

TECHNICAL REVIEW

النشرة التقنية - الشرق الأوسط

MIDDLE EAST

Vol 37/Issue Four 2021

ANNUAL MINING REVIEW

Qatar economy

On the path of
sustained expansion

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Providing
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CONTENTS

BUSINESS & MANAGEMENT	
Market News	4
AD Ports Group and GCPI Iraq sign MoU to promote investments; Etihad Water and Electricity advances digital roadmap; UAE embraces innovation with international conferences and events	
ANNUAL MINING REVIEW	
Sustainability in focus	16
ANALYSIS	
Qatar economy	22
On the path of sustained expansion	
MATERIALS HANDLING	
Electric forklifts	28
Benefits of switching to battery power	
TYRES	
Solutions for mining	30
Tyre range to withstand the stress of rough terrains	
POWER	
Sustainability	32
How digitalisation is supporting sustainability objectives of power companies	

CONSTRUCTION	
Android approach	34
Redefining building operations	
The Big 5	
The first in-person construction event in Dubai, in two years hosted global professionals	
TRANSPORT	
Case study	38
Charging stations for e-bus fleet in Jena	
WATER MANAGEMENT	
Innovative technologies	39
Air-to-water solutions for resolving water crisis	
TECHNOLOGY	
Converting fibre optic cables into sensors	44
Monetising fibre optic technology	

EDITOR'S NOTE

THIS ISSUE OF the magazine focuses on sustainability technologies in the mining industry and touches upon automation as well as electrification in the sector (p 16).

Economist Moin Siddiqi, takes a look at the sustained expansion path of the Qatar economy on pages 22, 24 and 25.

The feature on Android technology for buildings, talks about the Brownfield Revolution transforming real estate in the Middle East (p 34).

The Materials Handling articles (p 28,29) bring you innovations in the sector.

Elsewhere in the issue, we have an interview that sheds light on how digitalisation is helping power companies meet sustainability objectives (p 32).

At Technical Review we always welcome readers comments to treme@alaincharles.com



28



35



39

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TECHNICAL REVIEW

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MIDDLE EAST

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Country	Representative	Telephone	Fax	Email
India	Tanmay Mishra	+91 98800 75908		tanmay.mishra@alaincharles.com
Nigeria	Bola Olowo	+234 8034349299		bola.olowo@alaincharles.com
UK	Richard Rozelaar	+44 20 7834 7676	+44 20 79730076	richard.rozelaar@alaincharles.com
USA	Michael Tomashefsky	+1 203 226 2882	+1 203 226 7447	michael.tomashefsky@alaincharles.com

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Head Office: Alain Charles Publishing Ltd
University House, 11-13 Lower Grosvenor Place, London, SW1W 0EX, UK
Tel: +44 20 7834 7676, Fax: +44 20 7973 0076

Middle East Regional Office: Alain Charles Middle East FZ-LLC
Office L2- 112, Loft Office 2, Entrance B, Dubai Media City, Dubai, UAE
Tel: +971 4 448 9260, Fax: +971 4 448 9261

Serving the world of business

Briefly

Sharjah strengthens economic ties with Portugal

THE SHARJAH CHAMBER of Commerce & Industry (SCCI) received a high-level Portuguese delegation, headed by Eurico Brilhante Dias, Portugal's Secretary of state for internationalisation, to discuss strengthening economic relations between Sharjah and Portugal.

The delegation was received by HE Abdullah Sultan Al Owais, chairman of the SCCI, in the presence of HE Mohammed Ahmed Amin Al Awadi, director-general of the Sharjah Chamber.

The visiting delegation included Marta Costa, the Portuguese Assistant Minister of state for globalisation; Francesca Guedes de Oliveira, deputy commissioner-general of the Portuguese delegation participating in Expo 2020 Dubai; and Daniel Pontas, economic adviser at the Portuguese Embassy in the country.

The meeting explored the areas of cooperation between the two countries and the importance of organising joint programmes that serve the interests of their business communities, as well as a trade mission to Portugal in 2022, to enhance economic, trade and investment bilateral relations.

Al Owais welcomed the visiting delegation and pointed to the depth of relations between Sharjah and the Portuguese business community, thanks to the mutual visits of official and commercial delegations between Sharjah and Portugal, which culminated with the launch of the first Portuguese Business Council in Sharjah in January 2021, in addition to organising the Sharjah-Portugal Business Forum in cooperation with the Aicep Portugal Global last June.

The SCCI chairman showcased before the Portuguese delegation, Sharjah's economic growth and future projects across all sectors and invited Portuguese businessmen and companies to invest in Sharjah and participate in relevant international events, as they provide invaluable opportunities to forge partnerships with UAE companies and institutions.

AD Ports Group and GCPI Iraq sign MoU to promote investments

AD PORTS GROUP, one of the leading global drivers of trade and logistics, has signed a Memorandum of Understanding (MoU) with the General Company for Ports of Iraq (GCPI) to promote increased cooperation between the two organisations within the fields of transportation and maritime.

Set for an initial period of 12 months with a clause for automatic renewal, the MoU will see the exchange of expertise and best practices by both organisations. AD Ports Group will also conduct feasibility studies on the management and operation of the General Company for Ports of Iraq's ports and economic zones and other infrastructure, while also exploring potential investment opportunities.

As part of its scope, AD Ports Group will also develop national infrastructure, such as roads and rail networks, which will connect Al Faw Ports in Iraq with markets in Jordan and Turkey, while simultaneously financing the feasibility studies stated in the MoU.

Suhail bin Al Mazrouei, Minister of Energy and Infrastructure in the UAE, commented, "In line with the wise leadership's vision, the signing of this MoU exemplifies the UAE's drive to enhance cooperation with sister Arab states. Leveraging the lessons learned as part of our nation's pursuit to develop strategic sectors and build frameworks that contribute to the economic and social development of the UAE, we are transferring this invaluable knowledge to our kin in Iraq in order to support the formulation of a diverse and sustainable economy in Iraq."

Nasser Hussein Al Shebly, Minister of transportation in Iraq, said, "It is our privilege to



Photo Credit : AD Ports Group

The MoU aims to accelerate the UAE's drive to enhance cooperation with sister Arab states.

announce the start of this new cooperation with AD Ports Group. The MoU will serve as the starting point for future collaboration that will drive the development of a wide range of services, while also supporting investors across both our proud nations. It also sets the foundation to foster an Arab ports' ecosystem that can cater to the increasing global demands of this sector and keep pace with ambitious plans of the governments in Iraq and the UAE."

Mohamed Juma Al Shamisi, group CEO, AD Ports Group, noted, "The signing of this strategic MoU with the General Company for Ports of Iraq is a vital step in the efforts to enhance our regional and global status within the maritime transportation and logistics industries. We are confident that the cooperation with Iraq will serve as the foundation of a promising future of success and developmental opportunities that will benefit both nations."

Ethiad Water and Electricity advances digital roadmap to enhance customer experiences

ETIHAD WATER AND Electricity (Etihad WE) has announced that it is embarking on the next phase of its digital transformation journey with global technology company SAP to optimise experiences for more than 1.3 million persons in the UAE.

As part of its digital transformation roadmap, Etihad WE will move all its business process workflows to SAP cloud in the UAE. This will help Etihad WE to achieve better levels of customer experience, optimise asset management and additional business processes, whilst promoting environmentally sustainable development.

Owned by the Emirates Investment Authority, Etihad WE, which provides electricity

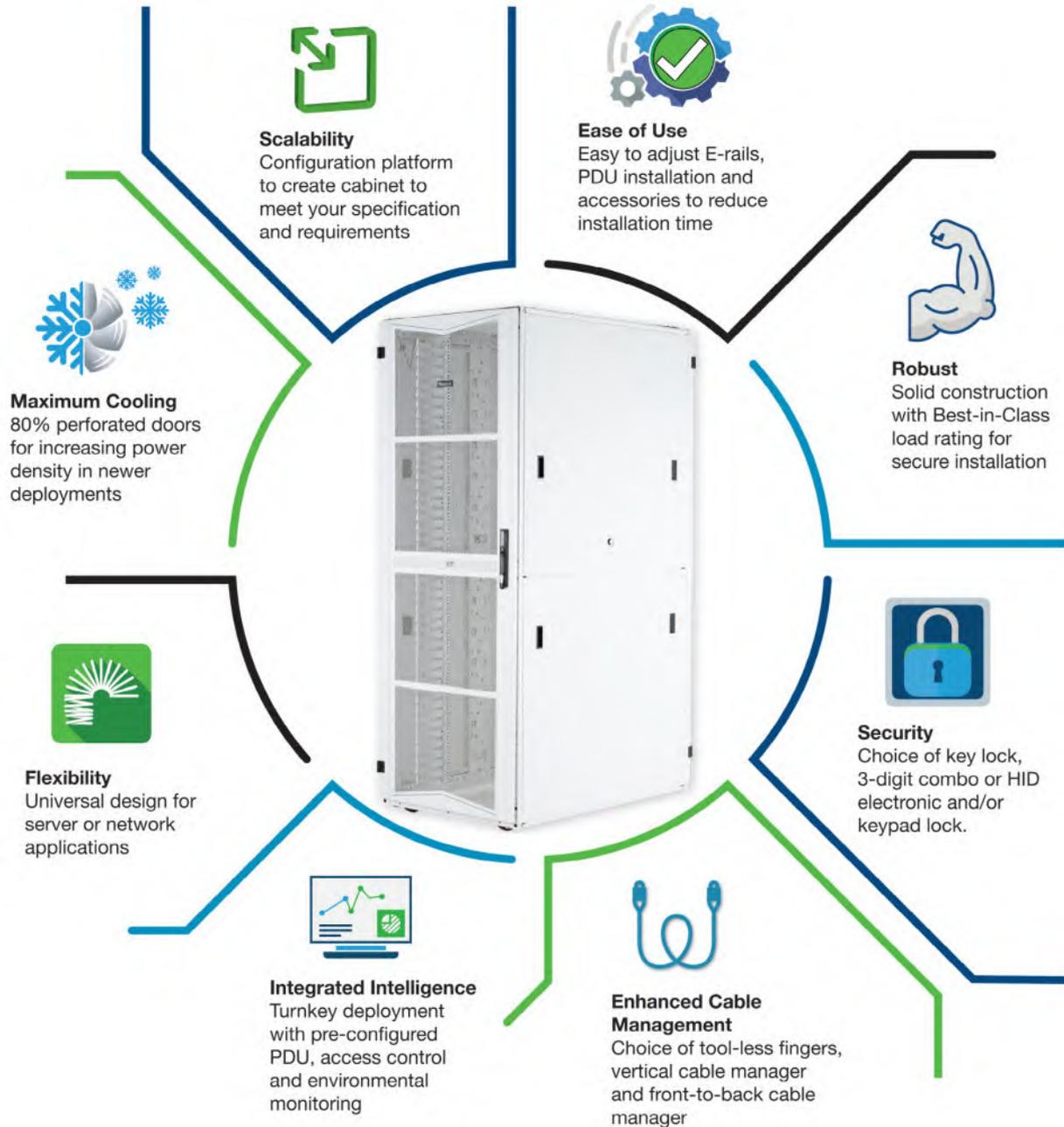


Photo Credit : Etihad WE

HE Mohammad Mohammad Saleh Abdulwahed is the director-general of Etihad WE.

and desalinated water to the Northern Emirates, has already installed 30,000 smart meters, with the goal of installing 350,000 meters in the near future.

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UAE embraces innovation with international conferences and events

THE UAE CONTINUES to celebrate innovators and bright minds from around the world, attracting and encouraging them to provide innovative and sustainable solutions to global humanitarian and development challenges to ensure a brighter future for humanity.

The awards that the UAE offers are a major factor in consolidating its position as an international hub for innovation, an attractive destination for creative minds, and an incubator for innovators from all over the world.

HE Saeed Mohammed Al Tayer, managing director and CEO of Dubai Electricity and Water Authority's (DEWA), said that the numerous awards launched by the UAE show the growing role of the country and its wise leadership in transforming challenges into opportunities.

Some of the most prominent of the international awards launched from the UAE are:

Zayed Sustainability Prize

The UAE's leadership launched the Zayed Sustainability Prize in 2008 to honour the legacy and vision of the late Sheikh Zayed bin Sultan Al Nahyan to lay a solid foundation for sustainability. The prize honours global small and medium enterprises (SMEs), non-profit organisations, and high schools that present innovative, sustainable solutions capable of making a positive societal impact, and



HE Saeed Mohammed Al Tayer spoke on the importance of the UAE in incubating innovation.

covers five categories: health, food, energy, water, and global high schools. The 2022 winners will be announced during the Abu Dhabi Sustainability Week in January 2022.

The World Green Economy Summit

The World Green Economy Summit (WGES), organised by DEWA and the World Green Economy Organisation (WGEO), plays an important role in raising awareness on the green economy and promoting green projects in the UAE and the region. WGES, which is held this year under the theme 'Galvanising Action for a Sustainable Recovery,' is a strategic platform to support international collaboration to address global challenges, enhance sustainable development and green economy investments, as well as

encourage the adoption of effective relevant policies and plans.

WGES attracts country heads, leaders, and influencers from across the globe. The event also draws thought leaders, specialists and experts in green economy and sustainable development along with CEOs, stakeholders, financial institutions, representatives of global markets, business leaders, and experts in the public and private sectors.

The 7th WGES will take place on 6-7 October 2021 at Expo 2020 Dubai. Coinciding with Expo 2020, this year's summit is expected to have a wider reach compared to previous ones. This will improve WGES' success in promoting Dubai's position as a global hub for green economy.

The Emirates Energy Award

The Dubai Supreme Council of Energy launched the Emirates Energy Award (EEA) to encourage individuals and establishments in the Middle East and North Africa to rationalise their energy and resource consumption, as well as highlight best practices in energy efficiency, clean energy, sustainability and environmental conservation.

Ahmed Buti Al Muhairbi, secretary general of the Supreme Council of Energy, said, "We strive to enhance the position of the EEA by sharing the efforts and innovations of experts and stakeholders with regional and global energy communities."

Mitsubishi Heavy Industries begins operations of Dubai Metro and Dubai Tram

KEOLIS-MITSUBISHI HEAVY Industries (MHI) Rail Management and Operation LLC, has begun operations of Dubai Metro and Dubai Tram in Dubai, UAE.

This marks Mitsubishi Heavy Industries Engineering's first direct participation in operation of overseas urban rail transport systems, contributing a safe and smooth system for the Expo 2020 Dubai, which starts on 1 October 2021. The business concession covers a maximum of 15 years' operation, comprising a nine-year agreement and a six-year option to extend.

To celebrate the handover, Al Rashidya metro depot in Dubai, welcomed HE Mattar Mohammed Al Tayer, director general, chairman of the board of executive directors, Roads & Transport Authority, Bernard Tabary, international CEO, Keolis Group, Kentaro Hosomi, chief regional officer for



Europe, Middle East and Africa of Mitsubishi Heavy Industries, and Wallace Weatherill, managing director of Keolis-MHI.

HE Al Tayer commented, "Dubai Metro currently constitutes the backbone of transportation systems in Dubai. It links vital areas and provides safe and smooth mobility for riders.

"The metro is a brilliant addition to

Dubai's iconic landmarks as it uses state-of-the-art rail technology. Billed as the longest driverless metro project worldwide, Dubai Metro contributed to boosting the global competitiveness of Dubai and its success in hosting mega-events, such as Expo 2020 Dubai, which will be launched this October."

Mitsubishi Heavy Industries has been providing high quality operation and maintenance services for urban transport systems, including the EPC of the Dubai Metro, as well as vehicle and system maintenance for urban transport systems in Qatar and the Philippines.

Keolis Group CEO Marie-Ange Debon concluded, "We are very excited to begin operating Dubai's world-class metro and tram networks in collaboration with MHI and MC."



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Looking Forward

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Briefly

Electric vehicle sales to cross six million in 2021

GLOBAL ELECTRIC VEHICLE (EV) sales are expected to vault over six million this year, says Wood Mackenzie, energy research and consultancy firm.

According to Wood Mackenzie, EV sales in the first half of 2021 nearly tripled worldwide compared to the first half of last year and the share of EV sales in global passenger car sales doubled compared to the same period last year and now stands at 7% globally.

Wood Mackenzie's head of road transportation Ram Chandrasekaran said, "H2 2021 sales will likely outperform H1 sales of 2.4 million EVs. The current trend points to levels slightly more than 6 million for the full year, with year-long sales exceeding 2.5 million each in China and in Europe. Policy measures passed by both regions for a green recovery from the COVID crisis appear to have a positive effect as far as the passenger transport sector is concerned."

The research claims that China led the battery electric vehicle (BEV) market in H1 2021. The country's share of BEVs leapt to 9.3%, nearly 2% higher than the European share. In terms of total numbers, BEV sales in China reached 900,000 units, nearly double the sales in Europe.

Apart from the two-year extension of subsidy policy, China's dominance in the BEV market is a result of the promotion of BEVs at both ends of the price segments. At one end is Wuling's Hongguang Mini priced at US\$5,000 and with 180,000 in sales in H1 2021. At the other end are Tesla's Model 3 and Model Y which recorded 161,000 in sales in H1 this year and cost about nine times as much as the Mini.

