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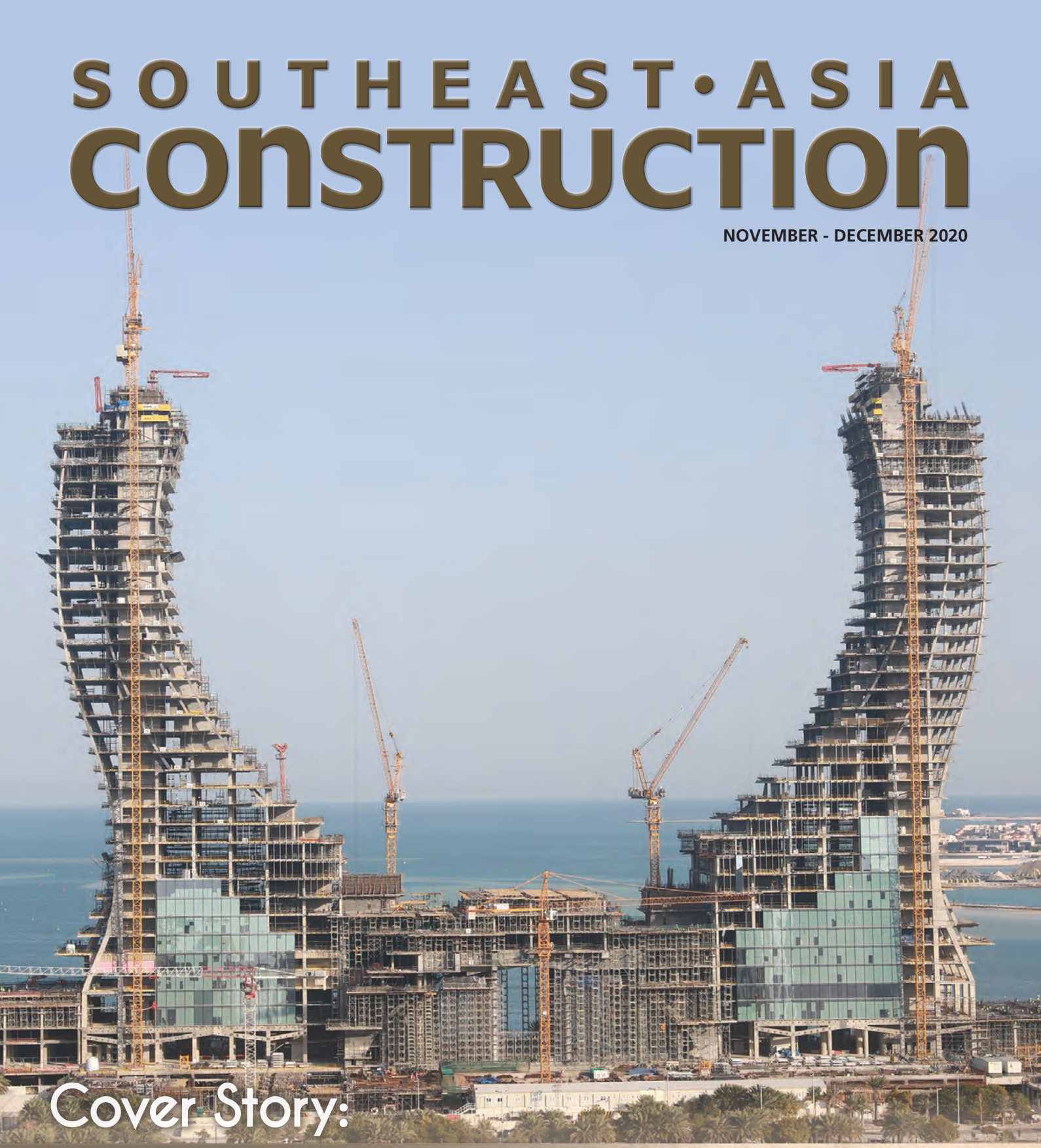
NOVEMBER - DECEMBER 2020



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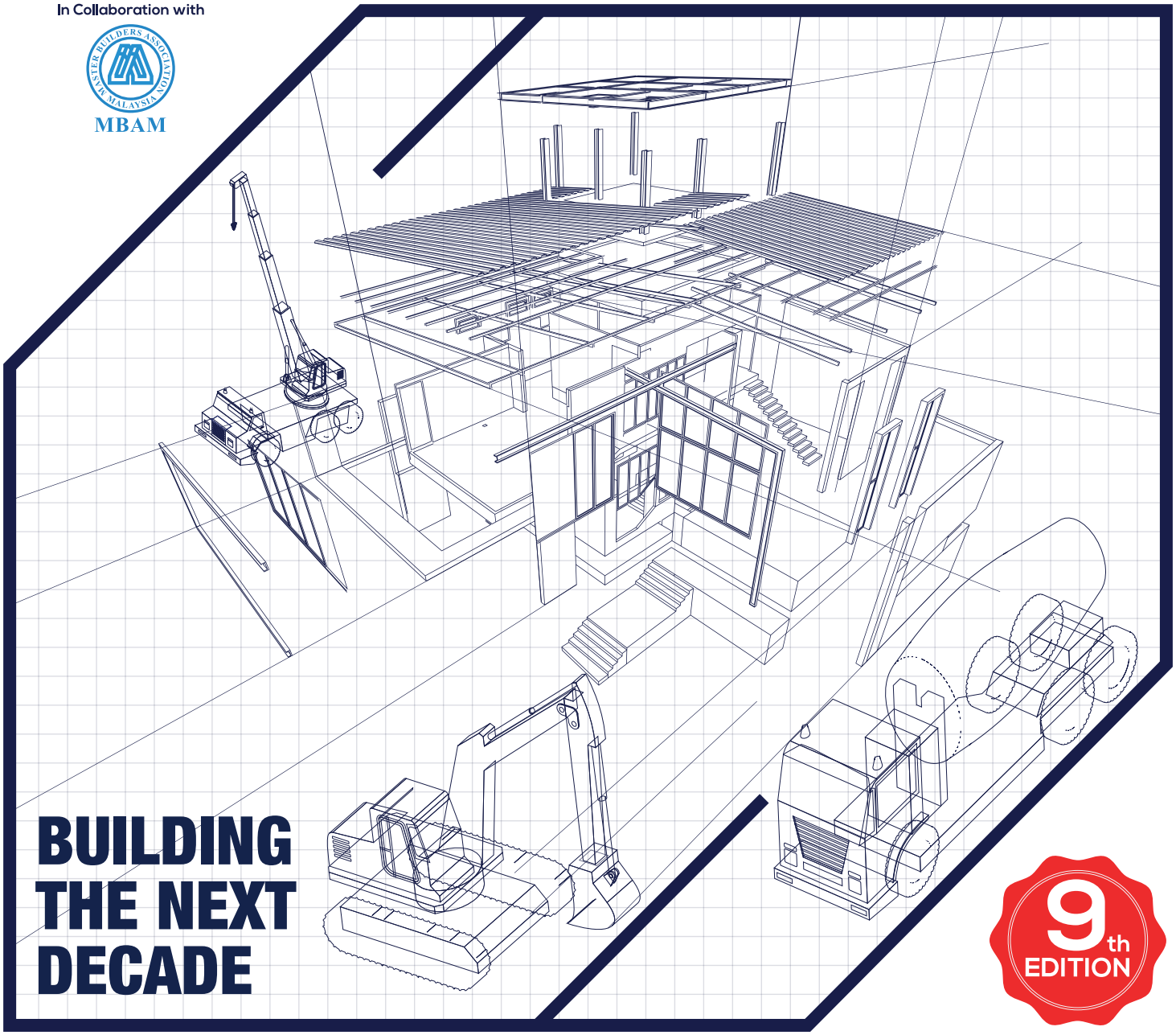

