

SOUTHEAST • ASIA CONSTRUCTION

JANUARY - FEBRUARY 2021



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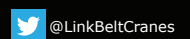
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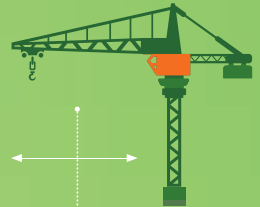
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Our Commitment Shows

Pan-United achieves Singapore's largest concrete pours

Pan-United Corporation Ltd recently announced that it has achieved Singapore's largest two continuous ready-mix concrete pours in casting the raft foundation for a development project in the Labrador area.

The Group's subsidiary, Pan-United Concrete, set a national record when it poured 18,916 cu m for 57 hours non-stop from 31 October to 2 November 2020. This first pour was followed by a second pour of 18,342 cu m of concrete two weeks later, carried out for 42 hours non-stop from 27 to 29 November 2020, to complete the raft foundation.

The mixer truck convoys delivered one truckload of concrete non-stop every 60 seconds, according to Pan-United. The total concrete volume of the two pours, at 37,258 cu m, is equivalent to filling 14 Olympic-sized swimming pools. The previous record of 18,000 cu m was achieved in March 2015 for the Marina One raft foundation.

Ready-mix concrete is produced just in time and typically has a brief two-hour workable lifespan. Pan-United designed a special concrete that remained workable for six hours to ensure the layers bonded integrally to form a solid raft.

The complex logistics planning for the production, delivery and casting of the raft foundation stretched over several months in close collaboration with Hyundai Engineering & Construction, the main contractor of the development.

"Both mass pours went very smoothly, thanks to the excellent co-operation with Hyundai, and the tremendous team effort of all parties involved," said Ken Loh, chief operating officer of Pan-United. "We had full confidence of success in executing this feat, supported by our concrete innovation specialists and with the advanced logistics managed through our digital optimisation platform called AiR."

AiR is the Artificial Intelligence for Ready-Mix Concrete optimisation platform developed by Pan-United, which allows the digitalisation of concrete operations across the entire supply chain. It enables the automation of back-end processes such as delivery orders and invoices.

"AiR optimises our supply chain, managing the efficiency of our batching plants and ensuring a seamless relay of trucks delivering



Pan-United has delivered a total of 37,258 cu m of concrete in two continuous mass pours – enough to fill 14 Olympic-sized swimming pools.

the concrete," said Mr Loh. "Pan-United will continue to innovate concrete and logistics solutions that can address any complex challenge in building smart cities like Singapore."

Chan Wai Mun, operations director of Pan-United Concrete added, "Technology-enabled precision was absolutely crucial in both mass pours to ensure zero disruptions to concrete placement. The continuous supply allows the concrete raft foundation to set uniformly within the required temperature properties."

Highlighting the sustainable aspects of the massive operation, Mr Chan said, "A sustainable Grade 55 temperature-controlled flowing concrete (PanU Cool) was chosen to improve the structural integrity and durability of the raft foundation. Chiller systems developed in-house were used to maintain the low heat of this special flowing concrete so as to prevent cracking during the setting of the huge raft."

Mr Chan further emphasised that "the custom concrete 'recipe' for PanU Cool comprised sustainable raw materials, such as ground granulated blast furnace slag, a by-product of steel production. We also used silica fume, a by-product of silicon wafer production. Stringent durability requirements were designed to ensure the concrete met high performance criteria such as strength and water-tightness. Virtual quality testing was conducted remotely using e-sampling to ensure safe distancing." ■

Doosan and Korea Western Power to develop hydropower plant in Laos

Doosan Heavy Industries & Construction has signed an MoU with Korea Western Power to cooperate on developing a hydropower plant in Phou Ngoy, Laos. The Thailand-based developer Charoen Energy and Water Asia (CEWA) had initially signed the deal with the Laos government to develop the Phou Ngoy project and since then, has been jointly executing the project with Korea Western Power. A tri-party investment agreement was entered into with Korea Overseas Infrastructure & Urban Development Corporation (KIND) in August 2020.

Under the MoU, Korea Western Power and Doosan will jointly pursue the development of the Phou Ngoy hydropower plant and cooperate on the local manufacturing of key equipment for

hydropower plant projects, as well as on the development of sales routes to promote exporting of the products.

The 728-MW Phou Ngoy hydropower plant will be built in Pakse, a city located in the southern Laos province of Champasak. The project is valued to be about US\$2.4 billion and will be carried out using the BOT (build-operate-transfer) approach. This is an EPC project, with Doosan handling the supply of main equipment and the construction work. Starting in January 2021, Korea Western Power and Doosan will jointly conduct a site survey, after which basic engineering will be carried out for the project. The plant construction is expected to start in 2022 and be completed by 2029. ■



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Surbana Jurong partners with LSI in Indonesia

Surbana Jurong and Lantera Sejahtera Indonesia (LSI), a leading Indonesia-based cost and project management consultancy, have signed a strategic partnership agreement to provide complementary consultancy capabilities to advance urban and infrastructure developments in Indonesia.

Under the agreement, Surbana Jurong Indonesia and LSI will harness their combined expertise to provide clients with complete consultancy services for urban and infrastructure development projects. Surbana Jurong will bring architecture and engineering expertise, whilst LSI will provide cost estimation and management through all stages of the project.

Surbana Jurong has a long presence in Indonesia and a proven track record of over three decades partnering with local counterparts to undertake a range of national urban and infrastructure projects. These include creating masterplans for transit-oriented developments (TODs) and industrial parks to architectural design for aerotropolis and construction supervision services.

Among notable projects that Surbana Jurong has been involved in Indonesia are masterplanning for Walini Transit-Oriented Development (TOD), Kertajati Aerocity, Nongsa Digital Economy Hub, Industrial City of Subang as well as the construction supervision services conducted by Surbana Jurong's subsidiary, SMEC, for the Palembang LRT project, the first operational LRT system.

LSI has been collaborating with local and overseas partners since 1972 to ensure the successful delivery of projects of all sizes in all sectors. The company has carried out the infrastructural works on 300 ha of the reclaimed Turtle Island in Bali, at Gading Serpong Residential City in West Java, at Taman Dayu residential estate in Pandaan, East Java as well as the recent revitalisation of the Semanggi intersection in Jakarta.

Wong Heang Fine, group CEO of Surbana Jurong said, "Our partnership with Lantera Sejahtera Indonesia demonstrates



FROM LEFT: Surbana Jurong Indonesia's regional manager Allan Tandiono and director Karolina Astaman, with Lantera Sejahtera Indonesia's director Natalia Pujiyanti and director Gary Miles.

our commitment to Indonesia. Indonesia's growing middle-class population, geographic position, urban and infrastructure development, alongside its focus on human capital, put it on the global economic stage. The pandemic has caused delays to some projects but the government's commitment to ongoing reform will undoubtedly further advance smart and sustainable urban development in Indonesia."

Peter Robinson, president director of Lantera Sejahtera Indonesia added, "It is a great honour and a great opportunity to partner Surbana Jurong in bringing to reality these projects, which are so important to the development of Indonesia. The experience and expertise brought together by our two companies is unmatched and is unreservedly placed at the disposal of those parties, whether from within Indonesia or from overseas, which are focused on improving the lives of the people of Indonesia." ■

Jianghehui project set to transform Hangzhou's urban landscape

A groundbreaking ceremony was recently held for the Jianghehui mixed-use development in Hangzhou, China. This new complex will feature a total above-ground gross floor area of approximately 836,000 sq m, incorporating offices, retail space, premium residences and five-star hotel facilities.

The project is a joint-venture development between Sun Hung Kai Properties, Ping An Real Estate and Hangzhou CBD Investment Group, with a total investment expected to reach RMB30,000 million. It is scheduled to be completed in phases starting from 2024.

Comprising two neighbouring riverside sites located at the intersection of the Qiantang River and the Beijing-Hangzhou Grand Canal, the Jianghehui project is prominently situated in the core area of Qianjiang New City CBD. It sits adjacent to two metro stations under construction, and is about a 15-minute drive to Hangzhou East Railway Station. ■



Upon completion, the Jianghehui project will provide offices, retail space, premium residences and five-star hotel facilities.

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Indonesia to develop first floating solar power plant

Masdar and PT. PJBI, a subsidiary of Indonesia's state electricity company PT. PLN (Persero), have established a joint venture to develop the Cirata Floating Photovoltaic Power Plant – Indonesia's first floating PV project.

The new joint venture company, PT. Pembangunan Jawa Bali Masdar Solar Energi (PMSE), was formally announced at a recent ceremony held at the Cirata reservoir in West Java, where the project will be located. The event was held as part of the UAE-Indonesia Week.

"This partnership will help to strengthen the already-powerful ties of friendship and bilateral collaboration between the UAE and Indonesia," said His Excellency Abdulla Salem Al Dhaheri, the UAE ambassador to Indonesia and the ASEAN region. "The UAE has committed to not only diversifying its energy mix but to extending its expertise outside its own borders. The Cirata project marks the UAE's first investment in Indonesia's renewable energy sector, and will contribute to the nation's sustainable development."

Construction of the Cirata plant is scheduled to start in the first half of 2021. This 145-MWac facility is said to have been designated a National Strategic Project (PSN) by the Indonesian government, giving it priority status and recognising its economic and social benefits to the nation.

"The creation of this joint venture company, PMSE, will enable us to continue the exceptional progress we have made on the Cirata Floating Photovoltaic Power Plant with our development partner PT. PJBI," said Mohamed Jameel Al Ramahi, CEO of Masdar. "This project marks our entry into Southeast Asia, where we see tremendous potential, given the region's rapid economic growth and commitment to sustainable development."

Gunawan Yudi H, president director of PT. PJBI added, "The development of the 145 MWac Cirata Floating PV is a big step for PJBI – a subsidiary of PJB – to develop a business and partnership as an electricity producer in Indonesia. Through our joint venture



The project kick-off ceremony was held in December 2020.

company, we commit to contribute to the development of new renewable energy power plants. We hope this collaboration will be the first step in PJBI and Masdar's cooperation in Indonesia and in the region."

The Cirata Floating Photovoltaic Power Plant will be located on a 250-ha plot of the 6,200-ha reservoir. Both partners said that upon completion, the facility will be able to power 50,000 homes, offset 214,000 t of carbon dioxide emissions per year, and contribute to the creation of up to 800 jobs.

Indonesia is reportedly targeting 23% of its energy mix coming from renewables by 2025 under its Electricity Infrastructure Acceleration Program. The government is currently considering plans to develop an additional 60 floating PV plants, capitalising on its more than 600 lakes and reservoirs, and helping to preserve precious land resources. ■

New general manager for Rossi Malaysia branch



The Italy-based global manufacturer of gear reducers, gearmotors and electric motors, Rossi, announced that Benjamin Quah (left) has been named general manager of Rossi Gearmotors South East Asia Sdn Bhd, with effect from 2 November 2020.

Mr Quah has more than 20 years' experience in the power transmission sector, system integration, solution provider environment as a manager with great knowledge on electronic, electrical, and mechatronic solutions, working for various companies in the field.

Through this new designation, Rossi aspires to improve its performance in Southeast Asia. Mr Quah said, "My first task is to grow our presence in already consolidated segments and to provide customers with added value."

Speaking about his approach to increase the company's performance in the region, Mr Quah explained, "The first step is

to establish the procedures which the team can follow accordingly. Concurrently, executing the business plan in line with Rossi SpA objectives and strategies. In summary, I emphasise to my team to be very objectives-focused and results-oriented, and of course to also ensure the company's cash flow is sufficient for business operation sustainability."

On the current market situation in Southeast Asia, he said, "At this moment, due to Covid situation, Rossi SEA office is operating on semi mode (every staff works in office and from home). Key directions are to grow our presence in already consolidated industrial segments.

"Following a deep recession in 2020, due to Covid situation, the economic forecasts for real GDP is to grow by 5% in 2021. Growth will be supported by infrastructure projects and a rebound in private consumption. The size of the economy will, nevertheless, be smaller in 2021 than in 2019."

Mr Quah reiterated, "We will continue, in spite of the situation, to provide customers with added value while striving to further enhance service quality and spread our brand value." ■

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Haulotte builds another manufacturing plant in China

Haulotte has started the construction of its second manufacturing plant in China, to keep up with the growth of the local MEWP (mobile elevating work platform) market. It is scheduled to open in the first half of 2022.

Called the Fei Long project, the new facility will be the flagship of Haulotte's ambition in China, featuring a 4.0 designed factory on 80,000 sq m of land. It comprises a 44,000 sq m building that will significantly enable the company to widen its range of local production, which will soon include both telescopic and articulated boom lifts.

Haulotte established its first office in China 15 years ago to focus on selling equipment. Not long after that, the company built a dedicated manufacturing plant to serve the country and areas abroad. The second plant currently under construction is located close to the existing plant, in Changzhou, Jiangsu Province.



An artist's impression of Haulotte's new manufacturing plant in China.

According to Haulotte, the new facility will benefit from the latest technologies in terms of organisation and process, such as the capacity to design locally customised solutions. It is also conveniently situated near the highway, which will ease logistics and allow the company to be closer to local suppliers. ■

Haulotte opens new branch in Wuhan

In another development, Haulotte Shanghai has opened a new branch in Wuhan (pictured). This new, modern office is part of the company's strategy to strengthen its presence in various Chinese provinces and to be closer to its customers.

Located in the Qiaokou district, the new office offers convenient transportation facilities. It aims to deliver efficient and reliable access platforms all over central China and western south China. Eventually, it will allow Haulotte Shanghai to grow its business by providing local customers with a full range of services: faster



parts supply, comprehensive training, technical support and refurbishment solutions.

"The opening (of the new office) marks a new chapter for us and perfectly illustrates Haulotte's commitment and confidence in the central China market," said Harry Wang, general manager at Haulotte Shanghai.

Mo Min, manager at Haulotte Wuhan branch added, "The branch is also expected to be a gathering place for local customers, friends and industry colleagues to meet and interact with each other on a daily basis." ■

Keppel DHCS secures contract for district cooling system development in Singapore

Keppel DHCS Pte Ltd, a wholly-owned subsidiary of Keppel Infrastructure Holdings Pte Ltd, has been awarded a S\$300 million contract by JTC to build, own and operate a new district cooling system (DCS) plant for 30 years.

The DCS plant, which will be implemented in stages, is sited in the upcoming Bulim Phase 1 of the Jurong Innovation District (JID). This contract follows on the back of the award of the design phase to Keppel DHCS, which was announced in September 2018.

A DCS comprises the installation of a centralised chilled water processing plant that serves a cluster of buildings via a network of distribution pipes for their air-conditioning needs. By aggregating the customers' energy loads, the overall installed capacity can be lower than if each building used a separate cooling unit, improving energy efficiency. Such aggregation also reduces the

overall carbon footprint.

Expected to be completed in 2022, the new JID DCS plant will have a cooling capacity to serve up to 14,000 Refrigeration Tons (RT) and provide a high quality and reliable chilled water supply service to the developments in Bulim Phase 1, covering a 28-ha area mainly comprising high-specification industrial-use buildings.

Bulim is one of the five precincts in JID, which is a one-stop advanced manufacturing hub. The 600-ha district will house a full manufacturing value chain from research institutes and innovation labs, to training providers and factories of the future. It will serve as a living lab for new manufacturing technologies and solutions, where companies can bring ideas from laboratories to prototyping, test-bedding, production and distribution. ■

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Renewable energy microgrid under way in Cambodia

Total Solar Distributed Generation (DG), in partnership with Canopy Power, is developing and constructing a solar and battery energy storage hybrid microgrid to deliver clean energy and power Koh Rong Sanloem island in Sihanoukville, Cambodia. Work on the project has started, with completion slated for April 2021.

The development will consist of a 1.25-MWp ground-mounted solar PV plant and a 2-MWh battery energy storage system integrated with diesel generators and a smart controller, making it one of Southeast Asia's largest off-grid renewable energy microgrids, announced Total Solar DG in its statement. Electricity will be distributed across two of the main bays of the island via a new Medium Voltage distribution system. The microgrid is designed to deliver electricity to the island with a renewable energy contribution of more than 50%.

Koh Rong Sanloem island is quite remote, home to more than 60 hotels, resorts and guest houses. These facilities currently rely on operating their own diesel generator systems and importing fuel in cannisters for their electricity supply. "This is expensive, unreliable, logistically cumbersome and environmentally damaging," said Total Solar DG.

The company explained that the new microgrid will provide a stable 24-hour electricity supply at lower cost, while removing noise and air pollution from the properties and reducing island-wide diesel consumption by more than 600,000 litres per year.

Canopy Power serves as the project's engineering, procurement and construction (EPC) contractor. The Singapore-based microgrid specialist will design, procure, build and handover the microgrid to Total Solar DG who will finance, own and operate the plant, providing renewable electricity to the licensed electricity retailer on the island.

"Converting an entire island from diesel to solar-battery power, in what is the largest project of its kind, is a milestone in our



© Canopy Power

Koh Rong Sanloem island in Cambodia is expected to be powered by renewable energy in the second quarter of 2021.

regional portfolio of over 600 MW of projects in operation and development. Integrating storage with solar is a way for remote locations to leverage renewables effectively. For us, it's also a great growth opportunity as there are tens of thousands of islands in Southeast Asia," said Gavin Adda, CEO of Total Solar DG, Asia.

Sujay Malve, founder and CEO of Canopy Power commented, "We are very pleased to partner with Total Solar DG to deliver this high impact project in Cambodia. Electrification rate in Cambodia is relatively low and renewable energy microgrids would help to electrify the islands and remote parts of the country. We believe this microgrid at Koh Rong Sanloem will build local capabilities necessary for future deployments in Cambodia." ■

Manitowoc inaugurates new training centre in India

The latest Manitowoc Crane Care training centre (pictured) has opened at the Potain manufacturing facility in Pune, India. Besides product-driven training, the facility also offers visitors a first-hand experience of The Manitowoc Way, the company's business philosophy that focuses on velocity and innovation to deliver unmatched product quality in its cranes.

The training centre features three areas: one for hands-on crane training, another housing the simulators, and a dedicated classroom section. The simulators mirror the operational systems used by Potain cranes and enable trainees to deepen their knowledge of hydraulic, electrical and mechanical principles; practice troubleshooting procedures; and learn basic lessons on software programming. In combination, this enables those who take advantage of Crane Care training to provide quick and efficient service to their own clients.

"The training centre provides knowledge on the latest lifting



technology to help customers and their technicians solve issues faster," said Prashant Suryawanshi, managing director of Manitowoc Cranes India. "At Pune, we offer simulators for cranes such as the Potain MCT 85 and mechanisms such as the 60 LVF winch, to ensure trainees can provide higher uptime on jobsites through proper operation and maintenance of cranes on projects."

"The training centre's main goal is to familiarise technicians on how to use our Crane Care technical documentation and where to find answers to everyday

questions so they can proactively address them," added Mr Suryawanshi. "India has more than 2,000 Potain cranes in operation so this is the right time to enhance our training activities here."

Manitowoc offers online and on-site training, as well as live training at its facilities around the world. In addition to the Pune facility, there are Crane Care training centres at a range of locations including Italy, France, China, UAE and Singapore. ■

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Work begins on ‘world’s longest subsea road tunnel’

Qingdao Conson Development, a Chinese state-owned capital investment and operations entity, recently held a ceremony to mark the commencement of its second Jiaozhou Bay Tunnel project. Featuring 15.89 km long, it is said to be the longest subsea road tunnel in the world.

“The second Jiaozhou Bay subsea tunnel will optimise the city’s urban structure and strengthen the connection between the east and the west, enabling both sides of the strait to flourish and alleviating traffic congestion,” said Wang Jianhui, chairman of Qingdao Conson Development. “With a high standard of design, construction quality, and management efficiency, Qingdao Conson Development is excited to contribute to the emergence of Qingdao as an open, modern, dynamic, fashionable, and international city.”