The EV share in the US has gone up by 1.4%, resulting in over 270,000 sales in the first half of the year. Price continues to be a pain point for consumers as EVs are mostly catered to the luxury end of the segment. Although the new US administration has announced support towards transport decarbonisation, regulatory and legislative changes have been slow.

Chandrasekaran also added that China and Europe combined for more than 85% of all EV sales in H1 2021 and the two regions are clearly the vanguard for transport decarbonisation, but there needs to be a focus on making it a more global phenomenon.

Cummins Arabia commits to hydrogen evolution in the MENA region

THE RECENTLY CONDUCTED second MENA Energy Meet featured a collaborative platform for global and regional energy stakeholders, policymakers and government officials to discuss approaches and solutions aimed at shaping the future of the energy sector.

Cummins Arabia, a part of the above-mentioned consortium, was represented by Alan D Kneisz, global business development director, Hydrogen and Fuel Cell, Cummins, who elucidated the company's energy transition endeavour. As part of his presentation, he explained how Cummins has been trying to expand its footprint across the world with its hydrogen technology, for a sustainable future. Cummins has been one of the leading research and innovation companies for low-carbon technologies. With more than 70 years of electrolysis and more than 25 years of fuel cell production experience, it has built a hydrogen technology portfolio and expertise in battery, fuel cell and hydrogen production technologies.

Kneisz spoke about how the demand for fossil fuels might dramatically decrease by 2030, giving rise to hydrogen energy demands, and how the MENA region is poised to become a world leader in fulfilling the same. He expounded on the region's potential because of the captive markets both locally and in Europe, having large demands of green hydrogen with aggressive decarbonisation targets.

Showcasing the highlights of Cummins' experience in electrolysis and fuel cell projects and its 'Green Hydrogen Ecosystem', the presentation



Photo Credit: Adobe Stock

Demand for fossil fuels might dramatically decrease by 2030, giving rise to hydrogen energy demands.

highlights also showcased the Cummins product line - for both stationary and mobility applications, and the world's most advanced fuel cell modules.

The audience was led through the benefits of the advent of the hydrogen ecosystem - leading to zero emissions and as a low-cost alternative over CCUS. The focus was also on ease of adoption, achieved through zero-emission funding for carbon reduction in cities and with local partnerships. Touching upon the much-debated topic of scalability, Kneisz commented on how Cummins is placed to achieve the same for hydrogen and fuel cells production and deployment in the MENA region, a fact backed by the world's first large FCEV bus fleet and the world's largest fuel cell project with Alstom.

The representation was concluded by stressing the economic ability of Cummins to deploy large-scale hydrogen projects, mass production facilities and participation in different global energy councils (such as hydrogen councils).

ACCIONA to operate three sewage treatment plants in Saudi Arabia

ACCIONA, ALONG WITH its local partners Tawzea and Tamasuk, has been awarded the financing, construction and 25-year operation of the Madinah-3, Buraydah-2 and Tabuk-2 sewage treatment plants in Saudi Arabia.

These new contracts, awarded by the state-owned Saudi Water Partnership Company (SWPC), are worth a combined US\$1bn.

These are the first BOOT/EPC (Build, Own, Operate and Transfer / Engineering, Procurement and Construction) contracts that ACCIONA has signed in the area of wastewater treatment in the Middle East.

The Madinah-3 wastewater treatment plant (WWTP) will be located in Medina, the fourth most populated city in Saudi Arabia with more than 1.1 million inhabitants, and will have a capacity of 200,000 m³/day (expandable to 375,000 m³/day) to treat urban wastewater. ACCIONA will be responsible for the facility's development, design, financing, construction,

operation and maintenance for 25 years.

The group will also build 23 kilometers of recycled water collectors for irrigation, three storage tanks and the respective pumping stations.

The Buraydah-2 (150,000 m³/day) and Tabuk-2 (90,000 m³/day) sewage treatment plants are located in rural areas in the central and northern regions of the country, respectively, and will serve one million inhabitants.

ACCIONA will develop, design, finance, construct and operate these two facilities for 25 years and will also build 34 kilometers of recycled water collectors for Buraydah-2 and another 28 kilometers of collectors for Tabuk-2.

In the southwest of the country, on the Red Sea coast, ACCIONA is currently developing the Shuqaiq1 and Shuqaiq3 desalination plants, which will have a treatment capacity of 400,000 cu/m per day, and 450,000 cu/m per day, respectively.

Veolia confirms growth in mobile water services

VEOLIA WATER TECHNOLOGIES, a subsidiary of the Veolia group and leading specialist in water treatment, continues its investment in its mobile water services offering through the development and construction of a new regeneration and recycling service centre and mobile assets in Dammam, Saudi Arabia. The facility will regenerate and recycle the resins used in the mobile water treatment process, an important sector of activity for Veolia.

The new Dammam service centre as well as a similar facility in Heinsberg, Germany, are important expansions of the company's mobile

water services and demonstrate the commitment to support its Impact 2023 strategy. The location will grant access to regional industrial manufacturing, supporting customer operations throughout the Kingdom as well as Qatar, Oman, Kuwait, Bahrain and Egypt, providing them with long-term value and support through local access to this flexible and innovative service.

Mobile water systems represent a cost-effective alternative to fixed plants in a wide range of industrial applications and circumstances, be it an emergency situation or planned for commissioning, refurbishment, or maintenance applications. Contracts can range from a few days to multi-year agreements.

Mark Dyson, vice-president of Veolia's mobile water business, explained, "This service centre enables us to bring our unique innovative service to support our customers in the region with mobile water treatment technologies and expertise anytime and anywhere. This service will enable our customers to have greater resilience around business continuity and ensure a reliable and compliant supply of treated water in the event of an unforeseen circumstance, providing peace of mind and stable operations."



The facility will regenerate and recycle the resins used in the mobile water treatment process.

Photo Credit: Adobe Stock

Konecranes receives Gold rating from EcoVadis

KONECRANES HAS RECEIVED a Gold rating from EcoVadis for its sustainability work. The company's actions, policies and reporting put it in the top 4% of all rated companies globally, and it is in the top 1% of its general-purpose machinery peers.

Konecranes' rating improved from 2020 due to implementation of additional policies, increased transparency and additional certifications, business sustainability rating provider EcoVadis said, declaring the company's overall sustainability performance to be on an advanced level in activities related to the environment, labour and human rights, ethics and sustainable procurement.

UKEF unveils new deal in the UAE

UK PRIME MINISTER Boris Johnson announced that a US\$36mn clean growth loan from UK Export Finance (UKEF) will help complete BEE'AH'S headquarters in the UAE.

ANNOUNCED ALONGSIDE the 'Partnership of the Future' during the visit of HH Sheikh Mohammed bin Khalifa bin Zayed Al Nahyan, President of

the United Arab Emirates to the UK, the project is a shining example of British innovation in sustainable construction within the UAE.

"The UAE and the UK share a long and rich history, but with today's agreement we are looking to the future. By working ever more closely together, our nations will be at the forefront of the industries of the future, helping to tackle climate change and boost prosperity," commented Johnson.

The UKEF Bee'ah Deal

The new green building, designed by late British architect Dame Zaha Hadid, will be entirely powered by renewable energy generated from its solar panels and waste-to-energy systems and be one of the most sophisticated 'smart offices' in the world.

It is the first clean growth loan issued by UKEF, the UK's export credit agency, in the Middle East.

The building now includes new interalia office-of-the-future technologies that makes it one of the first artificial intelligence integrated buildings of its kind in the world, recognised with the Digie award for "Most Intelligent Building – Corporate Headquarters".



New US\$36mn clean growth loan from UKEF to complete the construction of Bee'ah's new green headquarters in Sharjah, UAE.

Photo Credit: Adobe Stock

Briefly

Terex Materials Processing to Offer ORBCOMM's factory installed LTE telematics solution

ORBCOMM INC., A GLOBAL provider of Internet of Things (IoT) solutions, announced that Terex Materials Processing (Terex MP), a business segment of Terex Corporation (Terex), will now offer ORBCOMM's factory - installed LTE telematics solution as standard across several of its brands, including Powerscreen Finlay Terex and EvoQuip, produced at the Terex MP manufacturing facility in Hosur, India.

The extension will broaden distribution of ORBCOMM's latest LTE telematics device and next-generation data reporting and analytics platform, FleetEdge 4, to new geographies for Terex MP heavy equipment, including India and various other Asian, African and Middle Eastern countries as well as Australia.

Using ORBCOMM's connectivity and data acquisition capabilities, Terex MP can easily monitor various types of heavy machinery, increase operational efficiency and provide significant cost savings to their customers. Terex MP's customers will gain deeper insights into how their machines and entire fleets are performing through dynamic dashboards, filters and custom reports.

"With ORBCOMM's enhanced FleetEdge4 platform, Terex MP customers around the world can utilise our advanced analytic, predictive and diagnostic tools to access deep data insights for every type of machinery, optimising fleet management, uptime and performance," said Christian Allred, ORBCOMM's executive vice-president of Global Sales.

"ORBCOMM's leading telematics solutions are integral to our business and provide significant value to Terex MP customers by helping them monitor and manage their fleet remotely and grow their business," said Paul Morris, telematics manager for Terex MP.

"We look forward to continuing to work and collaborate with ORBCOMM on technology innovation, including expanded machine data collection and more robust analytics, to support the future needs of our global customer base," he added.

Briefly

World Utilities Congress to launch in Abu Dhabi

THE ABU DHABI National Energy Company PJSC (TAQA), one of the region's largest listed integrated utility companies, announced that it will be the official host of the World Utilities Congress, a global exhibition and conference which aims to address the future of low carbon power and water supplies.

Organised by dmg events, the congress will be an in-person event taking place in Abu Dhabi in May 2022. The event is set to be supported by the UAE's Ministry of energy and infrastructure, Abu Dhabi Department of Energy (DoE), Department of culture and tourism – Abu Dhabi (DCT Abu Dhabi), Emirates Nuclear Energy Corporation (ENEC) and Abu Dhabi National Exhibitions Company (ADNEC).

Christopher Hudson, president, dmg events, organiser of the World Utilities Congress said, "The World Utilities Congress will enable the energy and utility sector to forge new strategic partnerships that will help shape the future of the global utility industry. Through the exhibition, the energy industry will be enabled to showcase the latest technologies, products services and solutions to support the drive to net zero."

The events focus according to the organisers is said to be on the proactive measures for decarbonisation, curbing carbon emissions and attracting the long-term capital investment needed for a sustainable future.

According to the hosts, the World Utilities Congress will give power and water utility leaders an unrivalled opportunity to explore innovation and technological advances across the global industry, whilst addressing challenges of rapid urbanisation, decarbonisation, decentralised energy, customer empowerment, sector convergence and more.

The event is to be held at the Abu Dhabi National Exhibition Centre (ADNEC) as both an exhibition and conference, the World Utilities Congress aims to grant the utility industry direct access to growth opportunities in the UAE and wider MENA region, as well as with the fast-growing economies of Asia.

Metso Outotec's technology to eliminate water consumption

METSO OUTOTEC IS set to supply a sustainable screening technology for an iron ore project in the southern hemisphere. The undisclosed order value has been booked under the minerals segment's third quarter of 2021's orders and the start of the project is scheduled for the first half of 2024.

The order for the product screening and scalping application covers 12 Metso Outotec BSE series (Banana screen elliptical) tandem screens and 4 MF series screens, all equipped with 305PS screening media. In addition, the contract covers a metrics monitoring system for screens, expert support and installation services.

According to Metso Outotec, the need to reduce water in iron ore production and other mineral processing is a critical global challenge and the innovative and patented BSE series screens enable iron ore processing even with higher natural moisture content without adding water.

Jouni Mähönen, vice president, screening business line, Metso Outotec said, "We are pleased that the customer chose Metso Outotec for sustainable screening solutions for their process. The BSE screen is an outstanding option for their needs. The elimination of process water ultimately results in lower processing costs, increasing the customer's competitiveness and profitability in the iron ore global markets."

Metso Outotec says that it is possible to adopt a natural moisture screening process and at times when the mineral processing does not require water processing for ore upgrading, the BSE screening technology eliminates the use and storage of water which leads to a reduced energy consumption due to the removal of pulp handling equipment such as pumps, dewatering equipment



Photo Credit: Metso Outotec

Metso Outotec BSE series eliminates water consumption in the screening process

thickeners.

Metso Outotec BSE screening technology is a planet positive solution says the company and the following results are to be expected by the customer after the implementation. The company claims the BSE Series screens enable elimination of process water in the screening process and a 93% reduction of the plant's overall water consumption and eliminates the need for tailing dams. The energy consumption from the entire plant is set to be reduced compared to the wet screening process with a savings of 18,000 MWh/year with a 30% increase in screening capacity compared to traditional screening. The technology helps increase safety during media change-outs using the unique 'Hammerless attachment system' and the company claims to record a reduced CAPEX due to the adoption of high-performing BSE screens. Metso Outotec also features a wide range of screening solutions designed to meet regional specifications and needs.

MYCRANE set to expand with new franchisees

MYCRANE, THE DIGITAL platform for the search and selection of cranes has appointed four new franchisees. The appointments confirmed the launch of operations in the markets of the UAE, Oman, Kazakhstan and Uzbekistan and the opening of operations in Dubai, Muscat, Nur-Sultan and Tashkent.

The online business-to-business platform aims to simplify the process of crane rental procurement, allowing users to submit details of their lifting requirements in order to receive personalised quotes from a range of registered crane providers.

Mycrane has been developed by Andrei Geikalo, a former commercial director at heavy lift specialist Mammoet. Welcoming his new partners, Geikalo said, "The confirmation

The platform aims to simplify the process of crane rental procurement.



Photo Credit: Adobe Stock

of four franchisees so soon after our launch is a testament to the strength of the MYCRANE concept."

According to Mycrane, the platform also includes a marketplace to advertise used equipment, rigging equipment, spare parts and auxiliaries and career vacancies.

Photo Credit: Adobe Stock



KEPCO KDN presents a wealth of IT expertise for the UAE.

KEPCO KDN opens first Abu Dhabi branch

THE KEPCO KNOWLEDGE Data Network Co Ltd (KEPCO KDN), a specialist in ICT technology, has opened its first branch in Abu Dhabi to facilitate knowledge exchange and new business development between Korea and the UAE.

Since its establishment in 1992, KEPCO KDN has contributed to the energy industry through ICT technology and advancement, and is a leader in the Korean clean energy industry.

Jang Hyun Kim, CEO of KEPCO KDN, said, "KEPCO KDN has consolidated its position as a leader in its field, and will collaborate with local companies on ground-breaking projects such as the development of nuclear power plants ICT - a sector which lies at the heart of the electric power industry today."

"We are looking forward to technology exchange and business development in the areas of nuclear power plant ICT and cyber security as we initiate leading-edge projects within the UAE."

The UAE and Korea have maintained cooperative relations in the fields of economy, culture, and technology since 1970. In 2009, when UAE adopted nuclear power technology to fuel economic growth and invest in clean energy, it provided a new opportunity for cooperation between the two rapidly growing countries. Now KEPCO KDN is bringing its expertise in nuclear power plant ICT development and cyber security to the UAE.

In addition to this, KEPCO KDN is at the forefront and developing various innovative AICBM technologies such as AI, IoT, Cloud, and Big Data. The company is also a leader in the field of future energy and is continuously investing in cutting-edge new technology. This includes AMI diffusion, electric car charging stations, energy big data service, E-prosumer, microgrid, energy storage devices, among several others.

UAE to revise clean coal target

THE UAE HAS confirmed its intention to revise the percentage of clean coal in its 2050 energy target, according to an official announcement from the country's energy and infrastructure ministry.

The comments were made during the Green Hydrogen Middle East 2021 virtual conference, S&P Global Platts reported.

"Regarding clean coal, we are revising the percentage as well with the Dubai government," Nawal Alhaneaee, acting director of future energy department at the ministry told the Green Hydrogen Middle East event.

In 2017, the UAE outlined its 2050 energy mix target – under which renewables were to account for 44% of power production, followed by 38% from gas, 12% from clean coal and 6% from nuclear power.

The GCC's first coal-fired power plant is under construction in Dubai. In June 2016, utility Dubai Electricity & Water Authority (DEWA) signed a 25-year power purchase agreement (PPA) with a consortium led by Saudi Arabia's ACWA Power and China's Harbin to develop a 2,400MW clean coal fired plant.

Photo Credit: Adobe Stock



Briefly

Taqeef inverter ducted split cooling system marks regional first

TAQEEF, THE ORIGINATOR of desert cooling systems in the UAE and the Middle East, has launched the region's first range of inverter ducted split to further its commitment to supporting environment-friendly products.

The new range by O General is the first complete line of inverter ducted split models, ranging from 1.5 tonnes to five tonnes, in the Middle East with zero Ozone Depleting Score (ODS) and the new environment friendly R32 refrigerant, ensuring a lower carbon footprint.

Specifically created for the Middle East region, the O General inverter range is a leader in cooling capacity, power consumption and low-noise capability.