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Cover designed by
Fawzeeah Yamin

Publisher
Steven Ooi (steven.ooi@tradelinkmedia.com.sg)

Associate Publisher
Eric Ooi (eric.ooi@tradelinkmedia.com.sg)

Editor
Fabia Sugandy (seac@tradelinkmedia.com.sg)

Marketing Manager
Felix Ooi (felix.ooi@tradelinkmedia.com.sg)

Head of Graphics Department/ Advertisement Coordinator
Fawzeeah Yamin (fawzeeah@tradelinkmedia.com.sg)

Circulation
Yvonne Ooi (yvonne.ooi@tradelinkmedia.com.sg)

Any other matters : info@tradelinkmedia.com.sg
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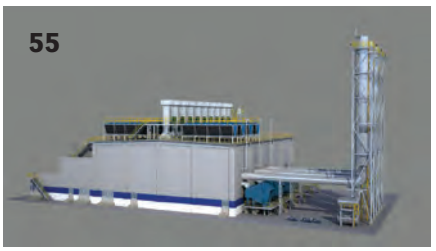

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Sinar Mas and Mitbana partner for TOP projects in Indonesia

Sinarmas Land Limited, through its subsidiary PT Bumi Serpong Damai Tbk (Sinar Mas Land), has established a partnership with Mitbana Pte Ltd, a joint venture fund management company of Mitsubishi Corporation and Surbana Jurong, to advance the creation of smart and sustainable transit-oriented developments (TODs) in Bumi Serpong Damai (BSD) City, Greater Jakarta, Indonesia. Established in March 2019, Mitbana is a Singapore-headquartered urban development fund focusing on TOD and township projects in ASEAN and South Asia.

Through this partnership, Sinar Mas Land and Mitbana said they seek to develop first-of-its-kind integrated TODs in Indonesia with new approaches to urban development in a post-pandemic connected world. Leveraging the experience and expertise of Mitsubishi Corporation and Surbana Jurong, Mitbana aims to accelerate such developments with the support of institutional capital from third parties. These projects are also expected to support the Indonesian government's focus on infrastructure development in Jakarta, which would lead to better connectivity for commuters and residents.

BSD City is Sinar Mas Land's flagship town development encompassing a total land area of approximately 6,000 ha. Developed since the mid 1980s, it is a thriving district with businesses, schools, shopping malls, hospitals, hotels and convention centres. BSD City is currently home to the Apple Developer Academy, co-run by Apple and a local Indonesian university, as well as an innovation and engineering lab run by Singapore-based ride hailing company Grab.

© Sinar Mas Land/Mitbana

An artist's impression of the TODs that will be jointly developed by Sinar Mas Land and Mitbana.

According to Sinar Mas Land and Mitbana, they will work together to transform over 100 ha of greenfield land in BSD City into TODs comprising residential units, commercial properties, living amenities and public transport nodes. This undertaking will enlarge BSD City's existing development footprint and expand on its current population of 200,000 residents. Gareth Wong, CEO of Mitbana said the projects will be developed over several phases, with more details to be unveiled later. ■

The Philippines' Malolos-Clark Railway Project expected to start soon

Construction of the Malolos–Clark Railway Project, a flagship Philippine project funded by the Asian Development Bank (ADB), is expected to begin soon, following the signing of three civil works contracts worth more than US$1.7 billion.

The latest signing ceremony on 8 October 2020 was hosted by the Philippines' Department of Transportation (DOTr), which has so far awarded five civil works contracts for the project totalling US$2.5 billion.

"This project is, by far, the ADB's largest ever financing package for a single project, and is the single largest 'Build, Build, Build' project to date in the history of the Duterte administration," said Arthur Tugade, secretary of DOTr. "Be assured that we are focused on our goal to make the Filipino life comfortable, the Filipino life convenient."

"The signing of these contracts means the Malolos–Clark Railway Project construction will now go on full speed, helping the country's economic revival over the next 12–24 months," said Ramesh Subramaniam, ADB director general for Southeast Asia. "When completed by 2025 based on current plans, we expect the project to benefit nearly 350,000 commuters daily. We are proud to work with the Philippine government, development partners, and the private sector to deliver this important flagship infrastructure project using modern technology for the country."

The Malolos–Clark Railway Project will cut the travel time between Clark in northern Pampanga province and Manila from two to three hours by bus to one hour by train, with a maximum rail speed of up to 160 km/hr. It is also aimed to reduce greenhouse gas emissions by more than 60,000 t/yr and boost economic activity in regional growth centres like Clark.

The project is expected to create about 24,000 local construction jobs in the next three years. Once completed, the railway system will employ 1,400 people. The project will also spur larger, indirect employment and economic benefits to local businesses and raw material suppliers and manufacturers.

One of the three contracts - covering the construction of about 17 km of elevated rail viaduct, seven bridges, and two railway stations - was awarded to the joint venture of Hyundai Engineering & Construction Co Ltd and Dong-ah Geological Engineering Company Ltd, both based in South Korea, and the Philippines' Megawide Construction Corporation.

Spain's Acciona Construction Philippines and Daelim Industrial Co Ltd won the second contract, covering the building and civil engineering works for about 16 km of viaducts and one railway station. The third contract, for the building and civil engineering works for 12 km of viaducts and two railway stations, was awarded to Italian–Thai Development Public Company Limited.

The other two contracts were already awarded in August 2020 to a joint venture of Acciona Construction Philippines and EEI Corporation, and South Korea's POSCO Engineering and Construction Co Ltd. A sixth contract for the construction of the Blumentritt station of the railway line will undergo rebidding.

The project is co-financed by the Japan International Cooperation Agency, which will provide up to US$2 billion in additional funding for the rolling stock and railway systems. ■

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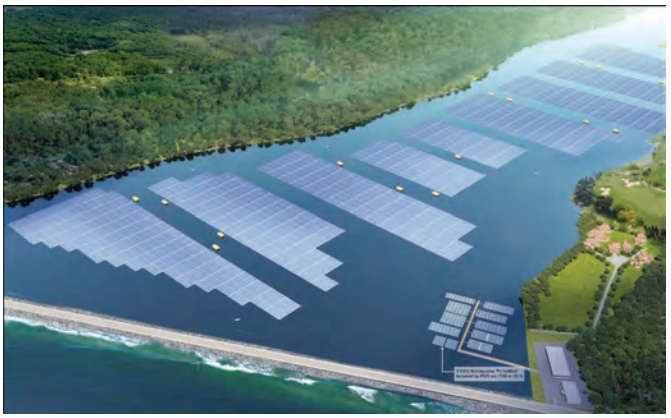
Construction of Singapore floating solar farm begins

Singapore has commenced the construction of its 60 megawatt-peak (MWp) floating solar photovoltaic (PV) system on Tengeh Reservoir, announced the national water agency PUB and Sembcorp Floating Solar Singapore, a wholly-owned subsidiary of Sembcorp Industries. This marks a significant milestone in building one of the world's largest inland floating solar PV systems, which not only helps to reduce dependency on fossil fuels and thus carbon emissions, but also builds national climate resilience for a more sustainable future.

Solar energy is Singapore's most viable renewable energy source, but large-scale deployment of solar panels is known to be challenging due to the country's dense urban landscape and limited land. Beyond rooftops and vertical spaces, PUB's large expanse of water bodies and reservoirs can now serve the dual purpose of water catchment and electricity generation. This follows positive trial outcomes and extensive environmental studies, which show that floating solar panels have minimal impact on the reservoir's water quality and biodiversity.

The large-scale floating solar PV system at Tengeh Reservoir – deemed the first of its kind in the region – will enable Singapore to be one of the few countries in the world to integrate green technology with water treatment. When the project begins its full commercial operations next year, the amount of clean energy generated is expected to be sufficient to power PUB's local water treatment plants, offsetting 7% of PUB's annual energy needs.

