنتشر برامج التحول الرقمي في جميع أنحاء قطاع النفط والغاز في الشرق الأوسط، مع إدخال أدوات تكنولوجية جديدة للاستفادة من النتائج النهائية من خلال تعزيز الكفاءة والإنتاج. وقد أدى ذلك إلى التناوب بين جانب البيانات في الأعمال التجارية، ومجال تكنولوجيا المعلومات التقليدي، وجانب تكنولوجيا التشغيل (OT)، المستخدم في إدارة أنظمة التحكم الصناعية (ICS).

المشكلة تكمن في أن بيئات تكنولوجيا التشغيل لا تزال تعاني من نفس مشاكل الحماية الإلكترونية الأساسية التي أثرت على البنية التحتية لتكنولوجيا المعلومات على مدار سنوات، ويزيد التقارب بينهما من تعقيد المشكلة. وعلاوة على ذلك، من خلال ربط تكنولوجيا التشغيل بالإنترنت، تقوم المنظمات بتعرض أنظمتها المنبثقة لمجموعة واسعة من التهديدات، ويظل الكثير من هذه المنظمات غير مجهز للحماية من تلك التهديدات.

ولسوء الحظ، لا يمكن لأدوات وعمليات الأمان السابقة حل مشاكل اليوم. فقد تم بناؤها وتصميمها عندما كانت وسيلة الهجوم عبارة عن كمبيوتر محمول ثابت أو سطح مكتب أو خادم داخلي. ونتيجة لذلك، تكافح المنظمات في كل خطوة، حيث تنظر إلى أصولها، وتكتشف نقاط الضعف، وتعطي الأولوية لفضائها العلاج وقياس المخاطر، والمقارنة مع أقرانها، فالتحدي الرقمي يتطلب نهجاً جديداً.

• ما هي الاستراتيجيات والتدابير التي ينبغي للمنظمات اتخاذها لحماية نفسها من التهديدات السيبرانية؟ هل ينبغي اعتماد نهج شامل، أي التكنولوجيا والأفراد والعمليات؟



والتطوير في بيئة مختلفة تماماً، وإذا نظرنا إلى الأثر طويل المدى لإدخال المزيد من الأفراد إلى القطاع الخاص، وتجربة بيئة متعددة الجنسيات وطرق تفكير مختلفة، فهذا أمر مهم جداً. كل يوم يخرج الفريق ويلتقي مع الشركات المحلية، ويناقش التطوير، وما هي الأساليب التي تتخذها الشركات، وكيف يمكنها جذب المزيد من الإماراتيين، لذا فإن التأهيل جزء كبير من العمل في الشرق الأوسط.

الاتجاه الآخر هو هو الطلب

على المهارات الرقمية

في بداية العام الماضي، قمنا بتوظيف شخصين لهما خلفية في مجال تكنولوجيا المعلومات، وبشكل أكثر تحديداً مجال الأمن السيبراني والذكاء الاصطناعي وبعض المجالات الأخرى. إنه بالتأكيد شيء نشهد طلباً متزايداً عليه، ونركز عليه كشركة تجارية. كل شيء سيكون مدفوعاً بالتكنولوجيا في النهاية. إن متطلبات التشغيل الآلي، وزيادة الكفاءة في العمليات الداخلية، وكيفية عملنا مع عملائنا والعكس، هي أمور مهمة جداً إذ أنه شيء نشهد تغيراً كبيراً فيه، ومن الواضح جداً مدى تقدم الحكومة الإماراتية في التفكير والرؤية، انظر إلى ما تمكّنوا من تحقيقه في فترة زمنية قصيرة نسبياً.

إنهم يتحدون باستمرار الوضع الراهن ويفكرون في المستقبل بشكل لا يصدق، هذه هي العقبة هنا، لذلك هناك تركيزاً حقيقياً في جميع أنحاء الإمارات العربية المتحدة على التقدم التكنولوجي.