Taqeef's new range conforms to strict technical regulations and guidelines issued by the Emirates Authority for Standardisation and Metrology (ESMA) and Abu Dhabi Quality Control and Conformity Council (QCC) for high Energy Efficiency Ratio (EER) values.

Hadi Ismail, chief sales officer at Taqeef said, "In a region where cooling is synonymous with quality of life, ensuring that the products we bring to the market are energy efficient has been, and always will be, our main priority."

The DC inverter technology opts to operate via a DC fan motor with an advanced inverter control system that helps achieve high operation efficiency using a sine wave, and a DC twin rotary compressor.

Taqeef's implementation of the DC twin rotary compressor allows for wider operation range, improved piping limitations and the introduction of new simultaneous multioperation ability.

"The new O General inverter range has been designed with the harsh climate and real-life operating conditions in the Middle East in mind.

"The new inverter helps achieve faster and more efficient cooling when compared to conventional air-conditioners, consumes less energy, and offers remarkable energy savings when compared to fixed speed compressor models," concluded Ismail.

EXECUTIVES' CALENDAR 2021

OCTOBER 2021

1 Oct-31 March 2022	EXPO2020	DUBAI	www.expo2020dubai.com
5-7	WETEX	DUBAI	www.wetex.ae
12-13	Middle East Rail	DUBAI	www.terrapinn.com

NOVEMBER 2021

2-4	Hypermotion Dubai	DUBAI	https://hypermotion-dubai.ae.messefrankfurt.com
16-17	The Mining Show	DUBAI	www.terrapinn.com

JANUARY 2022

17-19	World Future Energy Summit	ABU DHABI	www.worldfutureenergysummit.com
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FEBRUARY 2022

1-3	LEAP tech event	RIYADH	https://www.onegiantleap.com/en/home.html
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Readers should verify dates and location with sponsoring organisations, as this information is sometimes subject to change.

Hypermotion 2021 Dubai to focus on mobility transformation

HYPERMOTION DUBAI, THE German-originated exhibition which aims to address the transformation and future of the transport, logistics and mobility sectors through disruption, decarbonisation and digitalisation, will be held at Dubai Exhibition Centre (DEC) from 2-4 November 2021 and will coincide with Expo 2020.

HH Sheikh Ahmed bin Saeed Al Maktoum, President of Dubai Civil Aviation, chairman and CEO, Emirates Group and chairman of Dubai Airports said that the event will host more than 100 brands and will promote new ideas, cutting-edge technologies and innovative thinking to facilitate the development of next-generation logistics and smart mobility.

Abu Dhabi Ports has joined as a strategic partner. Speaking ahead of the event, Captain Mohamed Juma Al Shamisi, global CEO, Abu Dhabi Ports said that the need for such an event as the region's logistics sector expands into the digital space. Hypermotion Dubai is also set to take place with supply chain and logistics solutions provider DP World as the sole global partner.

Hypermotion Dubai will coincide with Expo 2020, the Arab region's first World Fair running under the theme 'Connecting Minds, Creating the Future,' and Messe Frankfurt officials believe the events share compelling synergies. Messe Frankfurt Middle East CEO, Simon Mellor, said that Dubai is the ideal environment to host an event like Hypermotion, as underlined by the global access provided by hosting the World Expo, where 191 countries are expected to showcase their talents, culture, government and economic strengths.

Hypermotion Dubai is expected to attract participation from international, regional and local government entities and private organisations across the logistics, mobility, infrastructure and



Photo Credit : Hypermotion

Hypermotion Dubai is expected to attract participation from international, regional and local government entities.

transport ecosystems. Through the event's three content streams – Hypermotion labs, Smart Mobility Conference and Scalex (co-hosted with Materials Handling Middle East) – guests confirmed to take the Hypermotion Dubai stage include Abdullah Al Shamsi, senior director of Future of Things, Dubai Aviation Engineering Projects, Prof Carlo Ratti, director of Senseable City Lab, Massachusetts Institute of Technology and Josh Giegel, CEO and co-founder, Virgin Hyperloop.

ON THE WEB

A round up of the leading developments and innovations recently featured on *Technical Review Middle East's* online portal. To read more or to stay up to date with the latest industry news, visit www.technicalreviewmiddleeast.com

Kuehne+Nagel organises transport of components

KUEHNE+NAGEL IS ALL set to organise the offshore project logistics for the power-to-methanol part of the pilot phase of the Haru Oni project in Chile for Siemens Energy.

The project is a collaboration between Siemens Energy (Germany), Porsche (Germany) and Highly Innovate Fuels or HIF (Chile).

It will be the world's first integrated commercial plant for producing climate-neutral fuel from wind and water for decarbonising the transport sector. <https://www.technicalreviewmiddleeast.com/power-a-water/renewables/>



Photo Credit: Adobe Stock

It will be the world's first integrated commercial plant for producing climate neutral fuel.

OK TRUCKS partners with Arabian Auto Agency

OK TRUCKS HAS announced a partnership with Arabian Auto Agency Co. Ltd for the distribution of its pre-owned vehicles in Saudi Arabia.

This cooperation is an important step to enable our customers valuable access to a range of inspected and certified pre-owned vehicles to support their transport business.

"OK TRUCKS, is the brand dedicated to sales and marketing of pre-owned vehicles certified by IVECO. Our transport solutions include versatile commercial vehicles from 3.5 to 7.5 tonnes as well as tractor developed to offer the best economy and performance in long-haul missions," stated the company.

<https://www.technicalreviewmiddleeast.com/construction/roads/>

Inaugural Dubai Awards for construction industry

DMG EVENTS, ORGANISERS of the inaugural The Big 5 Construction Impact Awards, has announced the winners of 15 categories during a glittering awards ceremony held at the Dubai World Trade Centre

The awards, a platform to recognise sustainable development, technological, and digital achievements in the construction industry, were judged by an independent panel of experts and thought leaders from the industry. They assessed hundreds of submissions and highlighted the winners who have shown innovation and project excellence through their success stories. <https://www.technicalreviewmiddleeast.com/events/>

Miyawaki forests can grow in deserts

DAKE RECHSAND, A Dubai-based company offering sustainable solutions in water conservation and desert farming, has announced its plan to develop green cover in deserts using the innovative Miyawaki forest model and the company's technology: Breathable Sand

They are developed by renowned Japanese botanist Akira Miyawaki.

<https://www.technicalreviewmiddleeast.com/manufacturing/innovations/>



Photo Credit: Adobe Stock

Miyawaki forest boasts high survival rates and can harbour 18 times more biodiversity.

GE Gas power Mesa partnership summit 2021 strengthens regional supply chain

IN CONTINUATION OF its commitment to strengthen collaborations with regional suppliers, GE Gas Power has organised the Middle East, Africa, and South Asia (MEASA) Partnership Summit 2021

Representatives of up to 220 organisations from over 30 countries attended the event, held under the theme, 'Grow Global Reach, Drive Regional Impact.'" <https://www.technicalreviewmiddleeast.com/events/>



Photo Credit: GE Gas Power

The summit also included a key suppliers awards.

Valves for a sustainable future

OLIVER VALVES FAMILY of companies intends to drive its decades of oil and gas valve, coupled with world leading R&D capability, into the green energy and emission abatement sector using the newly incorporated Oliver Hydcovalves Ltd company as the vehicle

Climate change due to global warming is now proven to be symptomatic of manmade greenhouse gas emissions.

Recognising that the industry as a whole now faces the challenge of transitioning to a future with net zero emissions, Oliver Hydcovalves Ltd is the latest addition to the Oliver family. Incorporated with the primary objective of providing valve technologies that support the net zero emission targets of industrial users, the company will build on the four decades of expertise held within the Oliver companies. Valves from the Oliver Twinsafe range are ideally suited for the new pipeline infrastructure for the rapidly expanding decarbonisation technology.

<https://www.technicalreviewmiddleeast.com/manufacturing/>

“Knowing that our advanced technology and product offerings are system relevant to vital infrastructure, we will keep supporting governments and corporate entities in achieving their sustainability objectives in critical aspects such as energy, water, and other resources. Guided by the Climate Facility Project of the United Nations Development Programme, we believe that with effective communication and strategic collaboration, our environment-friendly initiatives will succeed in mitigating the effects of climate change.”

MONICA GIAZZI

Group vice president government and public affairs

Wilo

“This new joint venture is critical for the development and growth of Dorf Ketal in the region, and allows us to collaborate with a valued partner, and contribute to the exciting vision for a future-ready, dynamic, KSA economy. The regional experience, capabilities, and strengths of Tribonds Chemical Co., will enhance Dorf Ketal’s ability to contribute to the growth and development of the Saudi Arabia Hydrocarbon Industry, while bringing innovative approaches to solving the critical industry issues of Flow Assurance, Plant Integrity, Energy and Water Conservation. This joint venture will deliver high-quality services and products for our valued customers, not only within Saudi Arabia, but other markets in the region as well.”



SUDHIR MENON

Chairman and managing director

Dorf Ketal

“Despite this challenging ongoing pandemic, Dubai has found a way to grow private jet traffic into and out of this beautiful city... As one of the leading global destinations for tourism and business, Dubai continues to thrive and welcome guests from numerous countries.”

ROB DICASTRI

CEO

RoyalJet

“While the switch to remote working was almost instant, we need to appreciate that was out of necessity. The return to work should be gradual – employers and employees alike should use this year to test a variety of working styles from hybrid-working to potentially removing the 9-5 in favour of hours based on project load. It all depends on which sector you work in. Businesses and professionals alike have a unique opportunity to form a new way of working – which, if done right and carefully thought through, could bring about greater efficiencies, higher productivity, more creativity, lower costs and overall improvement in wellbeing, morale and subsequently employee turnover.”

JASON GRUNDY

Managing director

Robert Walters Middle East & Africa

“Already at ADNOC, we produce about 300,000 tonnes of hydrogen a year. By leveraging our existing gas infrastructure and commercial-scale CCUS capabilities, the UAE can and will become a major player in the emerging blue hydrogen market.”



HE DR SULTAN AHMED AL JABER

Managing director and group CEO

ADNOC

“This ground-breaking product from Ceramic Materials was developed at their base in Masdar City, a testament to being Abu Dhabi’s only planned and approved research and development (R&D) cluster. Thermal energy storage is a technology with enormous potential, helping to overcome the intermittency challenges of renewable energy and mitigating climate change. Part of our work at Masdar City, is helping start-ups like Ceramic Materials to test new technologies, explore opportunities and build their networks, hence, helping to amplify their efforts and deliver a more sustainable future.”

ABDULLA BALALAA

Executive director

Masdar City

(On the unique patented solution to recycle industrial solid waste into a high-temperature thermal energy storage)

“The creation of the Dubai Integrated Economic Zones Authority is a vital move to enhance Dubai’s global competitiveness and raise its investment attractiveness. The private sector is a major partner in our development journey over the next 50 years and the government continues to explore innovative initiatives to support their growth and success.”

SHEIKH MOHAMMED BIN RASHID AL MAKTOUM

Vice-President and Prime Minister

UAE

“More than 40% of the recyclable materials in the Kingdom [Saudi Arabia], amounting to about 56 million tonnes annually, are concentrated in Riyadh, Jeddah and Dammam, where 85% of them can be recycled and utilised for the purpose of obtaining a source of alternative energy and raw materials that enter into manufacturing processes.”

ZIYAD AL-SHIHA

CEO

Saudi Investment Recycling Company

“One of the key challenges faced by restaurant operators is the labour-intensive pickup process for any off-premise orders. The integrated technology enables organisations to follow the process and optimise costs via digital access management, live monitoring and data analysis. GrubTech's Smart Locker System can help restaurant operators or retailers streamline the pickup of all orders received. Operators can also improve and refine internal processes and systems by analysing the data collected from the Smart Locker System.”



Photo Credit: GrubTech

MOHAMED HAMED

Chief technology officer

GrubTech

“Accelerating digital transformation has played a critical role in ensuring business and services continuity amidst the COVID-19 pandemic, providing a new array of innovative services.”

OHOD BINT KHALFAN AL ROUMI

Minister of State for Government Development and the Future

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The Middle East mining industry is going through several changes.

Photo Credit : Adobe Stock

Accelerating sustainability in mining

The pillars of energy efficiency, yield improvement and low greenhouse emissions, and others, are gaining increasing focus in the industry. Fyna Ashwath reports.

A **THRIVING AND** healthy mining and metals sector is crucial for the global economy and to support the innovation of new technologies and materials needed for climate change reduction, environment protection, as well as the circular economy.

Middle East mining

The mining sector in Saudi Arabia is witnessing major changes to achieve one of the most important goals of Vision 2030, which is to diversify the resources of the national economy and make it the third pillar of the local industry, along with oil and petrochemical industries, according to the Al-Eqtisadiyah newspaper quoting Khalid Al-Mudaifer, vice minister of industry and mineral resources for mining affairs, as saying.

Oxford Business Group's Focus report on Egypt's petroleum and mining reveals that the mining industry is set to be one of the

fastest-growing and most strategically important sectors.

In the UAE too, the industry is witnessing changes. The Mining Show this year will bring together the stakeholders that represent the entire regional mining, quarrying and mineral processing ecosystem. The event will cover major projects, the latest opportunities in mineral exploration, reformation of codes and regulations, and development of operations across several exciting countries.

Focus on sustainability

As with other sectors, the Middle East is giving a lot of importance to sustainability in the mining sector. The emphasis on global decarbonisation, is also heavily reliant on the sustainable production of minerals and commodities.

Schneider Electric and AVEVA are companies providing tools required by organisations to make informed decisions

that will empower people across the mining, minerals, and metals value chains to be more strategic in their choices based on sound advice with sustainability in mind. They are assisting operators and managers in these choices leaving these organisations well positioned to tackle some of the challenges associated with adopting sustainable practices, potentially resulting in reduced operating costs and thus providing the rare ability of appeasing all stakeholders.

According to an IDC Technology Spotlight, sponsored by AVEVA and Schneider Electric, Transitioning to Sustainable Mining, Minerals and Metals Practices, the top three market pressures driving the sustainability agendas of mining and metals organizations are:

- Need to improve brand equity
- Reduce the risk of an adverse event
- Ensure compliance with current and future regulations

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Electrification in mining is gaining significance.



Photo Credit : Adobe Stock

Key takeaways from IDC Technology Spotlight:

- Transitioning to Sustainable Mining, Minerals, and Metals Practices
- Sustainability strategy improvement is the number one driver for the future of mining organisations.
- 71% of mining organisations support sustainability goals with established formal programmes endorsed by executive sponsorship.
- 87% have business processes that are standardised and transparent across all functional groups
- Despite 56.5% of organisations having implemented operational metrics linked to sustainability goals, only 37.1% utilize sustainability scorecards, impacting the ability to create value and success from those initiatives.
- Yet, 27.4% of mining and metals organisations see improving brand equity as a top driver for sustainability, compared with the overall industry average of 18%.
- Mining, minerals, and metals companies

are on the road to delivering impactful outcomes outside traditional power purchase agreements (PPAs) – but have a long way to go.

- Digital integrated operations can address key areas of the industrywide sustainability agenda by combining power and process intelligence and controls

“Technology has a critical role to play in supporting mining companies,” said Ben Kirkwood, senior research manager, IDC Energy Insights - WW Mining. “Efforts to hit sustainability targets and gain greater visibility and control over operations will enable corporate insight and action relating to energy, water usage, and management of the operational environment. IDC’s global analysis of the revenue growth and profitability of industrial companies shows that those with a committed and ongoing sustainability-based strategy combined with a long-term, funded, digital transformation agenda considerably outperform their competitors.”

Electrification in mining

The new IDTechEx report, "Mining Electrification: Vehicles, Generation, Repurposing 2022-2042," reveals many surprises and gaps in the market for everything from the humble gravel pit to diamonds four kilometers below, and ocean-floor mining. All are headed for zero-emission battery-electric vehicles and processing, with electricity made on-site from sun, wind, and even water power each transitioning to better versions.

Electrification is inevitable, driven by cost, regulations, health, reputation, and ever-tougher location, morphology, and toxicity of remaining reserves. The unmanned mine has arrived and, to be optimal, it can only be electric. The report explains why faster adoption is possible, giving a competitive advantage.

Solar and wind power with energy independence is the mining trend but that means increased energy storage from hours to seasonal. ■

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Robust measurement solutions for slurry pipelines

Alexis Alexander, product manager, VEGA, explains how automation in mining has improved the measurement of critical parameters such as the pressure, flow and density of slurry.

AUTOMATION IN THE mining industry, like in any other industry, has provided huge benefits in process optimisation and increasing profitability. In addition to extracting valuable minerals, technology has helped evolve transporting these ores from wheel carts to trucks to trains and now using pipelines.

A common mode of conveying materials to and across a processing complex would be in the form of slurries through pipelines. Slurries are just an efficient method of transporting, where the 'solids of interest' are suspended in a liquid carrier and pumped between different points using a device like a centrifugal pump. Blending of the ores with the carrier fluid are done carefully before pumping, to maintain a good ratio of solids to liquid. A highly dense slurry would lead to difficulty in conveying the product while a light slurry would mean inefficient transportation.