Qingdao Conson Development revealed that it began preliminary research on the second Jiaozhou Bay subsea tunnel in 2012, engaging China’s leading experts, including academician Qian Qihu. In total, four pre-feasibility and 15 feasibility studies were conducted. Now, the company has begun construction work on what is believed to be the world’s longest subsea road tunnel.

The project leverages international



Map of the project.

cooperation and innovation to propel tunnel design and construction into a new era, according to Qingdao Conson Development. “By overcoming challenges such as tunnel ventilation, disaster prevention, super-high water pressure, passage through large-scale fractures, and large-scale diameter shield docking in the drill-and-blast method, it is a historic achievement and major feat, making China a leader in tunnel engineering,” the company said.

The tunnel will begin at Huaihe East

Road in West Coast New District, stretching alongside Liugongdao Road and passing under Jiaozhou Bay before landing at Qingdao Port, and connect East Coast, effectively linking Qingdao’s coastal urban areas. Measuring 15.89 km long with six two-way lanes, it is longer than Norway’s Ryfylke Tunnel (14.3 km). The earth and stone excavated are expected to top 8 mil cu m, exceeding Japan’s Seikan Tunnel (5.2 mil cu m) and Europe’s Channel Tunnel (4.8 mil cu m).

Qingdao Conson Development further highlighted that the project is part of China’s ongoing construction of large-scale urban infrastructure transportation facilities, supporting the country’s economic development. The second Jiaozhou Bay subsea tunnel is also expected to serve as an international benchmark in tunnel design, construction, and operations for the next decade, paving the way for future sea tunnels in China and around the world.

In addition, the project is aimed to promote the development of Jiaozhou Bay, enhance the overall competitiveness of the Jiaodong Peninsula, and establish Qingdao as a world-class coastal city on the One Belt, One Road’s Maritime Silk Road. ■

Arup appoints new leader for Indonesia



Khalid Saleem (left) has been appointed as Indonesia leader for global engineering and design consultancy Arup, bringing his deep experience in engineering, project management and leadership in senior roles across Australasia and Southeast Asia.

“I am very excited by the opportunity to lead the Indonesia group and work in partnership with clients on high quality, sustainable outcomes. Indonesia and the other Southeast Asian countries offer huge opportunities and I will be collaborating with Arup teams across the region and globally, to deliver many successful projects,” said Mr Saleem.

The Arup Indonesia team is working on plans for the new capital and various other urban and tourism masterplans. Menara Astra and Benhill Central DP3 are Arup projects and the team has recently completed the Mass Rapid Transit Jakarta Railway Protection Zone Guidelines and a project management office consultancy to PT KAI for Jabodetabek Light Rail Transit.

“Khalid’s extensive experience across infrastructure, combined with his understanding of Southeast Asia, will be invaluable in providing strong leadership to our Indonesia team and making a significant contribution to building a progressive, resilient and

sustainable country,” said Peter Chamley, region chair for Arup Australasia.

Mr Saleem has moved from his role as infrastructure leader for Arup in Indonesia to take up the new role. He has previously held senior positions at SMEC (general manager for the transport business in Asia Pacific) and was a member of its Asia Pacific management board for six years.

As a civil engineer and project director, Mr Saleem has worked on various projects in Australia, Indonesia, Vietnam, the Philippines and Myanmar. His career portfolio includes: Inner City Bypass Upgrade, Northern Busway Alliance, and South East Transit, in Brisbane, Australia; South Sumatera LRT (Palembang), Jakarta to Bandung High Speed Rail, and seven proposed toll roads (Java and Sumatera), in Indonesia; Ho Chi Minh City Metro Line 1 – CP1a, Hanoi Metro Line 3 – CP03, and Trung Luong to My Thuan Expressway, in Vietnam; Maubin to Phyapon Road Rehabilitation, in Myanmar; and NLEX – SLEX Expressways Connector Road, in Manila, the Philippines.

“I’ve learnt, by working on these projects and in fact throughout my career, that the keys to success on any project include maintaining open and honest communication, fostering good teamwork, striving for excellence and creating a win-win situation,” concluded Mr Saleem. ■

Lendlease to manage Shaw Tower redevelopment

The Sir Run Run Shaw Charitable Trust has announced plans to redevelop the Shaw Tower at Beach Road, Singapore, transforming it into a new landmark. To deliver this project, the Trust has appointed Lendlease to manage the redevelopment effort, tapping into the company's capabilities across development, project management, construction and asset management.

Shaw Tower is strategically located within the Ophir-Rochor corridor and is expected to contribute to the Urban Redevelopment Authority's (URA) vision to revitalise the area. Works on site were set to commence towards the end of 2020, with completion slated by 2024. Standing at nearly 200 m with extensive views of Marina Bay and the city, the new development is proposed to provide 450,000 sq ft of Grade A office space and integrated ground floor retail and café offerings.

The new office tower is planned to incorporate lifestyle amenities to complement the workplace ecosystem, indoor community facilities and an outdoor amphitheatre. The multiple sky gardens and terraces complement the URA's vision of a green city with park-like environments integrated into the building design.

"The Trust looks forward to developing a new Shaw Tower, which will assist in supporting the important charitable activities of the Trust. As the original Shaw Tower had achieved in the 1970s, the new Shaw Tower will set leading international design standards whilst respecting the heritage and local context of this key city location," said Raymond Chan, managing director of Shaw Group of Companies, Hong Kong.

Ng Hsueh Ling, managing director for Singapore at Lendlease said the project "will see the creation of a new city office landmark that is attractive to the best national and international occupants whilst further enhancing the city's skyline."

Lendlease further highlighted that, aligned with Singapore's vision to be a car-lite city, Shaw Tower will support urban mobility with seamless pedestrian integration to the surrounding developments, connectivity to the Esplanade, Bugis, City Hall and Promenade MRT stations and the provision of end-of-trip cycling facilities. It is also designed to meet leading sustainable building standards including the International Building Institute's WELL rating for advancing human health and wellness, and the BCA's Green Mark sustainability standards.

In addition, the development is aimed to honour the existing building's heritage and vibrant streetscape of the Beach Road area, whilst preserving and adaptively reusing a number of heritage elements from the existing building. ■



An artist's impression of the new Shaw Tower.

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Some models are not available depending on the area.

West Bund Financial Hub to start construction in 2021

Hongkong Land recently held the foundation stone laying ceremony for its West Bund Financial Hub development in Shanghai, China. Design and planning is currently under way and construction is scheduled to start from early 2021, said the developer. Upon completion, the project will comprise Grade-A offices, a retail mall, luxury hotels, residences, a convention centre as well as cultural, sports and other facilities.

The 23.1-ha site is located on the riverfront of Shanghai's Xuhui District. Hongkong Land revealed that following the municipal and district governments' ambitious plans to create a new international financial centre, the project is moving forward according to schedule and will be developed over five phases until 2027, with a total GFA of over 1.1 mil sq m.

Hongkong Land intends to leverage its extensive experience in developing and managing best-in-class prime properties across Greater China and Southeast Asia - including its iconic buildings in Hong Kong and Singapore - to deliver a waterfront development that will be highly tech-enabled, sustainable and liveable.

Robert Wong, chief executive of Hongkong Land said, "The West Bund Financial Hub project is swiftly moving ahead, with strong support from the municipal and district governments as well as business leaders in Shanghai. We are proud to capitalise on Hongkong Land's unparalleled experience and resources in prime property development and management, as well as our reputation for bringing ambitious plans into fruition.

"With the total investment for the West Bund Financial Hub



© Hongkong Land

The West Bund Financial Hub project will be developed over five phases until 2027.

estimated at approximately US\$8 billion, we look forward to pushing on with the next step in this landmark development following the recent foundation stone laying ceremony."

According to Hongkong Land, the West Bund Financial Hub development is expected to compete with existing commercial centres such as Lujiazui (Pudong), Huangpu, Jing'an and Xujiahui to be the most prestigious in Shanghai. The developer mentioned that the project is already generating significant interest amongst firms in the financial and technology sectors. ■

Tremco CPG APAC establishes new manufacturing plant in Malaysia

Strengthening its commitment to the region, Tremco Construction Products Group Asia Pacific (CPG APAC) has announced the development of a new manufacturing plant in Serendah, Malaysia. Construction of the facility is set to start in January 2021, and it is scheduled to begin full production by January 2023.

Located 38 km north of Kepong where the current plant resides, the new facility will be situated in the heavy industrial zone of UMW High Value Manufacturing Park. According to Tremco CPG APAC, the area was chosen due to its accessibility to other Asia Pacific markets via Malaysia's major port network.

The announcement comes as the company commemorates 25 years of business operations in Malaysia. Plans for the new Serendah facility show an expansion of production capacity, catering for the predicted growth of Tremco CPG APAC and ensuring uninterrupted supply to construction projects across the region for many more years to come.

"The new facility will be three times larger than our existing facility and will strengthen our foothold in the Asia Pacific market. We are seeing an increase in demand across the region



The signing ceremony for the confirmation of Tremco's new manufacturing plant in Serendah.

for locally produced and innovative construction solutions that improve the built environment, and we're excited to be a leading supplier for this developing market," said Jackson Kho, area director for Southeast Asia at Tremco CPG APAC.

Saptak Roy, managing director of Tremco CPG APAC added, "As ASEAN is projected to become the fourth largest economy in the world, our investment in the region will help us to keep up with demand, and continue to deliver excellence to our customers."

Aside from exporting its products to most ASEAN countries such as Singapore,

Thailand, Indonesia, Philippines, and Vietnam, the Serendah facility also exports to other countries and regions including South Korea, Hong Kong, China, Taiwan, Australia, India and the Middle East.

Tremco CPG APAC is a subsidiary of US-based Tremco Inc. and provides solutions from several world leading construction brands consisting of Tremco, illbruck, Flowcrete, Vandex, Nullifire, Dryvit, Nudura, NewBrick, Willseal and Euclid Chemical. Product lines include high-performance silicone and urethane joint sealants, waterproofing solutions, trafficable deck coatings, expansion joints, exterior insulation and finish systems, passive fire protection, and specialist resinous flooring solutions. ■

ADB supports township development in Bhutan

The Asian Development Bank (ADB) has approved an US\$18.5 million concessional loan and a US\$10 million grant as additional financing for the Phuentsholing Township Development Project in Bhutan.

ADB has been supporting the development and expansion of Phuentsholing by constructing flood and riverbank erosion defenses along the Amochhu River and facilities for an additional 66 ha of new modern urban area since 2018. This additional financing will continue funding the ongoing activities until their successful completion, which is targeted for 2025. These climate-resilient infrastructures will ensure safe and sustainable expansion of human settlement and commercial activities in the area.

Phuentsholing is the country’s largest commercial and industrial hub and serves as Bhutan’s strategic trading gateway. It is the country’s second-most populous city and is anticipated to grow by 5% per annum. Phuentsholing has reached its current limit for expansion due to being confined by steep terrain and close proximity to the Amochhu River. The project will be a part of efforts to develop Phuentsholing into becoming a regional growth centre and main trading gateway, facilitating its economic development.

“ADB is fully committed with supporting the Government of Bhutan to develop this new township and provide a safe,



© ADB

The project will feature climate-resilient infrastructures to ensure safe and sustainable expansion of human settlement and commercial activities in the area.

sustainable, and vibrant community for its people,” said Suzanne Marsh, water resources specialist for South Asia at ADB. “By constructing flood and riverbank erosion protection measures, such as river walls, raising land, and installing flood early warning system, Phuentsholing city and the new urban areas will have improved resilience to flooding.” ■

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Formwork manufacturer Doka expands into scaffolding

Austria-based global formwork manufacturer Doka has formed a strategic partnership with American scaffolding manufacturer AT-PAC, creating a strong global presence that combines international sales strength with years of know-how in scaffolding.

Through this collaboration, Doka is entering the international scaffolding market alongside its formwork business. A major milestone in the company's growth strategy, it opens up previously untapped market and customer segments – the industrial. "This complements the formwork perfectly and gives us a further pillar," said Harald Ziebula, CEO of Doka. "This business field is more constant and offers continuous growth opportunities."

He added, "With this strategic partnership, we offer much more than just scaffolding. We are now offering - as we have been doing in the formwork sector for decades - well thought-out scaffolding solutions and services to our customers."

Doka's scaffolding solutions and services are wide-ranging, from planning and engineering to training, ensuring transparency in complex construction projects, optimisation of material flow and cost efficiency.

The Ringlock scaffolding system, available globally, features a high-quality design and comes with a comprehensive digital construction management service. Doka's international network can also respond to individual customer requirements and local specifics.

AT-PAC is a leading manufacturer of high-quality scaffolding in the sales and rental segment. With 200 employees worldwide, 17 branches and 25 years of experience, the company provides full scaffolding solutions from planning and customisation to



Both images © AT-PAC



ABOVE AND LEFT: **Doka now offers scaffolding solutions and services to its global customers. These also include a comprehensive digital construction management service.**

production and training.

"With Doka, we have a strong partner in the construction industry. This strategic partnership means that Doka's customers can benefit above all from the fact that they get everything from a single source," said Jeff Davis, CEO of AT-PAC. ■

Vermeer acquires Normag electric HDD and fluid systems technology

Vermeer Corporation has announced its acquisition of electric-powered horizontal directional drilling (HDD) and fluid systems technology from Normag, a Netherlands-based company. This is a key part of the Vermeer strategy to meet growing demand for electric-powered worksite solutions.

With this acquisition, Vermeer now assumes the rights to develop, manufacture and distribute the fully electric HDD rigs, generator sets and fluid management systems, which are currently operating across Europe under the Normag brand.

The Normag electric HDD technology offers an innovative, integrated electric power system that optimises efficiency across the generator set, drill rig and fluid management systems during operations. When connected to the electric grid, the system can operate as a fuel-free system. All systems have also been designed to match standard international shipping container dimensions to reduce the machine footprint, jobsite set-up time, complexity and cost.

"With this technology already proven in operations across Europe, our Vermeer team can now fast-track an electric HDD offering that helps operators better control their cost of operations and worksite impacts through reduced fuel use, near-zero emissions, limited noise and an overall smaller rig footprint," said Jason Andringa, president and CEO of Vermeer. "This investment critically supports our innovation and product development focus to continually help customers optimise their worksite efficiency, while limiting environmental impact."

The Normag HDD system technology has been in development for more than eight years in the Netherlands. It was purpose-built to help companies comply with European transportation and worksite regulations and meet their goals to lower their environmental and worksite impacts. Drill rig and fluid packages have been piloted with customers across Europe for the last several years.

As the products are European-market ready and tested, Vermeer said it will focus first on introducing them to the European customer base to support large-diameter underground infrastructure projects. The products will be sold under the Vermeer brand in partnership with Vermeer dealers.

All product development, engineering, marketing and production for the technology will immediately move to the Vermeer EMEA headquarters in Goes, Netherlands. Vermeer expects that its first rigs and fluid systems will be in production and ready for distribution in Europe by late 2021 - which will likely include a system built around a 120-t HDD rig, a 2,500-l reclaimer and high-pressure pump. The company also plans to offer additional fluid systems in the first year to establish a range of reclaimers ranging from 750 to 3,000 l/min of cleaning capacity.

According to Vermeer, once the products get established in Europe, the company will look to introduce them in key global markets where electric systems are desired, such as North America and Australia. The intent is to bring the products to those markets within the next 24-36 months. ■

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Malaysian contractor Gamuda delivers another success

On 11 October 2020, the last of the tunnel ring making up the 13.5-km stretch of the Klang Valley Mass Rapid Transit (KVMRT) twin bored tunnels was finally completed. Part of a 52-km alignment known as the Putrajaya line, it is the second extension to the first Kajang line, and also Malaysia's first metro network aimed to connect satellite towns to its capital city, Kuala Lumpur (KL).

The job required eight units of variable density (VD) tunnel boring machine (TBM), four units of earth pressure balance (EPB) TBM, 16,000 tunnel segment rings and thousands of workforce for the construction of 11 underground stations - doubling as TBM launching and retrieval shafts - and other ancillary structures. It is no small feat, bearing testament to the ingenuity of its contractor, Gamuda Engineering (GE).

Overcoming difficult challenges

On the project, GE once again faced difficult challenges of tunnelling in KL. In the Kajang line, there were seven underground stations and 9.5 km of twin tunnels involved, many of which were nestled in KL's notorious karstic limestone. This time around, the Putrajaya Line tunnels are deeper, with more complex geological interfaces between Kenny Hill, KL limestone and even an abrasive granite region - not present on the Kajang Line - where frequent, almost daily stops were required to replace worn TBM cutting tools and carry out preventative maintenance.

Besides the more complex geology, the Putrajaya Line tunnels also traverse close to critical infrastructures, such as major railway lines, elevated transits, and even GE's past projects, the Stormwater Management and Road Tunnel (SMART) as well as the Kajang Line tunnels.

Despite all the challenges above, the entire Putrajaya Line is on track for full opening by January 2023, said GE. The company's leading tunnel specialist, Gusztáv Klados, who has been with GE for almost 20 years, commented, "When we started with the Stormwater Management and Road Tunnel (SMART) project in 2002, a lot of people told us we were crazy, we can't build a tunnel in the middle of KL."

Yet, with adequate preparation and collaboration with the TBM manufacturer, Herrenknecht, through which GE engineers experienced first-hand how to assemble a TBM, the job was delivered successfully. "Once we were awarded the construction



ABOVE: Situated between KL's dense business and financial hub is one of the underground stations, Chan Sow Lin, seen here with two TBMs at work in its shaft.

LEFT: Gamuda Engineering (GE) underwent rapid upskilling from ground up to meet the demands of the KVMRT mega project.

of Line One (Kajang line) tunnels, we had to build on the capabilities of the people who were with the company and nurture local knowledge and talent," said Mr Klados. "In fact, it is with such capabilities and commitment to the task that the VD TBM was developed to tackle the challenging geology of the Kajang line."

Ng Hau Wei, head of tunnels at GE highlighted that "continuity of the project from SMART to the Kajang line and now to the Putrajaya line definitely kept us in momentum, but it ultimately boils down to having the right set of people and the best machines."

'Best machines, right people'

In the Putrajaya line, GE stepped up its game further, breaking the frontiers of construction technology with the introduction of the world's first autonomous

TBM system. Dubbed ATBM, this system was plugged into 10 of the TBMs used in the Putrajaya line to boost overall productivity, safety and quality of tunnel construction using artificial intelligence.

"With the VD TBM, we could switch between multiple slurry and EPB modes with ease in a single drive. With the ATBM system, the possibilities are endless as we now have supervision over tunnelling parameters and operations for multiple machines simultaneously, at the speed and accuracy of a computer," explained Mr Ng.

The ATBM has won two prestigious international innovation awards in 2019, namely the Technical Equipment Innovation of the Year Award at the 2019 International Tunnelling and Underground Space Association (ITA) Tunnelling Awards in Miami, Florida and the Innovation in Tunnel Excavation Award at the Tunnelling Festival

Awards in the UK sponsored by the British Tunnelling Society.

As for the “right set of people”, both Mr Klados and Mr Ng commended the aptitude and agility of GE’s expertise with project management. In one example, a TBM codenamed S-777 was initially intended for a tunnel drive between two stations only. Due to unforeseen delays, a recovery plan was introduced – upon breakthrough at its original destination, the TBM would be pulled across the station box and launched from the other end to make up for lost time. The scheme proved successful as GE’s impressive project milestones have shown.

Another example is the management’s commitment to staying ahead of the Covid-19 crisis amidst construction. Many control measures were strategically applied early on throughout the mega project and have proven successful in safeguarding GE’s workforce from possible breakouts.