PUB and Sembcorp said the project will incorporate new innovations in floating solar PV design and construction. Every component of the system was carefully designed and selected based on Singapore's climate conditions in order to maximise energy generation, minimise environmental and water quality impact, and be durable enough to fulfil a service lifespan of 25 years.



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An artist's impression of the floating solar farm on Tengeh Reservoir.

Among these innovations include double-glass PV modules instead of the single-glass variant commonly used for rooftops installations, to enhance durability in a wet and humid environment. The PV modules are supported by certified food-grade quality high density polyethylene (HDPE) floats, which are UV-resistant to prevent degradation from the intense sunlight exposure.

To optimise performance and reliability of operations, the system is backed by a digital monitoring platform that features safety cameras, 'live' video monitoring, dashboards and alerts that help to track environmental factors such as wind speed, solar irradiation and ambient temperature. The system also detects abnormalities that may indicate potential overheating and fire hazard for pre-emptive troubleshooting. Staff will be able to monitor the system remotely via a mobile application, which allows maintenance teams to be swiftly deployed when required. ■

SOM unveils design for new waterfront development in Zhuhai

Skidmore, Owings & Merrill (SOM) has been selected to design Jiuzhou Bay, a new 5.6 mil-sq-ft mixed-use waterfront development in Zhuhai, China, featuring offices, residences, retail, and infrastructure. The design aims to set a new standard for public transit in the region, with plans for a robust transportation hub that offers connections to land, sea, and rail across more than 40 acres. It also features five modular canopies that envelop three sides of a 1.8 mil-sq-ft port, weaving together a landscape of towers rising behind it and creating covered pedestrian alleyways, a lively retail environment, and interlinked courtyards along the waterfront promenade.

Complementing the site's maritime heritage is a 1,045-ft-tall tower that rises at the heart of the neighbourhood. It comprises 35 floors of office space, topped by a 20-storey Ritz-Carlton Hotel complete with a skybar and observation deck.

According to SOM, the new waterfront development would utilise Zhuhai's most abundant natural resources - the sea and sun - to reduce natural gas consumption, conserve water, and create a comfortable environment for residents and visitors. The canopies also increase interior comfort and building efficiency by filtering daylight, harvesting energy via photovoltaic panels, and capturing rainwater. ■

Both images © ATCHAIN

ABOVE AND LEFT:
When completed, the Jiuzhou Bay development will have offices, residences, retail, and infrastructure.

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Work starts on Kajima's first overseas innovation centre

Kajima has broken ground on its first overseas innovation centre, Kajima Global Hub in Singapore, which will serve as the company's Asia Pacific headquarters. It is slated to be completed by 2023. Located at the Changi Business Park, the new facility covers 13,088 sq m of business park space, R&D lab space and double volume construction lab space. It will consolidate all 400 staff across various business functions, such as construction, engineering, development, research, and design under one roof.

Kajima Technical Research Institute Singapore (KaTRIS) will conduct R&D and open innovation on advanced construction technologies, as well as testbed sustainable and wellness technologies. Besides researching and showcasing new construction technologies in robotics, digitalisation and automation, the building will incorporate data-driven environmental control technologies and energy-saving solutions for its occupants. This will accelerate the adoption of ready solutions in the market, and grow the industry in a sustainable manner.

In addition, the expansion of R&D activities under KaTRIS will increase the number of local research personnel. With new digital technologies and solutions in robotics, integrated digital delivery, building design, sustainability and resilience, Kajima Global Hub aims to create better jobs, attract local hires and reduce the environmental impact of new developments.

"I am delighted to see that our plan has started to take shape in the development of our new Asia Pacific headquarters building, which further expands our research and technology function in Singapore," said Yoshikazu Oshimi, president of Kajima Corporation. "By promoting open innovations with renowned institutions in the region, both public and private, we strive to build our solid foundation, not only to deliver the best services and solutions to our clients, but to plant seeds and incubate new businesses for future generation. I would like to express my sincere gratitude to the Singapore Economic Development Board and JTC for their unparalleled support to make this epoch-making plan come true."

Kajima and JTC strengthen partnership

Kajima and JTC Corporation have also reaffirmed their partnership to bolster built capabilities and drive R&D efforts across the building value chain, from design and construction to operations and maintenance. This includes research and testbed of innovative solutions in robotics, integrated digital delivery, energy optimisation, sustainability, building design to improve occupant wellness, and facilities management. As part of JTC's Industry Connect initiative to connect companies with its partners to identify and solve common challenges, JTC introduced Kajima to several partners to testbed construction solutions.

Both organisations signed a Memorandum of Understanding last year to share expertise and collaborate on R&D in areas such as digital technologies and automated solutions to improve productivity and maintenance capabilities. Shared resources such as equipment, lab facilities, and manpower will also help defray the high cost of R&D.

Among the joint initiatives are research on the building information modelling (BIM) system to digitalise the building operations in facility management to optimise productivity. On the innovation front, Kajima and JTC will be jointly developing the concrete finishing robot with Nanyang Technological University (NTU) and a local SME, Mega Plus Technology Pte Ltd, to automate the construction process. By early next year, the robot can reduce manpower and labour cost by 50%, on top of improving quality and safety.

JTC also introduced Kajima to an NTU start-up, Transforma Robotics, to deploy its painting and inspection robots that were jointly developed with JTC, to work alongside Kajima's construction robots. The construction of the Kajima Global Hub project will be the first known application of a comprehensive suite of robotics solutions by Kajima outside Japan. The technologies can be deployed and scaled up at JTC's industrial estates and buildings once ready.

Furthermore, Kajima has been working closely with National University of Singapore (NUS) on 'well and green' building design concepts. This is an expansion from its prior contribution to 'the SDE 4 new-build net-zero energy building project' for NUS.

Another partner of Kajima is the Singapore University of Technology and Design (SUTD), collaborating on the adaptation of advanced technologies such as drones for the construction industry. These solutions, when ready, can be scaled up for future use at other industrial buildings and support the built environment sector.

Kajima also teamed up with Nanyang Centre for Underground Space (NCUS) at NTU on rock support modelling. This technology will contribute to the effective and sustainable use of underground space in the near future for Singapore. ■

New luxury resorts and residences for Thailand

Thailand-based investment company, Aquarius International Development (AQI), is developing Aquarius Residences & Resort in Koh Chang, an exclusive cliff top eco-sensitive retreat, and AQ Privilege Beach Club & Residences in Koh Man Nai, a private island located on Koh Chang's west coast.

Currently under construction on the southern tip of Koh Chang, in eastern Thailand's Trat province, Aquarius Residences (pictured right) will comprise 23 luxurious pool villas and 99 low-rise condominiums, including 12 penthouse units with private rooftop garden. The residence is scheduled to open in three phases from 2022. When completed, the two projects are set to elevate the tourism profile of Koh Chang island. ■

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Gammon wins contract for HKIA Terminal 2 expansion

Balfour Beatty has announced that its joint venture, Gammon, has secured a four-year HK$12.88 billion contract from the Airport Authority Hong Kong for the expansion of Terminal 2 at Hong Kong International Airport (HKIA).

Gammon will be responsible for the expansion of the main Terminal 2 building and construction of interconnecting bridges, mechanical and electrical works as well as associated viaducts and roads.

The expansion of Terminal 2 forms part of the Three-runway System (3RS) project at HKIA, which on completion will allow for both arrivals and departures from one terminal and increase overall passenger capacity.

Leo Quinn, group chief executive of Balfour Beatty said, "This award marks Gammon's second significant contract for the Airport Authority Hong Kong this year and the largest single contract ever awarded to Gammon.

