

Oil Review

Oil · Gas · Petrochemicals

Middle East

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The latest developments in pipelines

- Harnessing big data for improved flow meter accuracy
- The future of subsea technologies
- Repositioning operations in the face of COVID-19
- Egypt's oil and gas ambitions receive a knock
- All about stress corrosion cracking

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→ Editor's note

GROWING DOMESTIC DEMAND and exports will drive upcoming pipeline additions in the Middle East, particularly for gas pipelines, according to GlobalData. Our Annual Pipeline Review (p13-17) assesses the outlook for Middle East pipeline development, shares insights from companies operating in this sector in the region and looks at how digitalisation can transform pipeline operations.

Oil companies are increasingly turning to digitalisation initiatives to boost cost savings and efficiencies in the current challenging industry environment. We look at how digitalisation can bring benefits in areas ranging from asset performance management (p32) to subsea operations (p30), project delivery (p36) and power systems (p28).

We also look at the growth of Egypt's petrochemical sector (p21), how remote technologies and working from home initiatives are driving the trend towards more sophisticated communications (p38), saving energy with pump retrofits (p29) and optimising flow meter management with Big Data (p26).

→ Contents

Calendar

- 4 Executives' calendar**
Listings of regional and international events

News

- 6 Developments**
A round-up of the latest news from around the region

Annual Pipeline Review

- 13 The outlook for Middle East pipeline development**
Growing domestic demand and exports will drive upcoming pipeline additions in the Middle East
- 14 Opportunities in the Middle East pipeline market**
Business prospects in the pipeline sector
- 16 Digital transformation in the pipeline industry**
The benefits and challenges of digitalisation for pipelines

Egypt

- 20 Egypt's energy hub hopes receive a knock**
While positive momentum in Egypt's oil and gas sector has been knocked back, there is every reason for optimism long term
- 21 The growing importance of Egypt's downstream sector**
Egypt is increasingly focused on petrochemicals development

Interview

- 24 Transforming the business**
SNC-Lavalin's change of direction and its Middle East activities

Technology

- 25 Corrosion cracking in pipelines**
Chloride-induced stress corrosion cracking in pipelines
- 26 Optimising flow meter management with Big Data**
How the fault detection process in flow meters can be optimised through Big Data
- 29 Saving energy, reducing emissions with pump retrofits**
How upgrading two condensate export pumps on an oil platform saved energy and optimised performance
- 30 Lean, clean and digital – the future of subsea operations**
Digital solutions are critical for optimised subsea operations
- 32 APM 4.0 for Industry 4.0: the five essential pillars**
The five building blocks required to realise the results of APM 4.0
- 34 Navigating the COVID-19 storm**
How energy companies are maintaining cash liquidity and repositioning their operations to navigate the COVID-19 headwinds
- 38 A new era for offshore communications**
The COVID-19 crisis is catalysing interest in new, remote ways of working

Innovations

- 39 The latest product advancements in oil and gas**

Arabic

- 4 Analysis**

Front cover: Adobe Stock

→ Executives' Calendar, 2020

SEPTEMBER			
7-11	Gastech Virtual Summit	VIRTUAL	www.gastechevent.com
11-14	Iran Int'l Oil, Gas, Refining & Petrochems Show	TEHRAN	www.iran-oilshow.ir/EN
OCTOBER			
6-8	OPEX MENA	MANAMA	www.europetro.com/week/opexmena2020
6-7	6th Kuwait Oil & Gas Conference & Exhibition	KUWAIT	www.cwckuwait.com
20-21	Iraq Petroleum 2020	VIRTUAL	www.cwciraqpetroleum.com
20-21	OWI 2020 MENA	TBC	www.offsnnet.com/owi-mena
NOVEMBER			
9-12	ADIPEC 2020	VIRTUAL	www.adipec.com
14-15	GCA International Conference & Exhibition	MANAMA	https://gca2020.org/
16-17	Middle East Petroleum & Gas Conference	MANAMA	www.mpgc.cc
Nov-Dec	Dubai HSE Forum	DUBAI	www.hse-forum.com

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

ADIPEC 2020 to take place virtually in November

THE ABU DHABI International Petroleum Exhibition & Conference (ADIPEC) Strategic and Technical Conference will take place virtually in November 2020, with the next full event to take place in November 2021.

Event organiser dmg events, with the support of its strategic partner and host, the Abu Dhabi National Oil Company (ADNOC), has announced it will host the ADIPEC Strategic and Technical Conference virtually between 9-12 November 2020.

This follows a directive from Abu Dhabi's Department of Culture and Tourism that events should not take place in light of COVID-19 restrictions. The next full in-person annual exhibition and conferences will take place from 8-11 November 2021.

Omar Suwaina Al Suwaidi, ADIPEC's chairman, said, "Despite COVID-19's global challenge, we are delighted that ADIPEC's strategic and technical conferences will be held virtually this year, allowing leaders across

the oil and gas industry to come together to share ideas and connect with a range of major industry trends, challenges and opportunities.

"All ADIPEC participants' health and welfare is our highest priority, and we look forward to welcoming all visitors to the full exhibition and conference in person at ADIPEC 2021. Looking to the future, collaboration, technology, and innovation will be crucial levers as we continue to identify new opportunities for smart growth across the global energy landscape."

The virtual conference will bring together ministers, CEOs and leaders of the global industry to evaluate the collective measures that the industry is putting in place to continue recovery after COVID-19.

dmg events Global Energy president, Christopher Hudson, said, "We are committed to ensuring ADIPEC remains at the heart of the global oil and gas landscape, driving forward the



Image credit: dmg events

The next full in-person edition of ADIPEC will be held from 8-11 November 2021.

conversations, collaborations, and connections that address key challenges and fuel innovative ideas and strategies that shape the industry.

"By staging a concentrated and abridged virtual conference programme this year, ADIPEC will utilise cutting-edge technology that has evolved exponentially over the past four to five months, to ensure the industry and its community has a voice to discuss and share the learnings

of this year and into the future."

ADIPEC is a leading global event for the oil and gas industry. Attracting more than 155,000 attendees and 2,200 exhibitors in 2019, the event brings together Energy Ministers, global CEOs and leading decision makers alongside businesses across four days of commerce, dialogue and knowledge transfer that address today's energy needs and define tomorrow's energy landscape.



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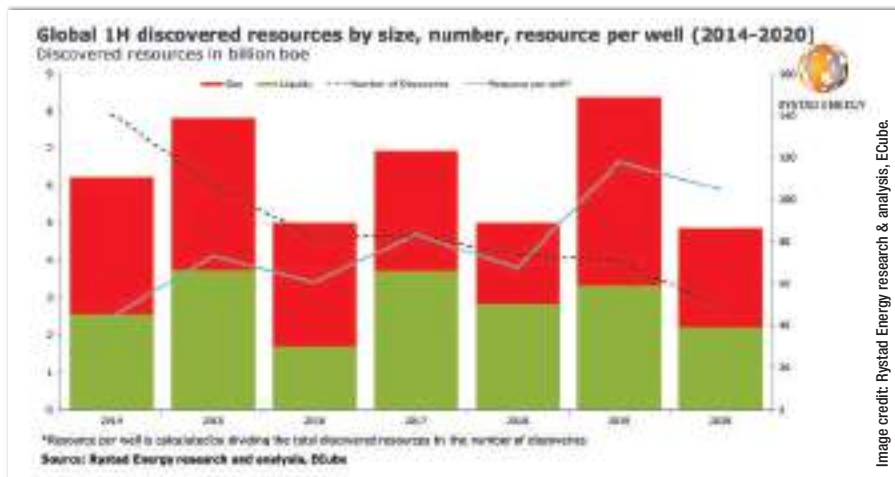
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Global discoveries plunge in H1 2020



GLOBAL DISCOVERIES Of conventional resource volumes reached just 4.9 billion barrels of oil equivalent (boe) in the first half of 2020, Rystad Energy estimates, representing a 42 per cent drop in resource volumes and 31 per cent drop in the the number of discoveries compared to the same period in 2019.

There were a total of 49 conventional oil and gas discoveries during the first half of 2020, and it is noteworthy that almost 70 per cent of the resources were discovered offshore and 55 per cent are categorised as gas.

Russia, South America and the Middle East account for around 73 per cent of the total discovered resources so far in 2020. Significant discoveries include Jebel Ali in the UAE, Maka Central in Suriname, Uaru in Guyana and 75 Let Pobedy in Russia.

“Last year we saw the highest volumes of discovered resources since the last downturn. Based on the large number of high-impact exploration wells planned for this year, 2020 was meant to follow the same path. But then COVID-19 struck and the oil market crashed in 1Q20, resulting in delays and cancellations as operators cut budgets,” said Rystad Energy’s upstream analyst Taiyab Zain Shariff. Travel bans and associated logistical issues caused delays for projects in the initial and ongoing drilling phase that required crew changes, Rystad adds. Delays may also arise in the second half of the year as a result of COVID-19 related logistical issues resulting from an expected second wave of the pandemic.

It is estimated that the global offshore exploration activity this year might reach its lowest point in 20 years, with discovered volumes falling even lower than they were in 2016, comments Rystad.

Phaze Ventures collaborates with OQ on disruptive energy technologies

PHAZE VENTURES, AN Oman-based venture capital firm, and OQ, Oman’s global integrated energy services company, have signed a Memorandum of Understanding whereby the organisations will work closely together to develop, deploy and invest in disruptive energy technologies from across the globe.

The agreement incorporates several areas of collaboration in support of the two organisations’ core missions and brings together Phaze Ventures technology and investment ecosystem with OQ’s global operating platform and industry-leading expertise. The agreement will see the two companies work together in a number of areas including talent development and technology incubation and piloting.

Abdullah Al-Shaksy, CEO and co-founder at Phaze Ventures, said, “We are on a mission to provide disruptive technology companies with the early-stage investments and strategic support they need to transform traditional industries such as the global energy and logistics sectors.

“This agreement marks an important step on that journey. Strategic partnerships with forward thinking global players such as OQ allow us to provide innovators with the unique opportunity to develop and deploy their offering and, ultimately, supercharge their growth.” The agreement follows Phaze Ventures’ partnership with Petroleum Development Oman in 2018 and the launch of the region’s first energy-focused startup accelerator programme.



Abdullah Al-Shaksy, CEO and co-founder, Phaze Ventures.

Eni makes new gas discovery

OIL MAJOR ENI has made a new gas discovery in the Mediterranean Sea offshore Egypt.

The discovery is located at a water depth of 22 metres, 11km from the coast and 12km north-west from the Nooros field and around one km west from the Baltim South West field, both already in production.

The well discovered a single column of 152 metres thick gas with excellent petrophysical properties within the Messinian age sandstones of the Abu Madi formation. The well will be put to production test.

In this sector of the Egyptian offshore shallow waters, the discovery of Bashrush demonstrates the significant gas and condensate potential of Messinian formation. Bashrush’s discovery further extends the gas potential of the Abu Madi formation reservoirs that were discovered and produced from the so-called ‘Great



Eni and its partners have successfully drilled the first exploration well in the North El Hammad license.

Nooros Area’ to the west.

Eni, along with its partners BP and Total, will begin screening the development options for this new discovery in coordination with the Egyptian petroleum sector, with the aim of ‘fast tracking’ production through synergies with existing infrastructures in the area.

In parallel with the development activities associated with this new discovery, Eni will continue to explore the ‘Great Nooros Area’ with this year’s drilling of another well-known Nidoco NW-1 DIR exploration located in the Abu Madi West concession.

Eni says the Bashrush discovery is further proof of the effectiveness of its ‘incremental’ exploration strategy, aimed at selecting high-value opportunities and ensuring the rapid development of new discoveries through existing infrastructures.

In the North El Hammad concession, which is in participation with the Egyptian Natural Gas Holding Company (EGAS), Eni through its affiliate IEOC holds 37.5 per cent interest, BP 37.5 per cent, and Total 25 per cent.

Saudi Aramco restructures downstream operations

SAUDI ARAMCO HAS announced the reorganisation of its downstream business to support and enhance integration across the hydrocarbon value chain and better position the company to drive financial performance, value creation and global growth.

Saudi Aramco's downstream operating model will include four commercial business units: fuels (includes refining, trading, retail and lubes); chemicals; power; and pipelines, distribution and terminals. These business units will be supported by three corporate functions: manufacturing, strategy and marketing and affiliates affairs.

Abdulaziz M. Al Judaimi, senior vice-president of Saudi Aramco Downstream,



Image credit: Saudi Aramco

Abdulaziz M. Al Judaimi, senior VP, Saudi Aramco Downstream.

said, "This reorganisation is yet another step in the company's strategy to develop a global integrated downstream business that enhances our competitiveness by maximising our value capture across the hydrocarbon value chain."

Indrajit Sen, Oil & Gas editor at MEED, part of GlobalData, commented, "Aramco's downstream restructuring comes as the oil company's refining margins are hit by lower demand as a result of the COVID-19 pandemic. At the same time, petrochemicals demand is being knocked by the virus' impact and there is worldwide clamour against the environmental ill-effects of plastics. However, it also comes amid an aggressive expansion of Aramco's downstream activities that saw the company complete its US\$69.1bn acquisition of petrochemical producer SABIC."

Saudi Aramco aims to double its downstream output by 2030, she added, noting its widespread global downstream portfolio.

Gas flaring spikes

ESTIMATES FROM SATELLITE data show global gas flaring increased to levels not seen in more than a decade, to 150 billion cubic meters (bcm), according to the World Bank-managed Global Gas Flaring Reduction Partnership (GGFR). The three per cent rise, from 145 billion cubic metres (bcm) in 2018 to 150 bcm in 2019, was mainly due to increases in the USA (up by 23 per cent), Venezuela (up by 16 per cent), and Russia (up by nine per cent). Gas flaring in fragile or conflict-affected countries increased from 2018 to 2019: in Syria by 35 per cent and in Venezuela by 16 per cent, despite oil production flattening in Syria and declining by 40 per cent in Venezuela.

Gas flaring results in more than 400 million tons of CO₂ equivalent emissions every year and wastes a valuable resource, with harmful impacts to the environment from un-combusted methane and black carbon emissions.

"Our data suggests that gas flaring continues to be a persistent problem, with solutions remaining difficult or uneconomic in certain countries," said Christopher Sheldon, practice manager in the Energy & Extractives Global Practice, World Bank. "The current COVID-19 pandemic and crisis brings additional challenges, with sustainability and climate concerns potentially sidelined. We must reverse this worrying trend and end routine gas flaring once and for all."

The top four gas flaring countries (Russia, Iraq, the USA and Iran) continue to account for 45 per cent of all global gas flaring, for three years running (2017-2019). When looking at all oil-producing countries, excluding the top four, gas flaring declined by 9 bcm (or 10 per cent) from 2012 to 2019. In the first quarter of 2020, global gas flaring fell by 10 per cent, with declines across most of the top 30 gas flaring countries.

More than 80 governments and companies have signed up to the World Bank's Zero Routine Flaring by 2030 initiative to end routine flaring.

Weatherford wins Iraq contract

WEATHERFORD HAS SIGNED an 18-month contract with the Iraqi Drilling Company (IDC), a leading Iraqi service company focusing on rig services, to provide services and project management for the drilling and completion of twenty wells in the Al-Nasiriyah field in the Dhi Qar province in southern Iraq.

Basim M Khudair, general director for IDC, said, "Signing this contract between IDC and Weatherford is a great accomplishment for both parties. It sets the right ground for our mutual and constructive joint cooperation in the future."

IDC will provide rigs, civil works and drilling services; Weatherford will provide project management and all other associated services. The operation will be performed with four rigs provided by IDC.

Frederico Justus, president, international operations, Weatherford, noted, "This joint operation with IDC is an honour for Weatherford. Together, IDC and Weatherford will work as one team, providing project management solutions that deliver efficient and effective execution of the contract."

Green Petrochem expands its operations

SHARJAH-BASED GREEN PETROCHEM has announced an expansion plan to boost its storage capacity in the Hamriyah Free Zone.

Under the agreement with the Hamriyah Free Zone Authority (HFZA), the petrochemical company will lease a 200,000 sq. ft. (18, 580 sq. m) plot of land to expand its facilities and respond to the increasing demand for its products.

Green Petrochem said that the deal comes as part of its expansion strategy to augment its operations in the regional and international markets, with plans to expand into the US market.

In addition to its main storage facility in the free zone, the company is looking to establish additional storage facilities, targeting a future storage capacity of a 150,000 cubic metres.

Anish Vijapura, managing director of Green Petrochem, said the company selected HFZA to expand its activities because of its competitive advantages, especially in shipping services and logistical facilities, which meet its expansion strategy.

With total refining capacity of 2.1mn bbl per annum, the company offers a range of refined products to support transport and industrial applications globally including naphtha, kerosene, gasoil and fuel oil as well as specialty chemicals and solvents.



The signing ceremony.

Image credit: Green Petrochem

Neptune Energy reports major milestone for Algerian gas facility

NEPTUNE ENERGY HAS announced a major milestone for the Algerian Touat gas facility, with day-to-day operations formally passed on to Groupement Touat Gaz (GTG).

Operational handover was dependent on GTG and TR signing the Performance Acceptance Certificate (PAC) on 24 June.

GTG is staffed by secondees from Neptune Energy and Sonatrach who bring together decades of operating experience in Europe and Algeria.

Neptune Energy's vice-president for North Africa Asia Pacific Philip Lafeber, said, "The Touat plant continues to operate well, emphasising the growing importance of the North Africa business in Neptune's geographically-diverse and gas-weighted portfolio."

The Touat facility is located approximately 1,400 km southwest of Algiers and near Adrar, consisting of 19 development wells, a gas treatment plant and stabilised condensate with a collection network and export pipelines.



Image credit: Neptune Energy

Touat's production will account for around nine per cent of Algeria's total gas exports.

CBH to construct a low sulphur fuel oil refinery in Oman

CBH INC WILL invest in Oman to construct a low sulphur fuel oil (LSFO) refinery.

The LSFO refinery aims to serve the growing shipping needs for IMO-compliant cleaner fuel for shipping propulsion.

The planned capacity is 300,000 bpd in phases. The location of the refinery is open to the Arabian sea outside the Strait of Hormuz. The natural depth of the port area qualifies it to receive large ships with deep keel.

The refining process is based on a unique Canadian technology with proven results in turning poor quality fuel into cleaner and higher grades.

The project satisfies the strict investment criterion of CBH based on focused investment strategy, with safe, secure and high returns.

The company notes Oman's strategic location, educated workforce, political and economic stability and secure environment.

The total investment is US\$1.5bn.

ADNOC and ADQ team up to boost development of industrial and chemical projects

THE ABU DHABI National Oil Company (ADNOC) and ADQ have signed a joint venture agreement to create a new investment platform to fund and oversee the development of industrial projects within the planned Ruwais Derivatives Park, a key enabler of ADNOC Downstream's 2030 smart growth strategy and the UAE's chemicals and industrial growth strategy.

Under the terms of the agreement, ADNOC and ADQ will jointly evaluate and invest in anchor chemicals projects. ADNOC will hold a 60 per cent majority equity stake in the JV with ADQ holding the remaining 40 per cent. ADQ's extensive portfolio, including local and international logistics and transport, power and water, industrial construction, and other essential infrastructure and enabling services, will complement ADNOC's strong hydrocarbon feedstock position in Ruwais as well as its longstanding relationships with trusted international partners and investors. These combined strengths will enhance the overall value proposition of the planned Ruwais Derivatives Park and, in turn, support the growth of the Ruwais industrial complex and increased investment in the Emirate of Abu Dhabi, ADNOC says. The JV partners will conduct a feasibility study to further develop identified projects in Ruwais.

H.E. Dr. Sultan Ahmed Al Jaber, UAE Minister of Industry and Advanced Technology and ADNOC Group CEO said, "Our partnership with ADQ will expand on existing efforts to maximise the value of our assets in Ruwais, to kickstart the development of the UAE's downstream derivatives sector, support the transformation of Ruwais into a global hub for industry and attract additional foreign direct investment."

Middle East second highest contributor to global CDU capacity additions: GlobalData

DATA ANALYTICS AND consulting company GlobalData identifies the Middle East as the second highest contributor to global crude distillation unit (CDU) capacity additions, contributing around 23 per cent by 2024.