The contractor’s capabilities even extend to that of tunnelling machinery. The Putrajaya Line tunnels were in fact built with several TBMs from Kajang line refurbished by the contractors themselves. “As we speak, 11 TBMs from the Putrajaya line are already being carefully stored and maintained at our refurbishment facility in anticipation of upcoming tunnelling projects,” said Mr Ng.

With the remainders of the Putrajaya Line underground station construction finishing soon, GE is ready to move on to other complex tunnelling projects, be it in Malaysia or elsewhere. As Mr Klados summed it up, “Our technical knowledge is convertible ... there will be other places where we have an opportunity and we will have a good chance of getting jobs.”



GE’s leading tunnel specialist, Gusztáv Klados (third from left) and GE’s head of tunnels, Ng Hau Wei (centre with trophy) celebrate with the ATBM team members and the NCE’s award hosts.

Gamuda Engineering (GE) is a wholly-owned subsidiary of Gamuda Berhad, which is part of the joint venture MMC Gamuda KVMRT (T) Sdn Bhd (MGKT). MGKT is the appointed underground works package contractor for the Klang Valley Mass Rapid Transit Sungai-Buloh-Serdang-Putrajaya Project. ■

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Airport City vision: Hong Kong unveils blueprint for HKIA

The Airport Authority Hong Kong (AA) has unveiled the Airport City vision, a blueprint that entails an investment of over HK\$40 billion for 10 years until 2030 at Hong Kong International Airport (HKIA). The aim is to enhance the airport's capacity and functionality, while transforming it into a new landmark and propelling the economic development of Hong Kong and the region.

"The AA first put forward the Airport City vision and blueprint in May last year. We are very glad that the HKSAR government supports the development of Airport City, which aims to fully capitalise on the unique geographical advantage of HKIA and capture opportunities arising from new infrastructures," said Fred Lam, CEO of the AA.

"The core functions of the airport and related industries are organically and seamlessly integrated into the fabric of the Airport City, unleashing a strong synergy. The various mid- and long-term developments in our blueprint will strengthen HKIA as an international aviation hub and create a new landmark for Hong Kong."

The AA has been continuously enhancing airport facilities. Ongoing works include the refurbishment of boarding gates and other facilities in the terminal; construction of the Sky Bridge to connect Terminal 1 and North Satellite Concourse; and leveraging technology to enhance passenger services. Smart airport initiatives such as e-security gates and e-boarding gates, HKG My Flight mobile application, and deploying robots in the terminal enrich passenger experience. The 5G infrastructure and digital apron management system will further improve operational efficiency.

HKBCF Island project

The AA's proposals for the development of the Hong Kong Boundary Crossing Facilities (HKBCF) Island of Hong Kong-Zhuhai-Macao Bridge (HZMB) focus on enhancing HKIA's services and development as part of the Airport City strategy.

The government has accepted the AA's plan to develop automated car parks on the HKBCF Island that will provide around 6,000 parking spaces in phases. The 'Park and Fly' and 'Park and Visit' carparks will cater to air transfer passengers and visitors respectively.

The Park and Fly passengers will transfer to HKIA boarding gates directly from the HKBCF restricted area, facilitated by a bonded vehicular bridge connected to the airport's Intermodal Transfer Terminal, without having to go through immigration procedures in Hong Kong.

The Park and Visit visitors may go from HKBCF to SkyCity or to other parts of Hong Kong on Airport City Link, a vehicular and pedestrian bridge. The AA plans to introduce an autonomous transportation system on the Airport City Link to connect HKBCF Island and SkyCity, and extend the system to Tung Chung town centre.

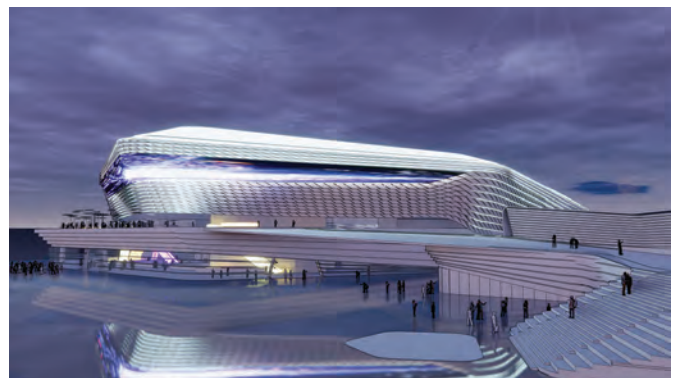
The AA also plans to develop a new campus and dormitory of the Hong Kong International Aviation Academy on the HKBCF Island, while land parcels have been reserved for future air cargo developments.

SkyCity and AWE Phase II

SkyCity is an integral part of the Airport City vision. Here, the new '11 Skies' developed by New World Development is set to become Hong Kong's largest integrated complex for retail, dining and entertainment facilities. The 11 Skies project will be completed in phases from 2022



ABOVE: Intermodal Transfer Terminal and Airport City Link.
BELOW: AsiaWorld-Expo (AWE) Phase II development.



to 2025, introducing over 800 shops and Hong Kong's largest indoor entertainment area. There will be three Grade A office buildings as well. Regal Hotels International's Regala Skycity Hotel is scheduled for completion next year, providing around 1,200 rooms.

The Phase II development of AsiaWorld-Expo (AWE) will house the largest indoor performance venue in Hong Kong, which accommodates up to 20,000 people. Upon completion, the total gross floor area of AWE's exhibition facilities will increase to 100,000 sq m. In addition, more hotels and office buildings are planned to be developed within SkyCity in the future.

Air cargo development

HKIA has reportedly been ranked the world's busiest international cargo airport for 10 consecutive years since 2010, and the AA is taking forward intermodal cargo initiatives to consolidate its leadership position.

The AA is planning to set up a HKIA Logistics Park in Dongguan and an airside intermodal cargo handling facility at HKIA, with a view to creating a brand new mode of cargo business, increasing cargo handling volume at HKIA, and serving as a growth engine for the industry.

With the new facilities in operation, customs clearance, security screening, palletisation, cargo acceptance and other services for Mainland (China) exports could be completed in Dongguan before shipping the goods to the cargo handling facility in the restricted area of HKIA by sea, for air trans-shipment to worldwide destinations.

For imports to the Mainland, the goods could be directly shipped from the HKIA restricted area to Dongguan. The AA said

the procedures will comply with Hong Kong’s air cargo security regulations, and next year a pilot scheme will trial the operations between Hong Kong and Dongguan.

Meanwhile, the strategy to develop the high-value, high-growth logistics segments continues, covering temperature-controlled cargo such as medicine and vaccines, and e-commerce. A premium logistics centre at the airport is being developed by a joint venture led by Cainiao Network, a subsidiary of Alibaba Group, which is expected to add 1.7 mil t of cargo volume to HKIA each year. Moreover, the expansion of DHL’s Central Asia Hub is expected to increase its capacity by 50% to 1.06 mil t.

Collaboration with Zhuhai airport

The commissioning of the HZMB has significantly shortened the distance between HKIA and Zhuhai Airport. The two airports have agreed to explore deeper collaboration and formulate long-term development plans to complement each other’s strengths. The AA’s proposed injection of equity into Zhuhai Airport is expected to pave the way for long-term and extensive collaboration between the two airports. Details of future collaboration will be discussed between the two sides.

Mr Lam explained, “Our goal is not only to complement each other on the basis of our existing flight networks, but set sight on over 160 airports in the Mainland which have no international border facilities, and over 130 new airports under construction. We aim to attract passengers from those markets to Zhuhai Airport, and onward to HKIA via HZMB for international air travels.



ABOVE: Airport autonomous transportation system.

LEFT: Hong Kong Boundary Crossing Facilities development.

This is an enormous potential source of passengers. In parallel, strengthening collaboration with Zhuhai will extend our air cargo services to the broader inland markets. These new sources of business will benefit our business partners, in particular the airlines and logistics industry.” ■

All images © Airport Authority Hong Kong

SOUTHEAST • ASIA CONSTRUCTION

Southeast Asia Construction (SEAC) is a trade magazine based in Singapore, published bi-monthly since 1994 and distributed to a qualified readership all over Asia. The magazine features various construction projects in the region and globally. It also covers the latest on construction equipment, materials, technology and management, as well as major regional and international trade shows.

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Geo Connect Asia 2021

24 to 25 Mar 2021

Suntec Convention & Exhibition Centre
Singapore

Email: rupert.owen@montgomeryasia.com
Website: www.geoconnectasia.com

bauma Conexpo India 2021

20 to 23 Apr 2021

India Expo Centre
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Tel: +49 89 949 20251

Email: info@bcindia.com
Website: www.bcindia.com

CICEE 2021

19 to 22 May 2021

Changsha International Convention &
Exhibition Centre
Changsha, China

Tel: +86 731 8696 9961
Email: csgcjxz@cicee.vip
Website: www.chinacicee.com

ASEAN Super 8

15 to 17 Jun 2021

Malaysia International Trade &
Exhibition Centre
Kuala Lumpur, Malaysia

Tel: +603 9771 2688
Website: www.super8asean.com

Laobuild 2021

17 to 19 Jun 2021

National Convention Centre
Vientiane, Laos

Email: youthaxay@ambtarsus.com
Website: www.laobuild.com

OS+H Asia 2021

28 to 30 Jul 2021

Marina Bay Sands
Singapore

Tel: +65 6332 9620
Email: osha@mda.com.sg
Website: www.osha-singapore.com

Cambuild 2021

17 to 19 Sept 2021

Diamond Island Exhibition &
Convention Centre

Phnom Penh, Cambodia
Tel: +855 023 901 579
Email: somaly@ambtarsus.com
Website: www.cambuildexpo.com

Worldbex 2021

23 to 26 Sept 2021

World Trade Centre Metro Manila
Metro Manila, The Philippines

Tel: +632 8656 9239
Email: inquire@worldbexevents.com
Website: www.worldbex.com

The BIC Show 2021

7 to 9 Oct 2021

NICE Pattaya, Thailand
Tel: +662 077 5668

Email: info@thebicshow.com
Website: www.thebicshow.com

MBAM Onebuild 2021

20 to 22 Oct 2021

Kuala Lumpur Convention Centre
Kuala Lumpur, Malaysia

Tel: +603 7981 0288
Email: info@mbamonebuild.com
Website: www.mbamonebuild.com

Trenchless Asia 2021

16 to 17 Nov 2021

Kuala Lumpur Convention Centre
Kuala Lumpur, Malaysia

Tel: +44 1923 723990
Email: pharwood@westrade.co.uk
Website: www.trenchlessasia.com

// Events outside Asia

World of Concrete 2021

8 to 10 Jun 2021

Las Vegas Convention Centre
Las Vegas, Nevada, USA


Tel: +1 972 536 6368
Email: contactus@worldofconcrete.com
Website: www.worldofconcrete.com

Hillhead 2021

22 to 24 Jun 2021

Hillhead Quarry
Derbyshire, England, United Kingdom

Tel: +44 115 945 4367
Email: hillhead@qmj.co.uk
Website: www.hillhead.com



Note: The show organisers may postpone or cancel their event without prior notice, so readers are advised to visit the show websites regularly for the latest updates.



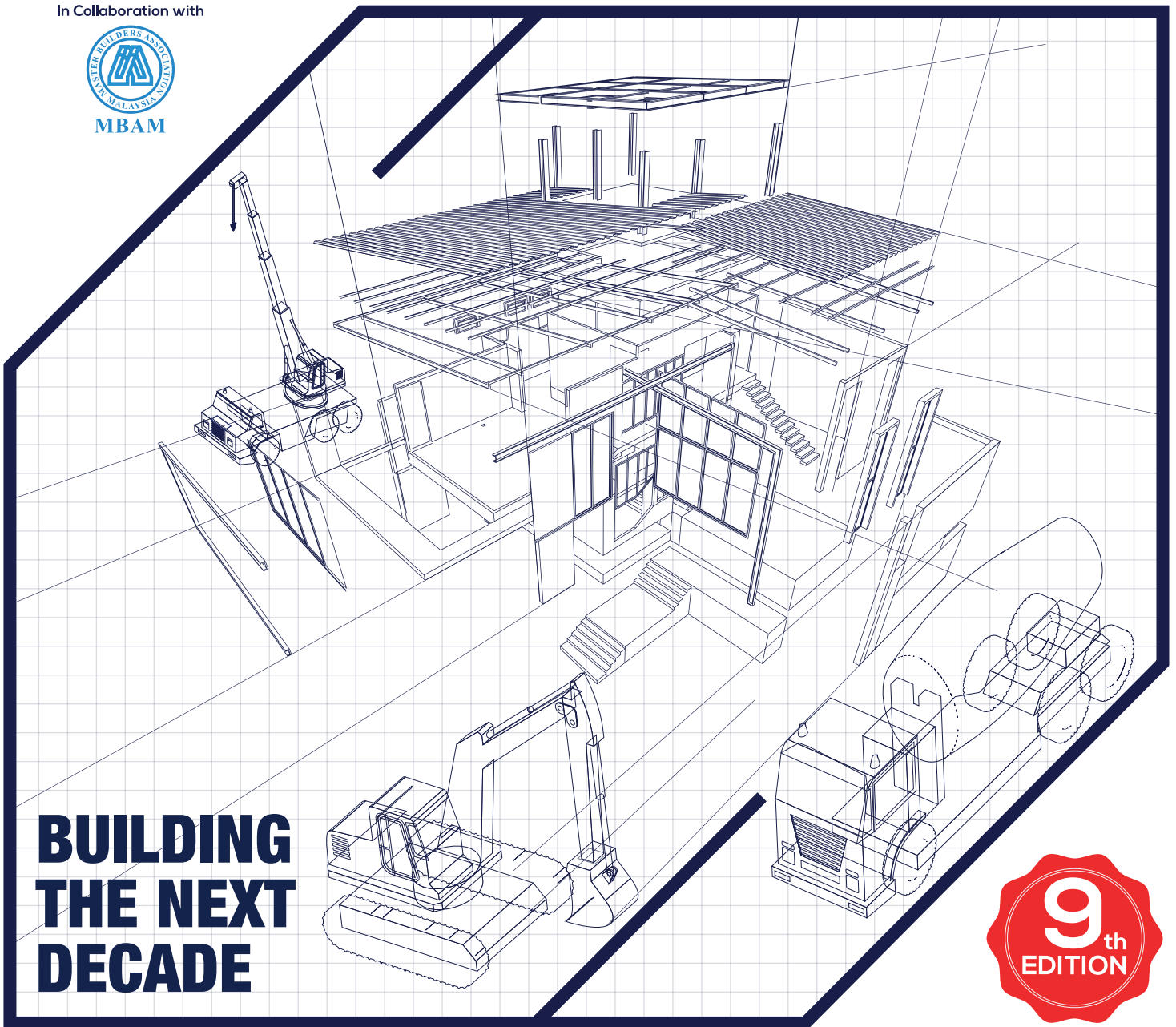
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bauma China ‘gives confidence and hope’

bauma China 2020 concluded on 27 November, drawing 2,867 exhibitors from 34 countries and regions, and attended by around 80,000 trade visitors from China, announced Messe München. “In these difficult times, bauma China 2020 gave the entire industry a reason to enter the coming fiscal year with confidence and hope,” said the show organiser.

“The year 2020 was marked by special challenges. But the construction machinery industry and its economy continue to grow while the effects of the epidemic are being warded off,” said Stefan Rummel, managing director of Messe München GmbH. “There is far-reaching demand for innovative technologies, intelligent and low-emission machines, and vehicles with integrated digital solutions. Hand in hand with our partners, we therefore made everything possible and provided the industry with a platform even in times of crisis.”

“The success of bauma China owes to the great support from our partners, exhibitors and all participants,” added Xu Jia, CEO of Greater China at Messe Muenchen Shanghai Co Ltd. “I am very proud to have such a strong bauma China team - together we overcome any difficulties!”

Su Zimeng, chairman of the China Construction Machinery Association (CCMA) highlighted that bauma China 2020 “is a very important event for the industry, and it was held when China has achieved major strategic results in Covid-19 prevention and control. The economy is showing a stable recovery. It is also the most successful construction machinery exhibition in the world held this year.”

Among the international exhibitors at the show included Caterpillar, Volvo, Bauer, Terex as well as pavilions by Germany, Italy and Spain. This participation signifies the continued international confidence in China’s growth and development, noted Messe München. The show organiser pointed out that major Chinese exhibitors such as XCMG, Sany, Zoomlion, Shangdong Lingong, and



bauma China 2020 drew 2,867 exhibitors.

Zhejiang Dingli even increased their exhibition space.

In addition to the on-site event, bauma China offered a range of digital solutions, especially for international participants who could not travel to the country. The bauma China Community online platform enabled visitors to join the show from the comfort of their home or office.

With this online platform, the participants could search for exhibitors, exchange company information, get to know products, attend events digitally and thus gain new market insights. Exhibitors and visitors also had the opportunity to communicate via live chats or video conferencing. According to the show organiser, bauma China Community had over one million online visitors based on the statistics.

The next bauma China is set to return to the Shanghai New International Expo Centre from 22 to 25 November 2022. ■

Website: www.bauma-china.com

Next Geofluid exhibition to be held in September 2021

The next edition of Geofluid - an international exhibition for the drilling and foundation industry - is scheduled to take place from 15 to 18 September 2021 at the Piacenza exhibition centre, Italy.

Organised by Piacenza Expo, the event aims to address the current issues such as geothermal energy, 4.0 underground construction sites, new trenchless technologies, dewatering and groundwater, energy transition, reductions in atmospheric emissions, and geoen지니어ing.

The last edition of Geofluid was held in 2018, attended by over 11,000 professional operators from approximately 86 countries. The show organiser asserted that Geofluid 2021 will offer a safe exhibition experience in compliance with anti Covid regulations for both exhibitors and visitors.

“The 2021 edition will be a strategic moment to understand how the continental economy, international orders and major works on public infrastructure can generate GDP in the future,” said the show organiser. “The event will also offer an excellent opportunity to plan for future work in the drilling, foundation and underground sector.”

According to Piacenza Expo, the traditional exhibition sectors (Geotechnology – Geotunnel - Geocontrol - Nodig - Geothermia)



The Geofluid exhibition is targeted at the drilling and foundation industry.

will feature a series of informative initiatives on the phase of energy transition and the Blue Economy. ■

Website: www.geofluid.it

bauma Conexpo India rescheduled to April 2021

bauma Conexpo India, which was due to be held in February 2021, is being postponed for the second time and will now take place from 20 to 23 April 2021 at the India Expo Centre (IEC), Greater Noida, Delhi NCR.

“After careful considerations of the Covid-19 situation and crucial discussions with the industry, we are postponing bauma Conexpo India to April 2021. The gradual upturn of the market leaves us confident that the industry will find even more favourable conditions for doing business at the new dates. Plus, rescheduling the exhibition will enable us to provide a safer environment for our exhibitors, stakeholders, and visitors as their safety is our topmost priority,” explained Bhupinder Singh, CEO of bc Expo India Pvt Ltd, the show organiser.

“The decision comes after the thorough consideration of market assessments and consultations with the key stakeholders. We feel it is in the best interest of our exhibitors and visitors. Besides that, we want to thank our partners for their continued support and help in facilitating this difficult decision to postpone the trade fair. Further, we are working hard to make the coming trade fair even better and more successful.”

“As the industry is witnessing a gradual recovery, the decision to postpone the event comes at an appropriate time,” added Arvind K. Garg, chairman of bauma Conexpo India – task force and also executive vice president and head of construction and mining machinery business at Larsen & Toubro Ltd. “To ensure a safer environment for participants we have moved the show to the India Expo Centre. Along with providing top facilities and an excellent infrastructure, bauma Conexpo India is all set to cater



The last edition of bauma Conexpo India was held in 2018.

to the industry’s needs. We wish to affirm that all government directives and norms will be followed stringently to provide a safe experience that the participants expect and deserve.”