"Through leveraging wide-ranging engineering expertise and off-site and modular construction approaches, Gammon has secured a material share of the Hong Kong market, which continues to look favourable with significant infrastructure opportunities ahead."

In the first half of 2020, Gammon won a major tunnel contract at HKIA to deliver tunnels and associated works for an automatic people mover and baggage handling system, also part of the 3RS project.

In a separate statement, Gammon's chief executive Thomas Ho described the Terminal 2 expansion project as the ideal showcase to demonstrate the company's capabilities in off-site construction and Design for Manufacture and Assembly (DfMA).

"Our construction proposal focuses on off-site and modular solutions, especially for electrical and mechanical aspects and many of the internal fit-out elements of the main building such as check-in islands, retail shopfronts and link bridges. We'll also be applying a kit-of-parts approach with a high degree of standardisation to a number of areas," explained Mr Ho. "These approaches allow us to simplify and reduce complex construction activities and provide a significant reduction in on-site labour requirements, to improve both safety and the logistics of operating in the airport environment."

The expansion of HKIA Terminal 2 forms part of the airpot's Three-runway System (3RS) project.

Mr Ho added, ""We have an exceptionally strong senior management team for the Terminal 2 expansion works contract, which collectively brings more than 60 years' experience of delivering projects at HKIA. Our understanding of the airport's systems and procedures combined with our DfMA approach will support timely delivery of these important works. We are also pleased that by maximising off-site solutions we will be able to reduce construction waste, which is a key component of our sustainability strategy."

According to Gammon, the company has long been a proponent of the digitalisation of construction and is expanding its 5G capabilities to support this approach. For the Terminal 2 expansion project, a number of in-house digital innovations will be used including an off-site fabrication monitoring solution, concrete management system, and sensors that track plant behaviour to ensure maximum productivity. Gammon said the project will employ about 3,000 staff and workers at its peak. ■

Niftylift appoints dealer in India

UK-based Niftylift Ltd has appointed RentEase International as its dealer in India, covering both the rental and sales sectors. The two companies believe that the Niftylift range will offer significant advantages in the Indian market, due to their class-leading working outreach, compact dimensions, low weight and environmentally conscious hybrid and zero-emission all-electric machines.

Niftylift's product range features working heights from 12 to over 28 m and include road-towable trailer mounts, self-propelled all-electric, hybrid and diesel booms, self-drives with outriggers and track-drives mounted on continuous tracks for maximum traction. They are used globally in the construction, maintenance, installation and service sectors.

Vipul Kumar Tulsian, CEO (left) and Meghraj Singh, managing director of RentEase.

"This new arrangement will provide Niftylift with excellent market coverage and a service support network in India, whilst working with a proven market leader in the rental sector," said Jim Craddock, international sales manager for Niftylift.

Meghraj Singh, managing director of RentEase added, "We are thrilled with the opportunity to join hands with one of the industry's leading brands and innovators and that this association will be a beneficial turnaround for both organisations in India.

"RentEase has continually grown from its inception in 2017 and is in line with its vision, to be an industry leader in India, in relation to the safety of human assets and increasing efficiency with ease." ■

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Leighton Asia awarded building contracts in India

Leighton Asia, part of CPB Contractors, has secured two major building projects in India. One of them is the Hindu Heritage Experience Centre, which was awarded by the JKP Foundation.

Located in Mangarh, Uttar Pradesh, this heritage project will be delivered under an alliance contract. It involves the construction of an iconic Lotus Building, Namaste structure and a retail, food and beverage precinct. Works are scheduled to commence in August 2020, with completion slated for 2022.

The other contract is for the Nita Mukesh Ambani Junior School (DAIS). It was awarded by the Jamnaben Hirachand Ambani Foundation, which is part of the Reliance Industries Limited Group. Works have commenced and are scheduled to be completed in 2021.

Located in the Bandra Kurla Complex, Mumbai, the DAIS project involves the construction of an extension to the existing Dhirubhai Ambani International School, comprising three basement levels, ground and seven upper floors, plus a terrace.

Diego Zumaquero, managing director of CPB Contractors said, "CPB Contractors' client focus delivers high-quality assets of lasting value. Our team's strength is the unique combination of local knowledge and international experience that comes from our people and corporate culture. We will apply these capabilities to safely deliver each of these projects." ■

An artist's impression of the Hindu Heritage Experience Centre in Mangarh, Uttar Pradesh.

MIC takes delivery of another Demag CC 8800-1 crawler crane

Japanese company MIC Co Ltd has taken delivery of its fourth Demag CC 8800-1 crawler crane. The unit will be used in various infrastructure projects such as bridges, steelworks and oil refineries, as well as for the construction of offshore wind power facilities.

Headquartered in Aichi Prefecture, MIC owns numerous large cranes. "With cranes of this category, we can increase the amount of work we perform on the ground and reduce the amount we perform at height. This ensures reliability and shortens traffic closures. For instance, in bridge-building projects a large crane makes it possible to use the 'large-block erection' method, which is more efficient, leading to shorter construction times," explained Eikichi Oyama, chairman of MIC.

"As companies have become more and more cost aware, shorter construction times are hugely beneficial in terms of reducing operating costs and increasing profits. This has caused demand for large cranes to soar, and thanks to the efficiency of our crane fleet, as well as the productivity of our skilled operators, we have received countless orders for large-scale infrastructure work."

Speaking about Demag CC 8800-1 crawler cranes, Mr Oyama said, "The Demag CC 8800-1 provides a top lifting capacity of 1,600 t, yet has a compact design. The boom booster kit enhances its lifting capacity, taking the crane to the next level. Also, with its full boom length of 240 m, it can handle work at extreme heights. And, in addition to its capabilities as a crane, disassembly, transportation, and assembly are extremely efficient."

MIC ordered its latest Demag CC 8880-1 with the company's eye-catching paint scheme. "We want to freshen up the dull image people have of construction sites. With this in mind, we've introduced our own unique colour scheme, which we call 'Dreamic Colour,' to symbolise the importance of construction machinery in infrastructure development, maintenance and upkeep," said Mr Oyama. "In this scheme, red stands for friendliness and solidity, yellow for a sense of adventure and consideration, blue for youth and growth, and green for calmness and reliability." ■

ABOVE AND LEFT: **The new Demag CC 8800-1 crawler crane for MIC Co Ltd, featuring an eye-catching paint scheme, will be used in a variety of infrastructure projects such as bridges, steelworks and oil refineries, as well as for the construction of offshore wind power facilities.**

Two new initiatives for Singapore's built environment

The Singapore government has introduced the Built Environment Living Lab Framework (BE LLF) to facilitate test-bedding of innovative proposals in urban spaces and living environment, such as at Punggol Town and Jurong Lake Gardens. This initiative was officially launched on 29 September by Singapore's Minister of State in the Prime Minister's Office and in the Ministry of National Development, Tan Kiat How.

Speaking at 'CEOs in Conversation', the final plenary of the International Built Environment Week (IBEW) 2020, Mr Tan also announced the Skills Framework for Built Environment (BE), which aims to provide a common skills language for stakeholders in the sector. This initiative encapsulates comprehensive information about the BE sector, career pathways, occupations and job roles, skills and competencies required for each job role, as well as a list of training programmes available to help facilitate skills upgrading and mastery.

Mr Tan highlighted that while almost all construction projects in Singapore have resumed, all stakeholders must stay united and vigilant in efforts to prevent a resurgence of Covid-19 infections. He stressed the need to reduce the sector's reliance on a large foreign workforce in order to build greater resilience against future disruptions, adding that greater adoption of technology and innovation would help accelerate the sector's transformation efforts, while at the same time creating higher skilled and better jobs in the sector.