All the six upcoming projects in the region are planned projects, GlobalData added. Al-Zour in Kuwait is the largest upcoming CDU refinery in the region with a capacity of 615,000 bpd by 2024. Jizan in Saudi Arabia is the second largest upcoming CDU refinery with a capacity of 400,000 bpd



Image credit: Adobe Stock

Asia is expected to have the highest crude distillation unit (CDU) capacity additions.

Asia is expected to have the highest CDU capacity additions, contributing around 42 per cent of global CDU capacity additions by 2024, said GlobalData.

The company's report, 'Global Capacity and Capital Expenditure Outlook for Refineries, 2020–2024 – Asia Dominates Global Refinery CDU Capacity and Capex Outlook', reveals that Asia is likely to witness a total CDU capacity of 2.7mn bpd by 2024. Out of which, the capacity of planned projects that have received necessary approvals for development account for nearly 1.3mn bpd.

Africa ranks third across the globe, contributing around 18 per cent of world's CDU capacity additions during the outlook period. The region has 12 upcoming projects, of which nine are planned and three are announced. Lagos I is the largest upcoming CDU refinery in the region with a capacity of 650,000 bpd by 2024.

Soorya Tejomoortula, oil and gas analyst at GlobalData, said, "Asia is expected to witness the start of operations of 11 new-build CDU refineries by 2024. Of these, eight are planned and the remaining three are announced refineries. China's Yulong and Jieyang are the largest upcoming CDU refineries in the region, each with a capacity of 400,000 bpd by 2024."

Petrofac implements SkillsVX software for Valaris

PETROFAC HAS SUCCESSFULLY implemented its SkillsVX learning and competency software for offshore drilling services provider Valaris, supporting its 7,000 employees globally to manage their learning and competency needs.

The implementation involved integrating data from Valaris' two legacy organisations, which had deployed two different systems prior to their merger in 2019. Petrofac merged the companies' training and competency matrices to provide a single platform to manage all of Valaris' training and competency data consistently across all of its rigs.

SkillsVX is an integrated eLearning, competency and training management software solution. The system maps and manages workforce competency for more than 40 companies worldwide and has been

designed to meet the specific challenges of safety-critical industries. Its six modules offer an efficient, reliable and automated route to mapping, managing and tracking workforce capabilities across multiple projects and locations.

Eliot Doyle, senior manager – training and competency, Valaris, said, "Bringing our training, competency and learning management systems together into one platform across our operations has significantly improved efficiencies as well as facilitated compliance."

SkillsVX leverages the strength of Petrofac's broader operations, maintenance, engineering and training experience to deliver effective training and competency management for the oil and gas industry.



The SkillsVX desktop.

Image Credit : Petrofac

Mammoet completes Oman contracts

MAMMOET, A SPECIALIST in engineered heavy lifting and transport, has successfully carried out two contracts for Oman's Duqm oil refinery.

The first contract came from a local manufacturer, which included inland and sea transport for the project scope of nine 780t LPG storage tanks (bullets) for EPC-2 Offsite and Utilities. Mammoet was able to ensure timely and safe delivery of the bullets by managing the entire logistics chain.

Agility Global Logistics (Agility) awarded the second contract which involved receiving and transporting different reactors. This included handling a 1,130t reactor which was the heaviest cargo ever loaded in at Duqm Port. All Agility reactors handled were successfully and securely delivered to the project site using SPMT's 54-axle lines.



Loadout of LPG bullets at Sohar.

Image Credit : Mammoet

CALGAVIN makes new appointments

CALGAVIN, A HEAT transfer enhancement specialist, has announced two new appointments in the Sales and Marketing team, Tom Higley as sales and business development manager and Alex Codreanu as sales proposals manager, both promoted from within the company.

Martin Gough, founder and managing director at CALGAVIN said, "As you have seen in the past, CALGAVIN has gradually been adding to its resources and planning to follow the company's quality policy. Two key policies are focusing on customer satisfaction and investing in sustainable business, which Sales plays a vital role in achieving. It is this investment within the company that needs to be continually reviewed moving forward, adapting to the global markets – today an added importance – and CALGAVIN's place within the product supply chain."

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Saudi Aramco CEO positive about the future

IN A WIDE-RANGING conversation with IHS Market vice chairman Daniel Yergin for the CERAWEEK Conversations, Saudi Aramco president and CEO Amin H. Nasser discussed how the company had weathered the pandemic, expressing the opinion that “the worst is behind us” in oil markets. He said that already-recovering demand has made him “very optimistic” for the second half of 2020 with China demand at almost 90 per cent and countries starting to open up. With forecasts now looking at between 95 and 97mn bpd by year-end, much will depend on whether there will be a second wave of coronavirus, Nasser said, adding “but I think we are much better prepared now.”

Saudi Aramco had learned lessons from the MERS pandemic, that had “put us in a very good position in terms of tackling COVID-19”, he said. The company had started early preparations with John Hopkins University to ensure it had all the necessary supplies available.

“All of our fields and plants were running smoothly with very high reliability during the pandemic,” he said. “More than 50 per cent [of the office workers] were working from home, but when it comes to field presence, everybody was working, especially in remote areas and offshore sites. We were able to manage the situation very well by putting all the precautions necessary to maintain their safety and health while maintaining our operational resilience during this time.”

Cyber security is “top of our priorities,” he said. “We benefitted from having a chief digitalisation officer and having one of the best IT infrastructures. We were availing more than 30,000 remote workstations for our people to work from home. We had to be making sure



Amin H. Nasser, president and CEO, Saudi Aramco.

Image credit: Saudi Aramco

that we are able to provide the connectivity while protecting our network from any hackers. There is a lot of talk about working from home and utilising networks and remote working. But at the same time, even though there is a lot of productivity and savings by doing so, we need to also guard against cybersecurity because its system needs to be really protected very well during these times with a lot of remote people working.”

While some of its global suppliers had to shut down because of lockdowns, the maintenance of optimum levels of inventory and high levels of local content, with many things being manufactured in kingdom, had helped to mitigate the impact.

“COVID-19 further confirmed that having your supply chain closer to you is very important. Globalisation, when it comes to supply chains, is definitely successful and worked. But we are seeing, because of either the critical nature of the incident we had at Abqaiq and Khurais, or the lockdown that happened in different countries, having it closer to end use is very important these days.”

Commenting on Saudi Aramco’s role in the energy transition, he said, “The focus even before COVID-19 about climate change and sustainability was one of the highest priorities for Saudi Aramco. That focus will continue to be there even after COVID-19 because climate change is important and critical.

“I still believe that oil and gas will continue to be strongly part of the energy mix over the long-term. However, it’s going to be cleaner because we are working to make sure that we are reducing our carbon footprint.” He stressed the company’s leading position in reducing carbon emissions in terms of carbon intensity and methane intensity as a result of putting in the right investment and using the right technologies.

“Climate change, carbon capture and sequestration, turning CO₂ into useful products, the use of hydrogen from crude oil or from gas, ultra-clean engine fuel systems. Non-metals is a focus area which will find a different use for our hydrocarbons and at the same time will reduce our carbon footprint significantly. Crude-to-chemical, that’s part of our strategy in acquiring SABIC. The highest sector in terms of use of oil demand up to 2040 is chemicals. Climate change, reducing carbon footprint and identifying new usage for oil is a focus area for Saudi Aramco going forward.”

Global drilling activity declines, but Middle East remains relatively resilient

THE NUMBER OF drilled wells globally is forecast to reach around 55,350 this year, according to Rystad Energy analysis, the lowest since at least the beginning of the century. This represents a 23 per cent fall from 2019’s number of 71,946 wells. Drilled wells are expected to partly recover to just above 61,000 in 2021, as governments ease travel restrictions, boosting oil demand and prices, and are expected to rise to just below 69,000 by the end of 2025. North America is likely to be most affected, with the country’s rig count already down to historic lows.

“Both new wells and drilling lengths will be pared down as E&P’s scale down investments, affecting the entire supply chain associated with these services. This includes drilling tools, which will decline by 35 per cent in 2020 compared to 2019,” said Reza Hassan Kazmi, energy services analyst at Rystad Energy.

Rystad expects that onshore and offshore purchases for drilling tools will drop from US\$16bn in 2019 to US\$10bn in 2020, North America, Africa and Russia being the biggest contributors to this loss.

However, the Middle East is expected to be more resilient in terms of budget and activity cuts compared to other regions, Kazmi commented.

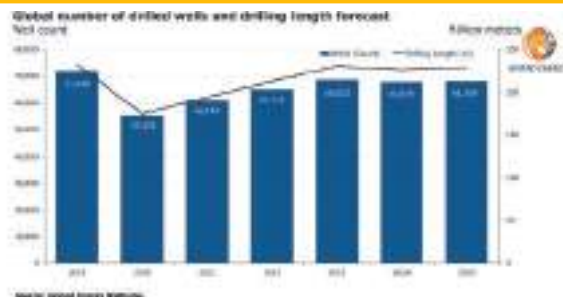


Image credit: Rystad Energy

“Globally, we have observed that NOCs have comparatively been better off in keeping up with their investment plans, and since most Middle East activity is controlled by NOCs, we can be a bit more optimistic about the region. Less expensive drilling and operational costs could certainly be other factors contributing to stability in the Middle East. We should definitely expect a drop in both drilling activity and spending compared with 2019, but the negative growth could be restricted to single digits.”

Health, Safety & Security Review

Middle East

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Iran builds pipeline to bypass Strait of Hormuz

IRAN HAS STARTED building a 1,000km pipeline to circumvent the disputed Strait of Hormuz for its future oil exports, according to press reports.

The west to east Goureh-Jask route will bring one million bpd of oil from the southern Bushehr province to the Iranian coast on the Sea of Oman for export. The project is said to cost more than US\$1.1 billion.

President Hassan

Rouhani said in a televised video conference that the pipeline would enable the Islamic Republic to export its oil without relying on the Strait of Hormuz, adding that Iran would be the only country whose oil exports would be cut off if the Strait of Hormuz were to be closed.

He said that a foreign company had been due to set up a plant to manufacture pipes, but that the project had been stopped due to sanctions and the materials were therefore being manufactured locally.

Rouhani said that 440km of the 1,000km pipeline has been built and five pump stations are also being constructed.

Iran's Oil Minister Bijan Zanganeh said that oil exports will start from Jask, which is envisaged to become Iran's main export hub and where 20 tanks are being built. He said that the export terminal was more than 40 per cent complete, and that Iran should be able to start crude oil exports from Jask terminal by the end of the current Iranian calendar year, which began on March 20.



Image credit: Adobe Stock

The pipeline will enable Iran to export its oil without relying on the Strait of Hormuz.

ADNOC enters into US\$20.7bn energy infrastructure deal

IN ONE OF the largest global energy infrastructure transactions, and the single largest energy infrastructure investment in the region, a consortium of investors will collectively acquire a 49 per cent stake in ADNOC Gas Pipeline Assets, a newly formed ADNOC subsidiary with lease rights to 38 pipelines covering a total of 982.3km, with ADNOC holding the 51 per cent majority stake.

The consortium, comprising Global Infrastructure Partners (GIP), Brookfield Asset Management, Singapore's sovereign wealth fund GIC, Ontario Teachers' Pension Plan Board (Ontario Teachers'), NH Investment & Securities and Snam, will invest in select ADNOC gas pipeline assets worth US\$20.7bn.

The consortium will acquire a 49 per cent stake in the newly-formed ADNOC subsidiary.



Image credit: ADNOC

Under the terms of the agreement, ADNOC will, in return for a volume-based tariff subject to a floor and a cap, lease its ownership interest in the assets to ADNOC Gas Pipelines over 20 years. The transaction will result in upfront proceeds to ADNOC amounting to more than US\$10bn and is subject to customary closing conditions and regulatory approval.

Sultan Al Jaber, UAE Minister of State and ADNOC Group CEO, said, "The landmark investment signals continued strong interest in ADNOC's low-risk, income-generating assets, and sets another benchmark for large-scale energy infrastructure investments in the UAE and the wider region."

Adebayo Ogunlesi, chairman and managing partner of GIP, commented, "ADNOC's gas network is a core piece of midstream infrastructure in the UAE and this transaction presents a unique opportunity to invest in an asset of this quality and importance, while also supporting ADNOC in their smart growth strategy."

The strategic joint venture will see ADNOC pay ADNOC Gas Pipelines a volume-based tariff for the use of pipelines that transport sales gas and natural gas liquids (NGL) from ADNOC's upstream assets to Abu Dhabi's major outlets and terminals.

New system for gas distribution pipeline Isolations

T.D. WILLIAMSON (TDW), the global pipeline solutions provider, has introduced the POLYSTOPP Quick Connect system for the gas distribution market. Lightweight and easy to use, it allows operators to isolate a polyethylene (PE) line twice as fast as other methods while preventing the damage associated with squeezing.

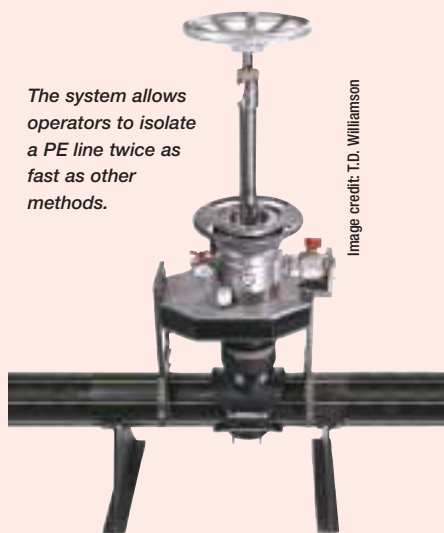
According to HT&P senior product manager Ryan Ragsdale, it takes less than 10 minutes to tap and isolate a pipeline with the POLYSTOPP Quick Connect system. The technician can install the tapping, plugging and completion machines onto the valve in around 20 seconds each, and removal is just as fast.

"Faster isolation dramatically decreases job time and increases efficiency while preserving pipeline integrity, which maximises value to the operator," Ragsdale said.

The POLYSTOPP Quick Connect system is extremely lightweight compared to previous solutions. All components are made of aluminum, including the valve and tapping, plugging and completion machines, making it light enough for a one-person lift operation.

This is the second cutting edge isolation product TDW has introduced to the gas distribution market in recent months. It follows the ProStopp DS isolation tool, a low-pressure double block and bleed technology.

The POLYSTOPP Quick Connect system is available worldwide for 4-inch through 8-inch pipelines up to 10 bar (150 psi). Technology for 12-inch pipelines will be available in the near future.



The system allows operators to isolate a PE line twice as fast as other methods.

Image credit: T.D. Williamson

The outlook for Middle East pipeline development

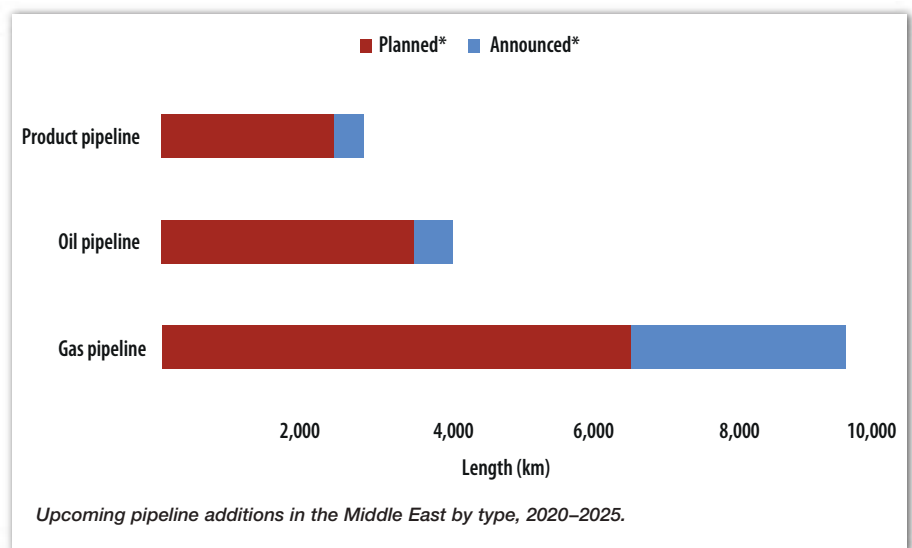
Growing domestic demand and exports will drive upcoming pipeline additions in the Middle East to 2025, says GlobalData.

DESPITE BEING A strategic region in terms of oil and gas production, the Middle East currently accounts for only around five per cent of global trunk pipeline length. By 2025, the region is expected to constitute around 11 per cent of global upcoming pipeline length additions. More than half of these new additions will be natural gas pipelines. Growth in natural gas pipelines in the region is driven primarily by growing domestic gas demand in different countries, and exports. Domestic demand is primarily from gas-fired power plants and a growing petrochemicals sector.

Iran, which has high domestic gas demand from its power, industrial, petrochemicals, and residential (peak demand in winter for heating) sectors, is planning the IGAT XI – a 1,200 km gas pipeline. The pipeline will be transporting natural gas from the South Pars field (Iran) to southern Iran, passing through provinces such as Bushehr, Fars, Yazd, and Isfahan. Iran is also planning a 380km export gas pipeline to Oman – to meet Oman's domestic demand as well as helping Iran to produce and export LNG, utilising Oman's liquefaction facilities. Saudi Arabia, which is witnessing growing gas demand from power and petrochemical sectors, is planning a 450km Haradh-Hawiyah gas pipeline to meet its domestic demand.

Both Iran and Saudi Arabia are also witnessing strong domestic demand for petroleum products from the transportation sector. The 920km Abadan-Rey pipeline in Iran, expected to be operational this year, is being planned to meet petroleum products demand in the Iranian cities of Abadan, Ahvaz, Arak, and Tehran. Saudi Arabia is planning the Yanbu-North Jeddah I and Yanbu-North Jeddah II pipelines to meet products demand in the Makkah province.

While countries such as Iran and Saudi Arabia are planning pipelines mainly to meet domestic demand, Iraq is planning export pipelines. Iraq's Basra-Aqaba Oil and



Basra-Aqaba Gas, two parallel pipelines each with a length of about 1,700km, would supply oil and gas to Jordan. Some of this

“The COVID-19 pandemic seems to have had little impact on upcoming pipeline projects in the region.”

oil will also be exported from the Aqaba port. Israel and Cyprus are planning the 1,900km EastMed gas pipeline to export natural gas from the Levantine Basin to Greece. The pipeline has the potential to increase natural gas security in south-east Europe and would provide an alternate source of gas imports to the region, reducing its dependence on Russian gas.

In the Middle East, major upcoming crude oil pipelines are mainly being built for exports. Besides the Basra-Aqaba Oil

pipeline, Iraq is also planning the 1,000km Iraq-Turkey II pipeline which will transport crude from the Kirkuk oil field (Iraq) to the Ceyhan port (Turkey) for exports to global markets. The pipeline will run parallel to an existing pipeline and help Iraq to bypass the Strait of Hormuz for exports. Iran is planning the 1,100km long Goureh-Jask pipeline to transport crude oil to its Jask oil terminal for storage and exports.

The COVID-19 pandemic seems to have little impact on upcoming pipeline projects in this region, most of which are being built by state-owned companies. The Basra-Aqaba Oil (1,700km) is one such planned project that has been delayed due to the pandemic. The deadline to submit technical bids for the project has been postponed, which is likely to push its start year by a year. The start years of South Pars Phase 11 Line I and South Pars Phase 11 Line II pipelines in Iran are also likely to be pushed by a year due to delays in construction work. ■

GlobalData is a leading provider of data, analytics and insights on the world's largest industries. www.GlobalData.com

Opportunities in the Middle East pipeline market

Neale Carter, executive vice president for Middle East, Africa & Asia Pacific, Penspen, and Angus Bowie, director for MENA & APAC at STATS Group, spoke to *Oil Review Middle East* about pipeline prospects in the region.

How do you view the Middle East market for pipeline development, and are there any projects or contracts you would like to highlight?

Neale Carter (NC): A number of upstream oil and gas megaprojects are being delayed by Middle East national oil companies (NOCs) due to the impact on oil demand as a result of the current COVID-19 pandemic. With crude oil prices set to remain under pressure throughout 2020, we have seen the cancellation and delay of a number of greenfield projects, with NOCs preferring to focus spend on brownfield refurbishment and modification projects to maintain current production capacity. In the UAE, ADNOC are continuing with brownfield investment in both offshore (Upper Zakum expansion project to increase production to one million bpd requiring new subsea pipelines, and onshore (BAB and Al-Dabbiya facilities expansion), which will generate a number of new well tie-in opportunities, requiring new flowlines and pipelines.