Supporting the decision to postpone the event, Mu. Moahan, president of Builders Association of India (BAI) said, “The rescheduling will come with its own benefits as the industry is recovering from the deadly grip of the coronavirus pandemic. We are certain that with the travel restrictions relaxed, more exhibitors and visitors will be able to take part in the exhibition. The postponement is more welcome, as BAI national members meet can be planned alongside with bauma Conexpo India 2021 with maximum participation from pan India.” ■

Website: www.bcindia.com

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IPAF to launch MEWP and MCWP operator app

A partnership agreement has been signed between the International Powered Access Federation (IPAF) and Denmark-based member firm Trackunit to develop and deliver a new digital operator app called ePAL, which will be free to use and will feature a digital IPAF PAL Card, log book, and operator safety guides.

Peter Douglas, CEO and MD of IPAF said, "Developing this app is a key priority for IPAF and we are excited to team up with Trackunit to bring its considerable technical expertise to bear to roll this out in 2021, delivering a digital solution to connect IPAF and the operator for the first time."

"IPAF's ePAL will bring benefits for operators and IPAF training centres alike, will allow users to store their digital PAL Card and log book and to help communicate important safety and technical messages direct to the operator."

"The goal is to streamline and digitise our processes, including issuing and



renewing IPAF PAL Cards and helping operators keep track of their machine operating experience via the digital logbook function.

"IPAF and Trackunit have a shared aim to be at the forefront in driving change for our industry and we are involving a wide range of stakeholders to drive this change. Together we will ensure IPAF members are fully consulted and are as involved as much as possible, in shaping the future of these

technological advancements including the new IPAF ePAL app and its roll-out next year. These are exciting times."

IPAF plans to launch the app in April 2021, and it will initially be offered in English with other key IPAF languages to follow. It will be available for Apple iOS and Android devices and will be continually updated with additional features added as usage demands and technology allows.

Søren Brogaard, CEO of Trackunit said, "We are delighted to be working with IPAF on this exciting new digital innovation; it will be a real game-changer for the industry, allowing MEWP and MCWP operators to store and share their training accreditation, log equipment usage, gain access to machines and ge-fenced work sites safely and securely, and to obtain important safety and technical information at their fingertips. I am sure the app will be very popular with users and mangers and take-up will be strong." ■

IPAF signs agreement with Turkish rental association

A Memorandum of Understanding (MOU) has been signed between IPAF and the Association of Personnel Lifting and Transmission Platform Operators (Platformder), the Turkish rental, manufacturer and distributor association of mobile elevating work platforms (MEWPs).

The agreement sets out the terms and conditions for the two organisations to work together for the benefit of their members and the wider powered access industry, to collaborate in improved accident reporting, to promote quality training for MEWP operators, to establish greater understanding with governments and health and safety bodies, and to assist in the development and implementation of safety standards.

The partnership will also seek to promote apprenticeships, access industry career opportunities, recruitment, and career progression, to actively support the development of the market and safety activities in Turkey, to work together on events and conference and to share best practice related to powered access industry, especially by translating IPAF's technical guidance and safety materials into Turkish.



Erhan Acar from Rent Rise - a member of Platformder - at IPAF Summit 2019 in Dubai.

Romina Vanzi, IPAF's head of regional development commented, "We have been working with Platformder for some time now – last year Erhan Acar from member firm Rent Rise joined us in Dubai to address the IPAF Summit, for example – so it makes sense to formalise what is already a very positive and productive relationship."

Saruhan Günaydin, vice president of Platformder said, "Through the signing of the MOU we hope to collaborate in projects and publications, such as producing and promoting guidance documents and marketing initiatives to promote the safe use of MEWPs in Turkey and the wider region. We look forward to continuing to work together with IPAF to further our joint aims, in particular health & safety guidance

and legislation and promoting quality training for all in our industry."

Peter Douglas, CEO and MD of IPAF added, "I'm pleased that IPAF has been able to formalise this relationship with Platformder. Together we hope to jointly promote safety initiatives and industry recognition, find areas of mutual interest and seek new opportunities for cooperation on best practice, to inform and influence government, health & safety and other related industry bodies."

As with other MOUs signed between IPAF and organisations including ASEAMAC and ANAPAT in Spain, the Institute of International Risk & Safety Management (IIRSM), the Occupational Sustainable Safety & Health Association of India (OSSHA), and the Materials Handling, Storage & Industrial Equipment Association of Turkey (ISDER), the agreement will improve local, national and collaboration between organisations, promote the joint aims of work at height safety and extend mutual benefits to members of the respective organisations, such as access to safety and technical materials, as well as discounted rates to attend paid events, conferences and webinars. ■

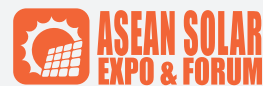


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Snorkel unveils two new boom lift models

Snorkel has expanded its China-built product line with two new diesel-powered boom lifts, the A46JRT and 660SJ. They were recently showcased at bauma China 2020.

From its 3,000 sq m production facility in Jintan, Jiangsu Province, China, Snorkel began assembly in 2017 of two electric slab scissor lift models, the S3219E and S4732E. This was followed by the introduction of the A46JE electric articulated boom lift in 2018, and the A38E electric articulated boom lift in 2019.

Growing in line with the market, Snorkel is continuing to add new models to its China assembly facility to meet customer demand. As boom lifts increase in popularity across China, the company has expanded its domestically assembled offering.

Designed for tough jobsites, the new Snorkel A46JRT articulated boom lift combines powerful four-wheel drive with high manoeuvrability and precision. This model provides a working height of up to 16.3 m and an outreach of 7.35 m. Ideal for working in tight spaces, the A46JRT has an inside turning radius of just 0.8 m, and the boom operates with zero tail swing. The spacious 1.83 m x 1.0 m platform can lift two people with tools and the 1.5 m jib offers additional flexibility at height.

Delivering excellent rough terrain performance, the Snorkel 660SJ telescopic boom lift is equipped with an 18.3 m boom and a 2.0 m articulating jib. The unit features a 20.1 m maximum platform height, an outreach of up to 18.0 m, and an unrestricted lift capacity of up to 272 kg. Fitted with a 2.0 m jib boom for additional flexibility, this heavy-duty lift measures 2.46 m wide and the stowed length of 10.5 m can be reduced to 8.5 m for transport by stowing the jib underneath the boom.

The new A46JRT and 660SJ boom lifts were on display at bauma China alongside the Snorkel A38E and A46JE electric articulated boom lifts, as well as the S3219E and S4732E electric scissor lifts, on Snorkel's 120 sq m booth in the outdoor area.

Matthew Elvin, CEO of Snorkel said, "We continue to expand our offering in China, working closely to meet the requirements of our customer base, and we are confident that these two new models will be well received in the market." ■

Website: www.snorkellifts.com



LEFT AND BELOW LEFT: The new 660SJ diesel-powered telescopic boom lift.
BELOW: The new A46JRT diesel-powered articulated boom lift.



S4732E electric scissor lift.



A46JE electric articulated boom lift.



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Volvo CE presents electric excavators for Asian market

Exemplifying its innovations for the near future, Volvo Construction Equipment (Volvo CE) recently unveiled two new electric customer pilot excavators at bauma China 2020. These include the 5.5-t EC55 Electric and the 22-t EC230 Electric, which will shortly go for testing by real customers in China. They are powered by lithium ion batteries and can work a full day with a high-power lunch-hour charge.

According to Volvo CE, this is the first time the company has developed electric customer pilot machines for China. These excavators are not commercially available yet, but during this research phase Volvo CE aims to mature them quickly so that they can be commercialised as soon as possible.

The EC55 Electric has been developed in China with locally sourced components for the needs of Chinese customers, using a common electromobility and charging platform. The EC230 Electric, meanwhile, has been designed at Volvo facilities in Changwon, South Korea to suit a broader Asian customer base.

Although the two excavators differ in size, they will both deliver the same performance as their diesel-powered counterparts, if not better, with the added benefits of zero emissions, low noise, and low total cost of ownership, said Volvo CE. The energy running costs for the EC55 Electric are expected to be 50% lower than that for its conventional diesel-powered counterpart the EC55D, while the EC230 Electric is expected to achieve a 60-70% reduction compared to the diesel-powered EC220E.

“China is the largest electromobility market globally and a leading producer of electromobility components, which provides the demand and means to manufacture a machine locally. In addition, China has an industrial strategy to decrease dependence on diesel and so the electromobility market is expected to move quicker. These factors make China the perfect place to test our new machines and gain valuable customer feedback,” said Mats Sköldberg, head of technology at Volvo CE China.

Volvo CE has also introduced its 14-t EX03 electric wheeled excavator prototype, which is earlier on its development phase than the EC55 Electric and EC230 Electric customer pilots. The EX03 offers the same low noise, zero emissions, energy efficiency and simple maintenance, but includes several groundbreaking safety features.

When driving on public highways, a real-time video stream from the front of the excavator will allow vehicles behind to clearly see ahead. When working, a text-based safety screen



Volvo EC55 Electric (above) is targeted at the needs of Chinese customers, while the EC230 Electric (below) has been developed to suit a broader Asian customer base.



LEFT: Volvo EX03 concept wheeled excavator.

BELOW LEFT: Volvo Electric Site miniature model.

will alert jobsite staff to left/right movement and reversing. A communication live stream will also enable the operator to make eye contact with pedestrians and other works to help minimise misunderstandings and increase safety. While still in the concept stage, Volvo CE is exploring the possibility of eventually trialling a similar version of the EX03 in customer pilots.

In addition, Volvo CE showcased a miniature Volvo Electric Site model at bauma China. This represents the company’s vision for the future of quarrying, which is designed to achieve zero emissions, zero accidents, zero unplanned stops and 10 times greater efficiency. Although Volvo Electric Site is not a commercial offer, it could serve as a model for rethinking production operations to run on green, sustainable power, while increasing safety and efficiency. Indeed, its application is not limited to quarries.

The Volvo Electric Site system consists of four HX02 autonomous, battery-electric load carriers, one LX01 electric-hybrid wheel loader prototype, and one EX01 70-t dual-powered, cable-connected excavator prototype. ■

Website: www.volvoce.com



EvoQuip introduces Falcon range

EvoQuip has launched the Falcon range of finishing screens to its product portfolio. It consists of the Falcon 1220 and Falcon 1230, providing a solution for scalping, screening and stockpiling in self-contained units. Both models are available to order now and scheduled to be shipped to customers in early 2021.

“This enhances the EvoQuip product offering and results in us having a more comprehensive product portfolio that will improve our versatility, and make us more competitive in the marketplace. We are confident that these highly aggressive finishing screens will open up new opportunities for EvoQuip customers globally,” said Barry O’Hare, business line director.

The Falcon range with its exceptional screen angle range provides efficient classification of fines, and is ideal for multiple applications and processing materials including sand and gravel, crushed stone, coal topsoil and demolition waste. In keeping with the EvoQuip range, both the EvoQuip Falcon 1220 and Falcon 1230 are compact, easily transported machines and offer operators rapid set up and tear down times.

The Falcon 1220 features a 3.65 m x 1.5 m double deck incline screen with remote tipping reject grid, hydraulic screen tensioning of bottom deck and three on board hydraulic folding conveyors as standard, with the option of adding the double deck vibrating grid.

The screenbox on the Falcon 1230 is equipped with three inclined decks (top and middle deck: 3.66 m x 1.52 m, bottom deck: 3.00 m x 1.52 m), giving a large screening area of 170 sq ft to provide efficient, high capacity screening - even at small fractions. The fourth product conveyor has variable tilt and side slew to accurately discharge material for recirculation and stockpiling. The screenbox features quick wedge tensioning (top and middle deck), access holes and bottom deck hydraulic tensioning system to reduce time required for mesh changes.

The Falcons come with T-Link telemetry system fitted as standard, delivering real-time information on the performance of their machine, thus leading to effective machine management and maximising uptime. ■

Website: www.terex.com/evoquip



ABOVE AND BELOW: The Falcon range with its exceptional screen angle range provides efficient classification of fines, and is ideal for multiple applications and processing materials including sand and gravel, crushed stone, coal topsoil and demolition waste.



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New generation of material feeders from Vögele

Material feeders form a hub in the transfer of material from trucks to pavers, thus guaranteeing a constant and efficient paving process and high paving quality on large jobsites. To further enhance the user-friendly nature and efficiency of the equipment, Joseph Vögele AG has introduced its new MT 3000-3i Standard and MT 3000-3i Offset PowerFeeders, weighing some 20 and 24 t respectively.

The MT 3000-3i Standard PowerFeeder and MT 3000-3i Offset PowerFeeder with pivoting conveyor are equipped with the efficient and ergonomic Dash-3 machine technology. This includes the ErgoPlus 3 intuitive operating concept, AutoSet Plus automatic functions and PaveDock Assistant truck communication system, among others.

“We have developed the new generation of PowerFeeders in close collaboration with our customers,” said Bastian Fleischer, product manager at Joseph Vögele AG. “All the functions are aimed at making jobsite processes even more efficient, economical and convenient – whilst delivering the same high performance.”

Both versions of the material feeder achieve a conveying capacity of up to 1,200 t/h and can accommodate a full truckload of mix within 60 seconds. The MT 3000-3i Offset is also fitted with a conveyor belt that can be pivoted 55°. This provides contractors with a wide variety of potential applications, from parallel feeding two pavers to the so-called InLine Pave method, in which the material feeder, the paver for the binder course and the paver for the surface course work one after the other.

The MT 3000-3i Standard and MT 3000-3i Offset integrate the ErgoPlus 3 operating concept to increase efficiency on the jobsite. In the process, Vögele designed the operator’s console specifically to suit the requirements of material feeder operators, making it as intuitive and convenient as possible - all the functions are arranged in logical groups, and clear function and status indicators, a high-contrast display and glare-free backlighting facilitate operation for users. The pivoting seat console also allows for ergonomic working environment with excellent all-round visibility.

The AutoSet Plus and PaveDock Assistant assistance systems are new; Vögele previously offered these only for pavers of the Dash-3 generation. With the AutoSet Plus automatic functions, operators only need to push a button to put the material feeder in the transport, repositioning or operating positions - or to save material handling programmes and just easily call up these settings again whenever they are required. This is especially useful on jobsites that demand frequent repositioning or have similar paving requirements.

The optional PaveDock Assistant communication system facilitates material transfer. The material feeder operator can use two signal lights to show the truck driver clearly whether he/she is to back up, stop or dump mix. If the InLine Pave method is in use, the signal lights also indicate whether material for the surface course or the binder course is required. This leads to reliable, loss-free and efficient material transfer.

In addition, Vögele has paid particular attention to the conveying components. The new design of the receiving hopper, for example, guarantees fast material transfer and loss-free conveying. The colour-coded markings on the receiving hopper simplify the material transfer process, even in the dark. The offset and additional seals in the inlet area prevent loss of material and soiling of the conveyor belt.

A new control system and special centring aids ensure that



The new MT 3000-3i Standard and Offset material feeders feature the latest Dash-3 machine technology.



LEFT: The new design of the receiving hopper guarantees fast material transfer and loss-free conveying.

BELOW: The new MT 3000-3i Offset feeding two road pavers paving hot-to-hot on a jobsite near Karlsruhe, Germany.



the conveyor belt always remains centred, even under difficult conditions involving crossfall. “Another important new feature is the optimised belt heating,” added Mr Fleischer. “The new control system provides optimum temperature management and is even more economical than before.” The system can handle critical materials, such as low-temperature asphalt, without loss of temperature.

Vögele has significantly improved access to the maintenance and setting points, as well as to the cleaning zones. For instance, the transfer hopper of the MT 3000-3i Offset is hinged, and its larger step makes it easy to clean. The setting points have also been reduced in number and colour-coded to make them more easily identifiable.

Contractors can transport the new material feeders comparatively quickly and easily. The large angle of inclination of 15° makes it easier to load feeders onto commercial low-loaders, whilst the receiving hopper can be raised 25 cm higher than before. This now allows users to deposit material feeders on the so-called goose neck of the low-loader without any issues, resulting in reduced transport length. ■

Website: www.wirtgen.com



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RM 120X: New crusher from RM Group

RM Group is introducing a new machine range, part of its latest product philosophy called 'RM Next'. The RM 120X is the first crusher to be developed in this range, featuring enhanced safety with maximum performance and flexibility. At the same time, RM Group said its proven service and intuitive 'Go!' operation concept will be maintained, which the company continues to expand.

The prototype of the RM Next product philosophy was unveiled at bauma in Munich in 2019. "With this philosophy, we are once again setting standards in user-friendliness," said Gerald Hanisch, founder and owner of Rubble Master (RM). The company revealed that an RM screen will be launched in 2021.

The RM Next product philosophy focuses on four points. One of them is extended service, which includes a standard five-year warranty and annual service.

Simplicity is another focus, which will be ensured despite the extra features, equipment options and configurations that have been developed based on customer requirements. Mr Hanisch reassured, "Operating an RM 120X still involves only a few buttons. The built-in screen is only used to display information and has no sub-menus. We have received valuable input for this operating concept from our customers around the world, and the controls and display meet the specifications on jobsites 100%."

Safety is also an important focus. With RM Next and the comprehensive operator-machine interface, the operator no longer has to enter the danger zone while operating the machine and is able to see the light signals indicating both the status and current workload of the crusher from the excavator cab.

An additional focus was on the optimisation of material throughput. Here, RM Group implements job-specific crushing equipment for the respective material and real-time analysis. This reduces running costs and increases turnover.

RM Group mentioned that optimisation starts with the machine configuration, and therefore five main application cases are available with the necessary equipment options. Furthermore, the performance indicator on the machine and the RM Go! Smart system immediately detect



The RM 120X is the first crusher to be developed in the RM Next range.

potential improvements so that they can be implemented straight away. This optimisation concept works well in natural stone processing and recycling applications.

RM Group recently exhibited its RM Next product philosophy at bauma China 2020. The company's Chinese sales subsidiary, Tianjin Rubble Master Technology Co Ltd, was present at the show.

Expanding in China

In the past, there were reportedly various companies specialising in natural stone processing in the Chinese market. However, with the increasingly strict environmental regulations imposed in recent years, numerous stationary crushing plants and low-price machines have been banned from the market because they do not comply with the regulations.

As such, demand for environment-friendly mobile crushers has been rising in China. According to RM Group, its fleet of mobile crushers and screens is not only the quietest in the industry, but also meets the strict environmental standards. The manufacturing process and design of RM machines take into consideration the reduction of emissions and noise levels.

RM Group unveiled its diesel-electric drive concept for compact mobile crushers nearly 30 years ago. Many RM products can be purely electric powered, an option that is high in demand and often necessary, especially in inner-city construction sites.

China's local and national authorities have also been promoting the recycling of construction & demolition (C&D) waste,

making it a promising business sector, said RM Group. At present, the recycling rate in China is less than 10% while in Europe and the US, it is already 90%. In Japan and South Korea, the recycling rate is up to 95%.

RM Group believes that China's C&D waste recycling industry will continue to grow strongly in the future, as evidenced by the fast expansion of the company's local dealer network.

Since its establishment two years ago, Tianjin Rubble Master Technology has focused on the recycling and natural stone industries across China. More dealership contracts were signed in 2020, and there are now 13 local sales and service partners that look after customers in 12 provinces.

Future developments

"When we started developing RM Next, we always had our entire product range in mind. In the future, an important role will be played by networking different products in operation at the same jobsite. However, we can only make this happen if all the products work according to the same philosophy," explained Mr Hanisch.

RM Group said intensive work is currently under way to network RM machines that work together. This means that the throughput of the screen can be adjusted in the future to match the utilisation of the crusher. Machines downstream from the crusher can also stop automatically if the crusher is currently not processing any material. These optimisations are designed to increase efficiency and save running costs. ■

Website: www.rubblemaster.com

New Rockmore reaming bit for tunnelling drill and blast

Rockmore International has developed a new reaming bit to allow for more efficient underground drilling and blasting operations. This new model features retrac style cutting fins to ensure better retraction out of the hole.