Critical parameters that are normally measured include pressure, flow and density. These measurements are highly challenging due to the abrasive nature of these products, making operators cautious while designing and selecting the devices as they are subjected to a heavy toll. An improvement in these measurement technologies would reduce costs significantly and improve reliability.

Pressure measurement

Pressure is an important and critical parameter that is measured across different stages. Using electronic differential pressure transmitters on the suction and discharge of pumps provides static and differential pressure. This information helps avoid dry runs, cavitation, leaks, sealing, vibration and mechanical issues. This, in combination with the flow rate, can help operators run the pumps at the best efficiency curve. As these pressure transmitters are subjected to pressure shocks and as the overload pressure of



Slurries are an efficient method of transporting, where the 'solids of interest' are suspended in a liquid carrier and pumped between different points using a device like a centrifugal pump.

metal diaphragm sensors are limited, overpressure protectors are added to the hook-up. On the other hand, on using ceramic based pressure transmitters, these extra accessories are not needed due to their high overload resistance which can be up to 200 times than of metal diaphragms.

Pressure transmitters are also installed along the pipes to measure the pressure drops that can occur. An important reason to use ceramic sensors on the pipes is the abrasion protection it offers. In aggressive process environments, metallic measuring cells can readily fail through a variety of stresses such as abrasion, impacts, friction, corrosion and high temperatures. CERTEC® ceramic cells are exceptionally hard and abrasion resistant: 10 times harder than stainless steel. This makes them the ideal choice for slurry containing metallic debris or sand-laden media. Even strong cleaning

agents or mechanical cleaning with a brush have no effect on the measuring cell.

Density measurement

Radiometric densitometers offer a non-invasive measurement on these highly demanding slurry pipelines. Intrusive density measurement are difficult to isolate for any maintenance which is often needed due to the stressful conditions they are subjected to.

Non-invasive radiometric measurements are designed using a gamma source which would radiate the other side of the pipe through the slurry. A scintillation-based detector on the opposite end measures these radiations to infer the density based on the amount of absorption of these gamma waves. Simply put, lower the slurry density, higher will be radiation detected. Density measurements using radiometric technology can be very accurate even beyond what is needed for a slurry density measurement. Hence, these systems are carefully designed to provide just enough radiations sufficient to achieve an optimum control.

As these devices are demanded more in harsh environments, newer models available in the market have internal electronics that are completely encapsulated and protected from the mine's dirty, harsh environment. These designs have extended the life of these detectors, hence needing minimal maintenance.

Instrumentations like the Ceramic pressure transmitters and the non-invasive densitometers cover a small, yet significant measurement in slurry pipelines. Along with improvements these technologies offer, automation specialists also prefer them as they provide a huge advantage in interoperability with plant asset management based out of FDT/DTMs and standards like NAMUR. Standardising all instruments on these grounds have provided great benefits to operators in spending less costs on maintenance and stocking less spares. ■

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GROWING TOGETHER





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The World Bank expects Qatar to be the fastest growing economy over the 2021-23 period.

Project-driven economy on the path of sustained expansion

Moin Siddiqi, economist, examines what makes Qatar one of the most resilient energy-based economies of the future.

QATAR COPEd FAIRLY well with global economic and health crises, thanks to the National Response Programme, which protected essential public services and supported the private sector, as well as continuous heavy infrastructure spending ahead of the FIFA

2022 World Cup and ambitious expansion plans on the liquefied natural gas (LNG) segment.

“Following the COVID-19 disruption, Qatar’s economy is coming back on the right recovery path, thanks to the timely response from the government as well as the private

sector institutions in adequately handling the shockwaves of the pandemic. The current growth prospects stem from the early stimulus measures that were taken to mitigate the effects of the pandemic on businesses in Qatar,” said Yousuf Mohamed Al Jaida, CEO of Qatar Financial Centre (QFC) Authority.

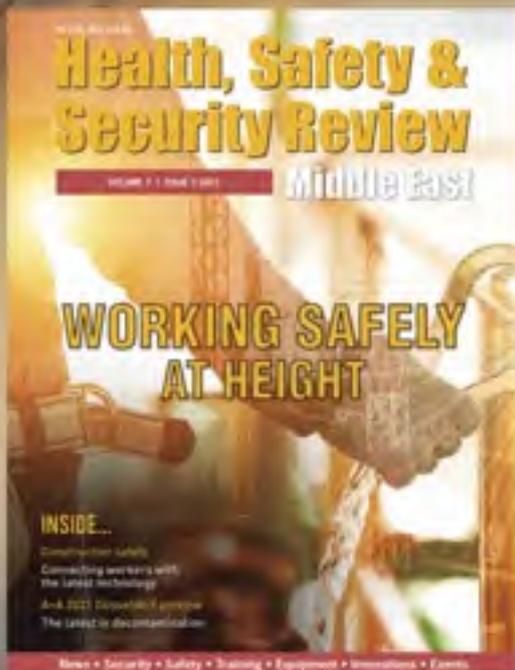
The ending of diplomatic rift in January 2021 bodes well for the non-oil economy, and intra-Gulf Cooperation Council (GCC) trade/investment with a resumption of travel links lifting tourism inflows and renewed interest of regional buyers in Qatar’s real estate market. Doha Stock Exchange has recovered to pre-COVID-19 levels, whilst the banking sector remains

Despite the global downturn, Qatar planned efficiently and was ranked 17th in The World Competitiveness Yearbook 2021, out of 64 mostly high income developed economies.

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well-capitalised and liquid. The World Bank expects Qatar to be the fastest growing economy over the 2021-23 period (see Table 1).

Qatar is not impacted by the OPEC+ agreement – 70% of hydrocarbon exports are in the form of natural gas. The Washington-based Institute of International Finance (IIF) expects hydrocarbons and non-oil sectors to grow by 2.2% and 4%, respectively, this year. Qatar's lower fiscal breakeven oil prices (US\$52 per barrel in 2021) and its large public foreign assets provide substantial fiscal space, the IIF noted.

Despite the global downturn, Qatar planned efficiently and was ranked 17th in The World Competitiveness Yearbook 2021, out of 64 mostly high income developed economies (see Table 2). Positive factors included consumer price inflation (ranked first), health of government finances (ranked first), gross fixed capital formation (ranked second), Central Bank policy (ranked second), transparency (ranked third), and entrepreneurship (ranked third). HE president of Planning and Statistics Authority, Dr Saleh bin Mohammed Al Nabit, stated, "Despite a slight decline in Qatar's ranking among the 64 countries, it continues to rank high thanks to the flexibility of the Qatari economy in addressing economic crises and efforts to address the repercussions of the COVID-19 crisis."

Recent reforms to labour laws, public-private partnerships (PPP), free zones, privatisation and foreign direct investment (FDI) regimes will lead to a more vibrant post-COVID non-oil economy. The two-tier residency programme has encouraged participation in Qatar's booming property market. A new Investment Law (April 2021), allows 100% foreign ownership in listed companies and provides opportunity for global investors. Doha has implemented a new tourism strategy, which it hopes to turn 'one-off' windfalls of FIFA 2022 into a long-term driver of sports, business and leisure tourism.

Table 1: Qatar's Economic Outlook in context of the GCC Region*

	Projections					
	2018	2019	2020	2021	2022	2023
Nominal Gross Domestic Product (US\$ billions)	183.1	175.8	157	167	178	197
Real GDP Growth, annual (%) change	1.2	0.9	-3.7	3.0	4.1	4.5
GCC-Region, average, (%)	1.9	0.7	-4.8	2.2	3.4	3.2
CPI Inflation Rate, average, (%)	0.1	-0.9	-2.6	1.0	3.0	2.5
Fiscal Balance, (%) GDP	2.3	1.0	-3.6	-2.3	2.7	1.8
Current Account, (%) GDP	9.1	2.4	-2.5	1.7	2.7	4.1

Qatar is emerging as top regional performer, with twin surpluses (govt budget & balance of payments).

*GCC member-countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates.

Sources: International Monetary Fund, World Bank and FocusEconomics.

Solid risk profile

Qatar enjoys a strong balance sheet, with a low breakeven oil price against other GCC-countries, one of the world's highest ratios of GDP per capita, sizeable hydrocarbons reserves (low extraction costs), very robust government net asset position and a proven record of macro-economic prudence, among other factors. Thus, persistent current account surpluses, rising foreign exchange reserves and large sovereign wealth fund (SWF) assets will underpin the stability of Qatar's external position over the medium term.

Affirming a 'Stable Outlook' on foreign and local currency ratings, Standard & Poor's (S&P) said it does not expect the government's fiscal and external stock positions to "materially" deteriorate beyond its expectations. The hydrocarbons sector accounts for 50%, 80% and 85%, respectively, of Qatar's GDP, government revenue and exports.

Qatar's LNG expansion could have powerful multiplier effects over the medium-term – doubling nominal gross domestic product (GDP) to US\$300bn by 2027, according to Bank of America (BoA) Global Research. It projects compound annual growth rate (CAGR) reaching 7% (2021-25), the highest among the Middle East North Africa (MENA) markets. The BoA research states, "In particular, we see this driven by accelerating natural gas investments in upstream, LNG and other downstream projects, a strong response to the pandemic with limited new cases, the upcoming World Cup 2022 and in the medium term, improving relations with the

GCC which could spur stronger growth opportunities."

Buoyant construction activity

Qatar is investing heavily in developing infrastructure and construction projects, with estimated US\$200bn-to-300bn worth of development in the planning or construction phase under the auspices of the National Vision 2030. Numerous major transport projects, coupled with the rapid expansion of tourism, sport facilities, real estate and downstream oil-gas sectors are expected to dominate economic diversification efforts. The 2022 World Cup has underpinned US\$13.6bn a year of project contract awards in the past decade.

The Qatari construction market (valued at US\$42.2bn in 2020) is projected to reach a value of US\$76.98bn by 2026, registering a stellar CAGR of 10.5% over 2021-26 (Mordor Intelligence) – thus making construction activity, the fastest-growing sectors in Qatar.

The state is directly or indirectly financing the bulk of these projects. Though Qatar recently turned its attention to draw investment through a new public-private partnership (PPP) law to help address increased demand for public services in innovative ways. The new PPP law, introduced in June 2020, will help to spur private finance and expertise in the delivery of public utilities, roads/highways, schools and healthcare projects in the coming years.

These efforts will entice increased FDI inflows over the longer term. In addition, Qatar boasts fiscal incentives, solid digital and physical infrastructure, and ease of doing business.

Mega developments

Qatar boasts some of the region's most exciting projects of various types.

Infrastructure: Mixed-use Lusail City (largest project), Qatar National Rail Scheme, Doha Metro, Expressways, Roads & Drainage Scheme (run by the Public

Table 2: Key National Attractiveness Indicators

	2017	2018	2019	2020	2021
Overall Rank (1-64 countries)	17	14	10	14	17
Economic Performance	8	5	3	6	11
Government Efficiency	11	10	5	7	6
Business Efficiency	12	13	10	11	15
Infrastructure	38	38	40	40	40
Digital Competitiveness	28	28	31	30	

Source: World Competitiveness Yearbook 2021.

Works Authority), New Doha Port (Hamad Port phase-1), Hamad International Airport extension, Qatar-Bahrain Causeway, and Sharg Crossing.

Hydrocarbons: North Field Expansion Project – 4 Liquefied Natural Gas Mega-Trains, Gas-to-Liquids Project-3 (Pearl GTL), Ras Gas 3 Trains 6&7. Qatar plans to spend US\$29bn to increase LNG output to 110mn tonnes/year by 2027 from currently 77mn tonnes/year.

Public utilities: Water Security Mega reservoirs, Ras Laffan C Independent Water & Power Project, Facility D - IWPP(Umm Al Houl Power Plant), Ras Abu Fontas Station, and Qatar Electricity & Water – New Power Plant.

Industrial: Electric Car Plant, Qatalum - Aluminium Complex in Mesaieed, Qatar Fertiliser Co, (Qafco V), Baladna Farm in Umm Al Hawaya, and Solar Polysilicon Plant.

Development of free zones: led by the newly-established Free Zone Authority. (Source: Ventures Middle East DMCC)

Future beyond hydrocarbons

Doha's long-term strategy 'National Vision 2030', which aims to transform Qatar into an industrialised, knowledge-based economy, boosting greater skills, technology and productivity remains on track. The four main pillars of Vision 2030 are human, social, economic and environmental development agendas.

The emirate inspires to become a hub for a variety of sectors and 'value-added'

manufacturing in Gulf region. This vision includes the attraction of industrial facilities to its free and economic zones in sectors as diverse as digital technologies, food processing, transport and logistics, downstream oil/gas, and pharmaceuticals. Colossal infrastructure spending and diversification have been buzzwords in recent years.

In sum, Qatar is among the most resilient energy-based economies of the future. ■

FACT FILE*

POPULATION: 2.8MN; **GDP per capita:** US\$57,463; **Labour force:** 2.13mn; **Inward FDI stock:** US\$31.1bn; **Proved hydrocarbons reserves:** Oil (25.2bn barrels); Natural gas (871.1 trillion cubic feet); **third-largest holder of gas reserves after Russia and Iran;** **Sovereign ratings:** Moody's (Aa3), Standard & Poor's (AA-), Fitch (AA-); **Qatar Investment Authority (SWF):** US\$300bn-plus in assets under-management; **Non-oil/gas industries:** Qatar Petrochemicals Co, Qatar Steel Co, Qatar Fertiliser Co, Qatar Vinyl Co, Qatar National Cement Co. **Major financial institutions:** Qatar National Bank – MENA's largest bank and Commercial Bank of Qatar. **Exchange rate:** The Qatari riyal is pegged to US dollar at a rate of 3.64 per US\$ - underpinned by higher forex reserves.

*Figures refer to base-year 2020.

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Achieving Stage V compliance with rental generators

How several factors have contributed to the ability of diesel engines to meet each new stage of the regulations and how for Stage V compliance, Diesel Particulate Filters (DPFs) are critical for controlling exhaust gas particulate emissions from larger gensets.

Introduction

Studies validate that diesel exhaust emissions account for 15% of the nitrogen oxide (NOx) and 5% of Particulate Matter (PM) emissions in the EU.

Stage V emission standards came into force in 2019 and 2020. The regulations for Stage V generators focus on particulates and NOx emissions for non-road mobile machinery (NRMM), especially mobile generating sets.

For Stage V compliance, Diesel Particulate Filters (DPFs) are critical for controlling exhaust gas particulate emissions from larger gensets.

Kohler has a long history of support to the energy industry and a track record of developing diesel generators that meet the latest environmental regulations.

Stage V in greater detail

Stage V regulations apply to a wider range of NRMM by including both smaller and larger capacity engines than previously covered.

Stage V demands an improvement in particulate control by introducing a particulate number (PN) limit, which relates to particle size. There is also a reduction in the PM limits compared to Stage IV. These specifications effectively enforce the use of wall-flow particulate filters. Additionally, Stage V regulations are more stringent on NOx emissions.

Stage V regulations define emission limits based on engine power. Stage V also applies to compression ignition (CI) engines below 19 kW and above 560 kW and spark-ignited (SI) engines above 19 kW. Other previously unregulated engines like Category NRG generator set engines above 560 kW are also included.

Stage V rental solutions

The trend towards increasing emission requirements is likely to continue, putting pressure on the rental generator sector to

ENGINE POWER	STAGE V EMISSION STANDARD (g/kwh)
From 0 to 8 kw	7.5 NOx+HC / 8.0 CO / 0.4 PM
From 8 to 18 kw	7.5 NOx+HC / 6.6 CO / 0.4 PM
From 18 to 37 kw	4.7 NOx+HC / 5.0 CO / 0.015 PM
From 37 to 56 kw	4.7 NOx+HC / 5.0 CO / 0.015 PM
From 56 to 130 kw	0.4 NOx / 0.19 HC / 5.0 CO / 0.015 PM
From 130 to 560 kw	0.4 NOx / 0.19 HC / 3.5 CO / 0.015 PM
> 560 kw	0.67 NOx / 0.19 HC / 3.5 CO / 0.035 PM

Fig.1: Range of engine powers and related Stage V emission standards

comply. This has already led to several advances in engine technology. Emissions targets are more achievable with smaller engines due to the lower fuel consumption, but larger engines require several emission reduction elements.

The starting point for emission control is minimising fuel usage. Common Rail injection systems are important for this approach. Their optimised computer calibration ensures that engines run at maximum efficiency. On smaller engines, this element alone may be sufficient for the machine to meet Stage V requirements.

Exhaust gas recirculation (EGR) is the next step in emission control. An EGR valve manages the quantity of exhaust gas by cooling a portion of these gases and re-injecting it into the engine intake. Burning these exhaust gases limits NOx production.

Post-treatment systems limit exhaust emissions further. A diesel oxidation catalyst (DOC) transforms carbon monoxide gases, hydrocarbons and nitrogen oxides into water, carbon dioxide and nitrogen dioxide. The reaction takes place as the exhaust gases pass over a honeycomb structure covered with catalyst metals.