Built Environment Living Lab Framework

The BE LLF allows firms in Singapore to test out new, innovative solutions that could benefit the local built environment sector. Interested parties can submit their proposals to the Built Environment Technology Alliance (BETA), which will be the 'one-stop' shop to manage all test-bedding proposals *(www.beta.org.sg/be-living-lab-framework)*.

Good proposals with innovative solutions and ready for deployment will be expedited for test-bedding in living spaces, where possible. To provide firms with greater confidence to innovate, the government will support firms to navigate regulatory clearance processes and, where necessary, introduce a 'regulatory sandbox' for proposals that may not be allowed under current regulations.

"BETA helps bring industry stakeholders together to catalyse industry-led innovation and commercialisation of technology solutions. This will provide opportunities for our firms to increase their competitive advantage by translating their technology and innovation investments into enterprise-level capabilities," explained Mr Tan.

"Despite the outbreak of Covid-19, BETA has managed to engage over 30 firms, Institutes of Higher Learning and agencies. There are promising discussions with local companies like Pan United, Certis and Sembcorp Development to collaborate on advanced construction materials and digital initiatives. We hope to kick start these projects soon."

Skills Framework for Built Environment

Singapore's Building and Construction Authority (BCA), SkillsFuture Singapore (SSG) and Workforce Singapore (WSG) have worked closely with trade associations and chambers (TACs), unions, professional boards, employers and educational institutions, to develop the Skills Framework for Built Environment *(www.skillsfuture.sg/skills-framework/built-environment)*.

"Transformation of the BE sector must be underpinned by a competent and skilled workforce," pointed out Mr Tan. "Industry transformation will create new job opportunities, but will also require some existing job roles to be redesigned to keep up with evolving trends. Hence, it is critical to ensure that our workers are equipped with the right skills and training to harness these new technologies in their work."

The Skills Framework for Built Environment covers 49 job roles in the BE sector, across eight career tracks such as architectural consultancy and design, engineering consultancy and design, and quantity surveying. It helps BE companies and existing professionals as well as prospective new employees to the sector identify career progression pathways and the skills needed to stay relevant, especially for new jobs arising from industry transformation that require new skills.

For example, an individual interested in joining the sector as a digital delivery professional could use the framework to determine the skills and courses he or she needs for the job role. Another example is existing employees using the framework to understand the skills and training needed to upskill in digitalisation. BE firms can improve their capabilities and HR practices by taking reference from the Skills Framework for their recruitment and talent management strategies, as well as to provide more career advancement opportunities based on the skills and competencies of their employees.

The Skills Framework identifies 163 existing and emerging technical skills and competencies to capture the evolving technology and industry trends, and its impact on jobs and skills in the sector. Education and training providers can use the framework to curate programmes that are aligned to the needs of the industry. For example, BCA Academy's Diploma (Conversion) in Integrated Digital Delivery (IDD) course under the SGUnited Skills programme can help jobseekers prepare for the role of specialist (digital delivery) as defined in the framework, or help existing BE professionals to upskill their knowledge in IDD.

According to BCA, there are existing training programmes and upcoming new programmes that support industry transformation skills. A full list of training programmes with skills mapping will be ready by end 2020.

The government is also working with relevant TACs to establish various accreditation schemes that align with the Skills Framework, said BCA. Moving forward, the Skills Framework and accreditation schemes can help employers and industry partners to better differentiate and identify individuals with the relevant skill sets when procuring BE services. More details will be available later.

Hugh Lim, CEO of BCA said, "We have seen the benefits of technology adoption and innovation in overcoming some of the challenges posed by Covid-19. Our firms must continue to embrace new innovations to remain competitive, and deal with challenges posed by Covid-19. As part of our industry transformation efforts for the built environment, we have been placing close attention and focus on ensuring good and meaningful jobs for Singaporeans.

"The Skills Framework for Built Environment will support our collective desire to have a skilled and progressive workforce, to support our shared ambitions for the sector. Through industry transformation and innovation, anchored by a dedicated and capable core of Singaporeans, we will be able to overcome the current challenges and emerge stronger together." ■

Singapore's first campus-style integrated development

Targeted for completion in the fourth quarter of 2021, Rochester Commons is set to become the first campus-style integrated development in Singapore. It covers 2.4 ha of area, offering an office tower, a hotel and 12 heritage bungalows, as well as Southeast Asia's first shared executive learning centre, Catapult.

Built in line with the Singapore government's vision for a world-class learning ecosystem in one-north, the approximately 400,000 sq ft project is developed and managed by CapitaLand. The hotel component will be operated by CapitaLand's lodging arm The Ascott Limited under the Citadines Connect brand.

The 17-storey Grade A office tower features over 200,000 sq ft of core and flex working spaces. CapitaLand said corporates can choose from column-free large floor plates spanning 22,500 sq ft per floor, or in one of the seven heritage bungalows that have been conserved and converted into workspaces.

Designed by Gensler, the integrated development will be connected via an approximately 1,200 ft green trail, interspersed with a sky garden, viewing decks, event spaces and meeting pods for the community. With its eco-friendly features, Rochester Commons has clinched the Singapore's Building and Construction Authority's highest accolade, the Green Mark Platinum award.

There will also be a variety of F&B establishments, plus outdoor social areas that incorporate a multi-purpose outdoor court named 'Common Ground', where executives can take part in curated community events. Rochester Commons' purpose-built executive learning centre - Catapult - is designed to deliver

© CapitaLand

The Rochester Commons masterplan.

training programmes in an experiential and immersive way using the latest learning technologies. It aims to groom executives for leadership agility, with future-ready skills relevant in a regional and global context.

According to CapitaLand, Rochester Commons will provide a single digital identity access that allows executives to easily move through the entire development via facial recognition, QR code scanning or access cards. Rochester Commons will also deploy a cloud-based intelligent building platform, which allows the property manager to draw insights using energy and space usage data to optimise building functions for occupiers' comfort. ■

Chinachem employs 'Enertainer' for clean energy use on construction sites

Chinachem has introduced Enertainer (a battery storage system) to improve the environment of its construction sites and surrounding areas. The company is believed to be the first real estate developer in Hong Kong that adopts this solution, which replaces traditional diesel generators to promote the use of clean energy on construction sites and fully implement the concept of green building.

According to Chinachem, Enertainer is the first purpose-built construction energy storage system in the world. It has been developed by Ampd Energy, an incubatee of Hong Kong Science and Technology Parks Corporation. Compared with diesel generators, Enertainer is smaller in size, nearly silent, will not emit dark smoke from burning diesel, and can reduce carbon emissions by up to 85% or up to 200 t per year. It can significantly reduce air pollution, noise and fire risk caused by diesel generators on construction sites.

Donald Choi, executive director and group CEO of Chinachem said, "Chinachem Group attaches great importance to sustainable development and is dedicated to incorporating the concept of sustainable development into its core businesses, creating positive value for people, the community and the environment as it shapes the city.

"As the first real estate developer in Hong Kong to introduce Enertainer, we hope to promote clean energy and the sustainable development of Hong Kong, while also supporting start-ups in their innovation and technology development. Enertainer has

Enertainer is a battery storage system aimed to promote clean energy use on construction sites.

been applied first on the Anderson Road project site and will be extended to our other development projects."

Brandon Ng, CEO of Ampd Energy added, "When we learnt of Chinachem's Triple Bottom Line of people, prosperity and profit, we knew we had a natural partner. Ampd is driven entirely by our vision of an emission free future for construction and to do this at scale, we know we need to make products that are better in every way and that deliver tangible results for our customers." ■

New solar power plant to be built in Hoa Hoi, Vietnam

The Asian Development Bank (ADB) and Phu Yen TTP Joint Stock Company (Phu Yen JSC) have signed a US$186 million loan to develop and operate a 257 MW solar power plant in Hoa Hoi, Phu Yen Province, Vietnam, through the country's first certified green loan. Phu Yen JSC is owned by B.Grimm Power Public Company Limited and Truong Thanh Vietnam Group Joint Stock Company (TTVN).