القوى العاملة إلى سلعة بشكل كبير. لقد كانت حلولنا تحاول القيام بشيء أكثر إبداعاً بدلاً من تقديم خدمات المتعلقة بالمعاملات. فالأمر يتعلق بمحاولة فهم الأهداف والتحديات التي يواجهها عملائنا، والمحاولة الحقيقية لإضافة القيمة. وهذا الأمر هو الدافع في إحدى الاستراتيجيات الرئيسية لدينا، وهي الابتعاد عن بعض الشركات والتركيز على العملاء الذين يمكنهم رؤية قيمة ما نقدمه كشركة. لذلك هناك حالة من التنازل في السوق، لكنها تأتي مع تحدياتها الخاصة وهي في مرحلة مبكرة، ونحن بحاجة إلى أن ندرك ذلك.

التكيز على التوظيف

يعد التوظيف موضع تركيز كبير لشركة إيرسويتس، وذلك تمسحياً مع الضغط من أجل إضفاء الطابع الوطني في جميع أنحاء المنطقة، والقواعد واللوائح الصارمة في العديد من البلدان التي تضع على مستوى المحتوى الوطني. فقد كوّنّت الشركة فريقاً في مكتبها في دبي عام 2018 لدعم ثقافة التوظيف الإماراتية وتشجيعها وتعزيزها، داخل أبو ظبي ودبي بشكل خاص، مع التركيز على القطاع الخاص. ففي عام 2018 فقط، كان هناك نمو بنسبة 200 في المائة في التوظيف الإماراتي في القطاع العام والخاص، والهدف هو مضاعفة ذلك بحلول نهاية هذا العام. إنها زيادة مثيرة للإعجاب. لكن في عام 2018 كان أقل من 2 في المائة من الإماراتيين يعملون في القطاع الخاص، والباقي في المنظمات الحكومية. ويوفر القطاع الخاص فرصاً للتدريب

الجيد، يشج كل ما تسمعه وتراه من حيث النشاط إلى أن التوقعات إيجابية للغاية. ومن الإصاف أن نقول إن هذه المنطقة ربما شهدت طفرة أكبر من أوروبا، وهنا نركز على قطاع الطاقة أكثر من عملياتنا في أوروبا لأن النفط والغاز يلعبان مثل هذا الدور الكبير في اقتصادات الشرق الأوسط.

أحد الأشياء التي نحاول إيصالها لعملائنا هو عندما ترى أن هناك طفرة في السوق، عليك تغيير طريقة تفكيرك عندما يتعلق الأمر بتوظيف الكفاءات المناسبة، وجذب الأفراد، وإشراكهم والاحتفاظ بهم. ففي السوق الذي يحركه العملاء أو الذي تحركه الوظيفة، توجد خيارات أكثر عندما يتعلق الأمر باختيار الكفاءات، حيث يوجد المزيد من الأشخاص. ومن المؤكد أننا نشهد تغييراً في ذلك في الوقت الحالي، خاصة عندما يتعلق الأمر بالأشخاص الذين لديهم مجموعات من المهارات في مجال أعمال الهندسة والتصميم الأولية والغاز الطبيعي المسال.

هذا الأمر يتطلب نهجاً مختلفاً لا يتعلق فقط بالكمالات المالية، بل يتعلق أيضاً ببناء بيئة وثقافة الفريق الجيد. يجب أن يكون هناك تركيز على تطوير الأفراد وتوفير الفرص لهم. ففي السنوات الخمس الماضية، كنا سوفياً يمكن أن يكون فيه العملاء انتقاليين بشكل لا يصدق بشأن الأشخاص الذين يجلبونهم إلى العمل، لكن هذا يتغير الآن. لا شك أن مبادرات توفير التكاليف كانت محط تركيز كبير لجميع العملاء على مدار السنوات الخمس الماضية. إذ يسعى العديد من الشركات إلى تحقيق وفورات في التكاليف من خلال اقتصادات القوى العاملة. ما كنا نحاول القيام به، على مدى الثمانية عشر شهراً الماضية وحتى عامين، هو وضع رسالة مفادها أنه عليك القيام بذلك بالطريقة الصحيحة، وإلا أسبب اقتصادك بسوء. في النهاية، يمكن أن يؤدي تأثير توظيف الأشخاص الخطأ، أو اختيار شركة القوى العاملة لدعمك بناءً على السعر والتكلفة، إلى أخطاء مكلفة، مثل المشاريع التي يتم تأخيرها وتأتي في النهاية في حدود الميزانية، من الجيد أن نكون واعياً بالتكلفة، ولكن لماذا لا ننظر إلى توفير التكاليف مما تحصل عليه من الأشخاص الذين يعملون معك، من خلال إدارة الأشخاص بشكل أكثر فعالية وتطويرهم بشكل أكبر، فيمكن أن يكون للشركات تأثير إيجابي بشكل لا يصدق على الإنتاجية.