The final step in emission control uses a diesel particle filter (DPF). The filter collects particles and burns them using heat from the engine and DOC. When a DPF has accumulated a large mass of particles, it

must be regenerated, which can be accomplished through passive, active regeneration or stationary regeneration:

Engines above 58 kW can also benefit from selective catalytic reduction (SCR) to reduce NOx.

The stringent requirements of Stage V regulations make it imperative for operators to have a continuous view of the engine performance and compliance. Kohler's APM403 controller with its user interface allows for fingertip access to all the relevant information. It displays parameters like soot and ash rates in the particle filter and which type of regeneration is in progress. The controller also manages the load distribution of the ballast to space out manual regeneration intervals as far as possible.

Kohler has introduced a wide range of rental generators to meet the Stage V requirements. The range covers the 20 to 550 kVA power ratings with the KOHLER engines for the lower power demand generator sets from 20 to 50 kVA. John Deere engines drive the 110 kVA to 550kVA models. The R20C5 is a 20 kVA generator set, which achieves Stage V compliance using diesel injection controls. However, the R330C5, a 300 kVA machine, uses an entire pollution reduction technology package, including selective catalytic reduction with urea injection. ■

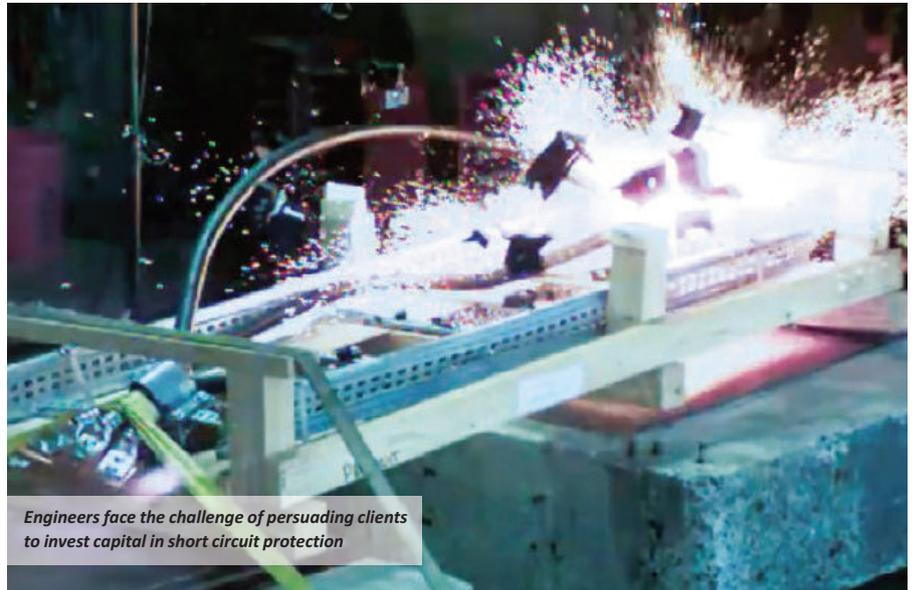
Short Circuit Faults — Are you protected?

Protection against short circuit events are of paramount design consideration for engineers and their clients

WHEN THE DECISION IS MADE TO initiate infrastructure or facility projects, the engineers responsible for their design are often faced with multiple priorities and project tasks. Ensuring electrical infrastructure reliability, while protecting against short circuit events, are of paramount design consideration for engineers working on these projects and ultimately for their clients.

The growing projects risk is a direct result of escalating project complexity, with clients challenging design engineers to complete projects at an unprecedented pace to realize the return on their investment while there is a need for infrastructure development in remote and complex environments.

One potential risk to these projects are short circuit events. This accidental conductive connection between two or more points of a circuit at different potentials can create tremendous magnetic forces. This results in a violent and catastrophic explosion damaging equipment and putting personnel at the plant at risk. There are solutions that can help mitigate the damage caused by these short circuit events, but there is still resistance in the industry to adopt certain tools that can protect the installation cost-effectively and, most importantly, safely. Engineers are faced with the challenge of persuading clients to invest capital in short circuit protection at the start of the project to ensure long-term reliability and safety. It is imperative that electrical design engineers



Engineers face the challenge of persuading clients to invest capital in short circuit protection

and electrical contractors know how to protect the project, people, and equipment from short circuit events. By preventing

Panduit cable cleats, that have intuitive designs, are compatible with a variety of ladder racks and cables

these occurrences downtime can be reduced, damage to equipment can be avoided, and the workforce can be protected from significant injuries or death.

Without the use of a cable cleat system, there is no protection for the employees or equipment in a facility when the short circuit forces are at their peak prior to a circuit interrupter engaging. To avoid potentially severe damage to the facility and infrastructure, as well as personal injury, cable cleats are used to restraint cables during short circuit events.

Lab tests performed on Panduit cable cleats verify strength of cleats and provide a baseline rating, in addition to being validated at a third-party test facility to ensure they perform to specifications when needed. They are designed to perform in a wide range of harsh environments and can be installed twice as fast as other similar products while reducing material cost in half. Their simple and intuitive design leads to increased productivity, and they are compatible with a variety of ladder racks and cables. ■



Panduit cable cleats are designed to perform in harsh environments

Photo Credit : Trident Technology Services

Ready to switch to battery power with Cat[®] Lift Trucks

Cat[®] Lift Trucks points out why switching to electric forklifts makes good economic sense. With decades of experience in electric lift truck development, this manufacturer and its strong Middle East dealer network are ideally placed to help in the transition.

Long-term benefits

Most customers look at the initial purchase price of an electric counterbalance truck instead of the benefits of the longer-term investment. “There is still a lack of knowledge that impacts the customer’s decision,” commented Raed Hunaidi, product manager, material handling at Zahid Tractor, the Cat[®] dealer in KSA. It is important to involve the dealer early in the purchase funnel and get the best advice.

The saving in the total cost of operation is achieved largely through lower maintenance needs and easier servicing, together with high levels of reliability and durability. Quite simply, the truck will spend less time being serviced and repaired, and more time in productive action. This is – according to Mamoun Mutair, product manager materials handling at MA Al-Bahar, the Cat dealer in the UAE – an important benefit for customers who look at their operations in the long run.

“By reducing operating expenses and increasing uptime, electric forklifts will raise your productivity and profits. They will also give a long lifetime of service and maintain a high residual value,” explained Mutair. The amount of advantage you gain from moving to electric will depend on the quality of the trucks you choose.

A healthier environment

Electric forklift trucks meet increasingly stringent regulatory standards aimed at improving environmental sustainability and workers’ health. According to Hunaidi, “Customers in the KSA have been advised to switch to eco-friendly electric forklifts to minimise emissions and maintain health standards in sectors such as food, beverages and pharmaceuticals, in which product cleanliness is essential. At the same time there are no harmful emissions for employees to breathe in – which is especially important in factories, warehouses, retail premises and other indoor workplaces.”

Cat[®] forklifts offering and support

Building on decades of experience in the electric counterbalance segment, both Cat Lift Trucks and its dealer network in the Middle East are well prepared to assist customers who are ready to make the change. They offer, along with a comprehensive warehouse truck line-up and unbeatable sales and aftersales product support.

As an example, the versatile and economical range is becoming particularly popular in this region. Especially successful is the EP25CB model (2.5 tonnes) with 48V batteries, which can compete in situations where others require a more expensive 80V battery to do the same job. These energy-efficient, robust trucks are equipped with a host of ergonomic and safety features which allow drivers to work confidently, quickly and productively.



The EPCB range is popular in the Middle East.

Photo Credit: Cat[®] Lift Trucks



Raed Hunaidi, Zahid Tractor.



Mamoun Mutair, MA Al Bahar.

Dependable service

The tremendous reputation of Cat products for durability and dependable service in a wide variety of industries is matched by the strength of the Cat dealer network. “We offer expert customer support through our Cat dealers in the Middle East. They truly understand electric applications and can select the right models and configurations for each customer’s needs. Our network can also supply everything necessary to keep your trucks working, including service contracts and rapid parts availability,” said Herve Quattrhomme, regional director AME, speaking from the Dubai office of Cat Lift Trucks. As a result, transitioning to electric counterbalance forklifts is made easy. ■

To know more about electric forklift trucks and their advantages, use the following link:

<https://www.catlifttruck.com/ame/blog/product-spotlight-electric-forklift-trucks>

Doosan Industrial Vehicles now part of Doosan Bobcat



DIV boasts diverse product lines.

Photo Credit: DIV



DIV is expanding its business portfolio based on new technologies.

Photo Credit: Doosan Bobcat

and downstream businesses.

Founded in 1968, DIV was the first company to produce forklifts in Korea, and is now the market leader with an unrivalled share of the Korean forklift market, which has been growing at an average annual rate of 7% since 2015.

DIV boasts diverse product lines including 1.5 to 30 t engine forklifts, 1 to 5 t electric forklifts and logistics equipment for warehouses. In line with the growing trend towards digital transformation and the sharing economy, DIV has been running a 'downstream' business that provides total services comprising forklift rental, used equipment sales and vehicle maintenance services since 2018.

DIV is expanding its business portfolio based on new technologies such as real-time data collection, utilisation and automation system equipped with Lin-Q, a telematics system developed by DIV.

According to DIV, the company is expecting annual sales in 2021 to surpass KRW 1 trillion (743 million EUR) for the first



Following DIV's incorporation as one of its subsidiaries, Doosan Bobcat anticipates the creation of synergistic effects.

Photo Credit: Doosan Bobcat

DOOSAN BOBCAT HAS announced a new subsidiary - Doosan Industrial Vehicles (DIV). Formerly known as the DIV Business Group (BG) of the Doosan Corporation, Doosan Bobcat completed the acquisition of a 100% stake in DIV for US\$ 650 mn (KRW 750bn, EUR557mn).

Now part of Doosan Bobcat, DIV offers a wide range of material handling equipment, including forklift, warehouse equipment

time since the business was founded, as sales volumes surge due to increased demand for DIV products in North America and elsewhere.

Following DIV's incorporation as one of its subsidiaries, Doosan Bobcat anticipates the creation of synergistic effects driven by deeper cost reduction and stronger dealer networks, coupled with the expansion of its product portfolio and enhanced organisational influence.

BKT solutions for mining

The EARTHMAX tyre range has been specifically designed to withstand the stress of the rough terrain typical of quarries and mines.

Photo Credit : BKT



WITH THEIR ROCKY and uneven surfaces and rough terrain, mines are a real challenge for the machines operating in this sector and above all for the tyres fitted to them.

It is therefore essential for operators to be able to count on resistant and reliable products that can withstand cuts and tears. This guarantees a prolonged product life cycle, while also providing traction and stability. Replacing a tyre due to damage or other problems would mean not only new investment, but would also impact on productivity.

That is why BKT wished to pay particular attention in developing tyres suitable for this type of application, studying them closely in minute detail.

The EARTHMAX range: Designed for the toughest conditions

The tyres in BKT's EARTHMAX range are designed for the toughest operations. It is a broad range of radial solutions designed to facilitate the best possible ground load distribution for dump trucks, wheel loaders, dozers, and graders.

All EARTHMAX tyres are distinguished by their All Steel structure which provides resistance to the casing and so against impacts. These are essential features when

faced with particular obstacles on the ground which could expose the tyre to serious risk of puncture or damage to the casing.

In particular, this range includes three models which, thanks to their large size, are particularly suitable to handling mining operations under the toughest conditions.

EARTHMAX SR 46 is fitted to rigid dump trucks which operate in rocky environments such as mines. Specifically designed to transport heavy loads, this tyre guarantees a

high level of resistance to cuts thanks to its casing with a steel belt. Thanks to the specific design of the tread with blocks and grooving on the circumference, it guarantees reduced damage to the surface of the product and improved performance on bends.

EARTHMAX SR 45 is also designed for rigid dump trucks and has a specific design of blocks and a deeper tread, which guarantees the product an extended life cycle.

EARTHMAX SR 53, classified L-5, has been designed for loaders operating in difficult conditions. The tread consists of a compound which is particularly resistant to cuts. In addition, it is designed to offer extraordinary self-cleaning properties, which facilitate the expulsion of stones and other foreign bodies.



Photo Credit : BKT

EARTHMAX SR 45.

Giant tyres

In response to market demand, BKT has launched a Giant version of for rigid dump trucks operating at mines, dams and large worksites. This solution is available in the largest size which BKT has ever made: 33.00 R 51. With a diameter of over three meters, this tyre weighs 2,400kg.

The addition of a new Giant size is a strategic choice for BKT, since it makes it possible to satisfy the needs dictated by new trends in the sector. ■

IMAGINE THE POSSIBILITIES



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**CAT[®] Lift
Trucks**

Supporting sustainability in the power industry

The twin sustainability goals of power diversification and efficiency require strengthening capacity and minimising losses. This is something that can be enhanced by digital transformation says Dr Tariq Aslam, head of MEA, AVEVA.

SUSTAINABILITY OBJECTIVES ARE high on the agendas of power companies, as they look to ensure energy security, hit 'green' targets and meet customer demand, all while protecting and potentially improving their financial outcomes.

Power companies realise the need to diversify their sources and improve efficiencies in order to boost energy security, become more sustainable and stay competitive. Forward-thinking industry leaders are investing heavily in digitalisation.

Challenges

Leaders must cultivate a business-wide openness to change and develop an organisational mindset centred around creating and driving value. Without bringing together their people, work processes, strategy and technology, digital transformation efforts are likely to fail. This is because digitisation provides possibilities, but needs to be supported by a holistic combination of all aspects of the business, and most importantly the buy-in of employees, in order to succeed.

Digital transformation should be seen as a work transformation programme, focused

on the wider business rather than the IT department, alone. This will bring a wide range of benefits from reduced costs and a rise in productivity, through to improvements in safety, reliability and efficiency as staff are empowered with not only the right enabling technologies to transform how they work, but also the right company culture and training.

The power industry's need to find efficiencies

In the Middle East alone, it has been reported that generating capacity needs are to increase by 40% in order to meet 2030's expected electricity demand (MEED MENA Power Sector Outlook 2020 - <https://buy.meed.com/product/mena-power-outlook-report/>)

In the European Union, there is still a lot of work to be done in order to hit the European Commission's (EC) target of 53% of Europe's power needs being met by renewable and nuclear.

Digitalisation is essentially, replacing manual processes with digital processes, or upgrading a digital solution with a more advanced technology. It is playing a MAJOR



Dr Tariq Aslam, head of MEA, AVEVA.

Photo Credit : AVEVA

role in helping power companies to meet these and other challenges, through the use of digital twins – real-time digital representations of physical assets – and automated asset performance management (APM) solutions.

These use artificial intelligence and machine learning technologies to provide information on how assets are running and predict future behavior. This can be applied to advanced diagnostics, enabling workers to detect potential faults before they occur, or opportunities to further optimise efficiencies.

The insights provided can help reduce operational and maintenance costs by approximately 20%, dramatically reduce fuel costs, significantly improve asset safety, efficiency and reliability, and drive productivity, all by providing fast and accurate data about where and how power is being generated, transmitted and distributed.

Industry & Market Pressures

"Operationalizing Artificial Intelligence at scale is the difference between success and failure"



Photo Credit : AVEVA

Changing the way we work

With technologies such as AI and ML, digital transformation improves work process efficiencies and accuracy, and minimises waste by automating calculations and the use of data. Amongst other things, this enables businesses to optimise their workforces by freeing up experts from manual tasks to focus on more intensive, business-critical projects.

Having adopted APM to drive the organisation's autonomous plant vision, ENEL, an international producer and distributor of electricity and gas, was able to remotely monitor its 1,275 renewable assets. This was particularly beneficial when the pandemic hit in 2020, as it enabled staff to pivot overnight to working from home, ensuring the resiliency and continued sustainable delivery of the company's critical services.

Since implementation, ENEL's APM solution has detected more than 220 events early, which prevented failures from occurring, and optimised performance across 23GW of power. "Digitalisation has truly enabled us to maximise returns," says ENEL's digital transformation director, Matteo Cantu.



Photo Credit: AVEVA

Benefits of digitalisation in the power sector

Another example comes from US-based Duke Energy, which introduced APM software to centrally monitor its power generation assets. Using strategically placed sensors to send data to AVEVA predictive analytics AI-infused software, Duke can detect equipment failure before it happens – driving better performance and improving uptime. The company has saved US\$50mn

through reduced failures, including a saving of US\$30mn from a single early catch event.

There remain many challenges for the power industry, but diversification, new technologies and business models continue to point to a positive, more sustainable future. Digital transformation empowers the power sector to engineer smarter, operate better and drive sustainable efficiency, so make the most of the latest technologies available to you. ■

TotalEnergies invests in projects worth US\$10bn in Iraq

FRANCE'S TOTALENERGIES HAS signed contracts worth US\$27bn for oil and gas and solar energy projects in Iraq.