The project is the largest single operating solar power plant in Vietnam and one of the largest in Southeast Asia, helping to reduce 123,000 t of carbon dioxide annually, said ADB. It will deliver electricity to Quang Ngai and Nha Trang cities, as well as surrounding areas in a region that is emerging as one of Vietnam's key tourist centres.

The financing comprises a US$27.9 million loan funded by ADB, a US$148.8 million syndicated loan (B loan) funded by commercial banks with ADB as lender of record, and a US$9.3 million loan from Leading Asia's Private Infrastructure Fund (LEAP). The syndicated loan is the first green B loan in Asia and the Pacific to be certified by the Climate Bonds Initiative, and one of the largest such loans yet mobilised in Vietnam. Green loans are used to fund new or existing projects that deliver environmental or climate-related benefits.

"ADB is committed to supporting B.Grimm, one of our most valued clients, with its long-term expansion into Vietnam and its important work in renewable energy. We're also excited to work for the first time with TTVN," said Jackie B. Surtani, infrastructure finance division director for East Asia, Southeast Asia, and the Pacific at ADB's Private Sector Operations Department. "This project will support the rapid development of solar power capacity in Vietnam, advance the country's low-carbon growth goals, and, we hope, catalyse further commercial bank financing for renewable energy."

"This transaction will support the development of clean and sustainable energy in Vietnam and help promote the green loan market in Southeast Asia," added Preeyanart Soontornwata, president of B.Grimm Power. "This project is a further demonstration of B.Grimm Power adopting international best practices, and this landmark green transaction is proof of our focus on doing business sustainably. We would like to express our sincere appreciation to ADB for their leadership role in the transaction, and to our B loan lenders whose invaluable support builds on our long-standing relationships forged over multiple transactions."

© ADB

The new 257 MW facility is set to be the largest single operating solar power plant in Vietnam and one of the largest in Southeast Asia, helping to reduce 123,000 t of carbon dioxide annually.

Dang Trung Kien, chairman of TTVN also commented, "TTVN is proud to be the local partner for the development, construction, and operation of this solar farm in Hoa Hoi, Phu Yen. TTVN has successfully worked with B.Grimm from day one to reach commercial operation within a short period, thereby contributing to the energy security goals of Vietnam. We are pleased to see the project operating very well and value the partnership and support from ADB and participating commercial lenders in achieving this financing milestone in the Vietnamese renewables market." ■

First Kato SR-500LX in Singapore goes to Mun Siong Engineering Limited

The first unit of Kato SR-500LX rough terrain crane in Singapore has been delivered to Mun Siong Engineering Limited. The company purchased the machine from Sin Heng Heavy Machinery Limited.

Manufactured by Japanese company Kato Works Co Ltd, the 51-t SR-500LX was recently introduced to the global market. The crane is designed for high safety and reliability, offering a 42-m-long boom and a 13.7-m-long Ejib with strong lifting capacity.

The Kato SR-500LX is equipped with a high resolution display ACS moment limiter with KCOR data logger system. The crane is also compact, featuring a 7.0 m fully extended outrigger.

Mun Siong Engineering Limited, one of Singapore's leading construction and integrated maintenance solution providers, has bought five units of Kato cranes since 2007, which range from 51 t to 70 t. These cranes are used to support the company's construction projects and maintenance works, helping to carry out jobs efficiently and safely. ■

RIGHT: **The first unit of Kato SR-500LX rough terrain crane in Singapore has been sold to Mun Siong Engineering Limited.**

GuocoLand expands Guoco Midtown development

Guoco Midtown, the mega mixed-use development by GuocoLand Limited located on Beach Road, Singapore, is expanding its footprint in the central business district (CBD) with the addition of Guoco Midtown II at Tan Quee Lan Street, which will also feature a new residential project named Midtown Modern.

The new combined master development now offers 1.5 mil sq ft of gross floor area (GFA), sprawling over 3.2 ha of prime land. It is believed to be the largest project currently under construction in the Singapore CBD.

The expanded Guoco Midtown will be the centre of innovative businesses and new lifestyle concepts, revealed GuocoLand. "Coined as a 'City of the Future', the development is based on sustainability principles and new concepts of working and city living. It is expected to attract a new community of companies, talents, residents and visitors into the area, redefining the vicinity into an exciting confluence of business, lifestyle, culture and heritage," explained the company.

The mixed-use master development will comprise a 30-storey office tower with 770,000 sq ft of premium Grade A office space, retail clusters, two condominiums (Midtown Bay and Midtown Modern), and a five-storey Network Hub building, which is a business and social networking club. The development will also come with around 3.8 ha of landscape areas, providing more than 20 concept gardens and public spaces.

Guoco Midtown's first residential development, Midtown Bay, is a 33-storey tower with 219 units. The second one, Midtown Modern, will have two 30-storey towers offering more than 500 units. There will be three concept retail and F&B clusters, each surrounding a key public space. They are Midtown Garden along Beach Road, Midtown Market directly behind the conserved Old Beach Road Police Station building, and Midtown Square right above the Bugis interchange MRT Station along Tan Quee Lan Street (at Guoco Midtown II).

Both images © GuocoLand

ABOVE: **Guoco Midtown is expected to be completed in phases between 2022 and 2024.**

LEFT: **A five-storey Network Hub building will be part of the development.**

Guoco Midtown is scheduled to be completed in phases between 2022 and 2024, and is expected to bring an additional 10,000 office workers, residents and visitors daily into the district. The development is led by GuocoLand with a group of investors, namely Hong Kong-listed Guoco Group, Hong Leong Holdings and Hong Realty. ■

Liebherr HS 8130 duty-cycle crawler cranes delivered to Middle East

Salim Equipment Rental LLC based in Jebel Ali Free Zone, Dubai, UAE and its JV partner Daikyo Kenki Co Ltd based in Tokyo, Japan have decided to increase their fleet with two Liebherr HS 8130 duty-cycle crawler cranes. The machines will be used to serve the specialised foundation industry in the Middle East.

The 130-t crawler cranes were delivered to the customers in July 2020, handed over by Liebherr representatives, Knut Brandenburg and Samir Hussein. Sajil Salim, one of the co-owners of the machines was present at the handover ceremony in Dubai; however, the other co-owner, Ryuichi Uchida was not able to attend due to Covid-19.

Equipped with the latest Liebherr technology, including an automated freefall system and the innovative Liebherr duty-cycle features, the Liebherr HS 8130 is well suited to the Middle East market. Both cranes have reportedly been assigned to a jobsite in the UAE where they will be working for the next few months. ■

LEFT AND FAR LEFT: **The official handover of the Liebherr HS 8130.1 duty-cycle crawler cranes in Dubai.**

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Haulotte relocates to new headquarters

After 17 months of construction, the new Haulotte headquarters in the town of Lorette, Loire, France, has been completed and recently inaugurated. Called H3 (short for Haulotte Higher Headquarters), the facility is home to approximately 350 employees.

The three-storey complex, designed by architecture firm Eutopia, occupies a 31,000 sq m green site. It features three buildings - named Europe-Africa, Americas, and Asia-Pacific - reflecting the worldwide activity of the company. Connected by an immense glass roof and walkways, these buildings offer areas for interaction to encourage collaborative work. In the complex, there is also a business centre to host Haulotte's partners and provide training courses developed within the new Haulotte Academy.