Reaming type bits in underground drilling and blasting operations are used to enlarge selected existing blast holes to bigger diameters for effective blasting and rock fragmentation. This is typically performed in tunnelling, mining, and underground construction drilling operations. The larger reamed holes are not loaded with blasting agents and therefore allow the rock formation to implode during the explosion phase. The empty voids in these reamed holes promote better rock fragmentation and more efficient blasting patterns.

After blast holes are drilled in the tunnel face with hole diameters ranging from 43 to 51 mm, certain holes in the pattern are enlarged with a typical reaming bit to 76-102 mm, depending on the blast and rock formation requirements. Standard reaming bits feature face designs with dome or narrow nose fronts and are intended to effectively enlarge a predrilled hole. When they are retrieved out of the hole, however, at the end of the target hole depth, they often seize up due to the loose rock debris inside the hole formation.



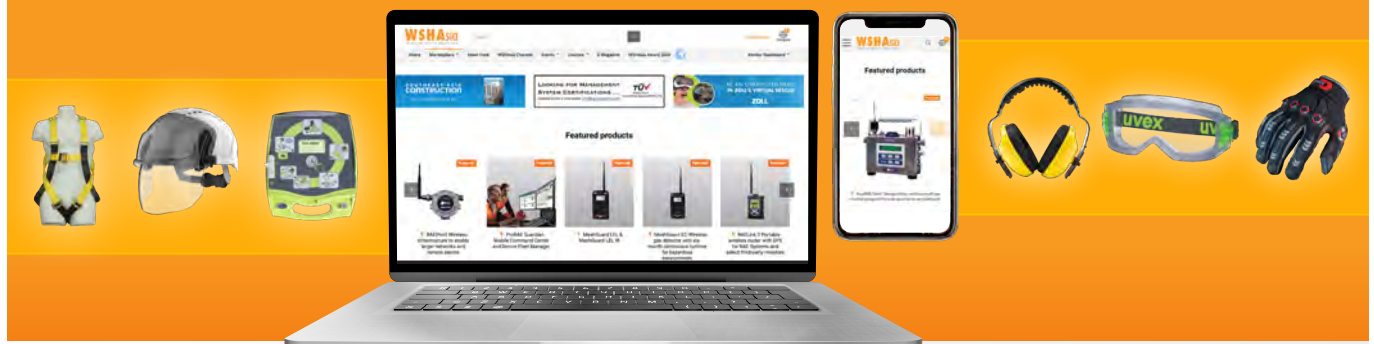
“Our field support engineers recognised the need for better bit retrieval in face drilling operations. After close collaboration with various drilling teams, our designers introduced the innovative retrac features in this new reaming bit,” explained Pejman Eghdami, executive vice president at Rockmore International.

Rockmore addressed the challenge of retrieving these style bits by developing this new model that features retrac style cutting fins in the rear section, to promote better retraction out of the hole. The fins effectively push out any rock chips

trapped behind the bit when the drill string is pulled from the blast hole, resulting in more efficient reaming operations in underground drilling operations. ■
Website: www.rockmore-intl.com

trapped behind the bit when the drill string is pulled from the blast hole, resulting in more efficient reaming operations in underground drilling operations. ■
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Cat D6 GC dozer launched in Asian market

The new Cat D6 GC track dozer from Caterpillar is a successor to the company's former D7G that had been widely used in many industries. The D6 GC has enhanced features that make it suitable for demanding jobs and a wide variety of applications. The machine is coupled with a fully mechanical Cat 3306B engine for reliable performance and long-term durability.

The D6 GC complements Caterpillar offerings in the 20+ tonne track dozers. For example, for forestry applications, customer may prefer the D6 GC fully mechanical engine and drive systems due to operator and technician scarcity. In other high utilisation and fuel efficiency focus applications, customer may consider the D6R2 XL track dozers. The D6R2 XL two-pump hydraulic system and differential steering allows simultaneous blade response and steering performance for greater precision, manoeuvrability and fuel efficiency, and its optional automatic machine settings help reduce operator effort for higher efficiency.

Built on the proven performance of generations of predecessors, the D6 GC is launched in the Asian market with the Cat 3306B mechanical engine that is robust and easy to service and a fuel system that is less sensitive to varied diesel fuel quality.

The D6 GC dozer does have some familiar features. Most notably, there is a return to the elevated sprocket drive and has now clocked up more than 40 years of service in some of the toughest operating conditions, said Caterpillar. The elevated positioning of the final drives also removes this key component from material packing or impact loads transmitted when the machine is working in demanding underfoot conditions.

The Semi-Universal (SU) blade of the D6 GC provides more capacity than the former D7G, resulting in better productivity. The machine case and frame have thicker plates, stronger blade structures and reinforced L-shaped push-arm as compared to the D7G. Other features of the D6 GC include adjustment-free steering clutches, elevated sprocket and optimised undercarriage with strong structures for stability and durability. There are also heavy-duty guarding options for cab and major machine components.

The D6 GC is equipped with the Integrated Roll Over Protective Structure (ROPS) and Falling Object Protective Structure (FOPS) as standard, leading to comfort, excellent visibility and added safety. The cab comes with a suspension seat and air conditioning for operator's comfort. The traditional blade controls and the two-lever clutch and brake steering systems make the dozing operation simple and easy for operators of varied experience levels. The easy-to-read dash display helps to keep track of machine functions, fuel levels and more with analogue gauges and warning/status lamps.

The Caterpillar-designed powertrain is set up to work as a system to maximise reliability and performance. The Cat three-speed planetary powershift transmission and Cat exclusive torque divider help customer harness more power to the ground. The elevated sprocket undercarriage provides better ride balance, improved blade penetration and a lower machine centre of gravity. Long length of track on the ground adds to machine stability and performance.

The dozer's powertrain is a mechanical drive system designed with a robust fuel system, up to B30 (biodiesel) compatible diesel engine, torque divider and power-shift 3F/3R transmission. The fully mechanical engine and transmission make diagnostics and repairs easier when working in remote locations. The high-torque-capacity oil clutches with special modulation permits fast speed



ABOVE: The new Cat D6 GC is well suited to demanding jobs and a wide variety of applications.

RIGHT: The D6 GC complements Caterpillar offerings in the 20+ tonne track dozers, such as the D6R2 XL (pictured).



and direction changes. The cooling modules are in a single plan for effective cooling and reduce plugging.

The elevated sprocket drive design helps make maintenance easier, and the modular designed main frame allows transmission and major component easy access and fast in-field exchanges. Segmented sprockets are easy to replace as well. The undercarriage module is designed with the two-piece track roller frame with maintenance-free recoil system, sealed and lubricated track to prevent internal wear and maximise bushing life, thus ensuring lower operating and owning cost.

The dozer's engine compartment enables all daily maintenance inspections to be completed from one side of the machine. Large and wide opening engine side panels give clear access to all inspection and service points on the machine, and daily powertrain oil check and sampling ports are easily accessed from machine platform for convenience and added safety.

The D6 GC Forestry arrangement is available with optional protection like sweeps, screens and extra guarding to help protect against harsh conditions. Cab and canopy machines can be ordered with sweeps to help protect against falling debris. Heavy-duty bottom guards come standard while extra sealing helps keep debris out of the engine compartment. SU and Angle blades are available with brush rack for more carrying capacity and to help protect the machine from debris. There is also an option to outfit the machine with a winch for towing capability. ■

Website: www.cat.com

Bauer's low-noise equipment for foundation construction

Bauer Maschinen GmbH offers a wide range of low-noise equipment - from drilling rigs to cutters - for use in foundation construction projects. "Reducing noise is an extremely important topic in the new development and ongoing development of our equipment," said Christian Heinecker, head of business unit drilling equipment at Bauer Maschinen GmbH. "Thanks to our Energy Efficiency Package, EEP for short, Bauer equipment is now significantly quieter than the predecessor models without EEP."

Bauer's smart eco mode relies on dynamic regulation of the engine speed based on the respective action being carried out. As a result, it not only reduces cumulative noise emissions but also reduces diesel consumption. This is assisted by an automatic motor stop function that automatically switches off the equipment if it is not used for a certain period of time. Optional add-on modules, such as inflatable noise control cladding for the power head or the upper carriage, also have a positive effect and can even be retrofitted to existing equipment.

The silent mode is used for Bauer equipment featuring standard technology without EEP. "This operating mode makes the new Bauer BG 15 H and BG 20 some of the quietest drilling rigs available in their class," said Mr Heinecker. "The silent mode reduces the maximum engine speed and slows down the hydraulic consumers. Thus, the equipment's noise level decreases by -2 dB(A).

"Compared with its predecessor model, the new BG 20 manages to reduce cumulative noise emissions by 9 dB(A). In some cases, individual measurements recorded values of just 100 dB(A). This is an extremely significant reduction in noise pollution, especially when we bear in mind that our perception of noise is not linear. A decrease of just 3 dB(A) means cutting the noise intensity in half, while a decrease of 6 dB(A) actually reduces the noise intensity by 75%!"

Apart from the equipment, the drilling method also influences noise emissions, highlighted Bauer. A differentiation is made between intermittent (e.g. Kelly drilling) and continuous methods (e.g. drilling with an auger using the displacement pile or double-head drilling method). "The latter method combines pulling and concreting into a single process, and for this reason produces lower emissions during excavation than a method such as Kelly drilling," said Bauer. The company noted that, however, the continuous method is limited in terms of drilling depth and drilling diameter.

For Kelly drilling, Bauer's adaptive Kelly retraction assistant reduces the speed during the retraction process at the joints of the Kelly bar, which has a positive effect on the noise level generated. Various assistants help during drilling and discharge, for example by preventing the drilling tool from overfilling (over-drilling) and thereby facilitating the subsequent discharge process. The optimal filling level of the drilling tool is displayed for the operator in the B-tronic. During discharge, a one-directional or bi-directional spoil discharge assistant helps the operator. The one-directional spoil discharge assistant can be used to optimise the intensity when shaking out the auger.

Mr Heinecker pointed out, "Whether EEP, silent mode or assistance systems, many individual components result in a noise-optimised package at the end. We continually optimise our equipment and conduct our own foundation research as well as participating in publicly subsidised research projects."

Besides drilling rigs, noise reduction is also a priority for Bauer's cutting technology. The EEP has been designed for the



Bauer BG 15 H (pictured) and its 'sister' model, the BG 20, are currently among the quietest drilling rigs in their class.



For the CBC 30 silent cutter (pictured) and the CBC 45, the hydraulic power pack can be positioned not only at the rear but also on the side or even next to the equipment.

company's cutter carrier machine, the MC duty-cycle cranes. The cutter itself produces low levels of noise and cutting is ultimately a low-vibration and thus low-noise method.

Bauer has further developed a compact series of cutters with low noise emissions, the CBC silent cutter. Two models are available - the CBC 30 for cutting depths of up to 80 m, and the CBC 45 for cutting depths of up to 120 m. The units feature a hydraulic power pack, which ensures silent operation.

The power pack is not permanently attached to the rear of the support frame as usual, but can be positioned on the side or even separately next to the support frame and connected via hydraulic lines. "This modular system, which is also available as a low headroom variant, offers maximum flexibility even in very tight spaces," said Leonhard Weixler, head of business unit diaphragm wall technique at Bauer Maschinen GmbH.

The power pack is housed in a container with a length of 6 m, width of 2.5 m and height of 2.5 m. Compared with the standard MC duty-cycle crane from Bauer, the silent cutter produces noise emissions that are 3 dB(A) lower, which corresponds to approximately half of the perceived noise as described above. ■

Website: www.bauer.de

Various electric aerial platforms from Dingli

The electric vertical masts from Chinese aerial platform manufacturer Zhejiang Dingli are divided into two categories - self-propelled type and mobile type. The machines provide working heights from 4.7 to 14 m and maximum load capacities of up to 300 kg. The entire series is battery-powered, resulting in low noise and reduced emissions.

Dingli self-propelled scissor lifts have maximum working heights from 5.9 to 22 m and maximum load capacities of up to 750 kg. The electric machines are also battery-powered, making them environment-friendly with low noise and reduced emissions.

Dingli boom lift series, covering both telescopic and articulating type, includes nearly 20 models. Their maximum working heights range from 16 to 30.3 m, with maximum load capacities of up to 454 kg.

Among these boom lifts, the electric models over 24 m high offer maximum load capacities of up to 454 kg, with maximum working heights from 24.3 to 30.3 m. As for electric models below 24 m, they cover working heights of 16 to 22.21 m and maximum load capacities of up to 230 kg. ■

Website: www.cndingli.com



Dingli offers various electric aerial platforms for the global market, including vertical masts (above), boom lifts (left), and scissor lifts (far left).

Southeast Asia Construction is available on issuu.com/southeastasiaconstruction



Ammann plants hard at work on SE Asian projects

Musyati Development Sdn Bhd has deployed an Elba CBT 60 SL concrete plant from Ammann on a housing project in Sibu, in the state of Sarawak, Malaysia. The company said the plant is consistent and reliable, instilling confidence in the entire construction team. It is also fuel-efficient and features the intuitive as1 control system.

Benjamin, a plant manager on site, reportedly described the Elba CBT 60 as “simple and easy to operate” and also praised the plant’s reliability and fuel efficiency. The CBT 60 SL can be set up quickly due to its folding mechanisms and compact design. According to Ammann, the plant needs just two open-top containers for relocation and is manufactured to meet favourable transport dimensions when travelling.

The compact plant is equipped with an Elba CEM 1000 S single-shaft mixer and an integrated linear bin for storing between two and four aggregate types. Cement, water, aggregate scales and all other electric and pneumatic plant components are pre-installed and ready for operation.

The integrated control cabin houses the switching cabinet and offers additional space for the control system. With a theoretical hourly output of 60 cu m/hr, the Elba CBT 60 SL is suitable for a wide range of applications.

No foundation is required for plant installation, as it only needs a surface with soil compaction of 250 kN/sq m, said Ammann. Optional solutions are also available for cement silo installation. In addition, the Elba CBT 60 SL has been designed for excellent accessibility to service and maintenance points.

Musyati is a relatively new development company, founded only five years ago. Its main clients are the housing ministry and private homeowners. Musyati’s sister company already has an Ammann pre-mix plant at work on the Pan Borneo Highway project. The success of that plant is believed to be a key reason that led Musyati to choose the Ammann CBT 60.

In Thailand, Bangkok-based company Sraloong Construction Co is using an Ammann ABM 90 EasyBatch asphalt plant for the expansion of Highway 115. This section is being widened from two to four lanes, located between Kamphaeng Phet and Phichit.

“This project is to extend the connecting road between the northern and central parts of Thailand,” explained Theerapat Theeratrakool, plant manager at Sraloong. The company turned to the Ammann ABM 90 EasyBatch to produce asphalt mix for the road expansion. The plant is capable of 65 t/hr on the Highway 115 project. While it has a higher capacity, that is all the production required for this particular job.

The work was quite complicated. “It had to be constructed within a limited time and under Covid-19 circumstances,” said Mr Theeratrakool. “There was also a need to connect to other roads, which were being built by other contractors who were also widening from two to four lanes.” Plus, the specifications called for precise material quantities and sieve sizes.

The ABM EasyBatch is designed for quick transfer and a rapid return to production. “We set up close to the jobsite to increase the daily production and reduce the costs of the pavement,” revealed Mr Theeratrakool. “It is a super-mobile plant in terms of disassembly and assembly. Only two semi-trailers are needed for transport, which is an improvement over competitive brands.”

As the work progresses, the plant can be relocated to reduce the length and costs of hauls and keep pace with the paving team.



Elba CBT 60 SL concrete plant from Ammann in operation on a housing project in Malaysia.



ABOVE AND LEFT: Ammann ABM 90 EasyBatch asphalt plant working on the Highway 115 expansion project in Thailand.

Such flexibility is also expected to pay off when the Highway 115 is completed and the plant has to be moved to a new jobsite in another part of the country.

Another advantage of the ABM EasyBatch plant is its as1 control system. “The as1 can give the exact statistics and store the old information for more than a year,” said Mr Theeratrakool. “Inspectors for the Department of Highways can retrieve all the information, from the first batch produced until the last.” ■

Website: www.ammann.com

Mapei waterproofing systems chosen for Malaysian bridge

The Kuala Terengganu Drawbridge is a bascule bridge located in Kuala Terengganu, Terengganu, Malaysia. It links two areas - Muara North and Muara South - to create a strategic connection in the city, leading all the way to the Sultan Mahmud Airport.

The bridge features a 23-m-wide single carriageway and spans the Terengganu River at a height of 638 m. It consists of a main route, four towers and two 'sky bridges', plus a gallery and an observer zone for visitors to enjoy the view.

As the first drawbridge in Malaysia and Southeast Asia, it not only serves as an alternative route to the airport, but also becomes a landmark and tourist attraction in the city. The design was inspired by the Tower Bridge in London.

For this project, Mapei's products were selected to provide a highly durable waterproofing system. The solutions, supplied by Mapei Malaysia, included Mapelastic and Mapenet 150 to form strong waterproofing layers on the concrete structures.

Mapelastic is a two-component cementitious mortar for waterproofing and protection of concrete structures, renders and cementitious screeds. It features excellent bonding properties to all concrete, together with its resistance to the deteriorating effect of UV rays. When used with Mapenet 150 (a glass fibre mesh designed to reinforce protective waterproofing layers and anti-fracture



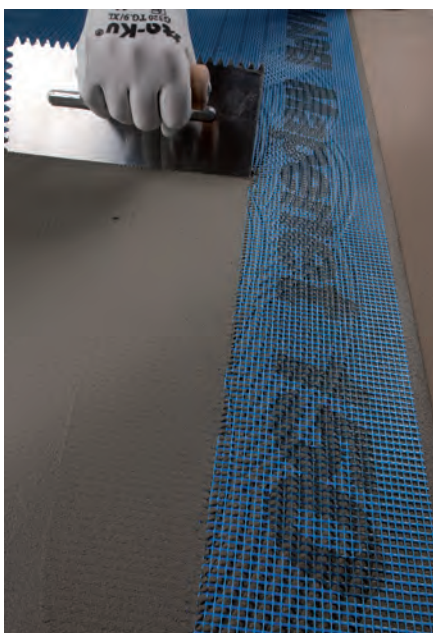
ABOVE AND RIGHT: The Kuala Terengganu Drawbridge features a 23-m-wide single carriageway and spans the Terengganu River at a height of 638 m.

BELOW: Mapelastic cementitious mortar was used in this project, along with Mapenet 150 glass fibre mesh, to form strong and durable waterproofing layers on the concrete structures.

LEFT: Mapenet 150 mesh was applied to reinforce Mapelastic.



The article courtesy of Realta Mapei International no. 82



membranes), it forms a durable and long-term performance barrier.

Once the surface had been prepared according to specifications, the next step was to apply the first coat of Mapelastic. After that, the Mapenet 150 fibre mesh was placed over the first coat and to complete the system, a second layer of Mapelastic was applied over the mesh.

Construction of the bridge started in 2014 and it was opened in 2019. The waterproofing work was carried out from October 2018 to March 2019, covering bathrooms, roof slab and water tank, on an area of 410 sq m. ■

Website: www.mapei.com.sg

Volvo CE ensures fuel savings for SE Asian contractors

Malaysian contractor Dofort Earthworks is using Volvo machines to carry out its latest residential construction jobs, the Bandar Meridin East and Jalan Kong Kong developments, in Pasir Gudang, Johor.