على مدى السنوات الخمس الماضية تحولت صناعة



سوق التوظيف في الشرق الأوسط تزداد إيجابية

نظرة إيجابية نحو سوق التوظيف في قطاع النفط والغاز

في هذا المقال، يناقش أندري جرينوود، المدير الإقليمي لمنطقة الشرق الأوسط في شركة إيرسوفت، الشركة العالمية لحلول القوى العاملة في قطاعات الطاقة والمعالجة والبنية التحتية، بيئة التوظيف في الشرق الأوسط. يقول جرينوود إن الشرق الأوسط، بصفتها لاعباً رئيسياً في قطاع الطاقة العالمي، يمثل جزءاً كبيراً من أعمال شركة إيرسوفت العالمية، ومن المتوقع أن يمثل جزءاً أكبر في العامين المقبلين. فالمنطقة تستأثر حالياً بحوالي 20 في المائة من إجمالي عدد المتعاقدين في الشركة، كما أن التوقعات إيجابية على المستوى الداخلي والخارجي.

الشرق الأوسط بأسره. ومن الواضح أن هناك العديد من المرشحات لاستخدام الغاز الطبيعي المسال من وجهة نظر بيئية، بالإضافة إلى فوائد التكلفة في مجالات مثل تقليل التكاليف الميدانية والنقل. هناك عددٌ من المشاريع الهندسية الكبرى تمضي قدماً في جميع أنحاء المنطقة. أحد الأشياء المثيرة للاهتمام التي نراها الآن هي أنه في حين أن هذه الأمور غالباً ما تركز على إنتاج النفط والغاز، فإن تطورات البنية التحتية المدنية، بالإضافة إلى، تحقق فوائد للصناعات الأخرى. وعلى المدى

وبعد ذلك إلى التشغيل والصيانة. وعلى الرغم من بعض الاستثناءات، فإن غالبية أعمال الهندسة والتصميم الأولية تراجها تركز على حقول مطورة مسبقاً وغير مستخدمة في الوقت الحالي، أي إجراء تعديلات على المنشآت الحالية، بدلاً من تنفيذ مشاريع بناء الحقول الجديدة الكبيرة. وقد أصبحت صناعة الغاز الطبيعي المسال مجال نمو في الشرق الأوسط، وتعكس الاتجاه العالمي، حيث تسعى المنطقة إلى استيراد كميات أقل وإنتاج المزيد. إننا نشهد دفعة أكبر على الإنتاج والأعمال المحيطة به في جميع أنحاء

لقد نما السوق خلال العام الماضي بنسبة كبيرة للغاية، ونحن على المسار الصحيح لتجاوز نمو العام الماضي بنسبة 40 في المائة، لذلك فهي صورة إيجابية بشكل لا يصدق على المستوى الداخلي. ومن الناحية الخارجية، بالنظر إلى السوق بشكل أعم، نجد أن هناك نمواً أكثر إيجابية الآن عن سوق الشرق الأوسط. إذ أننا على المدى القصير، نشهد طفرة حقيقية في النشاط، لا سيما في مجالات مثل أعمال الهندسة والتصميم الأولية، والتي عادة ما تكون بمثابة المحفز الذي يؤدي إلى التصنيع والبناء والتكليف،



نمو صناعة الأنابيب غير المعدنية

أصبح استخدام الأنابيب غير المعدنية أكثر انتشاراً في جميع أنحاء الشرق الأوسط، وذلك لمواجهة تحديات اهتراء الأصول وتأكلها، وهي مشكلة تفاقمت بسبب انتشار غاز كبريتيد الهيدروجين H2S واستخدام السوائل شديدة التآكل في عملية استخراج النفط بأساليب متطورة.