There are a number of major pipeline projects that we expect to move towards Final Investment Decision (FID) in the Middle East once oil demand returns to pre-pandemic levels. There will be new pipeline opportunities generated from ADNOC's Hail & Ghasha Development (HGD) projects, and we expect the long-awaited Iraq-Jordan Export Pipeline project, and the Iraqi Common Seawater Supply project to finally move to FID.

Angus Bowie (AB): The low oil price and COVID-19 has naturally impacted on the oil and gas sector internationally, leading to some project postponements, but, in the Middle East, STATS Group sees a lot of potential and we are engaged in a number of live pipeline worksopes.

We are working on major pipeline rerouting projects in Saudi Arabia and maintenance projects in UAE, Oman and Qatar. STATS is in the fortunate position of growing our market share in pipeline isolation, particularly intervention projects, which is more than offsetting the reduction in the overall market for our services.



The STATS Group hot tapping machine in action in the Middle East.

Image Credit: STATS Group

How are you looking to develop your business in the region?

NC: We are looking to broaden our range of capabilities in the Middle East to include

the downstream and renewables market sectors where we see continued growth in capital investment.

The integrity of existing assets is very important to our clients in the region, and the ability to both predict potential failures and optimise maintenance activities to reduce operational expenditure (OPEX) costs is becoming critical for asset owners given the challenging market conditions.

We see the launch of our new digital integrity platform, THEIA, as an important addition to our integrity toolkit for the market. Embracing the future of digital to benefit our clients is part of our commitment to being thought leaders in the integrity space.

“ There are a number of major pipeline projects we expect to move towards FID once oil demand returns to pre-pandemic levels.”

AB: STATS' current strategy is to maintain our technical supremacy in the pipeline and process pipe isolation sector. This does require maintaining a commitment to R&D and product development. However the current market conditions also require a focus on cost control.

Even with superior technology, we must maintain a commercially competitive position in the marketplace. Although most of the development is on improving our suite of technologies, we are also looking at entering new arenas with new tools. As the in-country value (ICV) is becoming more prevalent and a differentiator for our clients, we are opening new business units in each country, with Oman being the latest to open.

To what extent is the COVID-19 pandemic affecting your operations?

NC: As a business, we have had to adapt to the significant challenges of the pandemic and, as with all businesses, our first priority is the safety and wellbeing of our employees.

We have aligned to the government guidelines in the countries where we operate to ensure we take all precautions necessary to safeguard the wellbeing of our employees. We have been able to make use of our state-of-the-art IT cloud platform to enable remote working from home for our employees which has allowed them to stay connected, remain productive and committed to delivering on our client commitments.

In our Abu Dhabi office (our regional headquarters) we have maintained 30 per cent of our workforce in the office (working rotationally) and 70 per cent working from home as per UAE Government guidelines.

Our project management consultancy (PMC) site operations across the UAE, Kuwait and Saudi Arabia have continued to function normally and, again, we have adhered to both the Government and client guidelines in order to ensure the safety of our valued employees.

AB: The main impact is our inability to move people and equipment across borders as projects require. This has resulted in splitting our site technicians into different geographic regions, but we have countered any resultant limitations with extra support from our operational teams in Saudi Arabia and Oman, as well as our main workshops in UAE and Qatar.

Are there any technology trends or new developments in pipelines you would highlight?

NC: Digital transformation will be the linchpin for future development for pipeline owners. With technology advancements, more and more data is being generated for operators to interpret. At Penspen, in anticipation of this increase in data, we have developed THEIA to help our clients to handle that data, get value from it and support with making key decisions that will save them time, money and resource. It



Attracting and retaining talent is a challenge for engineering consultants in the Middle East oil and gas market.

is a complete digital integrity department offered as software as a service and complements the expertise of Penspen in this arena.

AB: The Middle East pipeline industry is now becoming far more safety conscious, with many operators throughout the region upgrading their isolation temporary philosophy specifications to demand Double Block and Bleed equivalent isolation. Many of the legacy technologies are no longer accepted. This is good news for STATS, who have been at the forefront of delivering high-end dual barrier isolations in all our tooling.

“ The Middle East pipeline industry is becoming far more safety conscious.”

Are there any market conditions or requirements that are affecting demand for your products or services?

NC: During the last low oil price market challenge in 2014 we undertook a detailed review of our engineering services delivery model and developed processes, workflows and automation tools to enable us to work more efficiently, increase productivity and flex our delivery capacity to enable us to remain competitive under commercially challenging conditions. This has enabled us to adapt to the challenges that the COVID-19 pandemic has brought, and continue to broaden our engineering capabilities and deliver more successful projects.

AB: The movement of the local oil and gas industry to safer isolation procedures

significantly increases the demand for our patented equipment and services. We are however optimising the utilisation of this equipment by “dressing” our tool range to cover a wider range of pipes, both for cost control and our ability to meet the demand.

What are the main challenges you face in executing pipeline projects in the region?

NC: One of the main challenges engineering consultants are facing today in the Middle East oil and gas market is attracting and retaining talent in their organisations. The ageing workforce in the oil and gas industry, coupled with a lack of new engineers wanting to enter the sector, will lead to competition for scarce talent resources and impact productivity and quality. Technology and automation will have an increasingly important role to play in overcoming the resource gaps, and therefore, we are investing in digital projects such as THEIA.

AB: The biggest challenge in the region today is the travel restrictions and quarantine. Whereas before we could make a day trip to meet clients and visit sites, now it could be a month – 14 days quarantine in and again on the return. This is not viable, so we are reliant on local teams and video conferencing. Where we need to import technicians to deliver larger jobs, the 14-day quarantine is a real concern. ■

Penspen provides a wide range of services to the energy industry, including engineering, project management, asset management, asset integrity, training services, software and tools. It has been involved in major pipeline projects around the world.

STATS Group are market leaders in the supply of pressurised pipeline isolation, hot tapping and plugging services to the global oil, gas and petrochemical industries.

Digital transformation in the pipeline industry

A Virtual Pipeline Summit held by Germany's EITEP Institute on 30 June provided a forum to discuss the potential of digitalisation in the pipeline industry. Louise Waters reports.

AMID THE GLOBAL pandemic, pipeline operators in particular must adapt their processes, procedures and staff to more extensive digitalisation in order to meet supply and safety responsibilities. Pipeline operators need to shift staff to crisis management tasks, which leaves a large gap in the capacity to perform business-as-usual operations. The ability of pipeline operators to leverage process automation, machine learning and artificial intelligence capabilities has become essential. In addition, pipeline companies around the world are more vulnerable than ever to cyberattacks as a result of the pandemic. As attackers try to take advantage of the situation, the ability of all companies to defend themselves against this threat has become critical.

These aspects were covered during the event in several live presentations from DNV GL, ILF Consulting Engineers, BIL, Hifi Engineering, Baker Hughes, ROSEN and Vallources, and a live panel discussion with participants from Shell UK, Energinet Denmark, BIL and Baker Hughes.

In a keynote presentation on 'The role of digitalisation in future-proofing the pipeline industry', Rob van de Spek, head of risk management advisory and digital lead, Continental Europe, Middle East and India, DNV-GL – Oil & Gas, discussed how digitalisation is enabling safer and more efficient pipeline operations, stressing the importance of data quality and availability for improved decision-making.

"Pipeline operators have to balance conflicting drivers ranging from opportunities and costs to performance and risk," he said. Industry 4.0 enablers ranging from AI, IoT, cybersecurity and cloud computing to augmented reality and big data analytics, can help operators to improve performance and reduce TCO while staying in control of risks. A global oil and gas survey carried out by DNV GL, which included 100 global pipeline operators, highlighted digitalisation priorities as data platforms and managing data across



Image Credit : Adobe Stock

Digitalisation can bring huge benefits for pipeline integrity.

different operations; cloud-based applications; and, increasingly, AI.

"If you're looking at the topics which are important, it's about data quality and availability of data within those platforms to ensure that we can take decisions based on quality data and the right data," he said.

However, while there is a consensus

amongst pipeline operators with regard to the importance of digitalisation, technology and cultural barriers are preventing the industry from accelerating as fast as it would like. In particular there is a strong demand for AI and data science specialists with domain expertise, he added.

"We see this as one of the critical factors in reaping the benefits of this kind of technology," stressed van de Spek. "While we have ambitions and priorities, we also need to have the capabilities to make it happen."

He highlighted the importance of breaking down information silos; creating platforms to allow the management of information and data related to the pipeline ecosystem and operations; spanning operational boundaries with those platforms; and advancing pipeline

“ While we have ambitions and priorities, we also need to have the capabilities to make it happen.”

analytics to enable decisions to be made based on the available data.

By using machine learning, AI and algorithms, valuable information hidden in large volumes in silos of data and documents can be extracted to enable companies to take more informed decisions, eg on inspection regimes, maintenance programmes and strategies, using embedded algorithms that can take real-time decisions.

Van de Spek presented two examples where DNV GL has applied this technology, the first relating to Corrosion Under Insulation (CUI), one of the major issues plaguing the oil and gas industry.

“We have developed with a number of companies CUI Manager, a dashboard based on data science and machine learning techniques which allows you to identify the risks and threats with regard to CUI. We work with certain stakeholders to ensure the data availability for the algorithms is in place to make decisions based on this kind of assessment.”

In another example, DNV GL is looking to use machine learning and AI to predict flow meter errors to reduce calibration costs.

Critical factors

To maximise the potential of these enablers, certain critical factors need to be addressed, said de Spek. First, there is a need to be realistic about the business value and ROI and the effort required to ensure the algorithms perform as they should.

The availability, volume and quality of training data is critical; a lack of this data will affect the quality of the algorithms and the accuracy of outcomes.

This is related to the lack of integration in existing systems and processes. “Those algorithms and those techniques cannot provide the maximum benefit if we are not able to extract the data from the different existing systems and processes. This requires we integrate the different legacy systems from the different parts of the organisation and bring that data within one platform in which we can use these types of algorithms. We must focus on getting the data into the platform, cleaning it up and ensuring we can use it as training within those algorithms.”

Another important factor is assurance of the quality of the algorithms.

“If we take decisions which will have an impact we have to ensure the algorithms are performing as they should. So assurance of algorithms for AI and machine learning is a growing domain in which we see a strong need. The same holds with regard to the explainability of algorithms, because if they can't explain why they have come to that outcome, we see a lack of trust,” he continued.

“Last, we see a strong need with regard to data scientists and AI specialists with domain expertise. We have to develop these

capabilities within the pipeline sector and more broadly. It's a combination of being able to apply these techniques in integrity analytics or other domains, with a strong domain expertise of people who understand our operations and assets.

“To use the maximum potential of data science, AI and machine learning, we have to ensure we not only build Industry 4.0 but also trust 4.0, in terms of sensor quality, data quality, algorithm assurance, the competencies of staff and the business case, but also integration into a pipeline ecosystem which ensures we are breaking down information silos and spanning operational boundaries,” van de Spek concluded. “These are the major critical factors for using these technologies within the pipeline sector, to reduce the total cost of operations.”

The following panel session discussed further examples of how digitalisation has enhanced operations, as well as technical and human capital issues such as aligning people and technology, and the impact of the COVID-19 pandemic.

Andy Studman, pipeline and subsea team lead for Shell UK, said that Shell has obtained a lot of value from building a digital twin of its offshore gas pipeline network, which brings gas from the North Sea for onward distribution to its customers. This has enabled schedulers to more easily work out the implications and explore the various scenarios in the case of a process upset or facility coming offline, for example.

“The IT skills in the OT industrial control system industry are not yet fully developed.”

“By building the digital twin with the associated modelling the scheduler can do that in close to real time, giving us value in managing changes in product streams, managing our shipping schedules, making sure opportunities to maximise revenue are not missed, and mitigating the downside of missing production targets. It's made a step change difference, delivering thousands of tons more product that we would have otherwise been able to do.”

Studman said that Shell had started moving into the digital space around 12 years ago, combining data into one platform, which had resulted in improved performance and efficiency. A good example has been in the integrity space, where bringing all the data together, from the acquisition data and inline inspection data to the risers inspection, seabed inspection and cathodic protection data, and making it available on mobile platforms for corrosion engineers and integrity

engineers, has been a “step change forward” for corrosion and integrity assessments.

“It has improved decision making, helped engineers to make recommendations for improving and maintaining integrity faster and in a more efficient way, reduced waste and reduced errors,” he said.

Security considerations

Pierluigi Meloni, engineering manager for Industrial Control Systems, Baker Hughes, discussed some of the security issues relating to remote access to control systems such as pipeline systems.

“During this crisis many infrastructure providers, including pipeline providers, have moved to remote working arrangements in line with social distancing guidelines, which in some cases have resulted in implementing remote access to control systems and infrastructures originally designed to be operated locally on premise, so potentially lacking security features,” he said. He highlighted a recent case in the USA where a network gas compression facility had experienced complete loss of view and operation because of ransomware spreading over the HMIs in the plant, resulting in a two-day shutdown and therefore loss of production and revenue. “Risk comes from the fact that the technologies are available to everyone but the IT skills in the OT industrial control system industry are not yet fully developed,” he said.

He recommended applying good IT common practices such as avoiding connecting directly from one network to another, using a jump host or jump servers, applying multifactor authentication, configuring everything to provide minimum access for the task that has to be done, and disabling copy and paste functionality from remote desktop. “These are simple things that can save days of headaches.”

Hannah Davidsen Jensen, senior digital business developer at Energinet, addressed some of the human and HR issues related to the readiness for more advanced digital processes, noting that many great digital initiatives had made disappointing progress as often the “classical operational backbone is not as robust as the organisation thinks.”

“A lot of companies around the world, including in the pipeline industry, want to move to digital platforms, but business processes are not completely aligned with technology,” she remarked. “There needs to be a business case, collaboration, transparency, but it requires everyone to work in new ways, and you can't change that from one day to the other.” She advised working systematically to improve processes while engaging staff throughout the change process. More work needs to be done to strike the right balance between autonomy and alignment, allowing freedom for innovation, she suggested. ■

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Egypt's energy hub hopes receive a knock

While positive momentum in Egypt's oil and gas sector has been knocked back by a mix of falling prices and demand in the wake of COVID-19, there is every reason for optimism long term, says Martin Clark.

RISING CONFIDENCE IN Egypt's gas industry in recent years, fuelled by a string of major offshore discoveries offshore, has taken a hit in the wake of the COVID-19 crisis. The country was positioning itself to be the energy hub for the Eastern Mediterranean region, a key import and export centre for Europe, North Africa and the Middle East.

While that dream still lives on, it has not been the easiest of starts in 2020, not least because of the global pandemic which has cut energy demand and oil prices worldwide. There is also reduced production from Egypt's flagship gas find of recent times, Eni's mighty Zohr field, during the early part of this year.

Local production also now faces competition with the arrival of gas from neighbouring Israel, which commenced back in January.

Dolphinus Holdings, a private firm in Egypt, is purchasing 85 billion cubic metres (bcm) of gas, worth an estimated US\$19.5bn, from Israel's Leviathan and Tamar offshore fields over a 15-year period.

There are other choke points too. A deal to unlock export capacity at Damietta, a former LNG plant on the coast that has been dormant for years, also looks in jeopardy after a deal between Spanish gas firm Naturgy Energy Group, Eni, and the Egyptian government to resolve a series of disputes fell through in April. The 7.56 bcm capacity plant facility has been idle since the end of 2012, when a popular uprising hit gas supplies to Egypt. Exports from the nation's other LNG site at Idku were also temporarily halted because of the fall in demand and prices arising from the pandemic.

“With plenty of oil and gas in the ground, Egypt remains a key energy hub for the future.”



Image Credit : Adobe Stock

Interest in Egypt's upstream sector remains strong, despite the current market volatility.

It is fair to say it has been a tough beginning to the year for all, but on the ground, there is still every reason to be optimistic long-term about Egypt's upstream ambitions.

Shell has seen a positive response to its plans to divest its onshore oil and gas assets, which have drawn interest from American, Egyptian, Asian and Middle East bidders, according to insiders cited by Reuters. This appetite suggests that interest in Egypt's upstream sector remains strong overall, despite the current market volatility.

One compelling reason is because new discoveries continue to be made, and the country welcomes smaller explorers alongside the majors.

In June, Egypt's Ministry of Petroleum announced a small oil discovery in the shallow waters of the Geisum concession, in the southern part of the Gulf of Suez, held by PetroGulf Egypt, Pico, and Kufpec Egypt.

UK-listed SDX Energy also reported that its

Sobhi discovery, in South Disouq, is now expected to maintain plateau production through to mid-2023, with the potential for a further extension to mid-2026. It reiterated its investment plans on 23 June with up to 10 wells planned in the West Gharib concession between 2021 and 2023, with the potential to increase gross production from around 3,200-3,300 bpd to around 4,000 bpd by 2022.

Another UK-listed explorer, United Oil & Gas, reported in late June much stronger production from its Abu Sennan concession, which yielded 13,900 barrels oil equivalent per day (boepd) during the first half of June – 69 per cent up from average April output.

“We remain highly confident that the licence has more to offer,” said Jonathan Leather, United's chief operating officer.

The same can be said for Egypt overall, even in the face of such testing market conditions – with plenty of oil and gas in the ground, this remains a key energy hub for the future. ■

The growing importance of Egypt's downstream sector

Egypt is increasingly focused on petrochemicals development, and despite feedstock insecurities and need for infrastructure expansion, it is set to become a significant exporter of products in the next decade, says Ekaterina Kalinenko, project director, Euro Petroleum Consultants.

EGYPT'S DOWNSTREAM INDUSTRY is mainly state-owned, which puts a strong emphasis on government support measures and policies. Unfortunately, as in most countries with a similar setup, refining has seen less investment compared to upstream E&P. This has secured the country with a stable supply of oil and gas and opportunities to export in the region, but at the same time resulted in lost opportunities to produce higher-margin products.

The downstream industry mostly relies on partner(s) investments. Like neighbouring countries in the Middle East and Asia in their period of rapid growth, Egypt made it a key strategy to attract investors from all parts of the world, through JV schemes. Both 2019 and 2020 have seen an unprecedented number of MoUs signed:

- BP signed an agreement with the Ministry of Petroleum and Mineral Resources to provide petroleum middle management training and develop offshore fields, and is discussing with the country's President and Bechtel a petrochemical complex planned for the Suez Canal Economic Zone;
- Shell signed an agreement with the Ministry for developing their personnel;
- Egyptian Petrochemicals Holding Company (EChem) and Bechtel signed an MoU for the refinery complex project;
- Egypt Petroleum Company (EGPC) and Schlumberger will jointly build, operate and transfer Egypt's Upstream Gateway (EUG);
- EBRD will invest US\$6mn to become a shareholder in Infinity Energy S.A.E., one of Egypt's leading private energy companies, along with JV agreement between Infinity Energy and Abu Dhabi Future Energy Company PJSC (Masdar) to develop renewable projects.

In addition, Egypt is present and active in other countries, developing cooperation with Somalia, Equatorial Guinea and Chile.

Without doubt, the petrochemical sector is booming in Egypt and is leading the region's development; according to ICIS, the announced capacity additions are more than 10 mtpa by 2030, with CAPEX of close to US\$12bn in this period.

Potential remains high – Egypt is in the top eight of major PET importers from Europe, increasing its volume 50-fold – from 1 to 57 thousand tpa in a two-year period (2017-2019). It is predicted that pressure on prices will come from PET capacity increases coming onstream in Asia.

At the same time, Europe is the second largest exporter of PTA to Egypt – while there was no trade in 2017, last year saw a large amount of PTA imported – more than 67 thousand tonnes – again, a significant change that means an opportunity for future import substitution.

ExxonMobil stated that in 2019, Egypt, along with Nigeria, South Africa, and Morocco, bought large volumes of base oils, notably Group I.

“The petrochemical sector is booming in Egypt.”

The petrochemical Industry is looking to expand significantly – with 11 new projects involving total investments estimated at US\$19bn. The new strategy adopted by Egypt will be developed and implemented through to the year 2035. The final version of the plan is currently being reviewed in preparation for its approval.

Future challenges and development

When faced with a downturn and / or increased competition, companies look to review capital-intensive sectors and give



Ekaterina Kalinenko, project director, Euro Petroleum Consultants.