“We work our excavators hard over long shifts, so it is important we can rely on them and the aftermarket support of our dealer to get the job done and with low operating costs,” said Alvin Lee, director of Dofort Earthworks. “I chose Volvo because it is a world-renowned brand with proven superior fuel performance, reliability and responsive aftermarket support.”

Since February 2020, Dofort Earthworks has deployed a fleet of 11 Volvo excavators – nine of them rented and two of them purchased from the Volvo Construction Equipment (Volvo CE) dealership in Johor – to work 10-hour shifts six days a week on the two jobsites. The eight EC350DL excavators and one EC480DL are used primarily for cutting and filling, while the two EC200D models focus on terracing, drainage and other utility work for the developments.

The exceptionally low fuel consumption on the Volvo EC200D, EC350DL and EC480DL was said to be a particular draw for Dofort Earthworks, as this helps keep the company’s costs at least 10-15% lower than its competitors. The fast cycle times were also important as they enable the company to achieve greater productivity than with other brands.

“Our operators like the powerful digging force and user-friendly operational modes on the Volvo excavators, which, coupled with the comfortable air-conditioned cabin, greatly improve productivity as a whole,” said Mr Lee.

“The Johor Volvo CE aftermarket team has been really supportive and responsive, and I greatly appreciate such support. Volvo CE also assisted us significantly during the Covid-19 pandemic by waiving some of our rental payments, which relieved us of our financial pressure during this challenging period and for which we are very grateful.”

The 11 Volvo excavators will work on site at the Bandar Meridin East and Jalan Kong Kong developments until August 2021, after which they will move to other projects. Dofort Earthworks has multiple jobs lined up in Desaru and Johor Bahru over the next two years, for which the Volvo machines will also be ideally suited.

In Sumatra, Indonesia, a total of 12 Volvo EC200D excavators are working on the construction of a road for a paper mill that has received a sustainable forest management certification under the Programme for the Endorsement of Forest Certification (PEFC).

In 1993, before APRIL Group - Indonesia’s leading manufacturer in the paper and pulp industry - began construction of its first pulp and paper mill on the island of Sumatra, the sleepy and virtually inaccessible town of Pangkalan Kerinci consisted of just 200 dwellings. Today, it is not only home to one of the world’s largest and most efficient pulp mills, run by APRIL’s main pulp and paper subsidiary Riau Andalan Pulp & Paper (RAPP), but also a thriving city of over 100,000 inhabitants, with a small airport, two ports and over 11,000 km of roads.

The latest addition to these roads is an 80-km stretch between Langgam site and Cirenti site, which started in August 2019. To ensure the task stays on the three-year construction schedule, Indonesian contractor PT Sumi Gita Jaya - a major player in infrastructure development in the province, as well as the oil and gas industry - added 12 Volvo EC200D excavators to its fleet, working alongside the company’s existing fleet of four Volvo SD110 soil compactors.



Volvo excavators are helping contractors in Malaysia and Indonesia to carry out their jobs more productively. The machines can be seen here being deployed on residential developments in Malaysia (above) and a road project in Indonesia.



The IDR 40 billion project (approximately US\$3 million) has now reached the construction stage, with the EC200D excavators primarily used for canal and trenching work, operating nine hours per day for seven days per week. When completed, the road will provide access to the pulp and paper mill, which is capable of producing up to 2.8 mil t of pulp and 1.15 mil t of paper per year.

“The financial aspects were a key factor in selecting the EC200D, particularly as a result of their competitive price and fuel efficiency,” revealed Mr Herland, director at PT Sumi Gita Jaya. “But it was also vital that the machines would be durable and deliver consistent high performance.”

The EC200D also meets Indonesia’s new requirements for machinery to operate with diesel containing 50% biofuel. “Because they are so reliable, we haven’t needed to call on the support of PT Indotruck Utama, the dealer who supplied our machines,” said Mr Herland. “And our operators really appreciate the cabin comfort, as well as the impressive swing speed.”

What’s more, the 20-t EC200D benefits from the perfect balance of power and fuel economy provided by its Tier 3 Volvo D5E engine, which delivers 123 kW at 2,000 rpm. Ideally suited to general construction duties, the EC200D is equipped with a 5.7 m boom, 2.9 m arm and 0.8 cu m bucket, delivering a maximum breakout force of 116 kN. ■

Website: www.volvoce.com

Busy weekend for Indeco hammers on Princes Freeway

The Princes Freeway is a 160-km motorway in Australia connecting Melbourne to Geelong on the west and Traralgon on the east. The Princes Highway-Geelong Road is one of the main routes that links Melbourne's western and eastern suburbs and is used daily by commuters, public and freight vehicles.

The Duncan Road junction is a key route to and from many suburbs. This bridge, built 61 years ago, has a daily circulation of approximately 11,000 vehicles. To improve traffic flow and road safety, the state of Victoria carried out upgrading work on the Duncan Road junction.

The work included the construction of new exit ramps; demolition of the old bridge and the construction of the new one with two lanes in both directions; the addition of two new ramps for traffic to and from Geelong; and the construction of cycle and pedestrian paths and safe crossings on Duncan Road.

To minimise traffic disruption, the old bridge had to be demolished in just one weekend. The flyover was closed to traffic on Saturday (in the evening), and reopened on Monday morning. The job was completed by Australian company City Circle Demolition.

One HP 5000 and two HP 7000 hammers from Indeco played an important role in the demolition of the Duncan Road bridge and the safety barriers of the pillars, which were built using high MPA concrete with extra steel reinforcements to withstand the impact of a truck of about 70 t travelling at 100 km/hr. ■

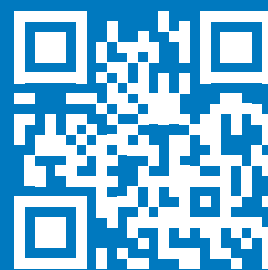
Website: www.indeco.it



ABOVE AND BELOW LEFT: Indeco HP 5000 and HP 7000 hammers played an important role in the demolition of the Duncan Road bridge and the safety barriers of the pillars.



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DEMAG SEVEN-AXLE CRANE



Tadano Demag has introduced its new seven-axle model, the Demag AC 450-7 all-terrain crane. The unit has an 80-m main boom with a maximum lifting capacity of up to 195.5 t. If the main boom's length is not sufficient, it can be extended with a luffing jib with a maximum length of 81 m.

The basic idea when developing the new AC 450-7 was both simple and demanding, said Tadano Demag. The company wanted to 'give wheels' to a more powerful alternative to its existing six-axle cranes, with the objective to keep it as compact as its counterparts despite the additional axle, all while combining that with significantly better performance.

In terms of its dimensions, the AC 450-7 meets the desired requirement, having a carrier length of only 15.99 m, an 8.45-m outrigger base, and a total length of 17.62 m. "In other words, it doesn't need more space than a six-axle crane at a work site, and yet it offers significantly better lifting capacities," said Michael Klein, product marketing manager at Tadano Demag.

But why seven axles to begin with? "Simple. The only way for the machine to be street-legal and meet our goals of having a longer boom and larger lifting capacities was for it to run on seven axles," revealed Mr Klein.

The AC 450-7 features a maximum system length of 132 m. The luffing jib can be 'divided up' in 3-m segments from 24 to 81 m. For easy transport of the luffing jib, two system dimensions

are used making it possible to slide the extension's individual parts into each other.

The luffing jib rigging system allows for a fast, simple and safe setup – a design that the new AC 450-7 shares with the Demag AC 300-6, AC 350-6, and AC 1000-9 models. Furthermore, the AC 450-7 is extremely versatile when it comes to extension matters. Besides the luffing jib, there is also fixed jib configuration, even with an offset section, and also a runner.

New SSL Superlift design

Tadano Demag has adopted a new engineering design for the SSL Sideways Superlift system on the AC 450-7. This is a major enhancement to the Demag SSL solution, with the Superlift arms now being mounted all the way in the front, on the head of the base section, meaning that they are ultimately longer and thus well-suited to larger lifting capacities.

With regard to lifting capacities, this also means that the Demag AC 450-7 is considerably superior to other seven-axle cranes or even some eight-axle units in a number of boom positions, according to Tadano Demag. More specifically, the AC 450-7 can lift 73.5 t at a radius of 9 m when equipped with a 60-m main boom with an SSL configuration, 37.9 t at a 13 m radius when the boom is telescoped out completely to a length of 80 m, and 12.8 t at a radius of 50 m with this configuration.



OPPOSITE IMAGE AND ABOVE: The new Demag AC 450-7 has an 80-m main boom with a maximum lifting capacity of up to 195.5 t. If the main boom's length is not sufficient, it can be extended with a luffing jib with a maximum length of 81 m.



However, the new Superlift design not only delivers a more powerful performance, but also better functionality and handling. The new design only requires one single wire rope line for the connection between the main boom head and the SSL arm. In addition, the SSL arms are pinned hydraulically on the main boom, which reduces manual work for securing the arms and the associated work at height.

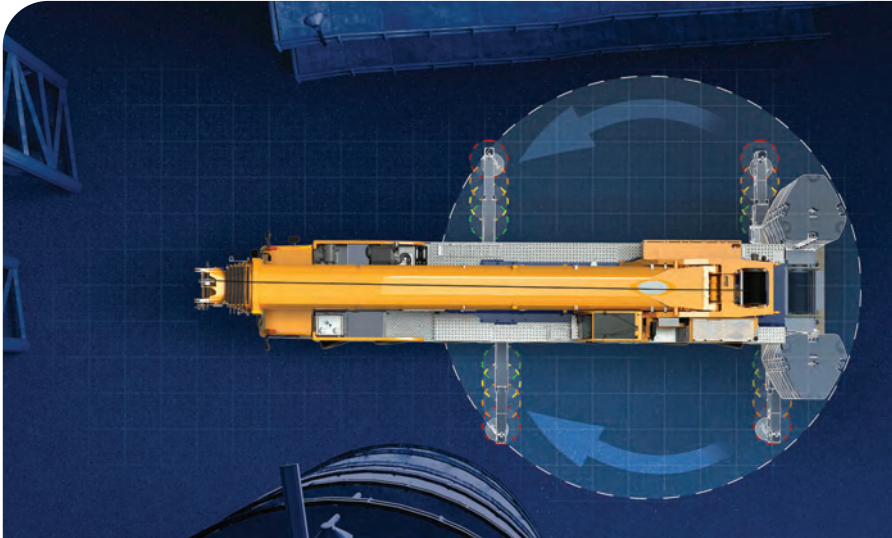
Improved counterweight design

The maximum counterweight for the AC 450-7 is 150 t. It consists of a 20-t base plate and redesigned counterweight plates that have been optimised in terms of swing radius, which is now only 5.60 m. The counterweight plates are available as 10-t plates, 5-t plates, or a combination of the two, with the goal being to enable customers to optimise their transportation logistics.

The base plate can be set up from the front – an advantage that is particularly beneficial at work sites where space is tight and the corresponding transportation truck can only be positioned in front of the



TOP AND ABOVE: The AC 450-7 features a new SSL Superlift design, with the Superlift arms now being mounted all the way in the front, on the head of the base section, meaning that they are ultimately longer and thus well-suited to larger lifting capacities. The crane is also available with two different carrier variants to satisfy axle load requirements all over the world.



ABOVE AND LEFT: **The new, optional Demag Surround View system allows the operator to position the crane easily at the job site. It also supports the driver on the way to the job site.**

TOP RIGHT: **The IC-1 Plus control system provides maximum available lifting capacity.**



available lifting capacity can be used with any outrigger configuration, including asymmetrical ones.

In addition to the IC-1 Plus control system, the crane is available with the IC-1 Remote straight from the factory, making it possible to remotely read and diagnose all important crane data.

Variable axle loads

The AC 450-7 is available with two different carrier variants to satisfy axle load requirements all over the world. In the standard version, the crane can be configured to travel under a 12-t or 16.5-t axle load limit, with the main boom in place. If the main boom is removed, the maximum axle load is reduced to just a bit over 9 t with a gross vehicle weight below 48 t.

Tadano Demag now offers a special carrier version with removable rear outrigger box. "With this solution, we provide our customers another possibility to reduce gross vehicle weight," said Mr Klein. "The quick connections allow our customers to remove the outrigger box very quickly."

The AC 450-7 excels in driving mode on the road as well as on the construction site. It is equipped with a Mercedes-Benz transmission with turbo retarder clutch for wear-less and powerful start-up, paired with an integrated high-performance primary retarder. Drivers benefit from sensitive starting and shunting and do not need to worry about temperature problems.

What's more, all seven axles on the AC 450-7 are steered, while four of them are driven. This makes the crane so manoeuvrable that it can navigate tight work sites. The AC 450-7 is powered by a Mercedes-Benz engine with an output of 480 kW (625 hp). The diesel engine conforms to EU Stage V and Tier 4 Final emissions standards, but can also meet the Tier 3 requirement. ■

Website: www.demagmobilecranes.com

crane. "This solution too was the result of us listening to our customers' explicit requests," said Mr Klein.

There is also an optional counterweight frame available for the AC 450-7 that can be used to increase the swing radius in order to further increase the lifting capacity, especially when using an SSL configuration. And last but not least, Tadano Demag offers various adapters that make it possible for customers to keep using existing counterweight slabs from other larger AC or CC models with their new AC 450-7.

Demag Surround View system

At 8.45 m, the outrigger base is at the level of a six-axle crane. The AC 450-7 has five different outrigger widths, so the crane can be used flexibly, particularly in confined construction site conditions.

The new optional 'Demag Surround View' makes it easier for the crane operator to position the AC 450-7 at the job site. This system uses the six crane cameras to display the possible outreach of the outriggers as well as the tail swing radius at the current position of the crane in a computer-aided display.

"Demag Surround View displays in the carrier cabin the different outrigger widths, so the crane operator can position the crane on the construction site in order to extend all outriggers sufficiently far and ensure the required slewing radius. This reduces time-consuming measuring and trial and error when looking for a location, so that the crane can be ready for operation more quickly," explained Mr Klein.

Demag Surround View also supports the driver on the way to the construction site. The cameras can deliver images of the crane side areas when turning, facilitating the crane driver to detect cyclists, pedestrians, or any obstacles. This function is activated automatically when the indicator is operated. "This new feature is a real highlight," stated Mr Klein. "We discussed it with several customers and received enthusiastic feedback for it."

Once the best location has been found, the IC-1 Plus control system provides maximum available lifting capacity, as it determines the crane's lifting capacity for every boom position as a function of the superstructure's slewing angle in real time. This means that the maximum



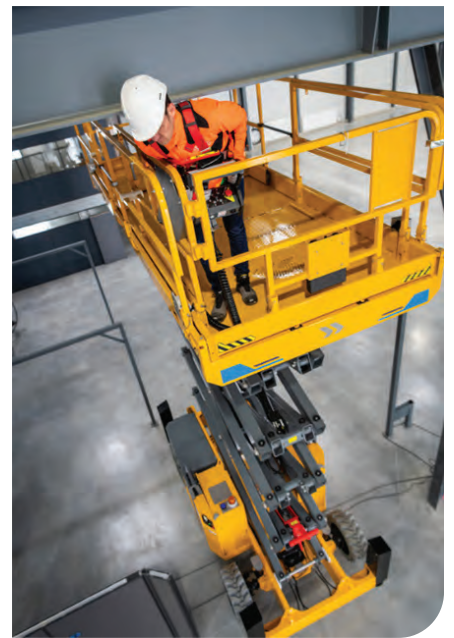
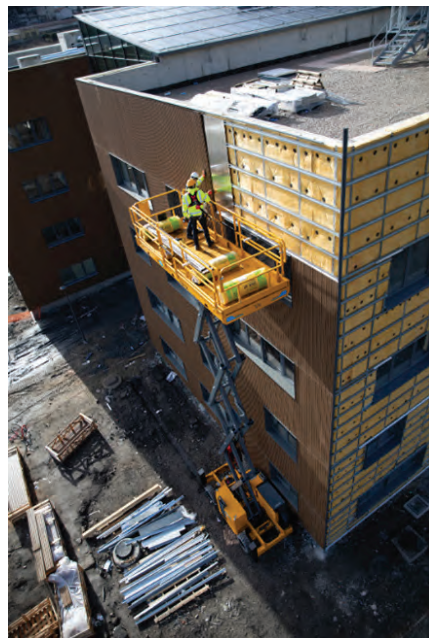
HAULOTTE ELECTRIC SCISSOR LIFTS

Haulotte's new electric scissor lifts, including the HS15 E and HS18 E (HS4390 E and HS5390 E in North America), are part of the company's Pulseo generation range. They are able to lift up to 750 kg of load and up to four people.

The HS15 E and HS18 E have a working height of up to 15 m and 18 m respectively. Their large work platform reaches 7.40 m long when both extensions are deployed. The scissor lifts are suitable for a wide range of applications and can be used in all types of terrain, even the most rugged. They can overcome various obstacles and climb slopes up to 45%.

The oscillating axle matches the position of the front wheels to the uneven terrain to maintain optimal ground traction. The four-wheel drive axles deliver maximum torque and ensure excellent power distribution. In low grip situations, the manual differential wheel lock provides extra traction, getting the machine in and out of challenging terrain.

Haulotte's new Pulseo generation range can be deployed on slopes up to 5° with outriggers to guarantee safe elevation on uneven ground. High ground clearance protects machine components in all terrain conditions. The proportional commands ensure precise movements and smooth operation on the way up to the work area, while ergonomic controls guarantee comfortable driving.



TOP, LEFT, ABOVE AND ABOVE LEFT: The new Pulseo HS15 E and HS18 E scissor lifts have a working height of up to 15 m and 18 m respectively. They are fitted with the Haulotte Activ'Lighting System.

The new Pulseo scissor lifts also incorporate the Haulotte Activ'Lighting System. Ten LED spotlights provide ideal illumination of the basket, controls, and the manoeuvring area around the machine for safe loading/unloading operations in low visibility conditions.

New on scissors, the Haulotte Activ'Shield Bar system protects the driver from entrapment situations. The machine stops automatically as the operator is pushed towards the bar.

Emission-free machines

Featuring a 100% electric design, the HS15 E and HS18 E scissor lifts operate with no harmful emissions. They offer a clean alternative suited to any situation, such as Low Emission Zones (LEZ) or green construction sites. Available with non-marking tyres, the units can also be used indoors on sensitive surfaces without leaving a trace.

The latest Pulseo machines operate in silence (acoustic profile <60 dB in electric mode), so they are ideal for low-noise areas or public places. These new all-terrain scissor lifts are also designed to maximise battery life and optimise power consumption. Their 48-V battery pack delivers enough power for a full day of work, and three charging solutions adapt to the on-site infrastructure.

The primary charger recharges the batteries at the end of the shift from



ABOVE, LEFT AND BELOW: Featuring a 100% electric design, the new scissor lifts operate with no harmful emissions. They can overcome various obstacles and climb slopes up to 45%.





TOP, ABOVE AND BELOW: The HS15 E and HS18 E are equipped with a 48-V battery pack, delivering enough power for a full day of work. There are also three charging solutions.

LEFT AND BELOW LEFT: The new scissor lifts are able to lift up to 750 kg of load and up to four people. The machines' large work platform reaches 7.40 m long when both extensions are deployed.



any standard 110 - 230 V single phase electrical network. An optional three-phase accelerated charger ensures an 80% charge in only three hours. The scissor lifts can also be equipped with a removable and interchangeable range extender to rapidly recharge the batteries while the machine remains fully operational. One range extender can be used on different HS15 E or HS18 E.

The new Pulseo models integrate the Haulotte Activ'Energy Management System. It features a tailored charging curve, built-in maintenance care programmes and preventive maintenance notifications to significantly optimise the performance and lifespan of the battery. Moreover, the HS15 E and HS18 E embed

centralised watering solutions to simplify the daily work of technicians and reduce maintenance effort.