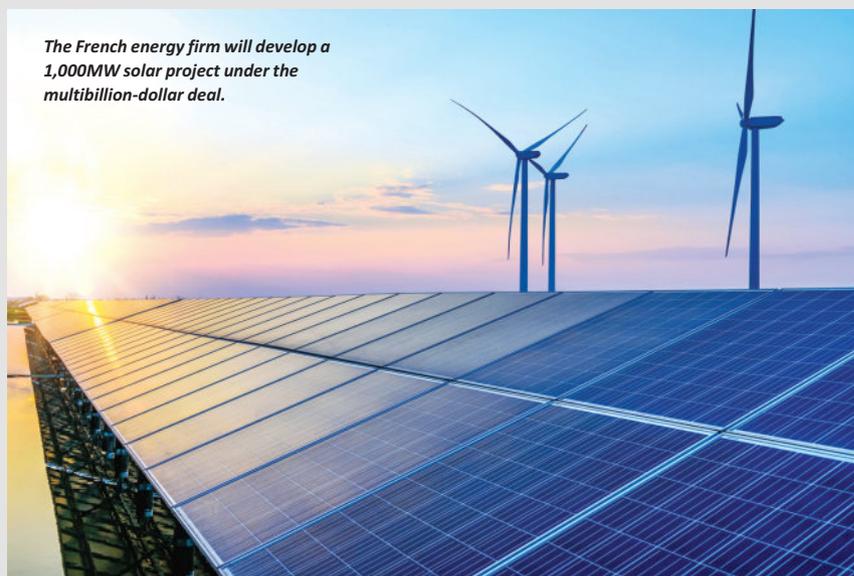
TotalEnergies will make an initial investment worth US\$10bn, TotalEnergies CEO Patrick Pouyanne said during the signing ceremony in Baghdad.

"This is the biggest investment by a western company in Iraq. Setting up these projects is the challenge we face now," said Ihsan Abdul Jaber, oil minister of Iraq.

Under the heads of agreement (HOA) agreement signed in March, Total will build a 1,000MW photovoltaic (PV) solar plant as part of Iraq's efforts to increase its power generation capacity and reduce electricity blackouts, which have become widespread across the country in the hot summer months.

Iraq is facing a major challenge to meet growing demand for power across the country. In 2018, the installed capacity of 15GW was significantly lower than the 23.5GW peak demand recorded during the year.

As a result of the shortfall, many areas of the country only have access to a few hours of electricity a day. According to the government, it is estimated that electricity



The French energy firm will develop a 1,000MW solar project under the multibillion-dollar deal.

Photo Credit: Adobe stock

shortages are costing Iraq's economy as much as US\$40bn a year.

In June, Energy & Utilities reported that UAE-based Masdar had signed an agreement with the Iraqi government to develop at least 2GW of renewable energy capacity across Iraq.

The projects will form part of Iraq's

target to generate 20-25%, about 10-12GW, of its energy from renewable resources by 2030. The projects will be located in central and southern Iraq, areas which are particularly susceptible to electricity shortages and blackouts.

These projects point towards the path to sustainability.

The 'Android' approach: Redefining building operations

What if the 'Android' approach, with which apps can be integrated and updated on the Android operating system in our smartphones, could be replicated in property operations? Fyna Ashwath finds out more.

DESPITE INCREASED ADOPTION of Proptech, operators and owners cannot replace the entire hardware in an older building, due to significant costs involved.

In the 'Android' approach, open-protocol controllers are retrofitted to existing BMS/BAS for vendor-agnostic integration of all assets. This enables deep-dive analysis, leading to higher efficiencies, optimal energy consumption, greater performance, and more savings — all with existing systems, through cost-effective retrofitting. This allows operators to seamlessly add new systems, as new innovations emerge. Without vendor lock-ins, they can work with any service provider, and replace them if they fail to deliver.

'Android' buildings: the future of real estate

Looking at the real estate landscape today, most building stock is at least a decade or two old. Greenfield developments, with state-of-the-art systems, are rendering these buildings obsolete, depreciating their value and desirability. This is where the 'Android' approach presents an economically viable solution to future-proof older buildings, so they can continue to be at par.

The Netix Novus Partner Programme comes as the solution to create a network of certified partners, empowered with the necessary tools to lead this new approach, and start the Brownfield Revolution in the Middle East real estate. The programme was recently launched as part of a conference organised at the Burj Khalifa, with several industry thought leaders and dignitaries, as well as online attendees from more than 25 countries, and was inspired by the successful implementation of Netix's solutions in projects handled by ODS Global.

Using Netix's Android approach, ODS Global — a Dubai-based integrated building management service provider and Netix Novus's first Platinum Partner — worked on BMS and maintenance of Emaar's 18 properties and five communities across Downtown Dubai and Dubai Creek Harbour. Its retrofit solution enabled ODS Global to avoid replacing the entire system and help Mazaya save 75% of costs.

"A useful analogy for the benefits of the Novus programme, in the maintenance space, is the example of premium branded cars, which come with warranty and service contract, for a limited period of time. After these arrangements have expired, the owner goes to the service provider regularly for ongoing maintenance, often having to pay a premium cost. Due to high maintenance costs, the owner ends up selling the car, only to buy a new car with another binding service contract. The alternative to selling the first car would be to find a reputed, alternative service provider, who can continue offering routine maintenance services, at minimum cost. Netix Novus provides this solution in the building automation space," explained Sanjeev Bhatia, CEO of Netix Global BV.



The 'Android' approach presents an economically viable solution to future-proof older buildings.

**The
Brownfield
Revolution.**

Photo Credit : Netix Novus

Scaling the impact across the MENA region

Taking stock of this opportunity, and to replicate the success of existing partners like ODS Global, Netix has launched the Novus Partner Programme, offering open-protocol solutions to real estate professionals across the MENA region.

The overwhelming early response testifies to the viability of the 'Android' approach to property operations in the MENA region. Upon large-scale implementation, regional real estate stakeholders will be well-equipped to create new value propositions, provide superior occupant experiences, and begin to achieve ROI immediately after implementation, while enhancing the competitiveness of the entire MENA real estate ecosystem. Bhatia explained, that, simply put, it is a Brownfield Revolution in the making, for the region's real estate sector.

Moving the building industry forward

The Big 5 hosted more than 36,000 global professionals in Dubai at the first in-person construction event in two years.

THE BIG 5, the Middle East, Africa and South Asia's (MEASA) largest and most influential event for the construction industry, welcomed more than 36,000 industry professionals, bringing the business community back to face-to-face business for the first time in two years.

Josine Heijmans, vice-president, construction at dmg events said, "The Big 5 has been an outstanding success this year and we are delighted to be back. The diversity and quality of participation has reaffirmed the industry's demand for in-person business events, and thriving activity at the exhibition shows that the region's construction sector is well poised for growth following the COVID-19 impact."

During the four-day event, inaugurated by HH Sheikh Mansoor bin Mohammed bin Rashid Al Maktoum, chairman of Dubai Sports Council, the exhibition connected the region's engineers, architects, contractors, and project managers with more than 1,200 exhibitors from more than 50 countries, offering access to the latest construction products and solutions set to accelerate market growth.

"Whether it be showcasing innovative products, offering skills development opportunities, or hosting live forums for progressive dialogue, it has been our first and foremost mission at The Big 5 to support and move the building industry forward, more important than ever this year we are determined not to let the conversation stop here," added Heijmans.

For the first time this year, The Big 5 launches its Online Reconnect days. Open from 16-17 November, the platform offers the global construction community the chance to re-engage to close sales, follow up on vital business conversations, and access the latest content from The Big 5's international speakers.

Faruq Mangera, general manager at Al Waseef Industries sees the Reconnect Days as a vital phase in exhibiting today, and as a means to enter new markets: "We have had



The event welcomed industry professionals from all over.

visitors from Iraq, Jordan, Oman, Africa and more to our stand and I'm sure that the online exhibition in November will continue to help us tremendously with these new markets; our team have been trained to use that system, to meet customers online to showcase our products and to show who we are."

With three high-level summits this year, 70 CPD certified talks delivered by 150 speakers, the inaugural Construction Impact Awards and returning Start-up City and the Women in Construction Forum, The Big 5 drew in proactive and forward-thinking professionals more ready to do business than any year before.

Hans Reinders, founder and new business development at returning exhibitor Oxycom concluded that the quality of participation at the event was as high, if not higher than any year before. He said, "The Big 5 welcomed dedicated people of the industry, people that have a reason to come because it is the surrounding where they can get new

information in a world that goes on and picks up again.

The Big 5 provided a safe environment for face-to-face business following the dmg 'All Secure' protocol and in collaboration with DWTC and local health authorities during the exhibition. The enhanced measures included guidelines covering all aspects of cleaning and hygiene, social distancing measures, and the use of PPE, screening, and a track and trace in conjunction with local authorities.

The 43rd edition of The Big 5 is set to take place at the Dubai World Trade Centre from 18 – 21 September 2022.

The Big 5 is the construction event providing leading-edge innovation, knowledge, and business opportunities for industry players around the world to connect, grow, and succeed.

It has facilitated partnerships, advanced knowledge and industry best practices, while serving as the gateway for international companies to access the Middle East, Africa and South Asia regions. ■

Photo Credit: The Big 5

'Smart grid technologies witnessing huge uptake'

US, China and France have framed policies to further develop smart grids, according to GlobalData's report.

SMART GRID-ENABLED technologies such as smart metering, demand response, and vehicle-to-grid (V2G) are witnessing huge uptake globally, according to GlobalData. The data and analytics company notes that this uptick in development is due to the technology offering several benefits such as greater transparency and control over power consumption, improvements in grid reliability, and reduced electricity prices.

According to GlobalData's report, 'Smart Grid Policy Handbook 2021', the US, China, and France have framed policies and set up programmes to further develop smart grids. Developing countries such as India and Thailand are also launching pilot projects to design and strengthen the policy framework for smart grids. The report offers comprehensive information on major policies governing smart grid in several countries. The report covers eighteen key countries and the EU, providing the current scenario and future plans in implementing smart grid technology, giving a fair idea of overall growth potential of the smart grid industry in each of these countries, and also globally. The report uses data and information sourced from industry associations, government websites, and statutory bodies.

Rohit Ravetkar, power analyst at GlobalData, said, "Smart meters are a win-win for both utilities and their customers, and several utilities are now making a mandatory switch to smart meters from regular meters. Customers can achieve cost savings with time-of-use pricing, while utilities can improve grid operation and enhance grid reliability through incentive-based demand response programmes."

The rapid installation of electric vehicle (EV) charging stations in several countries is aiding V2G infrastructure growth. Several countries are looking to develop smart grid technology as it offers several benefits such as greater transparency and control over



Photo Credit : Adobe Stock

power consumption, improvements in grid reliability, and reduced electricity prices. China has surged ahead with 807,000 EV charging stations, followed by the US with

China has surged ahead with 807,000 EV charging stations, followed by the US with 98,981, according to the International Energy Agency.

98,981 and South Korea with 64,188, according to the International Energy Agency.

Ravetkar added, "Countries such as France, the UK, Canada, and Spain, with high electric vehicle (EV) and renewable energy ambitions are betting on V2G systems as they are set to revolutionise both the sectors in parallel. As the power mix of countries increasingly leans toward renewables, the intermittency of renewables will become a bigger problem that can only be addressed by increasing energy storage capacity.

"The use of electric vehicles as modular storage units that can charge during off peak hours and supply a portion of their charge during peak hours will go a long way in balancing the grid, provided there are a higher number of electric vehicles and that most charging points are connected to V2G systems," he said. ■

Solving big data problems with edge controller technology

Dieter Gebert and Luigi Ballerio, application engineers for machine automation solutions at Emerson, shed light on the benefits and applications of edge computing in big data problems.

MANUFACTURERS KEEN TO exploit the full potential of their plants are increasingly looking at how 'big data' can help them create operational efficiencies. Big data, defined as extremely complex and large data sets, presents a number of opportunities for organisations, not just in supporting predictive maintenance strategies, but also in identifying issues, bottlenecks and areas of underperformance.

However, large and complicated data sets, accumulating at an incredibly fast rate, require the implementation of new advanced technology to gather the data, perform the analysis, and then present useful insights that can subsequently be acted upon. This is where the Industrial Internet of Things (IIoT) enters the fray. The IIoT makes use of a vast array of existing and new sensor technology monitoring devices, equipment, machines, production lines and processes, connected via a variety of data communications networks to high-performance computer processing and analysis software to interpret and then present this data.

Implementing technology to process and analyse big data can be a major problem when companies try to tackle it all at once. A better approach may be to start smaller and concentrate on known problems with defined parameters, which could be described as 'little data'. Data produced by field devices is analysed by a field-located controller to generate insights.

Edge computing

Edge computing is essentially a distributed computing paradigm that brings computing processing and data storage closer to the location where it is needed, to improve response times and save bandwidth. As devices get smarter, they produce more analytics to generate insights into equipment health and performance. Edge computing technology is doing this at or near the source of the data, instead of relying on the cloud and the computing power within data centres. With the latest edge controllers, embedded processing brings those insights closer to the plant floor, whilst also making them more widely available via the cloud.

Benefits

OEMs and manufacturers can use edge computing to evaluate equipment breakdowns and eliminate common issues. The technology can be used to provide feedback to development teams on machine performance to help them optimise future products. It can be used to answer questions on how the machine is actually used, the quality issues, and if the costs have to be reduced without affecting performance. Comparisons can be made between machines, processes and entire plant, as well as raw materials in terms of yield, quality and scrap.

The latest edge controllers, such as the PACSystems™ RX3i Edge Controller from Emerson, offer both deterministic and non-



Photo Credit: Emerson

deterministic control in a single compact device. These devices effectively have 'two sides of a brain', with the left side being where intelligent sensor data is gathered and real-time deterministic control is provided. Meanwhile, the right side has a software stack running on Linux to deliver the data processing and analytics, dashboards, data logging, and remote monitoring and diagnostics.

Imagine a single control unit, technically an industrial PC with multicore architecture, then separate it into two brains. The left side performs the typical functions of a controller, including reading inputs, executing logic in real-time and writing outputs. In addition, the left side is also able to prevent any problems the right side might incur from affecting the control functions.

The right side, which runs a Linux-based open operating system, has the ability to manage multiple loops and routines locally, collect data and interface with standard programmes for the IT world, such as Python or Java.

Anomaly detection at the edge

A typical application is anomaly detection at the edge. This requires historical data from a database such as InfluxDB or SQL Lite, and a machine learning algorithm created in Python or other tools like Prometheus. A selected data sample is taken and cleaned, removing all outliers, and then the ML programme is trained. The test dataset can then be applied, and then eventually the live data from the machine and relevant instruments. The ML algorithm can then spot an anomaly, were it to occur, record it or raise an alarm for an equipment operator. This helps issues to be identified before they become real problems, and a shutdown of the machine or operation can be scheduled, necessary parts ordered and downtime minimised, ultimately reducing the cost impact.

Conclusion

The need for digital transformation is now much more apparent, with business owners able to see the return on investments from IIoT supported by edge computing. IIoT allows companies to analyse and historicise previously isolated data that is critical to operational improvement. Edge controllers provide an affordable way to bring the IIoT down to the machine edge to enable organisations to begin solving big data problems one step at a time. ■

Monitoring the charging stations of the e-bus fleet of Jena

How Jena's public transport system monitors its charging columns for the e-bus fleet and uses advanced diagnostic features to increase availability and optimise maintenance activities.

IN THE CITY of Jena, Germany, electromobility has been present in the form of a tramway for 120 years. Supplemented by a fleet of diesel-powered buses, an efficient public transport system has been created over time. Last year saw the introduction of e-mobility in the operation of city buses as well. The first vehicles started regular service in 2020 to contribute to CO₂ savings (53,000kg per bus per year), and to reduce particulate matter and noise emissions in the urban area.

The power supply department at Jenaer Nahverkehr, operator of the city's public transport, is responsible for a reliable and uninterrupted power supply. In order to minimise the effects of malfunctions, a reliable control and telecontrol system was implemented on the basis of the PcVue SCADA software.

For many years, Actemium Germany's Automation Frankfurt business unit has been the partner of Jena's public transport system for the implementation and further development of the control and telecontrol technology for the power supply, and for the monitoring of signalling and safety systems.

Maintenance of the newly-introduced charging infrastructure for the electric buses is the responsibility of the Power Supply department. Actemium Automation Frankfurt was commissioned to integrate the chargers into the control system. The primary goal of this expansion is remote monitoring of the charging infrastructure by the power supply department so that any faults that occur can be detected and eliminated as quickly as possible. And to do so while reducing travel times for service personnel as much as possible. With the existing control system, the possibility of processing the data for visualisation, archiving and data exchange with external systems via various industrial communication protocols, as well as remote alarming, is already provided as standard.

OCPP – Driver for communication with charging stations

Typically, the open standard protocol OCPP (Open Charge Point Protocol) is used for monitoring e-charging stations, which ensures the interoperability of products from different manufacturers.

With its latest PcVue version, the manufacturer ARC Informatique provides a communication driver for the OCPP protocol that supports the current protocol versions 1.6-J and 2.0.1 as well as the security profiles 1 and 2. The software also overcomes a typical OCPP problem, which is that a charging station can only communicate with one Charging Station Management System (CSMS).