Image Credit : Euro Petroleum Consultants

priority to rational operational cost reduction and risk optimisation to sustain margins and save market position. Investment strategies are reviewed and, in some cases, revised.

Asset management is brought to the forefront of priorities, grounded by the structure and degree of depreciation of production facilities in the region. It addresses many issues, including supply chain and maintenance efficiency and performance management.

Human resources have long been a priority for industry development in the region; investments have been made in education and training and there has been a conscious effort to find the right balance between local and foreign specialists.

The next step will likely be focused on diversification – both geographic and in terms of products – and expanding to new emerging markets, preferably outside the region.

Other areas for industry efficiency increase relate to infrastructure development: pipeline and port construction, more gas-fired electricity generation units, unconventional gas projects, local supplier development and independent power producers, methanol, urea and fertilisers production for local use.

The willingness and drive to grow and further develop the Egyptian downstream industry can be seen in this context. In 2020,

the oil processing industry will decrease overall budgets, but is expected to still invest in major projects that are critical for future performance. The Middle East is focusing on boosting its higher-value products portfolio – low-sulfur and transportation fuels and petrochemicals – while

also increasing its gas processing capacity and improving its logistics infrastructure. ■

Euro Petroleum Consultants (EPC) is a technical oil and gas consultancy with offices in Dubai, London, Moscow, Sofia and Kuala

Lumpur, as well as organisers of leading conferences worldwide. EPC has recently launched the 'EPC Expert Lab' – a series of online (virtual) training courses for the oil and gas sector. For further details please visit europetro.com/training

COMPANY NAME	PARTNERS	INVESTMENT	PROJECT GOALS	CAPACITY
Assiut National Oil Processing Company (ANOPC)	Ministry of Petroleum & Mineral Resources, ENPPI, Techint Engineering	US\$2.5bn	Refining heavy vacuum oil residue into higher value petroleum products, mainly diesel with European specifications, produce butane and naphtha for high-octane gasoline production	2.8 mtpa
ECHEM	Bechtel, Ministry of Petroleum & Mineral Resources, Central Bank of Egypt, American Embassy	EPC: US\$6.7bn	Grassroots integrated refining and petrochemicals complex producing transportation fuels and petrochemical products for domestic market and export	2.7- 3.2 mtpa
Egyptian Refining Company (ERC)	Qatar Petroleum	US\$4.4bn grassroots	Refining residue upgrade project: to process mainly atmospheric residue feed from the adjacent Cairo Oil Refinery Co. to produce Euro 5-quality refined products, such as diesel and jet fuel, for Cairo and surrounding areas	4.7 mpta
ETHYDCO	Petrojet, Saipem	US\$180mn	Production of polybutadiene at Ethydco company, for domestic market and export	0.020 mtpa butadiene
Methanex	EMC, Sun Misr, Wadi El-Nile, Zavkom,, ENPPI	US\$117mn	Methanol and derivative project	0.110 mtpa urea-formaldehyde products, naphthalene and sulfonal-formaldehyde
Methanex		US\$400mn	Polyacetal project	50,000 tpa
MIDOR / Alexandria	UOP, Woodmac, TechnipFMC	US\$2.3bn	Middle East Refinery expansion: increase total production from 100,000 bpd to 160,000 bpd of refined product, increase middle distillate yield and meet the domestic requirement for Euro V grade fuel	~ 6.9 mpta
Ministry of Petroleum & Mineral Resources		US\$8.5bn	Refining and petrochemicals complex: studying the construction of a new refinery and petrochemicals complex in the Al-Alamein region	2.5 mtpa
MOPCO		US\$260mn	Melamine project	60,000 tpa urea
SIDPEC	W.R. Grace	US\$1.6bn (phase 1)	Production of propylene and derivatives for local market and export, utilising propane from GASCO in Alexandria	0.45 mtpa
SOPC, El-Nasr Petroleum Refinery	Petrojet	US\$445mn	Developing three salt separators with an integrated work system for refining crude oil with an integrated plan to develop the refinery	816 tpd
SOPC, El-Nasr Petroleum Refinery		US\$5mn	Formaldehyde and its derivatives production project (SMD): to maximise the added value of methanol produced by Emethanex, urea produced by MOPCO and caustic soda produced by EPC	0.052 mtpa formaldehyde 0.026 mtpa naphthalene

Transforming the business

Michael Dunn, senior vice president, Middle East & Africa and Asia Pacific, Resources at SNC-Lavalin speaks to *Oil Review Middle East* about the company's strategic change of direction and its Middle East activities.



Digital technology is playing an increasing role in project engineering and execution.

Image Credit : Adobe Stock

SNC-LAVALIN IS GOING through a major transformation, following the Group announcement in July 2019 of a new strategic direction, which includes exiting the lump-sum turnkey (LSTK) contracting model to focus on applying its expertise through the high-performing contracting models and growth areas of its business.

"This means focusing on three areas – engineering consultancy services, i.e. traditional front end engineering; project delivery services, encompassing the traditional PMC business, construction management services business and EPC small-end business, an area in which SNC-Lavalin has traditionally been very successful; and asset management services – operations and maintenance services, turnarounds and shutdowns, and asset integrity," Michael Dunn explains.

“The focus now is to offer the full lifecycle across those three areas.”

"The focus now is to offer the full lifecycle across those three areas, to de-risk and grow our business in a manner that is profitable, sustainable and predictable."

"I see great potential at SNC-Lavalin," says Dunn, who joined the company in May 2019 as its managing director, Resources, Arabian Gulf Countries, and was appointed to his current role in October. "Under Resources business, we have more than 13,000 employees globally and more than 9,000 in the Middle East and Africa region. So the Resources business in the region is a big part of the organisation, with oil and gas playing a major role."

"Mining and metallurgy is also part of it, and we see market opportunities in this region. We have worked with our customers to offer a different contracting model for these opportunities."

Major markets

Saudi Arabia is a key market for the company. "We've been in the Middle East region for over 50 years and see the Kingdom as a major investment opportunity," says Dunn. "Not just in terms of the projects, but also in terms of building local capabilities and supporting the

country's nationalisation programme, working with SMEs, which is a key part of our regional strategy."

Turning to the UAE, Dunn highlights the engineering services contract which it was recently awarded by ADNOC. "In the UAE, we've built a successful relationship with ADNOC Group that has resulted in a number of strategic wins. This includes a general engineering, project management and technical support services contract from Al Yasat Petroleum, a joint venture between Abu Dhabi National Oil Company (ADNOC) and China National Petroleum Corporation (CNPC)," he said, mentioning that it involves providing SNC-Lavalin's digital expertise to help Al Yasat in its ambitious digital transformation plan using the latest technologies. "We're really excited about this opportunity," he adds.

"We've got other framework agreements with ADNOC, and we're hoping to be successful in other opportunities. I see the digital transformation agenda of ADNOC as a major opportunity for our business future mindset and growth in the region."

Other regional markets such as Oman and Kuwait are also providing good opportunities for the company. "We have a major contract with Petroleum Development Oman (PDO) that supports the Sultanate's nationalisation programme by training 250 Omanis by 2021 in commissioning and re-commissioning services, which are going to be in demand. This training programme brings great value to Oman."

PDO is looking to invest significantly in new projects in-country, and the company is keen for part of the action, he adds.

Similarly, the company is providing training services in commissioning in Kuwait as part of its commissioning management support services agreement with Kuwait Integrated Petroleum Industries Company (KIPIC). "So that's a big part of our business."

Explaining the company's strong focus on supporting nationalisation programmes, Dunn says, "As part of our continuous commitment to support socio-economic growth in countries where we operate, sharing our knowledge and expertise to build local capabilities is pivotal to ensure sustainable growth of our business for the future. So we're very pleased to be associated with this type of work."

The increasing focus on offshore exploration and development in the region offers potential as SNC-Lavalin has "huge expertise" in this area, Dunn comments. "It's very clear Oman is looking at offshore exploration, and the UAE and Saudi are investing offshore as well as onshore. But it's a competitive market."

“ The impact of digital on the engineering space has been transformative.”

Growth of digital

Turning to technology developments, Dunn comments that digitalisation is "massive", involving many facets. Under the contract with Al Yasat Petroleum, for example, a joint venture between ADNOC and CNPC, SNC-Lavalin will provide its digital expertise to assist Al Yasat in implementing an ambitious digital transformation programme using the latest technologies.

"We've highlighted 12 areas where we can bring expertise in the digital innovation space," says Dunn. "We're working with our customers to understand what their digital requirements are, what their digital vision is for the short and long term, and how we can add value through our engineering expertise combined with digital solutions. It's a question of aligning what the company can offer with what the customer needs. So we're working with our customers to understand where we've got an offering that they would like us to pursue. That's where we'll invest."

"Five years ago, you would have put innovation and new technology as an add-on to a bid, now it's upfront and central," Dunn adds. "If you don't offer it, you don't make it on to the tender list."

"That's the major swing that's happened in our industry, and it's



Image Credit : SNC-Lavalin

Michael Dunn, senior VP, Middle East & Africa and Asia Pacific, Resources, SNC-Lavalin.

central now to everything we do, not an added extra," he stresses.

The impact of digital on the engineering space has been transformative, he says. "In Abu Dhabi, we have a centralised Innovation Centre in our office where we bring customers to see what engineering looks like in a digital world. It's moved away from traditional engineering drawings and mark-ups to full automation and visualisation. Artificial intelligence will play a major role here as well. With construction sequencing we're no longer looking at a chart, but visualising how to build a project before we've even mobilised the site. How do you manage your manning, when do you bring your cranes in, how do you interface your contractors – that's all happening now in a digital world."

"That's the big shift, and it's not just in the engineering, but also in the execution phase, where you can reduce the construction schedule by six months to two years on a project. If anything we'll see more benefits coming from the execution delivery contractors than from the engineering contractors."

Concluding, Dunn returns to the theme of SNC-Lavalin's transformation, which is paying off. "We see that in the financial results but also in the announcements on the structure, focusing more on where we can add value. That's the big shift we've seen. What is really important is that we can provide an offering right across the asset lifecycle, the consultant phase, middle phase and asset integrity phase. With the Atkins and Kentz acquisitions, and the DNA SNC-Lavalin has, we bring a well-rounded offering to the market, and that's what we're going to focus on." ■

Corrosion cracking in pipelines

AS-Schneider discusses chloride-induced stress corrosion cracking in pipelines.

CHLORIDE-INDUCED STRESS CORROSION Cracking (CISCC) is one of the most common reasons for steel deterioration. It attacks austenitic stainless steel components in the petrochemical industry.

Austenitic stainless steels are iron-based alloys that contain 19 per cent chromium and nine per cent nickel. These steels have high corrosion resistance in most aqueous and atmospheric settings. This resistance is due to passivation by a thin layer of chromium oxide.

Humid and wet environments containing chloride ions can cause pitting. It also causes crevice corrosion of austenitic stainless steel components.

Many companies use 300-series stainless steel. It offers excellent resistance to general corrosion but is susceptible to CISCC.

Stainless steel can donate free chlorine ions to an aqueous solution. Thus, it has the potential for causing failure in stainless steel.

Chloride-induced corrosion is not like the bulk corrosion seen in rust. It does not spread out in an even layer like rust. Instead, pits and crevices form and grow perpendicular to the surface under attack. The corrosion is often severe in some areas, while others may appear untouched. Thicker pipes and tubes do not always last longer than thin ones. They are as susceptible to failure due to chloride-induced corrosion.

Chloride stress corrosion cracking is also known as SCC. A pipeline's defence against it depends on the family of stainless steel from which it comes. The austenitic family is more vulnerable than any other. Its resistance relates to the amount of nickel contained in the steel. Most vulnerable austenitic categories have nickel contents ranging from 8 to 10 wt per cent. Austenitic classes with high molybdenum and nickel contents such as 904L and alloy 20 have better chloride SCC resistance. Ferritic stainless steels are very resistant to chloride SCC. These steels include Types 430 and 444.

Pitting is what causes the failure of stainless steel because of perforation. It engenders SCC in pipelines and other

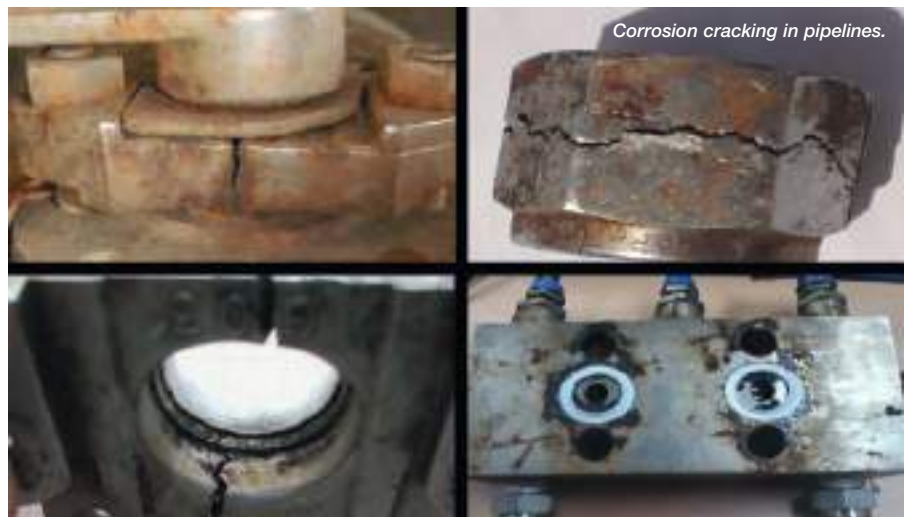


Image Credit: Armaturefabrik Franz Schneider GmbH + Co. KG

applications. The lifecycle of the stainless alloy decreases. We assume that corrosion happens in several pits on both sides of the rivet deeps. We also believe that it causes many fatigue cracks. A system failure can occur because of the linkage between any two neighbouring cracks. The pits continue to grow until the pipeline ends up with fatigue crack nucleation. It is here that mechanical effects such as stress intensity factor come into play.

“ The corrosion is often severe in some areas, while others may appear untouched.”

CISCC requires the presence of:

- Chloride. Saline environments cause CISCC in 300 series stainless steel
- High temperature. Surface temperature >40-60°C is enough to develop CISCC in 300 series stainless steel
- Stress – applied or residual.

Dye penetrant testing is one of the tools used

to detect SCC. It is the most straightforward and effective non-destructive examination technique. Eddy Current Testing is also useful. This type of testing uses purpose-designed probes calibrated on known defects. Penetrant testing does not show the crack size. Technicians may see it if they use Eddy Current testing, but this method is not in extensive use. Technicians can also apply ultrasonic flaw detection. They can use it as an automated or manual NDE technique for detecting CISCC.

One of the solutions to this challenge is the selection of the correct material. Technicians also need to select the right sealing elements. Some of the materials that fight CISCC are alloy C-276 and 6Mo. It is common practice to use alloys for wetted/pressure-retaining parts. Technicians also use it for small components in 300 series stainless steel. This practice is not advisable. The tiny components lodge between other parts and can corrode and crack. Painting the system with aluminum is also recommended to fight CISCC.

Companies can also reduce the risk of SCC through equipment and plant design. It is especially important to avoid any mechanical tensile stress concentration. This type of stress applies to notches and sharp edges. ■

Optimising flow meter management with Big Data

Dr Yanfeng Liang, mathematician at TÜV SÜD National Engineering Laboratory, discusses how the fault detection process in flow meters can be optimised through Big Data.

ULTRASONIC METERS (USMS) and Coriolis flow meters are commonly used for custody transfer in the oil and gas industry due to their unique properties and the advantages that they bring. For example, a clamp-on USM's non-invasive features reduce the need for breaking into pipelines which may contain hydrocarbons at high pressure. In custody transfer, payments are made based on the amount of fluid that has been delivered / received, and therefore a small error in meter readings could result in financial exposure to one or both parties in the exchange. Consequently, to ensure an accurate reading, regular maintenance of flow meters is essential.

Currently, flow meters are calibrated and maintained at regular time intervals (time-based monitoring) regardless of how frequently the flow meters are used and the process conditions which they are operated in. In oil extraction, flow meters need to operate in harsh environmental conditions such as offshore platforms or deserts. Such factors impact on the overall performance and life expectancy of these devices, and will undoubtedly vary for each end-user. Time and money are often wasted on unnecessary maintenance of flow meters which are in fact performing well with no calibration drift or physical damage, while perhaps neglecting those which require an earlier inspection due to operating in harsher environments. Therefore, time-based monitoring is not an efficient and reliable way for calibrating and maintaining flow meters.

Flow meters such as ultrasonic meters (USM) and Coriolis meters are capable of outputting a large amount of digital data which contains information on the condition and performance of the meters. By making better use of this diagnostic data, a more efficient and reliable method can be adopted to calibrate and to maintain flow meters: condition-based monitoring. Due to the vast amount of information and the complicated relationship between variables, without the

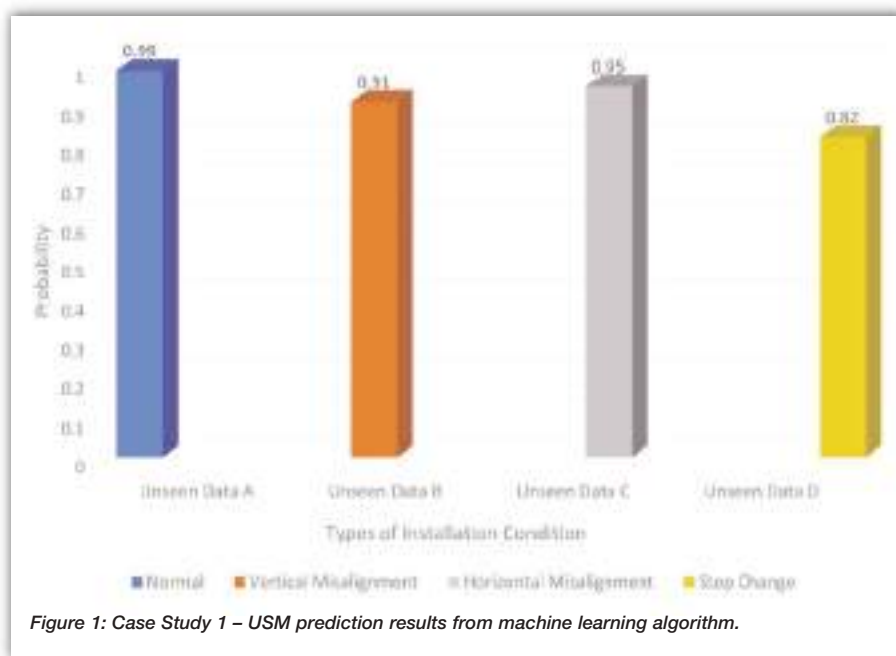


Figure 1: Case Study 1 – USM prediction results from machine learning algorithm.

proper use of advanced statistical techniques and machine learning models, it is time-consuming and difficult to understand the correlations between process variables under different conditions.

The additional diagnostic information obtained through the use of data-driven models can be demonstrated using case studies based on data gathered at TÜV SÜD National Engineering Laboratory.

Case Study 1: Predicting differing types of error within flow meter data based on diagnostic variables

In order to find the cause of a drift in flow meter performance, extensive labour time is usually required, reducing productivity and increasing costs. In addition, if end-users are unable to determine the cause of these drifts, the errors cannot be addressed at all. This impacts the reliability of flow meter data and in transactions such as custody transfer,

“Time-based monitoring is not an efficient and reliable way for calibrating and maintaining flow meters.”

results in errors in the measurement of the amount of oil being transferred.

From experimental data, it was observed that different operating conditions and meter error states can result in the same drift patterns observed across the meter's digital diagnostic variables. This raises several questions for end-users: What is the root cause of the observed drift? What is the meaning of these drifts? Can the problem be rectified and if so how? Machine learning algorithms can be used to answer these questions.

Motivated by this, a case study was carried out, with a focus on using machine learning models, to identify the types of error responsible for causing the drifts in ultrasonic flow meters' diagnostic variables.

Historical data obtained for different forms of error states, such as vertical misalignment and horizontal misalignment, were used to train and build our machine learning model. The model "learnt" the trends and correlations within the data when a certain error was present and prediction results, with associated probability, were then obtained by feeding a set of completely unseen data into the machine learning model. The unseen data was used to mimic a situation where end-users did not know the cause of data drift. The results obtained were promising, with the model successfully predicting the correct cause of drifts with high accuracy.