With maintenance-free, asynchronous motors, direct access to components, and high-quality routing, the new Pulseo scissor lifts ensure minimum downtime. Battery maintenance costs are significantly reduced thanks to the Haulotte Activ'Energy Management. The onboard diagnostic tool, Haulotte Activ'Screen, makes daily life easy for users and technicians and give them valuable information to guarantee the machines are always available and ready to work. These functions are available on mobile devices as well, via the Haulotte Diag app. ■

Website: www.haulotte.com



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LIEBHERR ELECTRIC CRAWLER CRANES

LR 1200.1 unplugged and LR 1250.1 unplugged

Deemed the world's first battery-powered crawler cranes, the machines can be operated without a cable, hence 'unplugged'. Manufactured at the Liebherr-Werk Nenzing GmbH facility, they have a maximum lifting capacity of 200 t (LR 1200.1 unplugged) and 250 t (LR 1250.1 unplugged). Both are driven by electric engines with a system performance of 255 kW.

The cranes can be recharged on a conventional jobsite electric supply (32 A, 63 A) in 4.5 hours and optionally with 125 A in 2.25 hours. The capacity of the battery is designed for 4 hours of lifting operation. "There are no compromises regarding performance or availability when compared with the conventional versions," affirmed Liebherr.

Because they are emission-free and have a low noise level, these electric cranes offer a major advantage for areas sensitive to noise and also for the people working on the jobsite.

On the machine design, the unplugged series has a blue accent in its colour composition, which symbolises the electric solution representing an advanced technology. "The unplugged cranes achieve the best possible combination of operator benefit, efficiency and environmental sustainability," stated Liebherr.

"The year 2020 has shown that one must be open-minded and bold to break new ground. With our unplugged cranes, we offer our customers an alternative drive design. As we have already seen with the LB 16 unplugged, the first battery-powered drilling rig, the strategy is a complete success," explained Gerhard Fraier, managing director for sales at Liebherr-Werk Nenzing GmbH.

"Strict requirements regarding environmental sustainability in tenders for construction projects increase the demand for advanced technologies. For us, it was clear that we extend and successfully establish the design in further product groups."



According to Liebherr, the new electric crawler cranes are already available on the market, with the first customers being Kynningsrud Nordic Crane AS in Norway and Select Plant Hire Company Ltd in the UK.

LRB 23 piling and drilling rig

Another new innovation from Liebherr is the LRB 23 piling and drilling rig, which closes the gap between the LRB 16 and LRB 355. This latest model provides an engine output of 600 kW, making it suitable for common deep foundation works, such as drilling with a Kelly drill, double rotary drill, full displacement equipment and continuous flight auger, as well as soil mixing and applications with a vibrator or hydraulic hammer.

The compact design allows for transportation of the LRB 23 in one piece, resulting in easy mobilisation between jobsites. The remote control simplifies the loading process for transportation and also the assembly of the machine.

The advantages of the rigid leader are proven in operation. It can withstand high torques, even Kelly drilling is possible, said Liebherr. The BAT 300 rotary drive delivers a maximum torque of 300 kNm.

OPPOSITE IMAGE AND ABOVE: The new LR 1250.1 unplugged electric crawler crane has a maximum lifting capacity of 250 t. It is emission-free and delivers a low noise level.

BELOW: The new LRB 23 piling and drilling rig provides an engine output of 600 kW, making it suitable for common deep foundation works.





LEFT AND RIGHT: The new HS 8070.1 duty-cycle crawler crane offers a lifting capacity of 70 t and can perform a number of applications, including material handling, deep foundation or lifting operations.

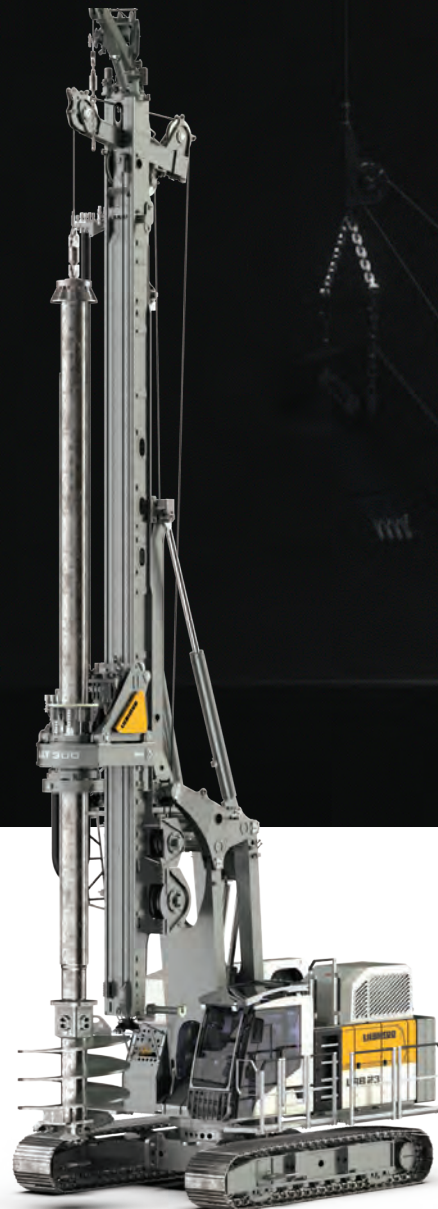
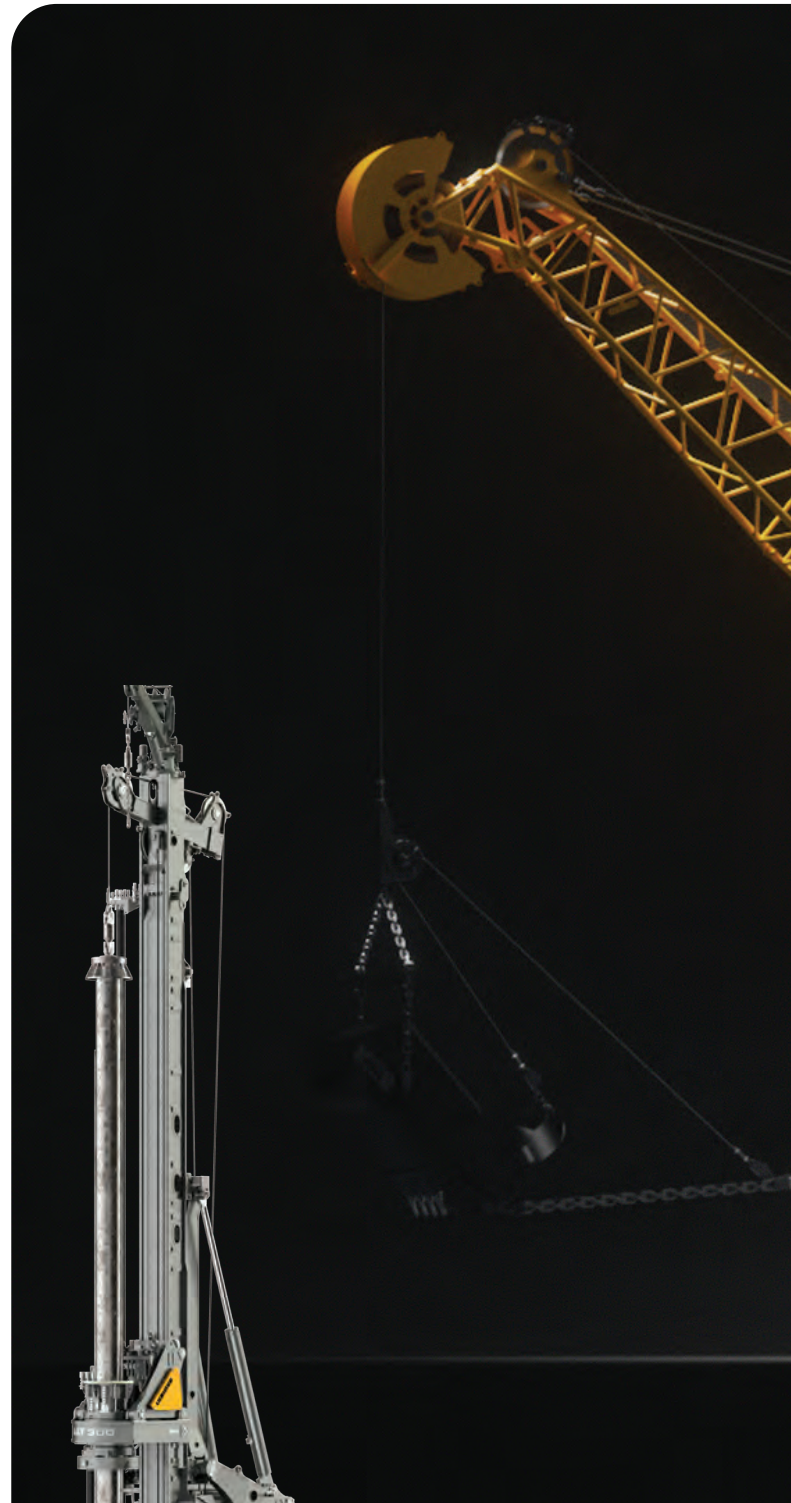
Locking of the Kelly bar's telescopic sections is made easier with the aid of the Kelly visualisation system. Thanks to the real time display of the Kelly bar's locking recesses on the cabin monitor, the operator is permanently informed about the actual distance to the next locking recess. Colour indications inform when the bar can be locked. Furthermore, false positioning of the Kelly bar during the shake-off process is indicated through a warning signal.

During continuous flight auger drilling the concreting process is automated, thanks to the drilling assistant. All assistance systems contribute towards time savings, higher availability of the machine, and a significant increase in safety during operation.

HS 8070.1 duty-cycle crawler crane

Liebherr has also revealed its latest generation of duty-cycle crawler cranes, the HS 8070.1. The machine offers a lifting capacity of 70 t and can perform a number of applications: material handling, deep foundation or lifting operations.

Using a new self-loading system (jack-up system) the crawlers can be easily disassembled for transportation, thus reducing the



The LRB 23 rig features a compact design, allowing the machine to be transported in one piece. This results in easy mobilisation between jobsites.



transport weight to less than 35 t. The platforms and railings must no longer be removed before transporting, said Liebherr.

Instead of a single counterweight, the HS 8070.1 now features a modular system. The crane can be individually equipped depending on the application. Plus, the boom of the HS 8070.1 is compatible with the HS 8100.1, so customers can use attachments such as the HSG 5-18 slurry wall grab on both machines and install thicker slurry walls with a more compact machine.

As opposed to the fixed system, the new floating A-frame system ensures higher performance in dynamic applications, according to Liebherr. It also simplifies and speeds up the assembly

and transportation of the machine. The user-friendly design extends to the tank neck, which is easily accessible via a platform on the uppercarriage.

All of these new machines from Liebherr are targeted at the global market. Their cab has been designed for operator comfort, featuring reduced noise and panoramic view. It is also fitted with a modern air-conditioning system with improved airflow, an optimised field of vision and an orthopaedic operator's seat with integrated heating and cooling. Additional safety is provided by the stone protection, even in the toughest of applications. ■

Website: www.liebherr.com



SHAOXING URBAN RAIL TRANSIT LINE 1

Construction of the Urban Rail Transit Line 1 in the city of Shaoxing, China, is under way. It is deemed the largest infrastructure project in the city's history and is of great significance due to its part in linking the cities of Hangzhou and its Metro Line 5, with Shaoxing via the Hangzhou-Shaoxing Intercity Railway.

Shaoxing Rail Transit Group entrusted Powerchina Huadong Engineering Corporation Limited (HDEC) to digitally engineer the entire Line 1 - including project management, overall consultation, survey, design, construction, and handover to operations and maintenance - at approximately CNY 24 billion.

To carry out the job, HDEC required software that would help streamline this complex project. Work on the 34.1-km line is mainly underground and includes 24 stations, 25 sections, one depot, a parking lot, two main substations, and a control centre. Construction commenced in 2017 and is expected to take 54 months to complete, with operations estimated to start in 2022.

Challenges

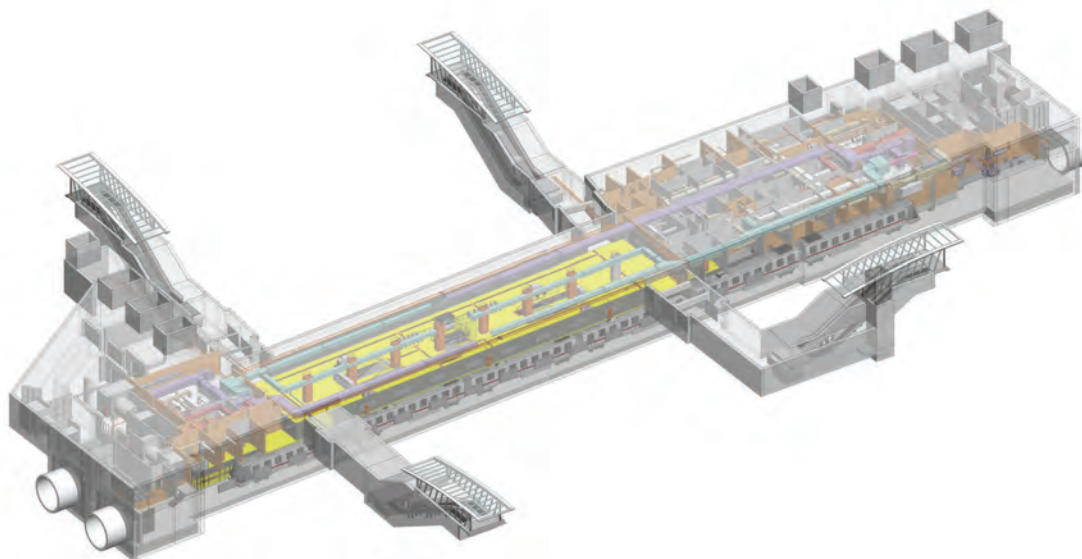
HDEC needed to overcome the issues of limited underground space and complex environmental conditions, numerous

technical interfaces between the multiple disciplines involved during design and construction, and governmental cooperation between departments and units from the cities of Hangzhou and Shaoxing.

Complex hydrogeological conditions along the line's corridor were a problem as well, where soft soil is relatively thick. This means that HDEC had to pay particular attention to the safety of foundation pits, long-term settlement, and water leakage during design and construction.

HDEC also needed software to help overcome significant project planning and traffic organisation challenges. The existing infrastructure conditions were complex because the railway passes through Shaoxing's old town, featuring narrow roads with large traffic flows, river courses, 26 bridges, two railways, and cultural and historical protection zones.

Due to Shaoxing Rail Transit Line 1's dual-function of serving commuter passengers within the city and connecting with the city of Hangzhou via the Hangzhou-Shaoxing intercity line, technology standards and interface protocols - such as vehicle selection, operation organisation, power supply division, communication networks, and signal systems - needed to cover the entire line.



OPPOSITE IMAGE: The digital twin of Shaoxing Urban Rail Transit Line 1 showing station box and underground utilities built with MicroStation, ContextCapture, and OpenRail Designer from Bentley Systems.

LEFT: The digital twin of an underground station on the project. Work on the 34.1-km line is mainly underground and includes 24 stations, 25 sections, one depot, a parking lot, two main substations, and a control centre.

Digital workflows

With tight deadlines and a high level of complexity on the project, HDEC realised that it was critical to consider ways of improving both the efficiency and quality of design, construction, commissioning, and handover of the rail line to operations. HDEC knew that its previous, traditional IT consulting processes would not be enough. Thus, the company decided to adopt advanced digital workflows and a digital twins approach, applying Bentley's open and collaborative design applications plus iTwin technology on the project.

At the outset, HDEC leveraged aerial photography within ContextCapture to create a 3D reality mesh that truly reflected the existing conditions of the city's landscape, architecture, and road network.

HDEC developed its own 3D geology software called GeoStation based on Bentley technology, using it along with the subsurface utility engineering functionality within OpenRoads to create an integrated BIM model of the railway's route. The company was able to leverage the insight that it gained for many tasks, including the complex design and engineering of subway crossings, as well as modelling of existing sub-surface pipelines.

Where the railway line passes through or is adjacent to key buildings and structures, HDEC used Bentley's iModel technology to integrate BIM models created by each of the many different disciplines involved, often including data generated by other non-Bentley software.

During construction, Bentley's iTwin technology enabled HDEC to consume dynamic and static data in its digital construction management platform. Allowing each participating unit to contribute to and collaborate on a unified 3D view meant that HDEC could improve many construction management activities, including component-level project schedule management, quality management, safety management, and cost management.

"To improve the information and digital management for this project, we deployed Bentley's 3D design, engineering, and collaboration platform," explained Yexing Zhang, executive general manager of Zhejiang Huadong Engineering Digital Technology Co Ltd, Powerchina Huadong Engineering Corporation Limited.

"This innovative approach, which included the use of Bentley's open applications, a connected data environment, and iTwin technology, meant that we had greater control of all elements within the project, and is helping ensure that our high-quality design transfers to a greater standard of construction and will ultimately result in improved levels of operation upon the railway's completion."

Shorter cycle and cost-saving

Integrating survey, geology, and pipeline models, along with the 3D design of the railway planning models, reduced more than 800 hours of field data collection time in the areas of site survey, and geological and pipeline exploration, saving an investment of over CNY 3 million in resource hours.

The ability to manage urban spatial data and planning data of the subway's surroundings in a single unified environment helped HDEC complete route exploration, station location, and civil construction planning in ways that reduced the impact of subway construction on the citizens of Shaoxing.

Combining BIM data with automated monitoring technology means the impact of construction on the surrounding environment can be analysed in real time. To date, the team has dealt with over 100 abnormal data events that previously could have negatively impacted construction or the cultural heritage of the city.

The use of digital workflows during the design phase has resulted in the removal of many traditional processes altogether, enabling design productivity across disciplines to increase by a factor of two, as well as design review efficiency by a factor of three.

Adopting digital workflows during drawing production, HDEC eliminated many low-level problems, and produced higher quality deliverables, and shortened the entire cycle by 20%, resulting in a saving of CNY 10 million.

By implementing real-time analysis, processing of data from multiple sources - including BIM, GIS, big data, and the Internet of Things (IoT) - and leveraging cloud computing, artificial intelligence (AI) augmented and virtual reality (AR and VR) in a connected data environment, HDEC is realising the full value and potential of its data to support improved decision-making across its business.

Moreover, with the seamless transfer of digital assets throughout the entire process, HDEC is laying solid foundation for a digital twin of the railway to be used in the later stages of project delivery, and onward into operations and maintenance. ■

Website: www.bentley.com

Note: For this project, HDEC received the Year in Infrastructure (YII) 2020 Award in the Rail and Transit category.

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TOWERING ABOVE HONG KONG





The new residential development currently under construction in the Ma On Shan area, located in northeast Hong Kong, will feature five towers ranging from 37 to 40 storeys. The project is managed by the Hong Kong Housing Department, with Sun Fook Kong as the main contractor.



'Impressive lifting performance'

Tower crane specialist NFT is using five Potain cranes to construct this public housing. The fleet includes two MCT 565 and three MCT 385 models, all from the advanced range of Potain topless cranes built in Zhangjiagang, China.

"We selected the MCT 565 and MCT 385 cranes for the project because the cranes offer impressive lifting performance on site, combined with easier transport and assembly on site," said Nawar Al Zahlawi, business development manager at NFT Group.

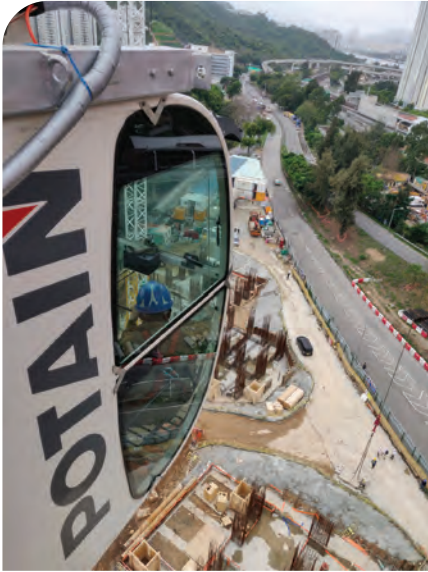
The MCT 565 cranes are the latest additions to NFT's fleet in Hong Kong and for this project, they are configured with 45 m of their 80 m jib. This gives the units a tip capacity of 13 t and the ability to lift 25 t at 25.5 m.