Integrated operating functionality

The central function of the implementation by Actemium is alarm and log data management, which allows precise fault analysis in live operation as well as in the evaluation of historical data. The alarm system enables the on-call service to diagnose the fault in advance



Photo Credit : Stadtwerke Jena/Anna Schroll

The primary goal of the expansion is remote monitoring of the charging infrastructure by the power supply department.

via the secure remote access of the public utility company and then to rectify it or initiate appropriate measures.

In addition, the traffic control centre benefits from the connection to the charging infrastructure. The dispatcher workstation there shows the whereabouts of a bus at the corresponding charging points in real time and points out faults that affect operation. This means that adjustments can be made quickly in vehicle deployment planning to avoid cancellations or delays in the route schedule. Afterwards, the maintenance personnel can determine the actual cause.

Alarms of particularly high priority are sent as remote messages to the mobile terminals of the on-call service.

The users of the system can monitor active charging processes via a trend data display, whereby all measured values, such as currents, voltages and power values of a transaction, can be visually compared.

Completed charging processes can be viewed in retrospect, as well as compared with each other. The respective vehicle is identified and its current state of charge is documented.

Practical benefits

Christian Zeh, a testing and maintenance engineer at Jena's public transportation system, commented, "By integrating the monitoring and control system for e-charging stations, all operating states are now visible in the control system, which opens up immediate intervention options for us. The charging infrastructure is thus fully integrated into the operational workflows of the power supply department. The usefulness of the system was proven after just a few weeks in daily operation, especially with regard to controlling temperature fluctuations in the charging stations."

With the implementation of the charging infrastructure in its control and telecontrol system, the power supply team is thus well prepared for the planned increase in the electric bus fleet and the associated expansion of the charging infrastructure. ■

Disrupting the Middle East's water market

Air-to-water vending machines that produce water from air, showcased at the Arab Water Forum, could drastically reduce dependence on desalinated water in the Arab World and save energy.

THE MIDDLE EAST and North Africa is home to 6% of the world's population and less than 2% of the world's renewable water supply, according to the World Bank.

Within a decade from now, it is believed that 50% of the world's population will live in areas without access to clean, fresh, and safe drinking water.

At the 5th Arab Water Forum held recently in Dubai, Prof Dr Mahmoud Abu Zeid, president of the Arab Water Council, said that water scarcity constitutes a major challenge to sustainable development in the Arab World, that affects water security, food security, economic development, energy security, livelihoods and human health.

"Enhancing cooperation with regard to water and developing its resources is a vital matter and an urgent necessity to achieve water security and sustainable development for peoples. This goal will not be achieved except through full coordination between regional, national and local policies among all relevant sectors and at the global level among other global plans related to water and national goals and objectives."

Latest technologies and innovations were displayed at the Arab Water Forum, including the air-to-water technology that can solve the water scarcity problem in the Arab World.

The five companies that showcased the air-to-water technology and the water producing machines at the Arab Water Forum, said, the technology has the power and capacity to provide enough clean drinking water to serve the needs of the world's 7.5 billion people – in a sustainable manner.

"With six times more water in the atmosphere than all the world's rivers combined, our goal is to help solve the world's water scarcity and security challenges by accessing Earth's greatest untapped water source - the atmosphere - to sustainably advance humanity and



Air-to-water technology has the power and capacity to provide enough clean drinking water to serve the world.

ensure communities have access to safe, clean drinking water and sanitation facilities," said Roheen Berry, chief executive officer of Beyond Water.

"In the Middle East and Africa region, where water security regularly tops government agendas alongside food security and industrial growth – all of which demand high water usage – we are in a unique position to make real change via scalable anywhere-anytime solutions which

can change the lives of countless communities across the region, improve the environment, and foster new employment opportunities in a diverse array of sectors.

"Our renewables-powered technology provides a carbon-negative water source to benefit communities and economies with critical and immediate needs. Beyond Water aims to help change the world by aiding and saving communities, economies and the planet," added Berry. ■

Project Databank

Compiled by Data Media Systems

Project Focus

Compiled by Data Media Systems

Amias Real Estate - Assila Investment - The Sail Tower

Name of Client	Amias Real Estate Assila Investment
Estimated Budget (US\$)	350,000,000
Facility Type	Hotels
Sector	Construction
Status	Construction
Location	Jeddah
Project Start	Q2-2011
End Date	Q4-2021
PMC	Drees & Sommer
Main Contractor	Six Construct Al Saad General Contracting Company
Award Date	Q1-2014

Background

The tower is a key project in the recent growth of Jeddah as a resort destination for locals and foreigners. The design is inspired by the project's prominent location directly on the Red Sea and along the cornice of Jeddah. The exterior 'skin' features synthetic fabric architectural sails that shade the interior spaces, protect balconies from wind, maintain privacy and house LED lights that create a distinctive pattern over the surface of the building. The 65-story tower will contain a Shangri-La hotel, serviced apartments, condominiums, and feature a 236-room hotel, 122 residences, 600 parking spaces, three restaurants, function rooms, three-story grand ballroom, luxury spa, fitness area, swimming pool, children's club, and several lounges.

Project Status

Date	Status
Aug 2021	The installation works of the LED lights on the tower's surface are nearing completion.
Apr 2021	Finishing and interior works are ongoing at the tower project. Shangri-La Hotel plans to commence operations in October 2021.

Project Scope

The scope of the project is to construct the following:

- Three basements and technical floors
- 64 mixed-use hotel rooms and apartments
- Two-to-four-bedroom residences are on levels 29 to 63
- A penthouse on the top floor
- Seven-story podium
- Three-story pre-function ballroom

The Shangri-La Hotel includes:

- Situated in the lower 28 floors of the tower

- Have 224 guest suites
- 18 serviced apartments
- Four restaurants
- A male and female health club/spa
- Kids' club
- Outdoor pool

The built-up area is 79,624 sq. m and the site area is around 9,710 sq. m..

The surrounding grounds and parking have a total built-up area of 150,000 sq. m.

Project Finance

The project clients are Amias Real Estate and Assila Investments.

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Project Databank

Compiled by Data Media Systems

CONSTRUCTION AND INFRASTRUCTURE PROJECTS, SAUDI ARABIA

Project	City	Facility	Budget (US\$ '000)	Status
AlKhozama - Al Faisaliah District Redevelopment -	Riyadh	Malls/Retail Outlets	300,000	Construction
AlMadinah AlMunawwarah Development Authority - Madinah Public Transport Program	Medina	Railway	1,600,000	Design
AMC - Wellness Village	Jeddah	Medical/Health/Spa	155,000	Design
Amias Real Estate - Assila Investment - The Sail Tower	Jeddah	Hotels	350,000	Construction
DCOMM - Makkah Mass Rail Transit (MMRT)	Makkah	Railway	16,500,000	Construction
DGDA - Diriyah Gate - Overview	Ad'Diriyah	Mixed-Use Development	1,600,000	Construction
Dr. Sulaiman Al Habib Medical Group - North Jeddah Hospital	Jeddah	Medical/Health/Spa	451,000	Construction
EMAAR - MISA - King Abdullah Economic City (KAEC) - Overview	Rabigh	Mixed-Use Development	27,000,000	Construction
GACA - Abha Airport Development	Abha	Airport	480,000	Construction
GACA - Al Jouf Airport Expansion Procurement	Al Jouf	Airport	300,000	Engineering &
GACA - Jeddah - King Abdul Aziz International Airport (KAIA) - Cargo Terminal	Jeddah	Airport	80,000	Engineering & Procurement
GACA - Jeddah Airport City Procurement	Jeddah	Mixed-Use Development	3,200,000	Engineering &
GACA - King Abdul Aziz International Airport (KAIA) Expansion - Overview	Jeddah	Airport	6,000,000	Construction
GACA - Regional Airports Development Program - (Program)	Various	Airport	3,600,000	Construction
GACA - Riyadh - King Khalid International Airport - Terminal 6	Riyadh	Airport	600,000	Feasibility Study
HOJDC - KDC Limited - Heart of Jeddah	Jeddah	Mixed-Use Development	11,000,000	Design
Jeddah Economic Company Ltd. - Jeddah Economic City - Phase 1 - Jeddah Tower	Jeddah	Mixed-Use Development	1,300,000	Construction
JODC - Jabal Omar Development - Overview	Makkah	Mixed-Use Development	2,700,000	Construction
Maaden - Gold Mines Development Program -	Various	Gold	600,000	Construction
Maaden - Sabic - Mosaic - Waad Al Shamaal PhosphateCity - Overview	Ras Al Khair	Phosphate	9,600,000	Construction
Majid Al Futtaim - City Center Ishbilyyah	Riyadh	Malls/Retail Outlets	1,000,000	Construction
Makkah Region Development Authority (MRDA) - Makkah - Al-Faisaliah City	Makkah	City	145,500,000	Design
Metro Jeddah Company - Jeddah Public Transport Program - (Program)	Jeddah	Railway	5,600,000	EPC ITB
Ministry of Housing - Housing Units Development	Various	Residential Development	40,000,000	Construction
Ministry of Interior (MOI) - Security Forces King Abdullah bin Abdulaziz Riyadh Medical City	Riyadh	Medical/Health Facilities/Spa	12,000,000	Construction

CONSTRUCTION AND INFRASTRUCTURE PROJECTS, SAUDI ARABIA

Ministry of Transport - (Saudi Arabia - Egypt)	Ras Hamid	King Salman Causeway	5,000,000	Feasibility Study
Ministry of Transport - GCC Railway Network - Bahrain - Saudi Link	Khobar	Railway	4,200,000	Design
Ministry of Transport - King Hamad Causeway	Dammam	Causeway	3,000,000	Feasibility Study
Ministry of Transport & Communication - GCC Railway Network	Eastern Region	Railway	25,000,000	Construction
MOH - Al Jouf - Prince Mohammed Medical City	Al Jouf	Medical/Health Facilities/Spa	1,300,000	Construction
National Center for Privatization & PPP - Obhur Suspension Bridge	Jeddah	Bridge	1,200,000	Feasibility Study
NEOM - Neom City - Rail Network -	Neom	Railway	23,000,000	Design
NEOM - Sindalah Island - Construction Facilities Package	Neom	Hotels, Malls/Retail Outlets, Beaches and Resorts	50,000	EPC ITB
PIF - Amaala Resort - Overview Procurement	Red Sea	Beaches and Resorts	3,000,000	Engineering &
PIF - New Jeddah Downtown	Jeddah	Mixed-Use Development	4,800,000	Announced
PIF - Rayadah Investment Company - King Abdullah Financial District (KAJD)	Riyadh	Mixed-Use Development	7,800,000	Construction
QIC - Qiddiya Entertainment City - Phase 2	Riyadh	Mixed-Use Development	3,500,000	Announced
ROSHN - Sedra Housing Development - Phase 1 - Residential Development	Riyadh	Residential Development	950,000	Construction
Royal Commission for Riyadh City - Riyadh Bus Rapid Transit System (BRT) - Overview	Riyadh	Mass Transit Systems	610,000	Construction
Royal Commission for Riyadh City - Riyadh Metro	Riyadh	Railway	23,000,000	Construction
SATS - King Khalid International Airport - Cargo Terminal	Riyadh	Airport	230,000	Engineering & Procurement
Saudi Aramco - King Salman Energy Park (SPARK) - Phase 1 - Utilities and Infrastructure	Abqaiq	City	1,600,000	Construction
Saudi National Housing Company - Murcia Housing Development	Riyadh	Residential Development	660,000	Construction
Saudi Railway Company - Saudi Railway Masterplan	Various	Mass Transit Systems	97,000,000	Construction
Saudi Railway Company - Yanbu to Jeddah Railway	Red Sea	Railway	1,000,000	Announced
SCLC - LandBridge Rail Link	Various	Railway	5,000,000	Design
Tatweer Buildings Company - Medina Schools	Medina	Schools	500,000	EPC ITB
TRSDC - The Red Sea Project -- Airport -	Tabuk Province	Airport	570,000	Construction
TRSDC - The Red Sea Project Coastal Village	Tabuk Province	Residential Development	350,000	Construction
TRSDC - The Red Sea Project - Facilities	Tabuk Province	Beaches and Resorts	9,000,000	Construction
TRSDC - The Red Sea Project - Shurayrah Island	Tabuk Province	Beaches and Resorts	1,000,000	Engineering & Procurement
Umm Al-Qura Development & Construction Company - King Abdul Aziz Road (KAAR) Development - Masar Package A - Hospitality and Retail Units	Makkah	Mixed-Use Development	400,000	EPC ITB
Wave One Project Company - Jeddah and Makkah Schools	Western Region	Schools	533,000	Construction

Monetising fibre optic cables with DAS technology

Maria Shiao, chief sales officer at Fotech, a bp Launchpad company, discusses how to monetise fibre optic cables into hard working, multi-use infrastructure.

DISTRIBUTED ACOUSTIC SENSING (DAS) technology enables fibre optic cables to become millions of sensors. DAS uses innovative photonics, advanced artificial intelligence and edge computing to convert fibre optic telecommunication cables into sophisticated acoustic sensors.

These sensors are used in numerous applications, from new smart city projects and traditional cities that are striving to become smarter, to traffic management and water pipeline monitoring. These have typically been tackled with disparate monitoring technologies, such as security cameras, GPS and environmental sensors. But using a single technology, such as DAS, to turn fibre optic cables into sensors, is a simple solution, particularly as the fibre optics are already there or are being installed. DAS is capable of sensing vital aspects above and below the ground, continuously, over hundreds of kilometres.

DAS essentially plugs into existing fibre optic cable networks and detects any disturbances taking place near the cable. It sends thousands of pulses of light along the fibre optic cable every second and monitors the pattern of light reflected back. When acoustic or vibrational energy – such as those created by vehicle movements or people walking, climbing or digging – creates a strain on the optical fibre, this changes the reflected light pattern.

DAS analyses these changes in light patterns to identify and to categorise the disturbances. Each type of disturbance has its own signature and the technology can tell, in real-time, what happened, where and when. The technology is sophisticated enough to identify incidents such as transport congestion, intrusion attempts around secure locations, or even footfall in a given area, such as a train station. It can help with public transport scheduling and allow for quick interventions if footfall is unexpectedly heavy and there is a risk of dangerous overcrowding.

Monitoring and informing all types of transport

Fibre optic cables are typically installed along road or rail networks, but with the integration of DAS, vehicle, train and pedestrian movements can be sensed simultaneously. For example, well-positioned fibre optic cables give excellent information about traffic patterns. DAS can detect vehicles approaching a junction and the information is then used to improve traffic flow.

The technology can track vehicles for many kilometres before a set

of traffic lights, classify vehicle size, calculate its arrival time at the lights, and potentially minimise stops for heavy vehicles, which reduces congestion and emissions. When used as part of a smart traffic system, DAS reduces travel times, and improves fuel efficiencies and air quality.

DAS can monitor and detect incidents on roads, such as stopped vehicles on fast-moving highways, and alert highway teams so they can investigate further, move obstructions and improve road safety.

For rail, GPS is typically used for tracking, but in a city, it loses accuracy, for example, when a train goes through a tunnel. GPS is also susceptible to urban canyoning – this is when the signal reflects off buildings and misplaces the train's location. DAS is a better solution as it has a good update rate, and is proven to monitor position second by second, metre by metre, while detecting subtle differences in acceleration and deceleration.

Maintaining a secure environment

DAS improves the security of the critical assets that keep a city running efficiently, especially pipelines and power cables.

Pipelines for vital services such as water, energy and waste are all worth monitoring against unwanted intrusion or leakage.

If there is a leak in a pipeline from a tiny orifice, it could easily remain undetected or it could take days for the location to be identified with existing computational systems. DAS can quickly detect leaks from orifices as small as 1mm. For water pipes, this can prevent significant water loss and for oil, gas and waste, early detection can mean the difference between a minor repair and a major disaster.

DAS can also pinpoint the location of power cable failures. Engineers can easily spend days trying to find a failure using the current practice of sending high voltages down the line. However, DAS can fault-find to within meters and within seconds. It is significantly safer, faster and more cost-effective to repair using DAS detection because engineers can go straight to the source of the fault.

Fibre costs are falling while the number of installation methods is increasing. Traditional ducts and trenches can be built to house the fibre networks, but micro-trenches and nano-trenches are now available, which allow installers to be more precise in positioning the fibre in relation to roads or railway lines. Surface-bonded fibre is also emerging offering higher accuracy.

Early collaboration among all major players will help to make the most of the fibre networks, monetising them for the telecoms companies. This should make the financial business case for fibre deployment easier, and enable not only more widely available broadband access but also a fibre optic network that is working harder, doing other vital things for the community. ■

Fibre costs are falling while the number of installations methods is increasing.

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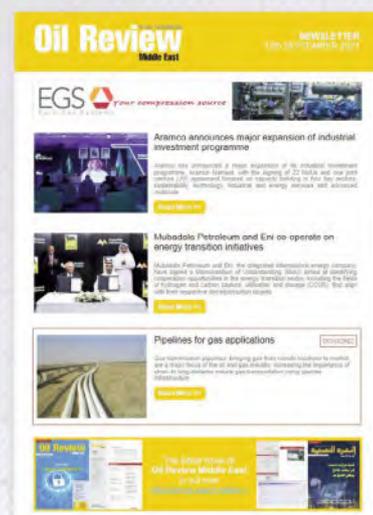
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The platform will optimise the operator's overall energy use.