غير المعدنية. وعُلق السعودي قائلاً: «إن إنتاج هذه المواد في المملكة سيفتح فرصاً للمصنعين المحليين ويسهل نقل المعرفة».

وتحتل سوليفورس موقعاً قيادياً في تطويرات وابتكارات اللدائن الحرارية المعززة في الشرق الأوسط منذ عام 2000، عندما دخلت منتجاتها لأول مرة في المنطقة. ولاتزال المنتجات تحمل حتى اليوم، دون أي مشاكل، كما تقول الشركة، مع استخدام المزيد من شركات النفط والغاز الآن حلولاً غير معدنية. وتتميز هذه الحلول بالاستثناء عن الصيانة المطلوبة، لأن المنتجات خالية من الصدأ والتشقق. فضلاً عن المرونة، دون الحاجة إلى دعم البنية التحتية مثل الدعائم الخارجية، والتي تكون مطلوبة عموماً للأنابيب الصلب. كما يمكن تثبيتها على السطح أو دفنها في الخنادق. وقد أصبحت الشركة رائدة في مجال الابتكارات؛ مثل حلول الأنابيب المركبة المرنة التي تعمل تحت ضغط غاز كبير ودرجة حرارة عالية.

وصرح مسؤولو شركة سوليفورس أنه «مع وجود عدد من الابتكارات القادمة، نواصل تطوير أسواقنا ومنتجات الأنابيب المركبة المرنة الخاصة بنا، والتي ستمكّننا من مواصلة تطوير وتدعيم أعمالنا في المنطقة». وأضافوا أنه يجري تطوير منتجات وحلول وتطبيقات جديدة تجمع بين استخدام مواد جديدة وتقنيات متقدمة.



أحمد عذار من السعودي

وتتطلع أرامكو السعودية إلى أن تصبح رائدة عالمياً في التطبيقات غير المعدنية، وتتعاون مع موزعين محليين ودوليين، وكذلك معاهد البحوث، لتسريع نشرها وتطويرها في منشآت أرامكو السعودية. ومن الأمثلة على ذلك مذكرة التفاهم الموقعة مع شركة بيكر هيرز في شهر يوليو/تموز لإنشاء منشأة مشتركة جديدة لتصنيع المواد غير المعدنية، مع التركيز في البداية على أنابيب اللدائن الحرارية المعززة

من أبرز الموزعين للمواد غير المعدنية شركة أرامكو السعودية، التي بدأت خارطة طريق في الصناعة غير المعدنية قبل عشرين عاماً بهدف خفض التكلفة السنوية للتآكل بنسبة تصل إلى 10 في المائة. وقد صرح أحمد عبدالرحمن السعودي، النائب الأعلى للرئيس للخدمات الفنية في الشركة، أن «بعض شبكات خطوط التدفق - المبنية أساساً من الصلب الكربوني - كانت عرضة للتآكل والتآكل بسبب سوائل حلول النفط الشائعة، وغاز كبريتيد الهيدروجين، وثاني أكسيد الكبريت، وحتى البيكربونات». واستطرد السعودي، أثناء حديثه في ندوة في نوفمبر/تشرين الثاني 2018، قائلاً: «ولكن وجدنا أن أنابيب اللدائن الحرارية المعززة (RTP)، المستخدمة في تطبيقات خطوط التدفق، ناجحة جداً في السيطرة على التآكل».