The results are given in Figure 1. For example, in the scenario presented by unseen data C, the data drifts which occurred within the flow meter diagnostic variables were due to the fact that the device had been installed incorrectly (specifically horizontal misalignment). The model was able to determine this cause with a high probability of 0.95.

This has the potential to improve the end-users' decision-making process as well as their efficiency in diagnosing errors within their instruments with high certainty. This type of modelling can be applied to predicting the presence of an unwanted second phase within the fluid, for example, gas or even sand content.

Image credit: TÜV SÜD National Engineering Laboratory



Dr. Yanfeng Liang, mathematician, TÜV SÜD National Engineering Laboratory.

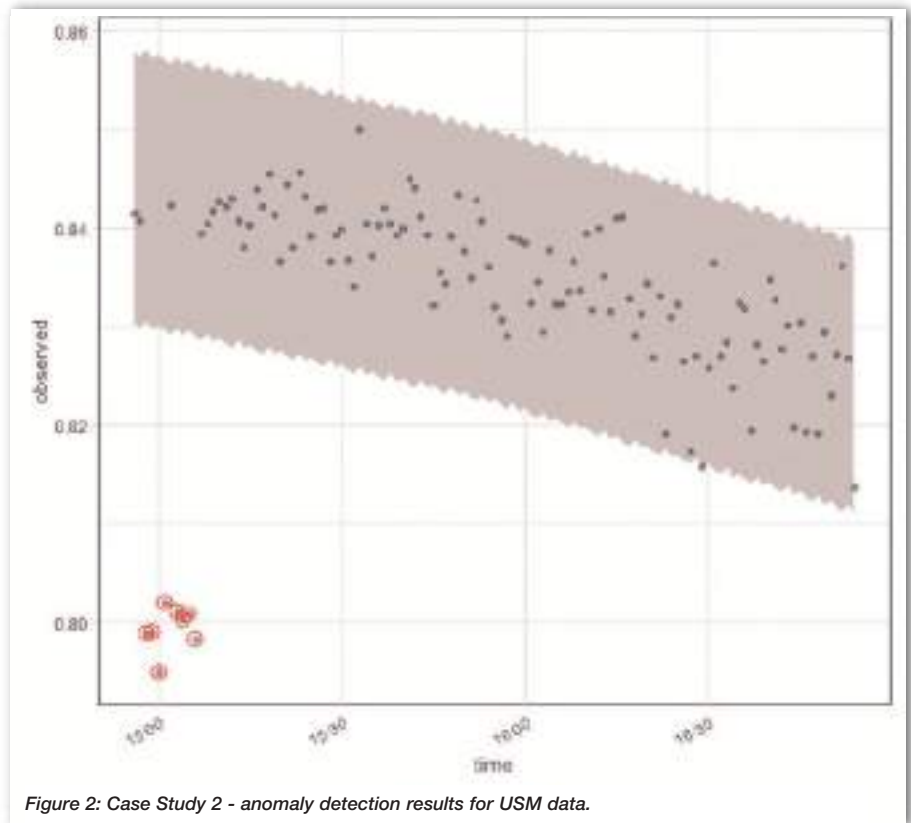


Figure 2: Case Study 2 - anomaly detection results for USM data.

Case Study 2: Anomaly detection model

An anomaly detection model can also be constructed, to examine data trends and therefore alert end-users to the presence of anomalies which could indicate potential problems. This type of model has been widely used in other industries, especially in the financial sector for fraud detection. A similar concept can be applied to flow measurement, where a model can be used to alert end-users to potential errors within their instruments and thus any errors can be rectified immediately.

A second case study was conducted where an anomaly detection model was created and tested using USM data gathered by TÜV SÜD National Engineering Laboratory. The visualisation result is shown in Figure 2, which clearly indicates the time periods at which the anomalies occurred. By using the results obtained from an anomaly detection model, end-users can diagnose potential faults within their flow meters and instruments. As a result, immediate rectification action can be taken to ensure high quality and reliable results.

Conclusion

To ensure that flow meters are operating within their specific 'optimal' conditions and to minimise uncertainty in meter readings, calibration and regular maintenance are required so that errors can be diagnosed and rectified at the earliest opportunity. In applications such as custody transfer, there is no room for mistakes in meter

“Advanced data-driven models can be used to extract valuable information from flow meters.”

readings as they can result in significant financial exposure. Advanced data-driven models can be used to extract valuable information from flow meters, alerting end-users to potential underlying problems such as the presence of an unwanted second-phase as well as installation errors, ensuring that the potential for measurement error is kept to a minimum. ■

Dr Yanfeng Liang is a mathematician specialised in mathematical and statistical modelling applied to real-world problems. TÜV SÜD National Engineering Laboratory www.tuv-sud.co.uk/nel is a world-class provider of technical consultancy, research, testing and programme management services. Part of the TÜV SÜD Group, TÜV SÜD National Engineering Laboratory is also a global centre of excellence for flow measurement and fluid flow systems and is the UK's National Measurement Institute for Flow Measurement. It has an impressive track record in the development, design and application of new technologies.

Image Credit: TÜV SÜD National Engineering Laboratory

The benefits of digital convergence

Digital convergence of power management and process automation can boost oil and gas profitability, say Chris Dartnell, president, Oil and Gas, Industrial Automation Business and Shebin Jalal, Global Solutions architect, Oil and Gas, Industrial Automation Business at Schneider Electric.

TODAY, DEVICES OF all kinds across the oil and gas industry are equipped with intelligent sensors that gather data. Since these devices are connected, they send the data forward to a repository such as the cloud, and the data is then correlated and analysed on servers. The rapid output of that analysis enables better, faster process decisions that help cut costs and drive efficiencies.

Consider the example of pump jacks in an oilfield. Traditionally, oil companies would regularly schedule crew visits (every six months or so) to the pump jacks to make sure they were running. This was an expensive process. Parts would often get replaced, whether or not they needed replacing. Certain pump jacks would be malfunctioning (and may have been malfunctioning for quite a long time). Others would begin to malfunction shortly after repair crews left. There was no way to monitor their behaviour.

New solutions now allow for these pump jacks to record data locally, so that operational history can be accessed remotely. Instead of waiting for a crew to come around, an AI engine allows these pumps to send a message to the crews that says "I think I'm going to fail in one week. My pump curve is off, and my on-board machine learning tells me a failure is imminent." This new approach reduces losses by limiting pump jack downtime and boosts the efficiency of the repair crews.

The constant pressure to reduce capex and opex is what drives both deployment of digitised solutions, such as pump control, and a fundamental rethinking of how core systems can work together. The ability to link and integrate systems has become more affordable and less time-consuming as a result of digitisation.

Another example of digitisation-driven rethinking surrounds the traditional separation between process automation and power management in oil, gas and petrochemical plants. For many years, the merging of these two engineering and operations silos was unthinkable or cost prohibitive. A lack of common communications, differing architectural standards and siloed operations departments presented some formidable obstacles.

Technology innovation and updates to standards (like the IEC61850 electrical standard) have radically altered this situation. Now, both process automation and power management can work together in a converged manner. Converged power and process systems drive profitability through a combination of improved operational efficiency, improved safety and improved asset reliability. In nondigitised systems, for example, motor control centres and low voltage systems that are linked to Distributed Control Systems (DCS) require many cables and a significant assortment of hardware in order to function properly. In the newly converged digitised systems, an element of "smart" low voltage emerges which enables a reduction of cables, faster commissioning, easier maintenance and an optimised footprint. Such systems are designed around a profit engine functional architecture that combines



Image Credit: Schneider Electric

process and low voltage electrical measurement and control. By closely linking electrical and automation systems, risks are reduced, costs are lowered and process and energy efficiency is improved.

Such integration saves oil and gas companies millions in engineering costs, operation costs, and support/maintenance costs. However, implementation of such converged systems is not easy. New tools are required. For example, multi-disciplinary software tools enable engineers to better perform the various mechanical, electrical and automation design tasks. Common templates of proven and validated functional modules simplify the engineering. Clear and well-defined interfaces ensure consistency and simplify data and model management.

Schneider Electric's EcoStruxure Process and Power, for example, is focused on facilitating and automating the complex decision flows in an oil and gas plant. EcoStruxure project methodology utilises a powerful digital engineering platform that extends and connects with Engineering, Procurement and Construction (EPC) platforms. Automation and electrical system engineering are coordinated, allowing changes in any part of the plant design to propagate through the system design. This powerful method, combined with the power of EcoStruxure solution, facilitates a natively-integrated automation and electrical system, simplifying construction, speeding up commissioning, and reducing capex, time to completion and project risks around onsite system integration. ■

Saving energy, reducing emissions with pump retrofits

Sulzer rerated two condensate export pumps on a North Sea oil platform, reducing energy consumption as well as optimising performance for the remaining life of the well.

OIL COMPANIES ARE under increasing pressure to decarbonise their operations and reduce emissions to meet government targets and justify their license to operate in the face of increased public concern for the environment. Cutting energy consumption not only saves money, it also helps to extend natural resources and reduces pollution.

Oil and gas platforms use a large number of pumps for a range of applications. As the wells are exploited so the pumping profile changes, and the hydraulic design of the pumps may need to be revised to deliver the most efficient service. There comes a point where the cost of a pump retrofit will be recovered from the savings generated by improved performance.

Pump retrofits involve the upgrade or modernisation of existing equipment to improve reliability, increase efficiency, take advantage of modern materials or, as in this case, adjust for a change in the process. This is a cost-effective alternative to replacing equipment and can also save a considerable amount of time.

Originally commissioned in 2001, the oil platform in the North Sea had been in production for nearly 20 years. Over this time, the application profile of the pumps had changed, and some had become less efficient, while others were beginning to exhibit increased vibration due to low flow conditions.

The owners of the platform wanted to address these operational issues as well as reduce energy consumption, which would reduce operating costs. This led to the introduction of challenging targets for energy savings that would also deliver associated CO₂ and NO_x reductions.

Peter Irlam, Retrofit specialist, Sulzer EMEA, explains, "Having worked successfully in the past with Sulzer, the platform management called us to assess two pumps that had been identified for rerating. Both pumps were involved in condensate export; the main pump was a horizontal, diffuser barrel design, and this was supported by a centrifugal booster pump.



The booster pump was operating at low flow, causing vibration issues.

Image Credit: Sulzer

Neither of the pumps were of Sulzer design and so there were no detailed engineering drawings available."

Essentially, the issue raised by the customer was that the booster pump had some vibration issues because it was operating at a flow well below the design point for this pump. Meanwhile, the main pump was generating too much head and as a result, it was consuming considerably more energy than was necessary.

To help with the project design, Sulzer assessed the production profile for the platform, projected over the next 25 years. This showed that performance would be reducing year on year, so Sulzer proposed several hydraulic changes to both the booster pump and the main export pump.

Sulzer's field service engineers removed the pumps from the platform and delivered them to the service centre in Norway, where work started immediately to gather all the necessary dimensional data. This was transferred to the service centre in Leeds, UK, for the design engineers to create the modified drawings.

For the booster pump it was decided to install an impeller eye choke ring to allow the pump to operate at lower flows, thereby

reducing the vibration levels. The proposed design was assessed using computational fluid dynamics (CFD) to establish the optimum size of the choke ring.

For the main pump, the proposal was to reduce the number of stages from seven to only two. To maintain a smooth flow path through the sections where the impellers had been removed, Sulzer installed transfer tubes which were designed and manufactured in-house. The modified design was verified using rotodynamic analysis to ensure that the pump would operate with acceptable vibration levels.

Irlam continues, "The customer would only allow the pumps to be off the platform for a maximum of eight weeks, which left Sulzer with a tight timeframe to complete the engineering, detailed design, manufacturing, rebuild and installation. Through close cooperation between our service centres, we managed to deliver the project on time."

Having completed the installation, the customer confirmed that the vibration levels from the pumps were satisfactory and the energy consumption had been reduced by 800 kW, which equated to a saving of more than GBP 800,000 (US\$1mn) per year, which puts the payback in a short period of time. ■

With the drive towards more distant and deeper subsea activity, unlocking the enabling power of data is essential.

Lean, clean and digital - the future of subsea operations

Digital solutions are critical for optimised subsea operations, say Dean Amison, subsea global product management executive and Mario Alonso Rincon, digital solutions product leader, Baker Hughes.



Image Credit: Adobe Stock

WHAT DO WE mean when we talk about digital? Current working conditions in all major business sectors have made that question more pressing than ever before, as desk-based workers get to grips with new digital tools. In heavy industries, including oil and gas, investments in automation have reduced dependency on human activity, and are truly coming into their own.

This is largely because over the past ten years or so, an operational climate has developed which favours solutions, tools and techniques that empower decision-makers; reduce human intervention; streamline use of equipment, chemicals and logistics; and build institutional memories.

In sub-sea operations, digital is often presented as the solution to the short and long-term challenges the industry faces, namely:

- The need for operational efficiencies in the face of fluctuating cost models
- An ageing workforce that is retiring from positions of expertise and experience
- A drive towards more distant and deeper subsea activity
- A growing demand for environmental protection from stakeholders, policy-makers and the general public

- The ongoing need for safe operations and working conditions
- A price environment subject to any number of external and internal shocks.

Defining digital

However, this doesn't really answer the original question.

When we talk digital what we're really talking about is data. How to extract it, manage it, understand it, share it, and act on it as quickly and efficiently as possible. How to turn years of experience and expertise into bits and bytes that can be widely disseminated and understood; and how to use previously unavailable information to build knowledge and insight.

In its broadest sense, digital comes down to sifting through complexity to bring the most useful data to the right user at the right time. It's about giving data context and clarity, and building highly usable tools around it.

And where humans meet machines, it is about turning data into images and intuitive interfaces to give users an all-knowing, all-seeing co-pilot to support operational decision-making.

Digital has suffered from the sheer, overwhelming volume of data involved. We are all familiar with the term Big Data, but that now feels like an inadequate description. Even the more rudimentary digital systems can produce what might better be described as Gigantic or Colossal Data, and it is still sitting in different places, unconnected, in different formats, and lacking context.

Intelligent, evidence-based decision-making is tantalisingly, frustratingly close. But for many organisations, data is a caged giant: a barrier to insight rather than an enabler.

The life of field

This is where our concept of Life of Field Digital Solutions for subsea operators comes into play, just one of the many digital enablement aspects. We wanted to give our clients the tools they need to unlock that giant, and use it to power useful and operational systems – not just theoretical possibilities, or science-fiction gimmicks.

Our Life of Field Digital approach is based on a number of core concepts. We believe

“ Intelligent, evidence-based decision-making is tantalisingly close.”

that making more intelligent, evidence-driven decisions is of value at every stage of an asset's or field's lifetime, and that digital solutions consequently need to take a long-term view. We know that as data flows increase, the ability to distinguish the signal from the noise becomes critical, and so the ability to sift through complexity to see the most critical information for a subsea system, is more than a short-term solution.

We recognise that when decision-making is powered by digital solutions, operators can be more focused on the future rather than assessing the past. Potential problems can be identified before they become critical, enabling operators to advance, defer or consolidate activities safely and efficiently.

We also know that digital solutions have to do more than bring intelligence, in a joined-up way, to operators. They need to be centred on individual users and the details of what those specific users need to do every day.

Finally, we are committed to the idea that digital is best designed, implemented, and supported by suppliers and consultants who understand not just the technology they are working with but also the context in which they are applying it. Digital is not an afterthought: instead it is integral from the initial design of a concept, manufacture, installation and finally operation.

The following examples illustrate how this translates into real-world situations in two critical areas of subsea operations.

Equipment integrity management – keeping flow in the pipe

Digital can prove transformative for onshore subsea engineers tasked with optimising asset uptime and availability while managing maintenance schedules and planning any necessary interventions, reporting on key metrics, efficiency targets and risks, and making investment recommendations.

The challenge here is the limited set of data to which they currently have access. Only a low percentage of subsea data from distributed control systems (DCS) is available onshore, and although analysis and visualisation is critical it is also complex and time-consuming. Simplifying the decision-making process is operationally advantageous, but engineers need more evidence than they often have.

The Baker Hughes solution for equipment integrity management is based on:

- Sensors that can be integrated with well, riser and subsea production system (SPS) equipment in a variety of locations to give a broader view
- Agnostic application modules that can analyse and integrate data on equipment from any manufacturer
- Customisable screens for onshore personnel so they can make decisions that are right for each site, project or asset
- Practical advanced analytics, combined with our knowledge, expertise, and service



Subsea operations will need to be smart, to face new and existing challenges.

Image Credit: Adobe Stock

advice, and amplified by considered use of artificial intelligence

- Providing future-oriented analysis that can predict failure points and expected lifetime of equipment.

It supports live inventory management by automatically tracking past, present and future maintenance and recertification. It also accesses upgrade history and last-time-purchase advice to proactively alert engineers to upcoming equipment obsolescence.

This is a solution that onshore engineers can adapt for a single asset or an entire fleet of wells. It ensures that they can develop and implement a standard for all subsea projects with the confidence of knowing that the system is being managed to industry standards.

“Digital is not an afterthought.”

Flow assurance management – keeping the pipe flowing

For production and flow-assurance engineers, data analysis is already fundamental to the job, from well testing to field characterisation. It also requires a lot of what-if analysis to determine optimum operational set points, like minimum water production, or to optimise required chemical injections. Nonetheless digital solutions can make a big difference.

The problem here is primarily with the hardware. Subsea meters typically consolidate a number of measurements; certain metering types, like manifold mount meters, are not always available at every well; and subsea flow meters only provide point measurements – which means discrepancies get missed, just one meter failure can affect accuracy and analysing evolving trends is extremely difficult.

Specifying the best flow-assurance, risk-monitoring solution for a given project is a

tough ask. Meters need to be selected before drilling commences, which can lead to lengthy cycle times, while radioactive sources, such as those in multi-phase flow metering (MPFM), can limit applicability.

Our analysts and engineers wanted to enhance production with accurate metering solutions that covered SPS infrastructure, wells and risers. We are developing a distributed flow-metering (DFM) solution that combines the best of virtual and physical metering, and which integrates measurements from downhole, trees, and the wider Subsea Product System (SPS).

By using the intelligence of multiple flow sensors to simplify the infrastructure, our clients can measure each well with only a water-cut meter at the tree instead of a bulky MPFM, while still securing accurate multi-phase flow measurements with optimised subsea instrumentation. With added analytics and expertise, the solution provides flow engineers with a whole-system view, allowing them to monitor conditions during operations, start-up and well cooldown and make recommendations on operational procedures. Overall, the solution lowers costs, shortens lead times and removes flow metering from the project-critical path.

Conclusion

Over the past few years, the industry has gone through a fundamental change: optimal production, minimal downtime, operational efficiency and environmental considerations are the pillars on which a successful operation will be built.

There will always be new challenges, new shocks, and new threats, but the three perma-challenges will remain: cost control, carbon emissions and HSE risk. To face these challenges in their current and future forms, subsea operations will need to be smart. They will need to be lean, clean and digital. The technology is there. Now we need leadership to focus efforts on the most practical, valuable solutions to make this impact. ■

APM 4.0 for Industry 4.0: the five essential pillars

Kim Custeau, global Asset Performance Management lead, AVEVA, discusses the five building blocks required to realise the results of APM 4.0.



Image Credit : AVEVA

Kim Custeau, global Asset Performance Management lead, AVEVA.

DIGITAL DISRUPTION, FROM the Industrial Internet of Things (IIoT) to Industry 4.0, is impacting all industrial and infrastructure-centric companies and boosting bottom-line metrics across the board.

The extent of its impact depends on a number of factors including technology, people, and access to trusted data. However, another aspect of Industry 4.0 is becoming increasingly central to success – Asset Performance Management (APM) 4.0. Unlocking its potential requires a clear understanding of the five foundational building blocks required to realise the results of APM 4.0.

1. Prescriptive analytics

Any successful APM 4.0 programme needs to include predictive and prescriptive analytics. Predictive Analytics provide early warning notifications and diagnosis of equipment issues days, weeks or months before failure. While the benefits of prescriptive analytics span everything from prescribing maintenance activities to postpone or prevent failures, to prescribing operational changes to alter how equipment performs. All of this is possible due to the greatly reduced cost of sensors and network connectivity.

2. Smart connected assets

The ability to connect physical systems is vital because the ideal outcome for maintenance is smart connected assets. Fully digitised assets lay the groundwork for APM 4.0 by providing a key data source for real-time, historical and predictive analytics. As analytic and automation capabilities evolve, Smart Connected Assets will pave the way for a future of autonomous assets, each operating optimally, independently and continuously improving.