Photo Credit : Adobe Stock

Honeywell unveils battery energy storage solution platform

HONEYWELL HAS UNVEILED its battery energy storage system (BESS) platform, which integrates Honeywell asset monitoring, distributed energy resource management, supervisory control and analytics functionality to enable organisations to accurately forecast and optimise their overall energy use.

Honeywell's BESS Platform leverages best practices for energy management such as energy arbitrage and demand management to deliver flexibility and control of when

energy is purchased and used. The platform is ideal for a wide range of commercial and industrial companies, independent power producers and utilities.

Hesham Tashkandi, vice-president and general manager, Honeywell Performance Materials and Technologies, Middle East, commented, "Honeywell's Battery Energy Storage System Platform will help solve a critical challenge in effectively integrating higher shares of solar energy in power systems that is being increasingly generated in the region, while also

optimising the use of non-renewables."

Honeywell's BESS platform improves grid stability and sustainability while decreasing supply costs. If a generator fails or goes offline for any reason, the platform reduces the need to bring additional, non-renewable power generators online.

In addition, the BESS platform can reduce the need for non-renewable power sources such as gas turbines and diesel generators and their associated high gas consumption rates, contributing to a smaller carbon footprint.

TrinaTracker Agile 1P obtains UL certification

TRINA SOLAR Co Ltd's business unit, TrinaTracker, has obtained the global safety validation, a UL 3703 certificate, for its dual-row Agile 1P tracker series.

The UL 3707 is a comprehensive and authoritative standard for solar trackers, issued by Underwriters Laboratories, an OSHA-approved authority.

Agile 1P offers a higher level of efficiency than competing models, with extra energy output and adaptability thanks to its 1P dual-row system and shorter tracker configuration.

The unit includes advanced wind engineering, a dual-drive system and globally exclusive patented spherical bearing.

Reliability assessments conducted as part of the certification include overload, power restoration, locked platform, energy stop, dielectric test, humidity cycling, metallic coating thickness measurements, rain and sprinkler tests, and bonding path resistant tests.

TrinaTracker have included the SuperTrack algorithm in the 1P models, which can deliver up to 8% extra yield gain while reducing LCOE.



The units passed a number of reliability assessments.

Antonio Jimenez, managing direct for Trina Solar MEA, commented, "The UL certificate shows Trina Solar's continuous devotion in high reliability research and proven quality.

"TrinaTracker is dedicated to offering customers high-quality, reliable ultra-high power trackers and service, and will continue to promote technical innovation and industry-wise standardisation of trackers."

Photo Credit : TrinaSolar

Smith Power launches new U17-3 mini-excavator

SMITH POWER EQUIPMENT has unveiled the new 'Kubota U17-3', a 1.7 tonne compact excavator aimed at delivering performance in space-restricted working environments.

Replacing the predecessor U15 model, the new Kubota U17-3 is similar to the U15. Michele Cicognani, national product & sales specialist at Smith Power, says that the U17-3 "packs a bigger punch" with better power under the hood to handle a variety of tasks as well as better groundbreaking force, increased digging depth and reach.

"One of the key selling points is the Kubota 16 hp engine, delivering superior horsepower and



Photo Credit: Smith Power

The Kubota U17-3 is designed to excel in tight working spaces.

performance, as well as low noise, vibration levels and exceptional fuel efficiency," says Cicognani. "With a working performance of 15,2 KN, 2 310 mm digging depth and 3 900 mm digging radius, the U17-3 has the power you need, when you need it most."

According to Smith Power, the HMS hydraulic system ensures greater operational performance. Kubota adopts a 3-pump system, which uses three independent pumps for boom, arm and swivel to make the cooperation of bucket, boom and swivel as smooth and efficient as possible. It allows the high capacity control valve and hydraulic variable pumps to realise superb excavating and loading performance.

Smith Power says the Kubota U17-3 particularly excels in tight working spaces and with the zero-tail swing the operator can rotate the cab of this 1,7-tonne excavator in any direction without any part of it going over the tracks. The workstation features more space than the predecessor model and the high-back seat provides optimal comfort for any size operator and the wide foot area is spacious and reduces operator fatigue.

BAUER unveils its first electric drilling rig

BAUER MASCHINEN HAS unveiled the new BAUER eBG 33 - the first electric drilling rig manufactured by the company. The equipment uses electrical power and operates extremely quietly, making it perfect for use in cities claims the manufacturer. "We have been working with electrification for some time now. In the past, however, this was tailored to specific customer requests or projects," said Christian Heinecker, head of the drilling equipment division at BAUER Maschinen GmbH.

The company said the development of the new eBG carries the component of "zero emission" and includes spheres of activity such as sustainability, recycling, energy, CO2 footprint and noise emissions.

The new eBG 33 falls in the mid-range segment of the drilling rig series with a drive power of more than 400 kW and within the range of 280 to 390 kNm torque. Apart from kelly drilling, the eBG 33 can be used

for high-performance methods such as cutter soil mixing (CSM) or double-head system drilling.

Analysis by Bauer has previously revealed that the average diesel consumption is significantly higher for the BG 28 and larger equipment when compared to smaller equipment types. This is because this type of drilling rig is also used for high-performance methods roughly a third of the time, in addition to frequent kelly drilling.

To deliver the same capacity as a conventional Bauer BG with a diesel engine, the eBG 33 is developed using a direct power supply solution. Because the currently available battery systems would not be able to manage the capacity in this size class. The company clarified that using the eBG is thus primarily advantageous on large-scale and long-running construction sites which observes reduced operating costs.

An electric engine was



Photo Credit: Bauer Maschinen

The equipment uses electrical power and operates extremely quietly, making it perfect for use in cities.

installed instead of the diesel engine and the power distribution is located in place of the fuel tank. A transformer supplies various voltages for the electric control components. The advantages of Bauer's award-winning Energy Efficient Power (EEP) system are fully available for the electrified eBG.

Briefly

NeoR lightweight formwork expanded to include new accessories

PASCHAL IS OFFERING a new lightweight formwork that combines the features of the Modular/GE universal formwork and the LOGO.3 wall formwork system as well as all the system properties of modern lightweight formwork with its NeoR formwork system. The four new accessories now are aimed at achieving better handling when aligning and transporting NeoR formwork panels.

According to Paschal, the new NeoR transportation angles or loading auxiliaries can be used to move or load stacked NeoR panels. Two to twelve NeoR panels, 90 cm and 150 cm in height can be transported with four transportation angles. The topmost and bottommost panels must have the same width and further panel pairs can be stacked in between if the width of the extra panels fits within the width of the two base panels. The integrated bolts on the underside of the transportation angles make it easy to fasten them to the NeoR panels. Paschal claims the additional advantage presented is that the NeoR transportation angles can be stacked, so that two packs can be placed on top of each other.

As an alternative to transportation angles, NeoR panels can also be transported using four loading auxiliaries per stack. With an admissible capacity of 400 kg, up to eight NeoR large-size panels can be moved or loaded in this way. The first bolt hole in the panel frame serves as the attachment point for the loading auxiliary. As they share the same frame profile, the loading auxiliary can also be used for panels from the Modular/GE universal formwork.

With the help of the integrated crane eyes, the stacks can then be easily and safely loaded and transported by crane.

Paschal claims, to ensure a better alignment of the NeoR lightweight formwork over longer distances, H2O beams or squared timber are fastened to the NeoR panels. This is done using the NeoR waling clamp and clamping support at both start and end of the beam and on every second or third panel in between. The NeoR waling clamp is inserted into the oblong hole and the clamping support is pushed through the waling clamp.



التكنولوجيا تلعب دورا رئيسيا في شركات التعدين

متى سيحين موعد المناجم ذاتية التشغيل وزيادة التصنيع في الموقع وانتهاء عصر الديزل والتحول إلى خلايا الوقود ومضاعفة المدة التي تقضيها المركبات التي تعمل بالبطارية قبل حاجتها إلى إعادة الشحن؟ هل ينبغي أن يتحول منجمك إلى استخدام الكهرباء أو يخزنها للأخرين أو كليهما؟ تغيير المسار لاحقا لإدخال بعض من هذه الإمكانيات الهائلة سيكون باهظ التكلفة، وقد يكون مستحيلا. يمكن لمنجم مفتوح توفير كمية ضخمة من الطاقة الشمسية وتخزين كمية ضخمة من الجاذبية في الصيف لاستخدامها في فصل الشتاء عندما تكون الشمس خافتة، ويمكن للتعدين في قاع البحر إنتاج طاقته الخاصة به من الأمواج والمد والجزر لاستخدامها في المكان وإنتاج الثلج لاستخدامه في مزارع السمك المحلية كذلك، فكر - على الأقل - في الخيارات التي بدأت ترى النور».

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www.IDTechEx.com/mining

الكهرباء ستقل الحاجة إلى تعديل مواصفات المركبات واستخدام مركبات مختلفة باختلاف المنجم. فالمنجم تطلب بالفعل مركبات «تسلا ساير ترك» ومركبات بناء عندما يكون ذلك مناسباً. عدد مركبات التعدين الكهربائي وتكلفتها وقيمتها السوقية محددة حسب النوع للفترة ما بين 2022-2042 وهناك تقييم نقدي لأنشطة استخدام الكهرباء التي يقوم بها ما يزيد عن 50 موردا ومنجما. يمكنك رؤية خارطة طريق للمبادرات والخيارات الجديدة والتقدم التكنولوجي في الفترة ما بين 2022-2042 وهي تعقد مقارنة معيارها هو أفضل الممارسات في مجالات أخرى متقدمة في جوانب معينة. كيف ستضاعف الطاقة الشمسية في التعدين من الكهرباء التي تنتجها لكل وحدة مساحة؟ كيف يمكن أن يكون لأشكال جديدة من طاقة الرياح وقت توقف أقل بكثير؟ لماذا هناك مجال لتقوية سلسلة قيمة موردي التعدين؟

يوضح راغو داس، الرئيس التنفيذي للمحللين في شركة آيدي تك إكس قائلاً: «سيحدث العديد من التطورات الجوهرية بعد عشر سنوات لكن ينبغي أن تؤثر على التخطيط وحسابات الجدوى الآن».

← مفكرة الفعاليات 2021

أكتوبر/تشرين الأول

دي 1 - 2022/3/31 معرض إكسبو 2020
دي 13 - 12 معرض سكك حديد الشرق الأوسط

نوفمبر/تشرين الثاني

دي 2 - 4 معرض هايبرموشن دبي دبي

وأخيراً تقديم المساعدة نظراً لما تتمتعان به من مؤهلات فريدة».

المناجم لن تظل مجرد مكان للتعدين بعد استخدام الكهرباء فيها

يكشف تقرير شركة آيدي تك إكس IDTechEx الجديد بعنوان: «استخدام الكهرباء في مجال التعدين: النقل والتوليد والتوظيف 2022 - 2042» عن الكثير من المفاجآت والفجوات في السوق لكل شيء؛ من مناجم الحصى المتواضعة إلى مناجم الماس على عمق أربعة كيلومترات والتعدين في قاع المحيطات، وكلها تسعى إلى مركبات وعمليات تصنيع تعمل ببطارية كهربائية ولا تصدر منها أي انبعاثات، ويتم توليد الكهرباء في الموقع من طاقة الشمس والرياح وحتى الماء حيث يتحول كل نوع منها إلى أشكال أفضل من الطاقة.

فاستخدام الكهرباء أمر لا مفر منه. ذلك لأن التكلفة واللوائح والصحة والسمعة وقسوة الظروف في الموقع والمورفولوجيا وسُمية المخزونات المتبقية؛ كلها أمور تدفع إلى استخدام الكهرباء. لقد حان وقت المنجم ذاتي التشغيل، ولكي يكون مثالياً ليس أمامه إلا أن يعمل بالكهرباء. ويوضح التقرير السبب في أن التعجيل في اعتماد التحول إلى الكهرباء هو أمر ممكن ومنح ميزة تنافسية. فمعرفة كيف أن للمناجم في السوق دوافع وخيارات لاستخدام الكهرباء أقوى مما للمجالات الأخرى. فعلى سبيل المثال يمكن لكل عمليات التعدين توليد الكهرباء المطلوبة أو تخزينها باستخدام الوسائل التكنولوجية المذكورة، وفوق ذلك توجد مصادر للمزيد من الدخل. فاستخدام الطاقة الشمسية وطاقة الرياح وتحقيق الاكتفاء الذاتي من الطاقة هو التوجه السائد في مجال التعدين، إلا أن هذا يعني زيادة فترة تخزين الطاقة من ساعات إلى مواسم. ستعرف كيف ستضم المناجم مخزناً لطاقة الجاذبية وألواحاً شمسية عائمة وكهوفاً لتخزين الهواء المضغوط حيث تتحول جميعها إلى كهرباء عند الحاجة إليها. ويغطي التقرير هذه الأمور وغيرها من الخيارات المناسبة للمناجم مصحوبة بنماذج ممتازة. وعندما تُستنفد المناجم يمكنها في الواقع تغيير نشاطها والتحول بالكامل إلى إنتاج الطاقة وتخزينها، وبذلك تستفيد من معظم تكاليف إنشاء المنجم وتحقق عوائد بتغيير نشاطها بهذا الشكل أو غيره. يبرز التقرير عدة مسائل مهمة. فالمكاسب المالية لاستخدام الكهرباء غالباً لا تُقدر حق قدرها مما يؤدي إلى اتخاذ قرارات خاطئة. فباستخدام



مبادرات الاستدامة في مجال التعدين ترفع كفاءة العمليات وتقلل من المخاطر البيئية

مواكبة التوجهات في مجال التعدين

للتعدين دورٌ هامٌ في المساهمة في مستقبلٍ تقل فيه نسبة انبعاثات الكربون. فعندما يكون قطاع التعدين والمعادن متعافياً ومزدهراً، يكون لذلك بالغ الأثر على الاقتصاد العالمي وفي دعم ابتكار مواد ووسائل تكنولوجية جديدة ضرورية للحد من تغير المناخ وحماية البيئة وتحقيق نظام الاقتصاد الدائري. وقد كان للأتمتة في مجال التعدين - مثله مثل أي مجال آخر - فوائد جمة في تحسين العملية وتشغيلها على النحو الأمثل وفي زيادة الربحية.

على الاستدامة إلى جانب خطة تحولٍ إلى الرقمية ممولة طويلة الأمد، تلك الشركات تتفوق كثيراً على منافسيها».

كما يشير ديفيد ويليك، نائب رئيس منطقة أمريكا الشمالية في قطاع التعدين والمعادن والفلزات بشركة شنايدر إلكترونيك، إلى أنه: «يمكن للعمليات المدمجة رقمياً التعامل مع مجالات رئيسية من خطة الاستدامة التي تضعها مؤسسة ما، وذلك عن طريق الجمع بين الطاقة ومعلومات العمليات والتحكم فيها. فالرقمنة تطور له أهمية بالغة في قطاع الموارد، ويمكن لشركتي شنايدر إلكترونيك

ويقول بنيامين كيركوود، وهو أحد كبار المديرين في قسم البحوث، في بحث أجرته شركة آي دي سي بعنوان: «نظرات متعمقة في مجال الطاقة - التعدين على مستوى العالم»: «للتكنولوجيا دور هام في دعم شركات التعدين. فالجهود الرامية إلى تحقيق أهداف الاستدامة، وإبراز الدور وزيادة التحكم في العمليات، ستعزز رؤية الشركات وإجراءاتها المتعلقة بالطاقة واستخدام المياه وإدارة البيئة التي تعمل فيها. إذ تُبين التحليلات العالمية، التي تجربها شركة آي دي سي عن نمو الإيرادات وربحية الشركات الصناعية، أن الشركات التي لها استراتيجية مستمرة تلتزم بها، تقوم

وفقاً لأحد البحوث، التي تسلط الضوء على التكنولوجيا والتي أجرتها شركة آي دي سي IDC برعاية شركتي أفيفا AVEVA وشنايدر إلكترونيك Schneider Electric، تحت عنوان: «التحول إلى ممارسات مستدامة في مجال التعدين والمعادن والفلزات»، فإن أكثر ثلاثة عوامل في السوق تشجع برامج الاستدامة لدى مؤسسات التعدين والمعادن هي:

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مواكبة التوجهات في مجال التعدين ٤



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Country	Representative	Telephone	Fax	Email
India	Tanmay Mishra	(91) 80 65684483	(91) 8040600791	tanmay.mishra@alaincharles.com
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USA	Michael Tomashfsky	(1) 203 226 2882	(1) 203 226 7447	michael.tomashfsky@alaincharles.com

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Company	Page
AD Ports.....	2
Balkrishna Industries Ltd	21
Cantoni Motor S.A.	15
ENEXIO Water Technologies GmbH	19
Fairtrade Messe und Ausstellungs GmbH & Co. KG (Iraq Agro Pack and plastprintpack 2021)	51
Liebherr Export AG	17
Marini S.p.A. - Fayat Group	25
MLE B.V.....	31
Trident Technology Services DMCC.....	5
VEGA Technique (Dubai Branch).....	7

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