وقد نجحت أرامكو السعودية في نشر أكثر من 5000 كيلومتر من الأنابيب غير المعدنية، مما أدى إلى زيادة كبيرة في الكفاءة وخفض تكاليف الصيانة والاستبدال عبر عمليات الشركة. وقالت أرامكو إنه في حين أن الاستخدامات المبكرة لتكنولوجيا اللدائن الحرارية المعززة كانت مقيدة بحدود استخدام الأنابيب المصنعة، والتي انعكست في الأحجام القصوى وضغوط الموائع، ودرجات حرارة تصميمات العمليات، فقد تم تخفيف حدود الاستخدام تدريجياً بسبب التقدم في المواد وتكنولوجيا التصنيع.

السعودية ستصل إلى أقصى طاقة إنتاج نفطية في نوفمبر



أحمد حسن ناصر

صرح أمين حسن الناصر، رئيس الشركة والمدير التنفيذي لأرامكو، في مؤتمر النفط والمال في لندن، أن أرامكو السعودية بصدد استعادة أقصى قدرة مستدامة تبلغ 12 مليون برميل يومياً بحلول شهر نوفمبر/تشرين الثاني (الحالي)، وذلك بفضل الإنجاز المتسارع لأعمال الترميم في أعقاب هجمات الطائرات بدون طيار في سبتمبر/أيلول على اثنين من منشآتها الرئيسية.

وقال الناصر في كلمة ألقاها في المؤتمر الذي انعقد في 9 أكتوبر/تشرين الأول، إن توطئة سلاسل الخدمات والإمداد والمرونة والتكرار في منشآتها وشبكة الإنتاج السريعة أثبتت فعاليتها في تسريع أعمال الترميم في أعقاب الهجمات على حقل خريص وأبيق والتي قلصت الإنتاجية بنحو 3,7 مليون برميل يومياً. ونتيجة لذلك، تمكنت أرامكو من تجاوز هدفها الخاص للوصول إلى مستويات الإنتاج التي كانت لديها قبل الهجوم بأسبوع واحد.

وأشاد الناصر بموظفي الشركة المديرين تدريباً جيداً والخطط القوية للاستجابة للطوارئ واستمرارية العمل، والتي كانت من العوامل الحاسمة في التقليل إلى أدنى حد من الأضرار والتعطيل واستعادة الإنتاج.

وقال الناصر: «يعرف الجميع ما يفترض أن يشملوه في حالات الطوارئ، مع التدريبات والسيناريوهات للتعامل مع أمور معينة، وإن لم تكن بهذا الحجم، فقد كان لدينا 10 حرائق هائلة وست حرائق في مصنع واحد وحتى الساعة 10:30 صباحاً مع عدم وجود عدراء حاضرين، تمكن موظفونا من تقليل الضغط على النظام والتقطيع للتخدية. لكننا المحظين في غضون دقائق، وتم تجميع صنابير الإطفاء ورجال الإطفاء لدينا، وتم إحضار جميع رجال الإطفاء المتاحين. وقد تم إطفاء حرائق خريص في غضون خمس ساعات وتلك التي في بقيق في سبع ساعات. وقد استؤنف الإنتاج في خريص في غضون 24 ساعة، والإنتاج في بقيق في حوالي 48 ساعة» وقال

المملكة وفي غضون 48 ساعة كان لدينا المواد التي تنقصنا، كل شيء يعمل كالساعة حيث استغرق الأمر عشرة أيام لإنهاء الأعمال واستعادة الانتشآت إلى الهدف المستهدف وهو 11,3 مليار برميل يومياً. لم تتقطع أي من شحنات عملائنا الدوليين، حتى أثناء الهجمات، وهي شهادة على قوة الشركة حيث تمكننا من إعادة المنشأة دون أي تأثير على عملائنا الدوليين ودون أي انخفاض في إيراداتنا.

وشدد الناصر على أن الهجمات «لا تستهدف فقط أرامكو السعودية والمملكة العربية السعودية، فهذه الهجمات تستهدف الاقتصاد العالمي والمجتمع العالمي».

وأعرب عن خوفه من أن «غياب التصميم الدولي على اتخاذ إجراءات ملموسة قد يشجع المهاجمين ويضع أمن الطاقة العالمي في خطر».