3. IIoT platform

For APM 4.0 to work properly, IIoT platforms are essential to handle the many connections to assets and communication protocols. The key value of an IIoT architecture is the context it provides data. By aggregating data streams into a single source of truth, it is possible to analyse and understand data and make actionable decisions.

4. Industry best practices

Maintenance professionals must also follow industry best practices to remain at the top of the adoption curve. One of the most prolific asset management standards is ISO 55000. It offers a proven framework for implementing a digital asset management

strategy, while remaining flexible enough to meet each organisation's unique needs. Companies ensure any investment lives up to its potential by partnering with industry experts, such as AVEVA, to implement their APM 4.0 programmes.

5. Killer mashup apps

APM 4.0 utilises the sensing, prescriptive analytics and autonomy of smart connected assets and services, and it leverages the connectivity, cloud and predictive capabilities of IIoT platforms - it is a mash-up concept. No surprise then that it requires best-in-class mash-up applications that take content from more than one source, such as video, documents, schedules and voice recordings, to create a single view of information that organisations can understand, deploy and share more easily than before.

Bottom line benefits

The five essential elements of APM 4.0 lay the right foundation to succeed with Industry 4.0. This combination is providing real benefits to companies today. Our clients have seen improvements ranging from a 25 per cent reduction in unplanned downtime, to a 20 per cent increase in asset availability, and up to 30 per cent improvements in asset utilisation. ■

For more information on AVEVA and its APM 4.0 expertise, please visit <https://sw.aveva.com/asset-performance>.



APM 4.0 is becoming increasingly central to success for industrial and infrastructure companies.

Image Credit : Adobe Stock

The digital imperative for GCC oil & gas companies

NOCs need to adopt an accelerated and holistic approach to digital transformation to retain their advantage, say Anil Pandey, partner at Strategy& Middle East, and David Branson, senior executive advisor at Strategy& Germany.

THE DUAL SHOCK of the COVID-19 pandemic and a sharp decline in oil prices has created significant challenges for oil companies worldwide. As a result, some may be tempted to stop their investments in digitising their operations. For most companies, however, the case for investing in digital is as strong as ever. Despite the ongoing energy transition, oil will remain an important part of the energy mix for the foreseeable future. The national oil companies (NOCs) of the GCC are well-placed given their low costs of production. However, they too need to transform their business to reinforce their natural cost advantage, boost efficiency and remain competitive and resilient to demand and price shocks. Digital transformation is a critical element in this respect.

Strategy& recently published a *2020 Digital Operations Study for Oil & Gas Companies*. The results show that leadership teams worldwide are well aware of the potential of digital applications to improve operational and financial performance. Over the next five years, industry leaders expect a 10 per cent increase in revenue from getting projects online faster, and an 8.5 per cent decrease in costs from operational efficiency.

Our analysis also found that most companies – NOCs, large international players, and independents – are still in the early stages of digitisation. Of more than 200 oil and gas companies in the study, only seven per cent identified themselves as “Digital Champions,” with digital tools in place at multiple levels of the organisation and integrated into partner and customer relationships. More than 70 per cent of respondents said they were still in the early stages of digital maturity.

Promising technologies identified in the Strategy& study include manufacturing execution systems, cloud computing, energy analytics, the Internet of Things (connected devices), and machine learning. What these technologies have in common is that they can integrate real-time data and advanced

analytics to improve decision-making and power applications to dramatically improve efficiency and sustainability. These tools have already been successfully deployed in other industries.

“Digital initiatives should be driven by business priorities.”

In common with their international counterparts, NOCs in the GCC have taken their first steps towards digital transformation. They have piloted digital applications, modified their organisation structures to embed digital, and have developed digital models and visualisation of the flow of hydrocarbons across their portfolios. With digital transformation still at an early stage of adoption across the industry, NOCs – with greater control of operations across the value chain – have an opportunity to lead the next phase of digital transformation.

To achieve leadership in digital, NOCs should apply four core principles.

First, digital initiatives should be driven by business priorities rather than being viewed as an extension of “traditional” information technology. In common with companies across the sector, increasing efficiency by lowering costs and/or increasing production, and managing increasing sustainability expectations are core business priorities. In addition, digital can have a key role in helping ensure optimisation of hydrocarbon flows and maximisation of value across the portfolio. Digital initiatives should be defined and championed by the “owners” of the assets where benefits are expected to accrue.

Second, companies need to invest in foundational capabilities, including an enhanced focus on rapidly improving the skills of their existing workforce, while hiring outside experts where necessary if they have

skill gaps for emerging technologies. This will require using online platforms, digital academies and intensive digital accelerator training programmes to quickly develop critical internal skills in emerging technologies, data analytics, cyber security and IT architecture.

Third, management needs to adopt a digital operating model with clear governance and accountability guidelines. Typically, this would include digital programme managers reporting to a chief digital officer and managing a series of digital initiatives in close co-operation with asset programme “owners.” For GCC NOCs which have traditionally had strong assets acting with a degree of autonomy, effective digital governance will require re-calibration of relationships between assets and central functions.

Fourth, NOC leadership teams need to understand that digital transformation goes beyond merely investing in new technologies. Instead, companies will need to rethink traditional ways of working, their business model, and their culture to become more agile, nimble, and resilient. Indeed, for functionally organised NOCs in the GCC, digital can be a strong enabler of cross-discipline and function collaboration and optimisation of operations.

The oil and gas industry worldwide faces considerable challenges – the COVID-19 pandemic and low prices in the short term, and lower demand as energy sources transition to renewables in the long term. However, NOCs still have a tremendous advantage over the rest of the world, with a much lower cost base. They have also taken steps to begin implementing digital in some parts of their organisation – meaning they are keeping pace with the industry overall thus far. The challenge now is to build on that progress through an accelerated and holistic approach to digital transformation to retain their advantage, and continue to power the world. ■

Strategy& is part of the PwC network.

Navigating the COVID-19 storm

Saul Zambrano, global industry director: energy and utilities digital transformation leader, Software AG discusses how energy companies are maintaining cash liquidity and re-positioning their operations to navigate the COVID-19 headwinds.

WHEN I THINK of what is happening in the industry today, the image of a double black swan jumps to mind.

The Black Swan effect is a metaphor that describes events that are rare, hard-to-predict and have a major impact. While a single black swan event is extremely rare, to have two happen at the same time is exceptionally rare. That is the situation the oil and gas sector finds itself in at the moment. As COVID-19 continues to accelerate, an economic contraction is causing oil demand to drop rapidly, and doing so at a time when supplies were already greater than what the world could consume. And while the energy sector has experienced volatile market contractions before, the speed and magnitude of this current one is unprecedented. As a result, energy companies are aggressively re-positioning their current operations to navigate the storm.

Two key trends are emerging as to how energy companies are responding – they have both a short- and long-term approach. The energy companies that survive this market correction are the ones that are not only hyper-focused on maintaining cash liquidity through the storm, but are also taking advantage of this time to reposition their operations. It has never been more crucial to function in a more agile, reliable and efficient manner now and for the expansion period ahead.

Focus on cash liquidity

The most critical area where energy companies are being affected is on their cash balances. As a result, the principal goal during these times is to preserve cash by eliminating non-essential or duplicative costs. One core area of focus is on non-essential costs in their supply chain processes. Historically, energy companies tended to manage these processes with a focus on cycle time improvements and/or vendor price concessions. In the current environment, that is no longer enough. The principal business



Image Credit: Software AG

Saul Zambrano, global industry director: energy and utilities digital transformation leader, Software AG.

outcome these teams are trying to address is to leverage process insights that allow them to pursue process improvements with an eye to reducing cost of operations. Thus, process mining is becoming one of the most relevant technologies they are pursuing within their finance, supply chain and field maintenance teams.

Additionally, one of the principal areas of duplicative costs is in the IT/OT application portfolio. Accordingly, the IT/OT application portfolio technology platform is one of the most relevant technologies that Enterprise Architects are evaluating for rapid deployment within their planning environments. The technology allows them to quickly understand their application portfolio with a full understanding of their application inventory relative to cost, cross-application dependencies and capabilities. This information is critical if they are going to get costs out of the business without sacrificing the capabilities that support the business.

Focus on agile operations

This brings me to my next area of impact – a focus on agile operations. One of the most important strategies that is being pursued by leading companies in this sector is the transformation of asset management practices. Ultimately, these leading

companies will continue to invest in Industrial IoT (IIoT) technologies that not only allow them to manage their assets more efficiently, but also embed a foundational IIoT capability. This is a pathway to workflow automation that leverages a full understanding of workflow processes, real-time data and analytics. The ultimate goal is to be able to monitor and optimise processes in real time through the application of streaming, predictive and AI/ML analytics.

Additionally, prior to the recent market contraction, one of the principal IT strategies that was prioritised by the industry was the migration to cloud operations. This trend will accelerate. Energy companies will continue to adopt iPaaS technologies that allow them to accelerate their cloud-to-cloud integration capabilities.

Focus on production reliability

Which leads me to my last area of impact: a focus on production reliability. Today, energy companies are selling less oil and gas. During times such as these, one of the first exercises they pursue is to decide which wells and refining assets to turn off. In a world of negative to low oil prices, the need to remove less efficient assets from production is critical.

While this approach ensures the best possible operating margins, it also concentrates operating risk in the wells that remain on – and the refining assets that are processing the oil and gas streams. Consequently, any unplanned service disruption in production and refining assets will have a massive negative financial impact.

Technology that allows them to ensure uptime performance for the remaining onstream production assets would be a welcome addition. By that token, self-service industrial analytics technologies are actively being deployed across the entire sector. These technologies provide production and reliability engineers with multi-asset visual data analytics that allow them to quickly identify reliability and production risk for multi-asset complex production processes. ■

Leading in isolation technology for offshore oil & gas

Peter Mannion, GPT Industries' director for oil and gas, discusses how the company has been at the forefront of design and innovation for many years with isolation products in and around the offshore oil and gas environment.

IN 2009, THERE was a planned development of a major oilfield in the Deepwater Gulf of Mexico which was originally discovered in 1998, some 200 miles south into the Gulf of Mexico.

This field was thought to hold one billion barrels of oil in place, and so production began in 2005 from the original truss spar. At that time the latest technology in isolation was utilised, which was the ID Seal Isolation Kit designed to prevent the core material of the isolation kit from being attacked by the increasingly aggressive medias that were starting to become more prevalent.

As the search for more productive fields was underway, it was discovered that the field had up to four mboe and the extension would have the ability to produce an additional 140,000 bopd from fourteen wells.

In 2015, the decision was confirmed to extend the access to the field, the end-user gave the green light to proceed with the project and the contract was awarded to the engineering, procurement and constructor (EPC) firm in Korea. During the front end engineering development (FEED) stage at all the EPCs, as well as at the end users, GPT introduced the EVOLUTION Isolation Kit, emphasising the numerous advantages.

At the same time, the company received a request from an EPC working on a construction planned for the Arabian Gulf for a fire-safe isolation kit on the compressor systems on the platform.

Their overriding criteria were for fire safety, higher temperature, a 3mm-thick gasket and for complete protection from the aggressive saltwater conditions. The conditions were listed as extremely sour and therefore, the highest levels of protection against sour media were required. Dealing with major engineers in the Middle East over the last few years, GPT had become very aware of the escalation of hydrogen sulfide (H₂S) levels in the oil and gas fields as the operators utilise new technology to extract oil from the previously inaccessible fields.

The EVOLUTION system met all the above criteria and was supplied for the compressors



Image Credit : GPT

GPT's EVOLUTION system has helped oil and gas companies address the ever-increasing demands of the offshore environment.

and associated piping section on the platform, which was destined for the Gulf off Abu Dhabi.

“ The EVOLUTION system looks likely to transform the face of pipeline isolation.”

The same criteria were of appeal to engineers working on the Gulf of Mexico project and having the ability to have one gasket in use across the platform, which also utilised the ID Seal technology. The EVOLUTION platform for Isolation gave the following advantages to this high technology project. Engineers wanted to use the ID Seal as it was already proven as a preventative measure against aggressive media, a one-size-fits all solution, a gasket as well as an isolation kit and a fully encapsulated fire-safe

approved isolator.

Initially, the EVOLUTION gasket was utilised on the Cupro Nickel pipeline firefighting system purely as a seal, the main advantage being the low bolt load requirement for sealing with the seal so close to the bore, which aids sealing on the soft flange material.

Then it was utilised as an isolation kit on the pipeline systems, and finally as an exchanger vessel gasket.

One of the main advantages was that the gasket and kit was the same dimension as any standard gasket, and therefore special design considerations for the isolation kits was unnecessary. This is the case for the traditional VCS style kits which are 6.2mm thick and do not conform to standard pipeline design software criteria.

Clearly, in terms of design and functionality, the EVOLUTION system has given engineers the ability to meet the ever-increasing demands of the field, and looks likely to transform the face of pipeline isolation in the future. ■

Saudi Arabia continues to expand its oil and gas industry, upstream and downstream.

Image Credit : Adobe Stock

Adopting efficient workflows for oil and gas projects

Scott Eustace, Industry marketing director, Project Delivery – Bentley Systems, recounts how Wood PLC used Bentley’s ProjectWise engineering project collaboration software to provide a single source of truth to connect 55,000 employees across more than 60 countries.

WOOD PLC IS a global leader in delivering project, engineering and technical services to energy and industrial markets. It provides asset solutions throughout the project lifecycle, from concept to decommissioning, and has worked in a variety of industries, including power and process, environment and infrastructure, and oil and gas.

Recently, Wood began executing capital projects valued at several billion dollars for various owner-operators in the Middle East’s downstream and upstream oil and gas sector. These projects will help deliver sustained growth in key areas of Saudi Arabia. The organisation is delivering end-to-end services through execution centres located throughout the Wood global community.

Wood was looking to adopt a follow-the-sun approach to project execution, meaning that projects can be handed off and passed between offices in different time zones without disrupting the workflow. This practice will help shorten schedules while still delivering quality work. The projects are all in various phases, including pre-front-end engineering design through to the design; engineering, procurement, and construction; and project management. Therefore, with operations in more than 60 countries and 55,000 people employed by the organisation, Wood knew

that it needed a single location to house all the projects’ information.

Connecting regional offices with a connected data environment

The Wood project team first began by looking for a platform where participants could upload, store, and organise the vast amount of project information. The project team required a platform that not only provided one repository for all project information, but also allowed participants to manage access controls and workflows. The team would also need to manage templates, SEED files, and metadata.

Bentley’s ProjectWise was chosen as the optimal platform for these projects. The team easily integrated the client-supplied CAD management and master templates to develop its connected data environment. With all the information housed in one location, several regional offices were able to come

together in a managed environment that was customised to deliver strict client security control, standardised project procedures and governance plans, and always up-to-date project information.

Improving efficiency with follow-the-sun workflows

As a connected data environment, Wood’s ProjectWise platform allows the team to adopt a follow-the-sun workflow. Teams can access information when and where they need it, regardless of time zones. This practice helps Wood guarantee that milestone, schedule-critical activities are met without impacting quality or project delivery consistency. It provides Wood with a single source of truth and the ability to standardise workflows, guaranteeing accuracy and consistency across projects and execution centres.

“The use of ProjectWise has ensured a consistent delivery across many projects operating across several workshare locations,” explained Andy Barr, head of engineering for capital projects at Wood. “The rigour and discipline built into the system ensures that deliverable quantity is improved and reliable across all office locations. This benefit, coupled with the saving in resource hours and infrastructure costs, has proved to be an excellent development for our project delivery.”

“ Teams can access information when and where they need it, regardless of time zones.”

Saving time with better connectivity

Wood's use of a connected data environment saved thousands of hours on its projects. With more than 20,000 drawings, automatic drawing creation saves in excess of 3,700 hours while rendition services save another 1,500 hours. Also, by training its team to use a standardised and consistent approach, Wood eliminated time-consuming, job-specific training, saving time and improving project delivery in the region. Using a single source of truth, the team was able to reduce time spent on quality assurance and auditing.

With this common execution methodology across all project participants, regardless of location, Wood is maintaining a competitive



Wood is executing capital projects for various owner-operators in the Middle East's downstream and upstream oil and gas sector.

“ With a connected environment based on ProjectWise, Wood will better deliver these projects.”

position in a globally challenging market. The oil and gas projects that Wood is working on will help continue to grow the industry in the Kingdom of Saudi Arabia. With a connected

data environment based on ProjectWise, Wood will better deliver these projects – saving time and streamlining workflows while maintaining the highest quality. ■

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With oil and gas operations extending into ever more remote locations and into deeper waters, robust communications are vital.

Image Credit: Adobe Stock

A new era for offshore communications

The offshore sector has long been dependent on robust communications, and the COVID-19 crisis is now catalysing interest in new, remote ways of working. Martin Clark reports.

MAINAINING RELIABLE COMMUNICATIONS with rigs and platforms offshore is critical for all operators. Not just for direct contact between workers engaged in decision making, but in the processing and flow of vast amounts of data generated by smart wireless devices and facilities all along the energy chain, from the wellhead through the pipeline and on to processing sites.

At each and every stage, technology is collecting and monitoring data to ensure the right decisions are made; this information can be the difference between a profitable field and a loss-making one. With exploration and production extending into locations that are even more remote, further offshore, into ever deeper waters, the need for robust communications becomes even more vital.

“This means that implementing industrial wireless technology is a must for businesses that need real-time information to reduce their non-productive time when facing extreme environments,” technology giant Siemens notes in a white paper.

Sometimes that means factoring in all the nuances of the oil and gas industry into the equation, such as the need for highly sensitive – and expensive – explosion-proof devices.

Siemens’ own industrial communications portfolio for the industry consists of the

SCALANCE and RUGGEDCOM product lines. These are built for reliable, high-performance communication infrastructures designed to provide oil and gas clients with a comprehensive range of network products from a single source. Fully integrated networks can be quickly and seamlessly deployed whatever the location.

“Remote technologies and working from home have likewise been proven during the COVID-19 outbreak.”

While oil and gas investment has been scaled back in the wake of the COVID-19 crisis, the fundamentals behind the communications segment remain strong. Indeed, some of the trends arising out of the pandemic will accelerate the global 5G network rollout, boosting overall infrastructure and capacity.

Remote technologies and working from home have likewise been proven during the COVID-19 outbreak, which will drive the trend

toward more sophisticated communications. The big oil services giants, Schlumberger and Halliburton, both noted in their Q1 earnings calls this year that the current downturn could accelerate the adoption of such technologies.

“This is especially true for technologies that enable remote operations, which remains an area where great cost efficiencies could be realised with more efficient operations,” notes Rystad Energy in an analysis paper.

While COVID-19 has already accelerated remote operations due to the movement restrictions imposed in countries to limit the outbreak, it could further advance a much longer-term trend towards off-site working, both upstream and downstream. Schlumberger underlined intentions of doubling down its digital strategy, while Halliburton, similarly, noted that demand for its cloud infrastructure services saw an uptick in April during the pandemic.

Another leading industry services player, National Oilwell Varco, reported updates on its digital and communications technologies in its latest earnings call. Using its TrackerVision augmented reality technology, which streams real-time audio and video, it is able to provide instructions on rig repairs remotely.

Soon, this could be the new normal. ■

Trendsetter designs Trident Intervention Systems for rapid reconfiguration

TRENDSETTER ENGINEERING HAS released the Trident Intervention Systems that have been designed for rapid reconfiguration in the field, providing the flexibility to conduct intervention riser, riserless wireline intervention and hydraulic stimulation operations all with a single system. This modular approach to intervention can result in reduced well maintenance costs, improved production and increased intervention operational efficiency.



Image Credit: Trendsetter Engineering

Trident's well control package (WCP) is built around the reliable shear/seal design of the Interventek Revolution valves.

The Trident System, initially delivered in the intervention riser system (IRS) configuration, provides a 6 3/8" through bore and is suitable for all types of well intervention operations up to 15,000 psi and in water depths up to 10,000 ft.

Trident's well control package (WCP) is built around the unique and reliable shear/seal design of the Interventek Revolution valves, providing a robust safety system in an extremely compact package.

With an overall WCP stack up height under 16' and a combined emergency disconnect package / lower riser package weight of just over 67,000 lbs, Trident is suitable for rapid mobilisation to any region and integration into almost any rig of availability, including many older generation MODU's which may be limited in both crane capacity and tree cart stack-up height.