Adjacent to the three buildings is a 2,500 sq m covered space, which is dedicated to innovations and prototypes to develop the equipment and services of tomorrow. This space also houses a showroom to showcase Haulotte's know-how and accommodate events for Haulotte's customers and employees. ■

ALL IMAGES: **Haulotte has inaugurated its new headquarters in the town of Lorette, Loire, France.**

Arup commits to net zero across global operations by 2030

Global engineering company Arup has committed to achieving net zero emissions across its entire operations by 2030, covering everything from the energy used in offices to goods and services purchased. To achieve this, Arup has set a target to reduce its scope 1, 2 and 3 global greenhouse gas (GHG) emissions by 30% within the next five years from a 2018 baseline.

The target, validated by the Science Based Target initiative, has been classified as ambitious as it exceeds the minimum requirements for keeping global temperature rise under 1.5°C . In addition, Arup is also committing to purchasing Gold Standard certified offsets for all domestic and international flights and to compensate for other residual hard to decarbonise emissions with high quality, certified GHG removal from 2030.

A carbon levy of US$40 per tonne is being applied to flights taken by employees in a bid to change behaviours across the company. The proceeds will be used to establish an Arup Carbon Fund to find and invest in ways of reducing and removing carbon including supporting local community projects.

Arup is working with organisations including the Ellen MacArthur Foundation, the C40 Cities Climate Leadership Group and the World Business Council for Sustainable Development to innovate and accelerate new approaches and business models to help the world decarbonise. The company is also working with The Resilience Shift and the Global Resilient Cities Network to enhance the resilience of cities and communities to increasing shocks and stresses resulting from climate change, including drought, water scarcity and food supply disruption.

Jo da Silva, Arup's global sustainable development leader commented, "While the world grapples with the Covid-19 pandemic, it is crucial that we do not take our eye off the ball when it comes to reducing emissions and managing the approaching risks because of climate change. We have taken these steps to consolidate our efforts to reduce the impact of our operations around the world. But the greatest difference we can make is through the advice and solutions we offer our clients and communities – from helping city leaders take practical steps to meet the Paris Agreement, to working with property developers to understand how digital technology can reduce their resource consumption."

"We congratulate Arup for setting emissions reduction targets that are in line with keeping global warming to 1.5°C. By setting targets that are grounded in climate science, Arup is ensuring they are getting on the right track now to meeting their net-zero goal and are showing that ambitious climate action and good, resilient business go hand in hand," said Cynthia Cummis, director of private sector climate mitigation at World Resources Institute, one of the Science Based Targets initiative partners. ■

Bentley and Microsoft expand strategic alliance

Bentley Systems and Microsoft Corp. have expanded their strategic alliance focused on advancing infrastructure for smart city urban planning and smart construction. The alliance will combine Microsoft's Azure IoT Digital Twins and Azure Maps with Bentley Systems' iTwins platform, enabling engineers, architects, constructors and city planners to work within a comprehensive city-scale digital twin, empowering better decision-making, optimising operational efficiency, reducing costs and improving collaboration.

The two companies will collaborate to develop new smart city solutions. They will explore opportunities for digital twins in urban planning and citizen engagement for cities around the world. The collaboration will enable improved decision-making and increased productivity through Microsoft Teams for infrastructure engineers.

"At Bentley we believe that infrastructure digital twins can empower engineers, constructors and owner-operators to design, build and operate infrastructure assets that are more cost-effective, more resilient and more sustainable," said Greg Bentley, CEO of Bentley Systems. "With Azure as the foundation of our cloud services, our offerings are more broadly scaled and differentiated by the further integrations of Microsoft technologies. We are excited to extend our partnership to bring new digital twin advances to infrastructure engineering organisations and their constituents."

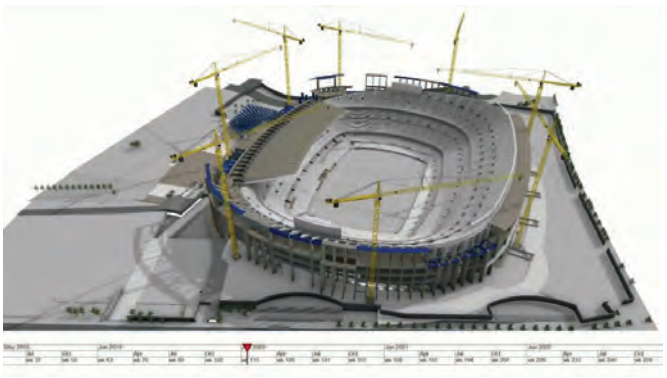
"With Azure IoT, Azure Digital Twins and Bentley's iTwins platform, the world's infrastructure - vital to our economies and environment - stands to gain so much by enabling people to create comprehensive digital models of an entire environment," said Casey McGee, vice president Partner Development, US One Commercial Partner, Microsoft. "Our expanded strategic alliance with Bentley Systems opens up new opportunities for innovation and will accelerate the benefits of digital twins for infrastructure engineering organisations and, more broadly, society at large."

City planning and football club complex projects

The capital city of Dublin, Ireland, with a population of more than 1.2 million, is working with Bentley Systems to develop a large-scale digital twin as part of the city's planning efforts. "To overcome the challenges of getting public review and comment for new development projects in Dublin during the pandemic, we turned to Microsoft and Bentley to create an interactive virtual environment to ensure our citizens could provide their input from the safety of their homes and keep the development projects on track," said Jamie Cudden, smart city programme manager at Dublin City Council.

"The impact of the pandemic has forced cities like Dublin to accelerate their digital transformation journeys. Working with Microsoft and Bentley, we are reimagining how interactive virtual environments and digital twins can support citizens to engage from the safety of their own home on new development projects in their local communities. Working with these technology partners, we are building an adaptable and scalable solution based on Microsoft Teams and Bentley's OpenCities Planner that will set the standard for the future of planning and public engagement in cities."

In addition to sustaining infrastructure development in smart cities, project digital twins are facilitating industrial construction. Bentley Systems was recognised by Microsoft as the 2020 MSUS Partner Award winner for the Industry-Automotive category, in which an automotive factory uses the HoloLens 2 with Bentley's Synchro 4D construction-modelling software.



Both images © Bentley Systems

TOP AND ABOVE: **FC Barcelona is working with Bentley Systems on the renovation of Camp Nou stadium.**

Similarly, FC Barcelona, one of the oldest football clubs in Europe, is partnering with Bentley as part of the club's renovation of Camp Nou stadium - which is currently under construction amid the pandemic. The project, located in Barcelona, will upgrade streets in the neighbourhood and increase capacity at the stadium to revitalise an ageing stadium and for the club to compete with other top European cities.

"Bentley has been working with FC Barcelona on the Espai Barça Project for over three years, helping the architects, the construction team and the club complete an extraordinary challenge - delivering a major renovation of the stadium while it continues to host matches," said William T. Mannarelli, director of Real Estate & Espai Barça. "With Bentley's Synchro 4D construction-modelling software running on the Azure cloud, we can apply cutting-edge techniques to manage the complex and precise scheduling required to keep the stadium open during construction."

Bentley's ProjectWise, in conjunction with Microsoft Azure and Microsoft Teams, has empowered Bentley's users to work from home safely while collaborating virtually on projects anywhere in the world.

The companies will further combine Bentley's infrastructure digital twins expertise with Microsoft's cloud technologies for: ProjectWise 365 - an instant-on, 100% Azure cloud-based solution that increases the speed and quality of infrastructure design collaboration, which will be available through Microsoft's commercial marketplace; and Bentley's iTwins platform to leverage Microsoft's Azure Digital Twins, Azure IoT Hub, Azure Time Series Insights and other Microsoft cloud services, for users to rapidly store and process operational data. ■

Tadano begins restructuring of German operations

Global crane manufacturer Tadano Ltd has begun the strategic restructuring programme for its two German subsidiaries, Tadano Demag GmbH and Tadano Faun GmbH, which are the core companies of Tadano's European operations. This restructuring activity is scheduled to take three months.