إن الشركة لديها خطة تفصيلية لاستمرارية العمل تتعامل مع أي شيء بداية من الهيار قطعة واحدة من المعدات مثل الضاغط أو المحرك إلى تعطل المحطة بالكامل. وقال: «تم توفير جميع الموارد اللازمة وجميع المقاولين في

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21 - 21 - منتدى في صحة والسلام والبيئة - www.hse-forum.com - دبي

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Geoscience Manager
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Salman Dawood Abdulla
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Dr. Mohammed Aref
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كما تم إطلاق واحدة من أكبر مبادرات الرقمنة حتى الآن في سبتمبر/أيلول 2019، نتيجة تعاون شركة شلمرجير وشيفرون ومايكروسوفت.

ويهدف هذا المشروع الطموح إلى تصور وتفسير والحصول في النهاية على رؤى ذات معنى من مصادر بيانات متعددة عبر قطاعات التنقيب والتطوير والإنتاج وقطاع النقل وخضوط الأنابيب.

محرك آخر للرقمنة هو أن عملية تخزين البيانات ومعالجتها أصبحت أرخص بكثير، وأن الاتصال المتزايد من خلال ما يسمى «بإنترنت الأشياء» قد سمح باستيعاب المزيد من البيانات بكفاءة.

ومع ذلك، يمكن أن تحتوي الأنظمة الرقمية للمنصة البحرية على نحو 5000 إلى 15000 جهاز استشعار، وربط هذا العدد الذي لا يحصى من نقاط البيانات ليست عملية مباشرة. فنظراً لتعقيد جهود الرقمنة، من المحتمل أن تكون الاستثمارات موجهة أساساً إلى مشاريع الحقول الجديدة، في حين أن أصول الإنتاج القديمة لن تشكل أي أولوية.



أندرو مارتنسون

أصبحوا أكثر فعالية، وفقاً لتقرير شركة ريسنارد. ويشهد التنافس حالياً بين الموردين مع طرح الشركات منتجات رقمية جديدة.

فقد شهدت الأشهر الثلاثة الماضية وحدها إصدارات رئيسية من شركات مثل شلمرجير وبيكر هيوز وتيكتيب أف إم سي.

تقدر شركة أبحاث الطاقة، ريسنارد إنرجي، أنه يمكن استيعاب ما يصل إلى 100 مليار دولار من ميزات التنقيب والإنتاج من خلال مبادرات الأتمتة والرقمنة في عام 2020. إذ أنه في عام 2018، تم إنفاق تريليون دولار أمريكي على النفقات التشغيلية والآبار والمرافق والنفقات الرأسمالية المغمورة في أكثر من 3000 شركة في مجال التنقيب والإنتاج، وتكررت الشركة أن نحو 10 في المائة من هذا الإنفاق يمكن التخلص منه من خلال عمليات أكثر كفاءة وإنتاجية، وذلك بفضل عمليات الأتمتة والرقمنة.

وقال أندرو مارتنسون، رئيس أبحاث خدمات حقول النفط: «بالإضافة إلى توفير التكاليف، يمكن لمبادرات الرقمنة أن تزيد من الإنتاجية بزيادة وقت التشغيل، وتحسين استراتيجيات استنزاف المكامن، وتحسين صحة وسلامة وبيئة العمال وتقليل الانبعاثات الدفينة إلى الحد الأدنى، وجميعها تمثل خلق قيمة كبيرة».

لقد أعطى تباطؤ سوق النفط للمشغلين في قطاع النفط ومقدمي الخدمات حافزاً قوياً للتكيف ودفعهم

لاستكشاف التعاون المستقبلي المحتمل بشأن امتياز غشا. وبموجب شروط منح الامتياز، سوف تستثمر شركة لوك أوليل مبلغاً أولياً قيمته 19 مليون دولار أمريكي كرسوم توقيع للامتياز. مع احتفاظ شركة بترول أبوظبي الوطنية بأغلبية الحصص في الامتياز، مع شركة إيني الإيطالية، وشركة ويترشال ديا الألمانية، وشركة OMV النمساوية كأصحاب امتيازات إضافية.