Emerson's modelling system RMS 12 for fully automated workflows

EMERSON HAS LAUNCHED the latest version of reservoir modelling system RMS 12. This version offers fast and fully automated workflows that improve both structural uncertainty modelling and Big Loop solutions.

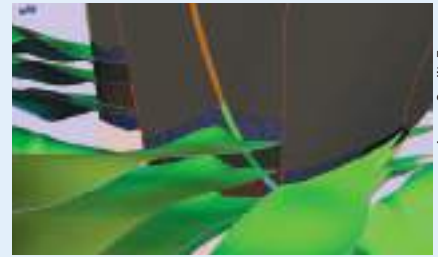


Image Credit: Emerson

RMS 12 includes a new Structure Uncertainty module that improves modelling results, workflow efficiency and the user experience.

RMS 12 includes new RMS structural uncertainty technology, a result of a three-year collaboration project between Equinor, the Norwegian Computing Centre (NR) and Emerson. The technology offers a new method for capturing and modeling structural uncertainty that can handle highly complex faulted reservoir structures and large amounts of horizontal and deviated wells. It allows structural uncertainties to be seamlessly incorporated in Big Loop ensemble automation workflows for history matching and production forecasting. Asset teams can use the module to quantify the impact of horizon and fault uncertainty on production as well as the risks associated with field development and reservoir management decisions.

Other vital features in RMS 12 include:

- Big Loop Variables (a new way of running Big Loop projects when using external workflow orchestrators) that, together with simplified workflows and improved openness and flexibility, enhance RMS's value as a key component of the Big Loop workflow.
- Extended Roxar API support that provides access to RMS project data and jobs using the Python language. It is now also possible to retrieve, copy and store data into other data object(s), run calculations, create new data items, generate new projects, and much more.
- An improved user experience through enhanced script handling, add-ons to charts and well correlation views, renaming options and seismic cropping.
- A new RESQML data transfer tool that streamlines RESQML data import and export to/from RMS.

Honeywell updates Forge Cybersecurity Suite to support safe remote operations

HONEYWELL HAS ANNOUNCED the latest release of its Forge Cybersecurity Suite that includes several enhancements to help ensure business continuity in the face of mounting cyberthreats, uncertain global business conditions



Image Credit: Honeywell

The Honeywell Forge Cybersecurity Suite addresses common pain points in OT domains.

and continued supply chain disruption associated with remote operations.

The new Honeywell Forge Cybersecurity Suite release (R200) incorporates new features such as enhanced industrial-grade remote access, increased asset discovery capabilities with active and passive functionality and improved cybersecurity risk monitoring.

The enhancements come as more industrial organisations are embracing remote operations to effectively manage facilities with reduced numbers of onsite personnel due to current safety restrictions. A new Honeywell report indicates that the severity of cyber threats detected to operational technology (OT) systems has risen by significant amounts in a 12-month period.

"As more operators of critical infrastructure and facilities move to support remote work, they're increasingly vulnerable to cybersecurity issues," said Jeff Zindel, vice-president and general manager, Honeywell Connected Enterprise Cybersecurity. "The Honeywell Forge Cybersecurity Suite helps customers increase productivity by providing the next level of protection required for more secure remote operations and better securing operational technology environments with asset discovery, inventory and continuous monitoring, as well as risk and compliance management."

It provides users with a single dashboard to centralise security operations and asset security management. It simplifies, strengthens and scales security operations for asset-intensive businesses facing evolving cybersecurity threats.

Schlumberger Performance Live Service offers real-time operational data

SCHLUMBERGER HAS INTRODUCED Performance Live digitally connected service that optimises remote wellsite operations control while improving safety, efficiency and footprint. The service includes technology and domain expertise within a digital ecosystem, leveraging cloud-based applications and automated data workflows through a secure and robust data network.

The Performance Live service provides customers with instant access to data and collaboration with domain experts, enabling faster, more informed decision making for directional drilling, well logging, formation testing and other oil and gas operations. Automated end-to-end workflows simplify tasks that eliminate redundancy and deliver consistent service. In addition, the service increases operational safety and reduces carbon footprint with less travel and fewer personnel needed on location.

The Performance Live service is used by more than 60 per cent of Schlumberger well drilling jobs worldwide, covering more than 18,000 runs in 2019. In wireline operations, the Performance Live service covered more than 12,000 runs worldwide.



In wireline operations, the Performance Live service covered more than 12,000 runs worldwide.

Technology platform enables well testing control to deliver real-time downhole measurements

SCHLUMBERGER HAS PRESENTED Symphony live downhole reservoir testing, a technology platform that enables operational control of the downhole testing toolstring to deliver real-time downhole measurements. Symphony testing reduces operational time and improves safety and efficiency while enabling informed decision making for better reservoir understanding and reduced field development planning uncertainty. Symphony testing unites Muzic wireless telemetry with the downhole string, creating a digital solution that enables real-time control of the dynamic range of conditions during well testing operations. The digitally enabled toolstring is customised for the test objectives to position, isolate, connect, measure, control, sample, select and profile the reservoir with real-time verification.

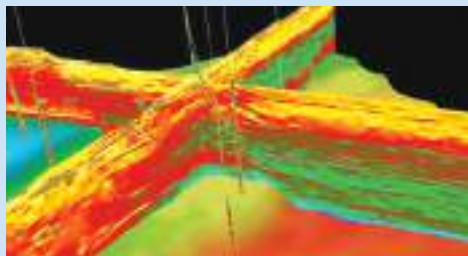
Extensive qualification of Symphony testing has been conducted offshore Asia, the Middle East and the North Sea. Using wireless control, Symphony testing eliminated the potential pumpout of a conventional drillstem testing (DST) toolstring that operates with pressure pulses.

CGG GeoSoftware and Alibaba Cloud pair up to support E&P sector

CGG GEOSOFTWARE HAS collaborated with Alibaba Cloud to successfully deploy its suite of proprietary geoscience software solutions on the Alibaba Cloud platform. All applications across the entire GeoSoftware portfolio run on the Azure and AWS cloud platforms, offering advanced capabilities in machine learning and artificial intelligence, as well as connections to Python ecosystem notebooks.

CGG GeoSoftware, through its industry-respected reservoir characterisation, interpretation and rock physics modelling solutions, such as Jason, HampsonRussell, InsightEarth, PowerLog and RockSI, enables geoscientists to work with greater efficiency and optimal productivity. Initial pilot studies have shown that using Jason Workbench software on Alibaba Cloud can bring dramatic improvements in computing efficiency compared to use of the same software on local compute resources.

Kamal al-Yahya, senior vice-president, Geoscience Software & Smart Data Solutions, said, "Usage of cloud computing technology in the energy industry continues to expand as E&P companies recognise the business value of cloud computing for streamlining operations and optimising decision-making."



Discover deepwater sandstone reservoir sweet spots with fast workflows and interpretation using CGG's Jason technology on the Alibaba Cloud platform.

Weatherford unveils Velox Wellhead System for enhanced operations

WEATHERFORD INTERNATIONAL HAS announced the Velox wellhead system solution for operators needing to lock in pressure integrity while enhancing safety and improving efficiency. Velox can deliver isolation between casing strings with quick-connect components that maintain pressure control, reduce potential leak paths, and minimise non-productive time during installation in many applications, including high-pressure, high-temperature, and sour-gas wells.

The Velox system expedites installation by enabling the packoff to be run in a single trip from the rig floor, which removes personnel from the cellar. The system reduces potential leak paths by eliminating conventional flange-to-flange methods and external lockdown screws.



The Velox wellhead system provides superior isolation between casing strings with quick-connect components.

"The Velox wellhead system enables operators to lock in pressure fast," said Dean Bell, president, Drilling, Evaluation & Intervention, Weatherford. "Operators can run the upper and lower packoff assembly from the rig floor to isolate the annuli of multiple intermediate and production strings."

Velox features

Simplify operations: Reduce potential leak paths from lockdown screws; eliminate costly blowout preventer separation to accommodate new casing sizes; support American Petroleum Institute and premium connections using a fluted mandrel hanger.

Improve efficiency: Expedite installation by eliminating wait time for cement to cure; enable mandrel hanger installation from the rig floor rather than the well bay; accelerate assembly to the blowout preventer stack with Rapid-Lok design feature.

Enhance safety: Isolate the annuli of multiple intermediate and production strings; protect personnel by latching the wellhead from the inside; work in wide-ranging environments, including high-pressure/high-temperature and sour gas wells.

New pump for horizontal directional drilling applications

GARDNER DENVER HIGH Pressure Solutions (HPS) has launched its new GD 250HDD pump to serve as a durable, reliable, American-made pump for a range of horizontal directional drilling (HDD) applications.



The GD 250HDD pump.

Image credit: Gardner Denver

HDD pumps — also known as drill pumps, mud pumps and high flow pumps — serve as an integral component to operations and provide an essential service to the HDD industry. The GD 250HDD pump can be used to tunnel under rivers and roads and help to lay sewerage systems, water pipes, fibre optic lines and pipelines.

The pump features a very high rod load rating of 50,000 lbs, making it extremely tough and long lasting. It is designed to run at much slower speeds while matching or exceeding the performance of existing pumps. For example, it can produce 300 gpm at 1400 psi while operating under 200 rpm. At this slow run speed, the pump can deliver the same output, flow, and pressure with less violent actions, wear and friction. By delivering fewer strokes, consumable life is extended.

Ryan Huseman, lead engineer on the project, said, “The weight to horsepower ratio of the GD 250HDD surpasses all other industry competitors. The GD 250 HDD packs a huge amount of power in a very small dimensional envelope, which makes it ideal for the HDD market. The pump runs incredibly smoothly due to the rigidity of the high strength ductile iron frame. Additionally, all of the bearings on the GD 250HDD feature a pressurised lubrication system, so the pump can tackle the biggest projects in the industry.”

Weighing less than 4,000 lbs, the GD 250HDD has a maximum flowrate of 460 gpm and the ability to reach pressures up to 3,000 psi. This triplex pump offers a five-inch stroke, 50,000 lbs rod load rating and 250 breaking horsepower (BHP).

Joining forces to accelerate digital transformation

OIL COMPANIES ARE stepping up digitalisation initiatives to boost cost savings and efficiencies in the current challenging industry environment.

Amongst these is Halliburton, which announced in its Q2 Results statement that continued deployment of leading digital technologies would drive efficiencies and cost reductions for its customers and itself.

Halliburton, Microsoft and Accenture have announced a five-year strategic agreement to advance Halliburton’s digital capabilities in Microsoft Azure. Under the agreement, Halliburton will complete the move to cloud-based digital platforms and strengthen its customer offerings by enhancing real-time platforms for expanded remote operations; improving analytics capability utilising machine learning and artificial intelligence; and accelerating the deployment of new technology and applications for overall system reliability and security.

“The strategic agreement with Microsoft and Accenture is an important step in our adoption of new technology and applications to enhance our digital capabilities, drive additional business agility and reduce capital expenditures,” said Jeff Miller, Halliburton chairman, president & CEO. “We are excited about the benefits our customers and employees will realise through this agreement, and the opportunity to further leverage our open architecture approach to software delivery.”

“Building a digital core and scaling quickly across a business is only possible with a strong foundation in the cloud,” said Julie Sweet, chief executive officer, Accenture.

In another digitalisation tie-up, DORIS Group, AVEVA and Schneider Electric have joined forces to create a Digital Twin alliance to address complex digital transformational challenges for the upstream oil and gas sector.

These new solutions will support oil and gas organisations’ goals of improving asset performance, enhancing sustainability and maximising project capital returns. The three companies will combine offerings to bring engineering capabilities, asset lifecycle software solutions and digital specialisation to create a fully formed digital twin to serve as a backbone for improving performance for the upstream sector. The new solution will:

- Bring new assets on stream faster through the use of cloud-enabled software that enhances collaboration and increases engineering efficiencies
- Deliver enhanced safety leading to better business outcomes
- Improve traceability through a single point of accountability
- Enable remote operations and production assurance through a fully functional Living Digital Twin that mirrors all aspects of the operating asset

Together, DORIS, AVEVA and Schneider Electric will provide a structured digital and collaborative solution throughout the project lifecycle that will help oil and gas owner-operators address many of those challenges.

MCS launches Remote Inspection System (RIS)

MCS HAS UNVEILED the Remote Inspection System (RIS). It utilises sophisticated data compression and transfer as well as 3D imagery and data capture to move all work completed from an offshore vessel inspection container onshore.

The solution overcomes travel restrictions and ensures the safety of people by allowing work to be completed anywhere, including at home, with live video feeds and clear voice communication.

Wael Bakr, founder and CEO of MCS, said, “The RIS system is part of our evolution of technologies towards a transformational programme to fully support remote digitisation, automation and machine learning as well as the efficient data management, data gathering and evaluation of inspection asset integrity programmes. It not only overcomes potential challenges caused by COVID-19, but it also saves money and allows inspection campaigns to be completed three times faster than using a traditional offshore team.

“The system has been used successfully by several OPCOs in the Middle East, allowing our clients to maintain maximum efficiency during 24-hour operations. We have delivered reporting from platform inspections just five days after inspection activities were complete, which is much faster than would be expected from a team offshore.”



Wael Bakr, founder and CEO, MCS.

Image credit: MCS

New system for weld purging on-site

HUNTINGDON FUSION TECHNIQUES (HFT) have designed and developed the PurgEye Site, which is manufactured inside a secure, waterproof and dustproof, tough carry case, suitable for on-site welding.

Georgia Gascoyne, CEO for HFT said, "Often, welders are left to guess at purge levels, due to some weld purge monitors not being able to handle various on-site conditions. By using the PurgEye Site, welders can ensure non-oxidised, zero colour welds are achieved regardless of conditions."



Image credit: HFT

The PurgEye Site has a fast response, long life sensor and is equipped with PurgeNet, allowing the monitor to connect to a variety of accessories.

With the housing case open, the PurgEye Site is IP65 rated and IP68 rated with the lid closed. It measures oxygen levels very accurately from 1,000 ppm, right down to 1 ppm (accurate to 10 ppm) with readings in parts per million (ppm) or percentage.

Field shelter delivers off-grid cooling solution

A FIELD EQUIPMENT shelter fitted with fault-tolerant cooling is ensuring the reliability of a wireless communications link that connects instrumentation on a new gas pipeline crossing a Middle Eastern desert to the remote control room.

Fabricated from tough glassfibre-reinforced polyester (GRP) materials, the shelter houses a TETRA basestation powered by solar panels.

Intertec's shelter employs a 'hybrid cooling' system to safeguard the 56 sq m shelter's electronics equipment, and battery power storage compartment – a Zone 1 area. The system consists of a water-based passive cooler assisted by dual-redundant electrically-powered water coolers. This approach combines the intrinsic reliability of passive cooling with active water refrigeration to increase cooling efficiency on hot days. The system can handle a cooling load of around 1.9 kW, ensuring that even during the summer, when ambient temperatures can climb as high as 55 degrees C, interior shelter temperatures will always stay below a worst-case peak of around 35 degrees C.

The remote location means that the basestation is far from the electricity grid, and must be powered by solar energy. The water coolers are a new variant of Intertec's novel Hybricool range that operate directly from a DC power supply, making them an efficient solution for solar-powered installations. These cooling units are specially designed to supplement passive coolers operating in process plants, with a heat exchanger element that can be installed inside the water storage tank of a passive cooling system to decrease temperature.

Cooling efficiency is aided by the shelter's construction, which uses composite wall panels with GRP sheets 'sandwiching' an embedded 85 mm layer of polyurethane foam insulation. In conjunction with a sunshade, this delivers very stable interior environmental conditions compared with conventional metal-based shelters. A further gel-coat layer on the exterior surface provides protection against the climate's very high levels of ultraviolet light, and abrasion from dust or sand. The externally-mounted water coolers additionally feature a centrifugal sediment separator that removes dust and sand, and flaps that close when the cooler is not operational.

"Hybrid cooling for field shelters and cabinets is a major enabler for process plant operators that need to install electronics equipment in remote off-grid locations, and hostile environmental conditions," said Intertec's HVAC project manager, Simon Marlier. "The very high level of reliability that can be achieved by hybrid cooling, and its suitability for applications in hazardous areas, can greatly simplify many common remote and unmanned applications. Among the applications potential are wellhead control systems, SCADA stations on pipelines, battery shelters – especially for lead-acid and lithium-ion types – and off-grid mobile basestations."



Image credit: Intertec

Bp invests in Satelytics

BP VENTURES HAS invested US\$5mn in Satelytics, a cloud-based geospatial analytics software company that uses advanced spectral imagery and machine learning to monitor environmental changes, including methane emissions.

Satelytics collects high resolution spectral imagery from the planet's surface using satellites, drones, and planes. Its technology combines these images with proprietary algorithms to create unique electromagnetic signatures that can be used to detect environmental changes, including releases or leaks. Its software visualises these data sets on interactive displays that give end-users a clear and actionable picture of operations, and alert them to facility risks, like methane leaks.

bp's US\$5mn investment will enable Satelytics to develop its technology further and scale its applications throughout the oil and gas sector. Use of the technology has the potential to be part of bp's aim to install methane measurement at all major oil and gas processing sites by 2023, publish the data and then drive a 50 per cent reduction in methane intensity of its operations.

Morag Watson, bp senior vice president of digital science and engineering, said, "Satelytics is modernising the energy sector by making data about physical assets more accessible and digestible, leading to better



Image credit: bp

decision making. We are excited to work closely alongside their unique team of scientists and technologists to help them evolve their technology and to continue to move the needle on industry digitalisation."

Sean Donegan, chief executive of Satelytics, said, "bp's early use of our detection and quantification software has inspired us to expand our capabilities. bp's investment marks an inflexion point for Satelytics, which will assist us in expanding our technological capabilities and fuel future innovation."

Collaboration on 2D exploration data

PGS AND ION Geophysical Corporation have announced an agreement to collaborate globally on 2D exploration data. Both companies have modern, high-quality MultiClient data libraries that together cover all the significant hydrocarbon provinces around the world.

The new joint data library will comprise nearly a million line kilometres of uniquely complementary data, including many areas of genuine broadband seismic that have substantial opportunity for integration and reimaging. Drawing on PGS broadband 2D GeoStreamer offering and ION's latest imaging technology, the companies will produce enhanced deliverables with higher resolution and greater spatial coverage, offering deeper insights and more reliable pre-stack attributes for exploration screening on a global basis. PGS and ION intend to develop an integrated seamless 2D seismic data library over time, to inform exploration business decisions for E&P operators.



Image credit: Edward Stojakovic/Flickr

The combined data libraries will help E&P companies evaluate frontier investment opportunities.

"The combined 2D data libraries will provide E&P companies with a more efficient way to identify and high-grade attractive frontier investment opportunities," said Berit Osnes, PGS' EVP, New Ventures. "ION's BasinSPAN offering is globally recognised as the benchmark tool for exploration insights at the basin-scale. Referencing and integrating our GeoStreamer enriched 2D data library into that framework will create a valuable opportunity to add resolution to that understanding."

"PGS' global framework of modern data is exceptionally compatible to integrate with ION's BasinSPAN framework to deepen basin characterisation and insights for our customers," said Ken Williamson, executive vice president and chief operating officer of ION's E&P Technology and Services group. "The collaboration extends beyond existing data to include new programme activity and the integration of third-party data where relevant to further augment the value of the offering."

MultiTox MOS Detector for H₂S detection in desert and Arctic environments

TELEDYNE GAS & Flame Detection has introduced the Multitox MOS Detector for H₂S detection in desert and Arctic environments. The Multitox DG-TT7-S (Type D), Simtronics provides best-in-class support when H₂S is a constant threat. By utilising the latest solid-state Metal Oxide Semiconductor (MOS) technology, inside a rugged and durable detector head, Teledyne enables H₂S to be detected easily, without the risk of poisoning, whilst providing sensor life of up to 10 years and an extended five years warranty as standard.

This, combined with the company's innovative Telecapteur Asset Management Software, being developed in partnership with ADNOC, enables automatic visualisation of key information, including instant access to historical calibration data, enabling quick and accurate analysis instead of relying on slower paper-based processes. The software simplifies calibration by reducing the number of operators required from two to one, decreasing OPEX spend and ensuring assets remain fully operational for longer.