The MCT 385 cranes are working with 35 m jibs out of their total of 75 m. In this configuration they can lift 10 t at a 35 m radius. The Potain MCT 385 features a maximum capacity of 20 t and a maximum freestanding height of 64.9 m.

The five topless cranes arrived on site between March and May of 2020. They are



TOP AND ABOVE: The new residential development is being built with the help of Potain tower cranes. Managed by the Hong Kong Housing Department, the project will have five towers ranging from 37 to 40 storeys upon completion.



ABOVE AND RIGHT: The tower cranes are used to lift steel bars, precast concrete and decoration materials for the building's facade.



expected to stay on the project until 2022, lifting steel bars, precast concrete and decoration materials for the building's facade.

The MCT 565 offers a load moment of 550 tm and jib length configurations from 30 m to 80 m in 5 m increments. At its 80 m jib end, it can handle an impressive 4 t. Despite its increased size, the model stays true to the design characteristics of Potain topless cranes, with easy transport and erection combining with excellent on-site performance.

The upper section of the Potain MCT 565, with its full 80 m jib, travels on just nine trucks thanks to innovative, space-saving design features such as a folding cab on the slewing unit and a folding counter jib. At the jobsite, set up can be finished inside two days. Users have the option to split the slewing unit, counter jib and jib into different sizes depending on available space as well as capacity of the assist crane.

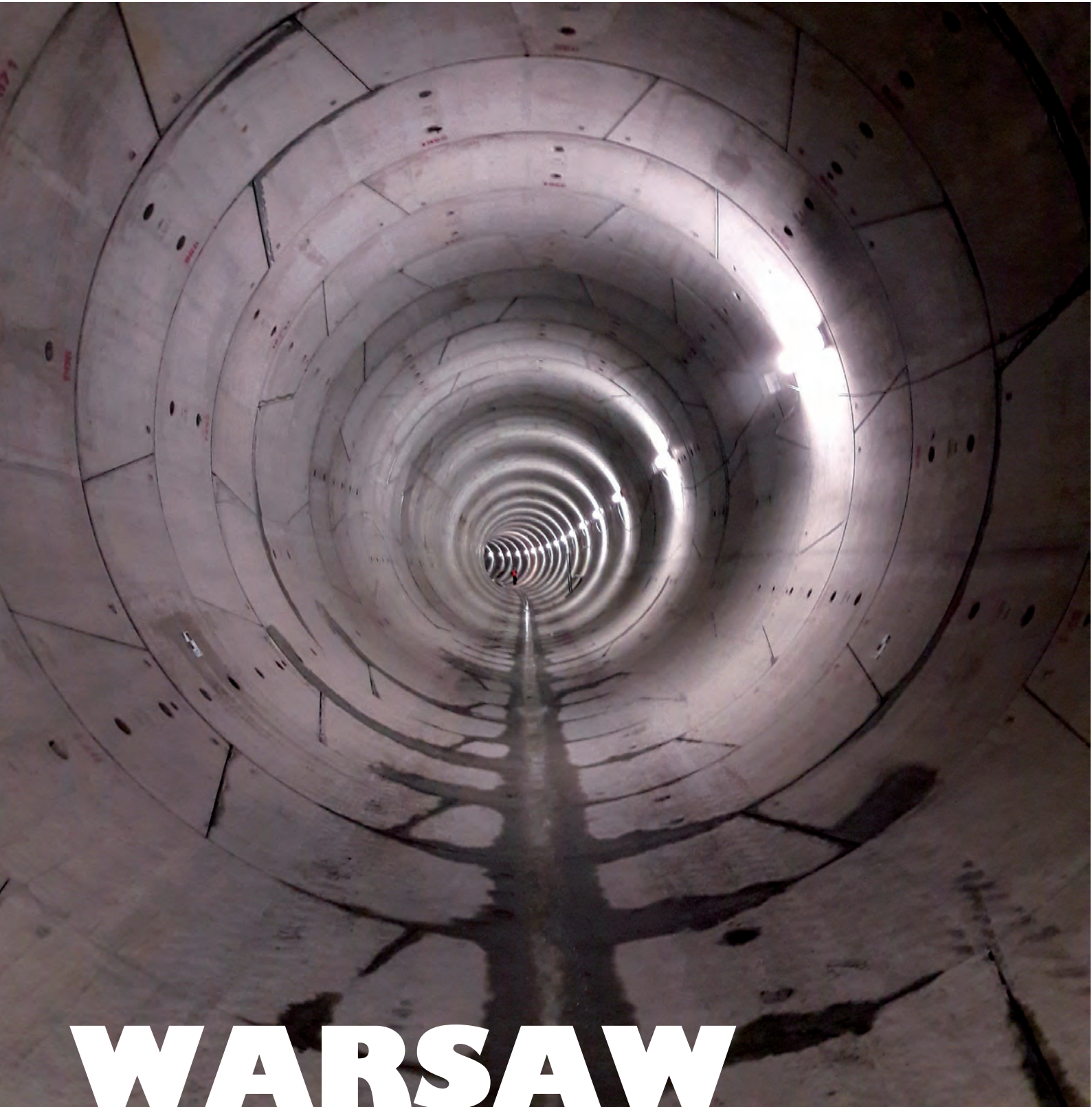
"We are seeing topless cranes grow in popularity for jobsites using heavier construction materials. Many contractors prefer cranes like the MCT 565, which is the largest topless crane from Potain's Asia Range," said Darren Tan, Manitowoc's regional sales manager for tower cranes, APAC. ■

Website: www.manitowoc.com



ABOVE: The five tower cranes arrived on site between March and May of 2020, and they are expected to stay until 2022.

ABOVE LEFT: A Grove all-terrain crane is also seen here on the jobsite.



WARSAW METRO LINE 2

The extension of Warsaw Metro Line 2, currently ongoing, is a further step in the development of the public transport system in the capital of Poland. The line is intended to become the main connection that links downtown and the northeast areas of the city, shortening the distance between the residential districts and the city centre.

The construction works carried out in 2017-2019 included the completion of three stations and 2.2 km tunnels in natural excavation for each tube. The excavation involved the use of two earth pressure balance tunnel boring machines (EPB TBMs). The section between C18 Trocka station and C15 Dworzec Wilenski station runs along a curved path with shallow overburden under the Targówek and the Praga District, with buildings that survived the Second World War.

The critical stretch for the excavation was the last part, the section from C16 Szwedzka station and the dismantling chamber, which was temporarily created in the holding track of C15 station. From this station, two tubes run under the historical area - the right one under Strzelecka street and the left one running for roughly 500 m under a row of ancient buildings, featuring a different elevation and 2.5 m basement deep. The overburden

between the top of TBM excavation and the lower level of the basement ranged from 7 to 10 m, in clean sandy soil, under water table.

Geological conditions and design approach

Along the whole route, the soil to be excavated and the soil above the tunnels were mainly granular. They belonged to the Quaternary period and were of sedimentary origin. The water table is 3 m deep from the ground level. Only the bottom part of the excavated front was silty and made of clay. Several buildings, in the area along the Strzelecka street, are in a critical structural condition and consequently more subject to possible damage.

The local authorities in charge of the design were proposed a 'classic' solution using the sub-horizontal drilling method, which would be performed from the ground

level under the foundation of the buildings in order to install sleeved grouting pipes for subsequent grouting. The difficulties in obtaining the working areas, as well as the issues and the time required to get the permits for temporary occupation of private properties and traffic routes, were not compatible with the general planning of the construction works.



OPPOSITE IMAGE AND ABOVE: The construction works carried out in 2017-2019 on Line 2 included the completion of 2.2 km tunnels.



Line 2 runs under several areas with ancient buildings that date back to pre-war times.

As a result, the decision was to limit soil improvement to five ancient buildings with a very fragile structure and in difficult conditions. This solution minimised the impact of the works on the urban area, reducing the risk of damage to the buildings located along the alignment of the tunnels. The final decision, also due to budget and management choices, was to limit soil improvement to the area located under the foundation of five buildings, and try to make an accurate excavation by EPB TBM closed mode, with some solutions and procedures devised with the help of Mapei systems.

Minimising surface settlements

Due to the peculiarity of the buildings above the tunnel alignment, the operation in closed mode and the accurate control of the earth pressure were key parameters to be kept under strict observation to minimise the surface settlements. Another fundamental aspect to be accurately controlled to minimise the loss of volume, and therefore, the settlement on the surface, was the annular gap backfilling injection.

The volume and pressure control of the injection had to be carefully managed. The injected volume had to reach at least the theoretical value, with pressures of about 0.5 bars exceeding the earth pressure applied to the tunnel face. The soil, properly conditioned to achieve an excellent TBM performance and a proper pressure transmission to the tunnel face, showed a too liquid behaviour on the TBM belt, due to the lack of finer fraction and the saturated conditions of the sandy soil.

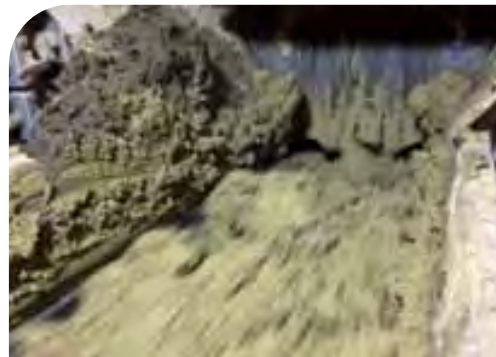
Beyond the logistic problems related to the muck management from the tunnel belt up to the truck transportation, a too liquid behaviour might have caused difficulties in the earth pressure control. In fact, a too liquid muck, in the presence of pressure in the excavation chamber, may flow along the screw conveyor by extrusion, pushed by the earth pressure.

The liquid consistency of the muck caused difficulties in the pressure management, and therefore in the minimisation of the surface settlement. The solution adopted was the injection of Mapedrill M1 (a soil conditioning polymer with water absorption and lubricating properties) in the excavation chamber.

The use of about 0.3 – 0.4 kg of Mapedrill M1 per cubic meter of soil, brought to an effective control of the soil consistency. By observing the TBM data during the use of the polymer, any



The excavation of the tunnels involved the use of two EPB TBM machines.



The muck can be seen here, before the injection of Mapedrill M1 (left) and after the injection of Mapedrill M1 (right).

uncontrolled fluctuation of earth pressure was visible. Although the muck was drier than before, the cutterhead torque and the TBM performances remained the same.

The injection of Mapedrill M1 and its fast reaction time allowed the treatment of the soil close to the screw conveyor inlet, without affecting the consistency of the conditioned soil close to the cutter head.

Improving backfilling grout injection

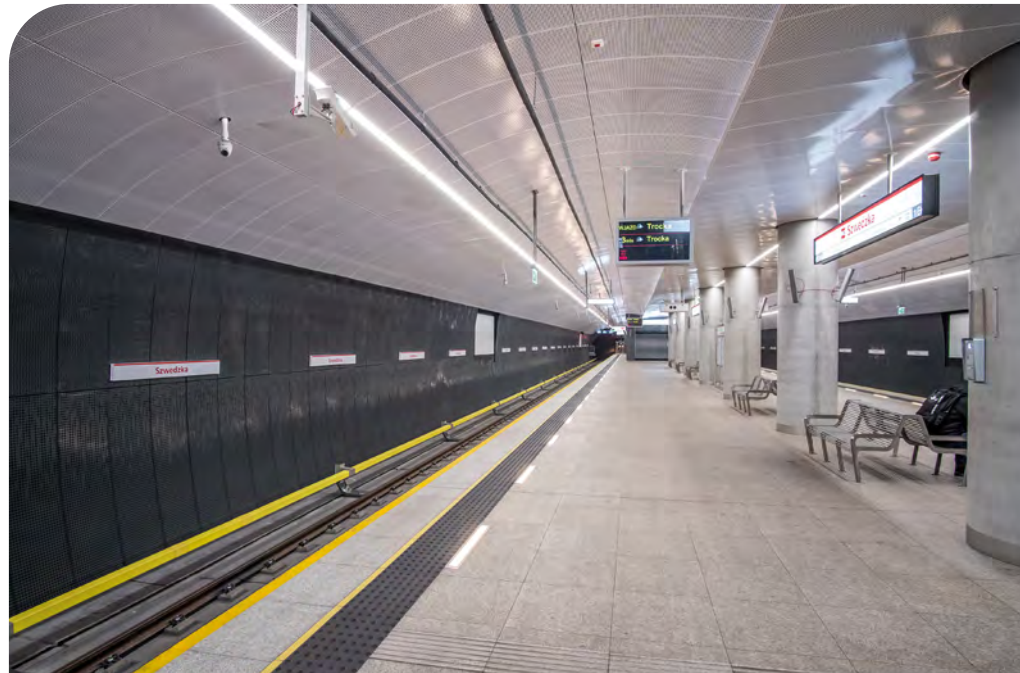
Due to the non-cohesive nature of the soil, every step of the excavation foreseeing an unsupported situation had to be reduced to a minimum. For this reason, the standard mix design of the A component of the two-component backfill grout, studied in the Mapei R&D laboratory during the site preparation, was modified. The proportions between the two components



were also modified in order to reduce the gel time. To achieve this without affecting the performance of the grout, cement was increased on the A component mix, together with a slight increase of Mapequick CBS System 1, an admixture used to ensure the A component a workability of three days. The proportion between Mapequick CBS System 3 (accelerator) and the A component was reduced.

Such modifications resulted in a reduction of about 2 seconds of the gel time and to a higher viscosity of the backfilling grout. The modified mix design was studied and tested by Mapei experts at the mixing plant prior to its actual production, to evaluate the most suitable mix design for the specific situation.

The injection parameters were modified as well, in order to minimise the possible fall of soil in the void and to compensate the loss of injected volume due to possible permeation of the grout in the sandy soil. The injection pressure was increased up to almost 1 bar exceeding the earth pressure. The total injected volume per ring was also increased, in order to keep the pressure level required to minimise the settlement.



The Szwedzka station after completion of the works.

TBM excavation performances

With the application of these measures and products during excavation works, earth pressure was kept regularly on the right range. It was checked that the volume of excavated ground never exceeded the theoretical values, which made it possible to avoid settlement around the area of the cutter head. On the other hand, the volume of grout filled in the gap behind the lining at the tail skin was always higher than the designed value.

The first of two underground routes began to be excavated in October 2017 with TBM S644, which drilled the left tunnel towards the C15 station and successfully completed the critical passage in December 2017. Then, following alignment under Strzelecka street, TBM S760 passed the same route between October 2017 and January 2018. Both underground passages, about 1,150 m in length, which included the 550 m stretch under ancient buildings and Strzelecka street with shallow overburden, were achieved with average daily advances of 18.75 m and 18.5 m respectively, featuring peaks of 33 m per day. The recorded volume loss was less than 0.30% instead of 0.44 % and the total settlement under the urban areas was lower than 1 cm.

Following a customary procedure for this kind of underground projects in urban areas, a monitoring system was installed to check settlements and deformation during the performance of the TBMs. The

system was able to continuously register data, providing automatic and manual measurements. The behaviour of the buildings was analysed during the passage of the two TBMs and proved to be similar. The settlement occurred in a similar way, both in terms of kinematics and values. The measurements underlined the success of the EPB technology in urban areas under sensitive buildings. The careful attention paid to the excavation parameters, such as earth pressure, muck extraction control, backfilling injection pressure and volume, played a crucial role in the minimisation of the settlements.

Good practice, together with the use of a specific soil conditioning product such as Mapedrill M1, as well as the adjustment of the mix design and injection procedure of the backfilling grout, combined with advanced skills of the TBM crew and careful supervision, made it possible to meet the admissible settlements limits, without the use of an extensive grouting campaign below the buildings. In addition, the synergy between contractors and suppliers was crucial to ensure the sharing of know-how with the common target of a safe and effective TBM excavation, while guaranteeing the expected results and excellent production rates. ■

Website: www.mapei.com.sg

The article courtesy of *Realta Mapei International* no. 82



GARDINER EXPRESSWAY

Frederick G. Gardiner Expressway is an 18 km east-west expressway running alongside Lake Ontario in Toronto, Canada. The Strategic Rehabilitation Plan by the City of Toronto aims to revitalise this 62-year-old expressway in multiple phases. The contractor for the first phase of the project is using bridge building methods - like prefabrication - to accelerate the construction process and lessen noise and environmental impact.

Lifting solution

Two 145-mt Link-Belt RTC-80160 Series II rough terrain cranes are being used to lift and remove existing steel and concrete expressway deck sections, and then replace them with new fabricated deck panels. The new concrete deck panels lifted in tandem weigh around 50-110 t and span 20-42 m.

Phase 1 includes complete replacement of steel girders and concrete for existing on-ramps and road decking between Lower Jarvis and Cherry Streets. Poured-in-place deck panels are built on-site east of Cherry Street in quality and climate controlled canopies. Approximately 400 sections



TOP: The Strategic Rehabilitation Plan by the City of Toronto will revitalise the 62-year-old expressway in multiple phases.

ABOVE: Initial construction of Phase 1 includes westbound lanes and ramps, requiring two open lanes in each direction for commuter traffic.



The contractor for the first phase of the project is using bridge building methods - like prefabrication - to accelerate the construction process and lessen noise and environmental impact.



of deck panel will be constructed and lifted into place, and the Link-Belt rough terrain cranes are part of the fleet performing the rehabilitation.

“We chose the RTC-80160s because of their agility and ability to turn under a small footprint. They are very easy to manoeuvre into place and are easy to setup. I also like where they put the counterweights. It’s very compact,” said a site superintendent on the project.

Initial construction of Phase 1 includes westbound lanes and ramps, requiring two open lanes in each direction for commuter traffic. Crews will primarily work on a 24/7 basis to accelerate the project and reduce the length of construction. In roughly eight months, the contractor has logged 1,200 hours on both RTC-80160 Series II.

“The cranes have handled the transitions and elevation changes very well. They are sturdy, and the sight lines are exceptional for early morning and overnight work,” said the crane operator. ■

Website: www.linkbelt.com

LEFT: Two Link-Belt RTC-80160 Series II rough terrain cranes lift and remove existing steel and concrete expressway deck sections, and then replace them with new fabricated deck panels.

BELOW: The RTC-80160 cranes are agile and have the ability to turn under a small footprint.



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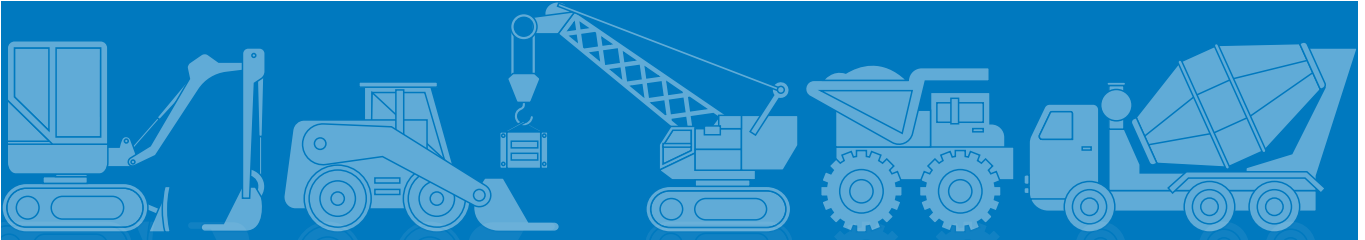
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