وقد دخلت شركة جازبروم نفط وشركة بترول أبوظبي الوطنية (أدنوك) في اتفاقية إطارية بشأن التعاون الاستراتيجي، حيث ستستكشف الشركات فرصاً لتنفيذ مشاريع مشتركة في قطاع التنقيب والإنتاج وقطاع الصناعات التحويلية، وكذلك في مجالات تقنيات المعلومات والذكاء الاصطناعي وغيرها من المجالات. وبموجب هذه الاتفاقية، سيدرس الشركاء فرص التعاون في التنقيب عن الغاز عالي الحموضة وإنتاجه، وتطوير استراتيجيات معززة لاستخراج النفط والغاز، وتطوير تقنيات مبتكرة لفحص خزانات الكربونات.

وتخلق الاتفاقية أرضية للتعاون المحتمل في تطوير أنظمة تحليل الإنتاج في استكشاف وإنتاج الهيدروكربون والإمداد واللوجستيات والمعالجة والمبيعات. وسيقوم الطرفان بتقييم فرص المشاريع المشتركة في التنقيب الجيولوجي وتطوير حقول النفط والغاز، بما في ذلك في الامتيازات داخل إمارة أبوظبي.

وتشمل مجالات أخرى للتعاون التكنولوجي المحتمل تطوير نظم الإدارة وتكنولوجيا المعلومات والذكاء الاصطناعي.



مراسم توقيع الاتفاقية بين «جازبروم نفط» و«ادنوك»

الإمارات تعمق علاقاتها بروسيا في قطاع الطاقة

الحموضة، إلى شركة تابعة لشركة النفط والغاز الروسية المسجلة (لوك أوليل)، في الوقت نفسه، وقعت شركة بترول أبوظبي الوطنية ولوك أوليل وشركة إدارة صندوق الاستثمار المباشر الروسي (RDIF) اتفاقية إطارية

شهدت الزيادة الرسمية التي قام بها فلاديمير بوتين، رئيس الاتحاد الروسي، إلى الإمارات العربية المتحدة في شهر أكتوبر/نشرين الأول، توقيع عدد من الاتفاقيات والعهود التي من شأنها تعزيز مشاركة روسيا في قطاع الطاقة في البلاد.

وقعت شركة بترول أبوظبي الوطنية اتفاقية إطارية استراتيجية شاملة مع وكالة الطاقة الروسية لاستكشاف فرص جديدة للتعاون عبر سلاسل القيمة في قطاع النفط والغاز، وكذلك في قطاع الذكاء الاصطناعي وغيرها من التقنيات المتقدمة، وتشمل مجالات التعاون المحتملة الحصول على الامتيازات في مجال التنقيب والإنتاج في أبوظبي، وتكرير الغاز الطبيعي المسال، والبتروكيماويات، وكذلك التسويق والمبيعات والتجارة. ومنحت حكومة أبوظبي وشركة بترول أبوظبي الوطنية حصة نسبتها 5 في المائة في امتياز غشا لحقول الغاز عالي الحموضة، بما في ذلك حقول حائل وغشا ودالما وحقول النفط البحرية الأخرى من الغاز عالي



لهندس موبينة مرمه، لمار رئيس وزارة الطاقة، خلال اللقاء مع سعادة السفير الروسي في أبوظبي، وزير الطاقة في جمهورية روسيا الاتحادية في أبوظبي

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مدير مبيعات: مايكل شيريدج

مدير مبيعات المجلة: تاماري مينيرا

هاتف: +914 7676644 - بريد إلكتروني: info@oilreview.com

Country	Representative	Telephone	Fax	Email
India	Satish Mittal	011-88609448	011-88609091	satishmittal@alaincharles.com
Nigeria	Bola Oluwalana	0201-86419909		bolaoluwalana@alaincharles.com
South Africa	Shirley Dreyer	021-88609090		shirleydreyer@alaincharles.com
USA	Margaret Fordeham	194-227-9151	141-227-9152	margaretfordeham@alaincharles.com
UK	Michael Sheridjan	011-202-266882	011-202-266847	michaelsheridjan@alaincharles.com

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