Image credit: Teledyne Gas & Flame Detection

New MultiTox MOS detector supported by the Telecapteur calibration management software.

Turning plastic waste into winter diesel

CLARIANT AND VUCHT, the research institute of Duslo, are transforming converted plastic waste into premium winter fuel distillate, using a proprietary technique and Clariant's HYDEX E next-generation hydro-dewaxing catalyst. The efficacy of this groundbreaking process has now been proven in a pilot plant in Slovakia. As plastics and fuels are both mainly composed of natural gas or crude oil, turning one into the other has major implications for sustainable and lucrative fuel production.

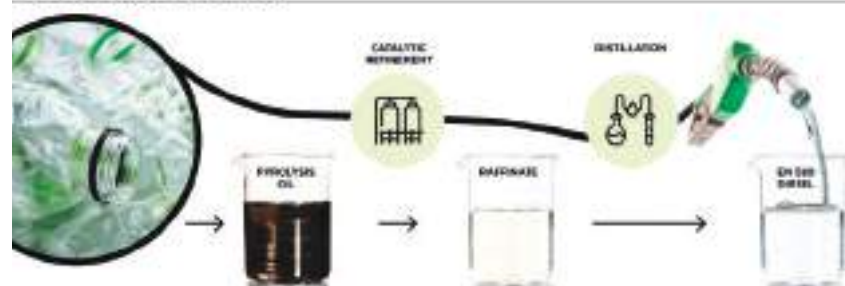
Stefan Heuser, senior vice president and general manager at Clariant Catalysts said, "Upgrading gas oil fractions to more valuable products has become essential for improving refinery economics. Clariant is committed to supporting this customer need through innovations such as HYDEX E. We are honoured to partner with VUCHT in their pioneering plastic waste-to-winter diesel technology, and very pleased about the outstanding performance of our next-generation catalyst in the process."

The institute uses a pyrolysis process to convert a variety of plastic waste (such as polyethylene, polystyrene, polypropylene and PET) into diesel fuel. The process thermally degrades the plastic at temperatures above 300°C (530°F), converting it into liquid oil comprised of various hydrocarbon compounds. Recently, the institute developed a proprietary technique to further convert the liquid oil into a high-quality fuel distillate known as winter diesel.

The winter diesel produced is compliant with Euro 6 fuel emission standards, including cold flow properties specified for temperatures as low as -30°F (-34°C), typically required in Arctic areas. To achieve this extreme improvement in cold flow, Clariant's HYDEX E hydro-dewaxing catalyst was applied. After intensive pilot testing proved the technical viability and economic appeal of the process, VUCHT is planning to expand the method's success in a custom-built demonstration plant with a fuel distillate capacity of 40 metric tons per annum (MTA).

Branislav Brežný, VUCHT's managing director, said, "Scaling up to near-plant capacity was the ultimate test of the practicality and profitability of our proprietary diesel production process, and we are extremely satisfied with the results of our team's innovations. This could not have been achieved without a partner such as Clariant, whose new dewaxing catalyst has delivered beyond expectations."

PLASTIC WASTE TO FUEL



Pioneering plastic-waste-to-fuel technology of Duslo's research institute VUCHT.

Image credit: VUCHT and Clariant

Project Databank

Compiled by Data Media Systems

OIL, GAS AND PETROCHEMICAL PROJECTS, EGYPT

Project	City	Facility	Budget (US\$)	Status
AGIBA - South West Meleiha Development Lease	Western Desert	Oilfield Development	6,00,00,000	Construction
Burullus Gas Company - West Nile Delta Gas Field - Overview	West Nile Delta	Gas Field	12,00,00,00,000	Construction
Burullus Gas Company - West Nile Delta Gas Field - Phase 2 + Phase 3	West Nile Delta	Gas Field Development	80,00,00,000	Construction
ECHEM - Alexandria Propylene Derivatives Project	Alexandria	Propylene	1,70,00,00,000	EPC ITB
ECHEM - Aromatics & Fertilizers Complex (SUPSC Project)	Suez	Aromatics	2,04,40,00,000	Feasibility Study
ECHEM - SCZone Refinery & Petrochemicals Complex - Overview	Suez Canal Economic Zone (SCZone)	Petroleum Oil Refinery	6,20,00,00,000	Feasibility Study
ECHEM - SCZone Refinery & Petrochemicals Complex - Petrochemicals Complex	Suez Canal Economic Zone (SCZone)	Petrochemical Plant	3,20,00,00,000	Feasibility Study
ENI - Nooros Exploration Prospect (Abu Madi West)	Nile Delta	Gas Field	12,00,00,00,000	Construction
EPPC - Propane Dehydrogenation (PDH) and Polypropylene (PP) Complex - Phase 2	Port Said	Polypropylene	1,20,00,00,000	Construction
ETHYDCO - Polybutadiene Plant	Alexandria	Butadiene	20,00,00,000	Engineering & Procurement
Petro Shorouk - Zohr Gas Field Development	Mediterranean Sea	Gas Field	12,00,00,00,000	Construction
Petro Shorouk - Zohr Gas Field Development - Grassroot Natural Gas Processing Plant (Phase 2)	Port Said	Gas Processing	20,00,00,000	Construction
PhPC - Atoll Gas Field	Damietta	Gas Field	30,00,00,000	Construction
SMD - Formaldehyde and Derivatives Project	Damietta	Formaldehyde	4,10,00,000	Engineering & Procurement

TechnipFMC signs a major contract with ANOPC for a new hydrocracking complex in Egypt

TECHNIPFMC HAS SIGNED a major Engineering, Procurement, and Construction (EPC) contract worth more than US\$1bn with Assiut National Oil Processing Company (ANOPC) for the construction of a new hydrocracking complex for the Assiut refinery in Egypt.

This EPC contract covers new process units such as a vacuum distillation unit, diesel hydrocracking unit, delayed coker unit and distillate hydrotreating unit as well as a hydrogen production facility unit using TechnipFMC's steam reforming proprietary technology. The project also includes other process units, interconnecting, offsites and utilities.

The complex will transform lower-value petroleum products from Assiut Oil Refining Company's (ASORC) nearby refinery into approximately 2.8mn tons per year of cleaner products, such as Euro 5 diesel.

Catherine MacGregor, president of Technip Energies, stated, "This award demonstrates TechnipFMC's long-standing relationship with the Egyptian petroleum sector and strengthens our expertise in the delivery of complex projects in the country. It comes after successful execution of the FEED, reflecting our selective approach and the importance of being involved at a very early stage of any development. Assiut is considered one of the major strategic projects needed to meet growing local demand



Image credit: Adobe Stock

The complex will transform lower-value petroleum products into cleaner products.

for cleaner products, and we are extremely honoured to have been selected by ANOPC to contribute to the largest refining project to be implemented in Upper Egypt."

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- Latin America
- North America
- Central America
- Russia & CIS
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- North Africa
- West Africa
- India
- China
- Europe

SECTORS COVERED



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Project Databank

Compiled by Data Media Systems

Project Focus

Compiled by Data Media Systems

Project Summary

Project name	AGIBA - South West Meleiha Development Lease
Name of Client	Agiba Petroleum Company
Estimated Budget (US\$)	60,000,000
Facility Type	Oilfield Development
Status	Construction
Location	Western Desert, Egypt
Project Start	Q1-2017
End Date	Q4-2024
Main Contractor	EDC, SinoTharwa Drilling, Weatherford
Contract Value (US\$)	50,000,000
Award Date	Q1-2017

Background

AGIBA is planning to develop the South West Meleiha Development Lease, located in the Egyptian Western Desert, some 130 km north of the oasis of Siwa. The oil is transported and treated at the Meleiha Plant facilities operated by AGIBA. South West Meleiha oil discoveries were made in 2018.

Project Status

Date	Status
Jun 2020	AGIBA has not yet started the drilling work in SWM 7x. The drilling work is still underway in SWM 6x.
07 May 2020	AGIBA, through its shareholder, Eni, has contracted EDC, Weatherford and SinoTharwa to drill production wells within the field. Six production wells have been drilled so far. Production from the sixth well started on 7 May 2020.
May 2020	AGIBA is preparing to drill two new wells.
Feb 2020	Production has reached 9,500 BOPD.
Jul 2019	Production has started and has reached 5,000 BOPD.
Jul 2018	Eni has made its second light oil discovery on the B1-X exploration prospect
10 May 2018	Eni announced an oil discovery on the SWM A-2X exploration prospect located in the South West Meleiha license. The client also plans drilling of other exploratory prospects located nearby A2-X discovery.
Dec 2017	The drilling work has been started in SWM A2-X.
15 Feb 2017	Eni has started conducting exploration activities.

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	JUNE 2020			VARIANCE From Last Month	MAY 2020		
	Land	Offshore	Total		Land	Offshore	Total
Middle East							
ABU DHABI	40	14	54	0	39	15	54
DUBAI	0	0	0	0	0	0	0
IRAQ	41	0	41	-10	51	0	51
KUWAIT	50	0	50	-2	52	0	52
OMAN	45	0	45	-8	53	0	53
PAKISTAN	17	0	17	0	17	0	17
QATAR	0	5	5	-1	1	5	6
SAUDI ARABIA	82	18	100	-9	90	19	109
SUDAN	1	0	1	-2	3	0	3
YEMEN	1	0	1	0	1	0	1
TOTAL	277	37	314	-32	316	48	346

North Africa

ALGERIA	29	0	29	+2	27	0	27
EGYPT	21	7	28	0	23	5	28
LIBYA	11	1	12	+1	10	1	11
TUNISIA	1	0	1	0	1	0	1
TOTAL	62	8	70	+3	61	6	67

Source: Baker Hughes

التصنيع الجديد داخل مجمع الملك سلمان العالمي للصناعات والخدمات البحرية بمدينة رأس الخير في فبراير/ شباط لغازي. وتتولى شركة أرامكو السعودية تطوير الموقع بالكامل، ومن المتوقع أن يكون أكبر مجمع للصناعات البحرية في الشرق الأوسط.

وكتهدفا دائما، لا تزال المملكة العربية السعودية تترقب على عرش المشاريع الكبرى في المنطقة، مثل مشاريع توسعة حقل المرجان والريز البحرية، حيث تم إبرام عقود تبلغ قيمتها نحو 18 مليار دولار أمريكي لأعمال الهندسة والمشتربات والتنشيد في منتصف 2019 مع شركات تشمل «ماكديرموت» و«سايم» و«إل أند بي هيدروكربون إنجنيرنج». وهناك إشارات أخرى على اجتياز شركات الهندسة والمشتربات والتنشيد لهذه الأزمة بشكل أفضل من شركات خدمات آبار النفط الأخرى، وتعرضها لتأثيرات أقل نسبيا فيما يتعلق بانخفاض رأس المال السوقي بوجه عام. وكان تأثر الأسهم في مجال حفر الآبار البحرية هو الأكبر، وهو القطاع الذي تعرض لهبوط سريع بنسبة بلغت نحو 80 في المائة منذ بداية هذا العام، مقارنة بنسبة خبوط بلغت 27 في المائة تعرض لها قطاع الهندسة والمشتربات والتنشيد، حسب دراسة «ريستاد إنرجي». وفي هذا السياق، قال بيبي باجي عن شركة «ريستاد إنرجي»: «توضح دراسة التحليلية أن الشركات العاملة في مجال الهندسة والمشتربات والتنشيد والتكيب كانت أقل الشركات التي شهدت عزوف المستثمرين عنها». وأشارت الدراسة الحثية أيضا إلى أن الانتشار الدولي يعود بالفائدة على هذه الشركات، لا سيما في أسواق منطقة الشرق الأوسط التي من المتوقع أن تبدي مرونة أكثر من أسواق أمريكا الشمالية والجنوبية.

والمشتربات والتنشيد الأخرى، بما فيها «سايم» و«تكيب إف إم سي» لاستكشاف تدابير خفض التكاليف من أجل عبور هذه الأزمة.

اصمود في وجه العاصفة

من الموارد الإيجابية أن انخفاض تكاليف الإنتاج في منطقة الشرق الأوسط، مقارنة بالمنطقة الجغرافية الأخرى، يعطي نصيبا من الأمل، وهي النقطة التي أبرزها الرئيس التنفيذي لشركة «تكيب إف إم سي» دوج بفردهرت، فني معروض حديثه، عن قطاع التكنولوجيا السطحية، قال: «لا تزال التوجهات بعيدة المدى مواتية للعديد من الأسواق الدولية، مثل الشرق الأوسط. وتوقع ألا تتأثر الإيرادات العالمية في 2020 كثيرا كما الحال مع أمريكا الشمالية». بالإضافة إلى ذلك، تعرض سوق الغاز لتطبات أقل من سوق النفط، فيما يمكن أن يمنح تحول منطقة الخليج إلى مجال البتروكيماويات، شركات الهندسة والمشتربات والتنشيد بعض الارتياح. إذ لم يتم تجميد جميع المشاريع، فقد أبرمت شركة ماكديرموت الدولية سلسلة من العقود الجديدة في المملكة العربية السعودية خلال الأشهر الماضية، وتشمل هذه المشاريع بناء العشرات من الخزانات الجديدة وإبرام عقد منفصل لتنفيذ الأعمال الهندسية والتصميم الواجهة الأمامية للأجزاء العلوية العاصفة بمنصة الرفع البحرية، كما ستعمل الشركة أيضا على إنشاء مجمع أساسي جديد للبتروكيماويات في الجبيل، إلى جانب توقع مجموعة التراخيص والهندسة الأساسية في وحدة C3 GATOHN لإنتاج البروبان بـ 44 ألف طن متري سنويا. واستهدفت ماكديرموت أيضا أعمال الإنشاء في موقع

«جبي إس إنرجي». غير أن عدد عطاءات حقول النفط والغاز الجديدة ربما يكون قد شهد تراجعا خلال النصف الثاني من هذا العام. وقد أفادت دراسة تحليلية أعدتها شركة «ريستاد إنرجي» بأن القيمة الإجمالية للعطاءات المتاحة الخاصة بأعمال الهندسة والمشتربات والتنشيد في مجال حقول النفط والغاز الجديدة، على مستوى العالم، تبلغ فقط 80 مليار دولار أمريكي هذا العام، مسجلة انخفاضا عن القيم السابقة لها والتي قُدرت بنحو 133 مليار دولار أمريكي قبل تفشي فيروس كورونا، بعد تأجيل العديد من المشاريع الجديدة أو إلغائها.

وتوقع البحث أن يتعاقب نشاط تقديم العطاءات بشكل طفيف خلال 2021 ليصل إلى 74 مليار دولار أمريكي. وفي 2019، بلغت قيمة العطاءات الإجمالية على مستوى العالم 170 مليار دولار أمريكي، ونظي هذه المعضلة نظائلا أيضا على قطاع الغاز الطبيعي المسال، مع احتمال تأخر العمل في مشروع توسعة حقل الشمال في قطر.

وعلى الصعيدين العملي والتشغيلي، نسب كوفيد-19 أيضا في إيقاف العمل في العديد من مشاريع الهندسة والمشتربات والتنشيد الجارية بسبب تطبيق البروتوكولات الصحية الصارمة، والتأثير الذي لحق بسلاسل التوريد، هذا إلى جانب القيود على السفر وحالات الإغلاق التام التي فرضتها الحكومات. وقد أشارت شركة «بروفاك» في ملاحظاتها للمضمنة خلال اجتماعها السنوي الذي عُقد في 15 مايو/أيار هذا العام، أن هذا وحده قد تسبب في تأخير وصول المواد لأنشطة التنشيد، وهو الأمر الذي لن يتم الصاق منه في 2020.

هذا، ونسعى «بروفاك» وغيرها من شركات الهندسة

مفكرة الفعاليات 2020

سبتمبر/أيلول

15 - 14	منتدى الكويت للصحة والسلامة والبيئة	www.hse-forum.com	الكويت
16 - 14	معرض عُمان للبتروكيمياويات والطاقة	www.omanpetroleumandenergyshow.com	مسقط
17 - 14	مؤتمر ومعرض الشرق الأوسط لعلوم الأرض	www.geo-expo.com	المناحة
29 - 28	منتدى دبي للصحة والسلامة والبيئة	www.hse-forum.com	دبي
أكتوبر/تشرين الأول			
27 - 26	منتدى البحرين للصحة والسلامة والبيئة	www.hse-forum.com	المناحة
نوفمبر/تشرين الثاني			
12 - 9	مؤتمر ومعرض أبوظبي الدولي للبتروكيمياويات	ADPEC www.adpec.com	أبو ظبي



مشرطات أرامكو السعودية كانت فوق النجاة لشركات المقاولات

المقاولون يعانون شح الموارد العالية

كانت دول الخليج على أهبة الاستعداد لإطلاق عدد من مشاريع الطاقة الأضخم على مستوى العالم، غير أن الرياح آتت بما لم تشتهه السفن. فقد جاء كوفيد-19 بهجمته المفاجئة، ولكن كيف أثر ذلك على سوق الهندسة والمشتريات والتشييد في المنطقة؟ فعلى خلفية خفض إنتاج البترول وتدني الطلب العالمي عليه في جميع أنحاء العالم الذي يواجه معركة ضارية مع الجائحة المنتفخة، فضلاً عن التوقعات التشاؤمية حيال الاقتصاد العالمي المستقبلي، بات يتعين على واضعي الخطط المتعلقة بالطاقة في الخليج التفكير في طرق للتعاوي من هذه التأثيرات.

إدارة المشروع وعلى الرغم من ذلك، فإن بتروفاك لا تزال تمارس عملها لإنجاز ما تبقى من مشاريع أبوظبي العملاقة التراكمية التي تبلغ قيمتها سبعة مليارات دولار أمريكي وتواصل طرح العطاءات لعقود أخرى، ومن المتوقع أن يؤثر إلغاء عقد دما على أوقات إرساء العقود الأخرى.

تدلي نشاط تقديم العطاءات

شهدت «أدنوك» نشاطاً جليلاً، لا سيما في مطلع عام 2020، كما منحت شركة «إس إن سي لافاين» عدة عقود للعمل في المرحلة الثانية من حقل حلية الواقع في منطقة امتياز شركة الطفرة للبرزل، وهي إحدى المشاريع للشركة بين «أدنوك» وشركة النفط الوطنية الكورية

الظروف الصعبة العالية» حسب البيان الذي أصدرته بتروفاك في 16 أبريل/نيسان، ومشروع دما هنا هو جزء من امتياز «عشا» للغاز عالي الجودة، والذي يعد أساساً لهدف «أدنوك» الاستراتيجي المتمثل في تحقيق الاكتفاء الذاتي من الغاز في دولة الإمارات، ويهدف هذا المشروع إلى توفير ما يقرب من 20 في المائة من الطلب المحلي على الغاز بحلول النصف الثاني من العقد الحالي. ومن المتوقع إنتاج ما يزيد على 130 ألف برميل نغص يوميا إلى جانب نتائج التكيف عالية القيمة التي يُتوقع إنتاجها بعد انتهاء العمل في المشروع. وفي سياق مماثل أرست «أدنوك» عقداً على شركة كيلوج براون لنز روت ضمن مشروع «عشا» للغاز، غير أن الأخيرة لم تعلن عن أي تأثيرات على دورها الاستشاري في

هذا السيناريو الذي لا يدعو للتفاؤل يُلقى بظلاله على المشاريع والجدول الزمني، وكانت له عواقب غير مباشرة على المقاولين في مجال الهندسة والمشتريات والتشييد الذين شهدت أعمالهم تدهوراً ملحوظاً في منطقة الشرق الأوسط على مدى عقود. فهذه التأثيرات تجعل بوضوح في إنهاء شركة بتروفاك الوطنية «أدنوك» - خلال شهر أبريل/ نيسان الماضي - عقدين مع شركة بتروفاك الإمارات مشروع تطوير دما للغاز. إنها خبرته فاسمة فقد بلغت قيمة الأعمال الموكنة إلى شركة بتروفاك الإمارات من العقد الذي تمت ترسيته في فبراير/شباط الماضي قبل نفثي الجائحة مباشرة 1.1 مليار دولار، وتتعاون شركة المقاولات الآن مع «أدنوك» لاستكشاف «خيارات بديلة» لتقديم هذا المشروع «في ظل

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Liugong Dressta Machinery sp. z o.o.....	2
Oswal Industries Limited.....	37
Reflex Marine.....	18
Saga PCE Private Limited	5
Wilhelm Layher GmbH & Co. KG.....	9

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