As a result of the reorganisation process, both companies will further enhance their capacity to serve the needs of customers in Germany, in Europe and globally, stated Tadano. This will maximise Tadano Demag's and Tadano Faun's value for the Tadano Group as a whole, create stronger 'One Tadano' group synergies, and make further contributions towards achieving the Tadano Group's goal of becoming a global leader in the lifting equipment industry.

In light of the ongoing economic challenges accelerated by the Covid-19 crisis, Tadano Demag and Tadano Faun have decided, in close consultation with Tadano Ltd and with professional advisors, to file for Protective Shield Proceedings ('Schutzschirmverfahren') pursuant to §270b of the German Insolvency Directive as of 8 October 2020.

Protective Shield Proceedings are a German judicial restructuring procedure, which provides companies in distress with a chance to stabilise their business while staying in control of their operations. During Protective Shield Proceedings, companies draw up a dedicated restructuring plan with some temporary regulations coming into effect to make it easier for companies to reorganise. Protective Shield Proceedings can only be applied to companies that are solvent and for which a successful restructuring is likely – as it is the case with both Tadano Demag and Tadano Faun.

According to Tadano, the two subsidiaries have been confronted with shrinking markets and mounting competitive pressure for some time. The resulting economic challenges have escalated considerably in recent months due to the Covid-19 crisis and cannot be sufficiently mitigated, despite short-timework, as well as other proactive measures taken. Tadano regards a reorganisation of Tadano Demag and Tadano Faun utilising Protective Shield Proceedings as an essential step towards better serving the needs of customers and continuing to advance the strategic goals of the Tadano Group.

Following the Tadano Group's strategic acquisition of Demag Mobile Cranes in 2019, integration initiatives within Tadano's European and global operations continue to take place. Tadano said teams spanning various locations worldwide are working to realise synergies in order to raise global competitiveness in the mid and long term. The initiated Protective Shield Proceedings will ultimately accelerate and facilitate more effective integration.

The Group added that production at Tadano Demag and Tadano Faun in Germany is ongoing and all existing and new orders are being fulfilled. "All measures taken within the scope of the Protective Shield Proceedings at Tadano Demag and Tadano Faun are geared towards offering greater added value to our customers than ever before - both with market-leading, innovative products and in the service business," stated Tadano. "To this end, we intend to permanently optimise production processes at Tadano Demag and Tadano Faun, and offer a far more complete range of lifting equipment solutions in the future."

Tadano reiterated that it remains fully committed to its goal of becoming a global leader in the lifting equipment industry and considers its German operations to be an important pillar in this endeavour. ■

Sandvik establishes new business area

Sandvik has established a new business area, Sandvik Rock Processing Solutions (SRP), with effect from 1 January 2021. It will consist of the current Crushing and Screening division, which is today part of the Sandvik Mining and Rock Technology business area.

According to Sandvik, this structural change is to further accelerate profitable growth within rock processing, based on Crushing and Screening addressing separate parts of the value chain and facing different competition to the other Sandvik Mining and Rock Technology divisions.

"Sandvik is market leading within rock processing and our Crushing and Screening division is a well-performing business with exciting growth opportunities. The business is today already operating quite independently from the rest of Sandvik Mining and Rock Technology, with its own manufacturing, sourcing and aftermarket. By establishing Rock Processing Solutions as a business area, we will improve transparency and strengthen our growth ambitions within the area," explained Stefan Widing, president and CEO of Sandvik.

Sandvik has also appointed Anders Svensson - president of the Crushing and Screening division since 2016 - to president of Sandvik Rock Processing Solutions and a new member of the Sandvik Group executive management, as of 1 January 2021. Mr Svensson joined Sandvik in 2008 and prior to his current position, he has had several different management positions within Sandvik and in Metso Minerals.

LEFT:
Stefan Widing, president and CEO of Sandvik.

RIGHT:
Henrik Ager, president of Sandvik Mining and Rock Technology.

The crushing and screening business, as a division within Sandvik Mining and Rock Technology, generated about SEK 7.4 billion in sales and 15.9% operating profit margin in 2019 with about 2,000 employees.

The Sandvik Mining and Rock Technology business area will continue to be led by Henrik Ager and will change its name to Sandvik Mining and Rock Solutions (SMR), starting from 1 January 2021. ■

Miller Formless acquires MBW slipform pavers

Miller Formless, a leading provider of concrete slipform paving machines and other products, has acquired the MBW slipform pavers, including the C-101 and CG-200 models. “In an effort to expand market share and continue our corporate growth strategies, we saw this small paver as an excellent opportunity to add a quality machine to our existing line of products,” said Darick L. Franzen, vice president of business development - North America, Miller Formless.

Based in Illinois, the US, Miller Formless is celebrating its 50th anniversary in business this year. MBW is headquartered in Wisconsin, the US, and has been a leader in compaction products and concrete finishing equipment since 1967.

Andrew Multerer, CEO and president of MBW, Inc., said, “Miller Formless has the reputation, knowledge and experience in the slipform paving industry to take this well-developed product and bring it to another level of productivity and professionalism. It is bittersweet for MBW because we have a deep and rich history with the paver, but in our hearts we know that Miller Formless has the core focus for the slipform paving world and MBW’s core focus is on compaction and concrete finishing.”

The C-101 and CG-200 pavers will be added to the growing line of products manufactured by Miller Formless. These models are now part of the company’s offerings that are capable of installing concrete curbs, curbs and gutters, barrier walls and concrete pavements. Miller Formless’ machines are currently in use throughout the US, Canada, Europe, Central America, Asia and Australia. ■

BOTH IMAGES: **Miller Formless has acquired the C-101 and CG-200 slipform pavers from MBW.**

Trimble and Boston Dynamics team up for autonomous robots in construction

Trimble and Boston Dynamics have formed a strategic alliance to integrate a variety of construction data collection technologies with Boston Dynamics’ Spot robot platform. This jointly-developed solution will combine the Spot robot’s autonomous mobility with Trimble’s data collection sensors and field control software to enable automation of repetitive tasks such as site scans, surveying and progress monitoring, while taking advantage of the robot’s unique capabilities to navigate dynamic and potentially unsafe environments. The relationship gives Trimble exclusivity to sell and support the Spot robot with integrated scanning, total station and GNSS technologies for the construction market.

This turnkey solution will streamline operation of the robot and provide quality control for missions, enabling construction project managers to easily get a clear picture of jobsite progress on an ongoing basis. Trimble technologies integrated with the robot enable accurate, scalable and rapid data acquisition while Trimble’s construction collaboration platforms provide a continuous flow of information between field and office. In addition, customers will benefit from local support and service from Trimble and its distribution partners.

Mortenson, a US builder, developer and engineering services provider headquartered in Minneapolis, is one of the first customers to leverage the competitive advantages of this new technology combination. The company has been piloting Spot robots with Trimble’s SPS986 GNSS solutions to autonomously navigate challenging exterior construction environments, such as solar farms, to continuously document existing site conditions. An automated and repeatable approach to field data capture can provide Mortenson with real-time awareness of project status, helping to accelerate project delivery. Through Trimble’s Early Experience Program, contractors such as Mortenson have advanced access to this technology for the purposes of evaluating its suitability in actual construction projects.

“Robots will play a crucial role in automated construction workflows and can augment the human workforce by handling dirty, dull and dangerous tasks,” said Martin Holmgren, general manager for Building Field Solutions at Trimble. “Our experience with early adopters like Mortenson gave us visibility into the transformative potential of an integrated solution that seamlessly marries a world-class robot with construction-specific sensors and workflows. We’re excited about this alliance and the potential to bring unprecedented improvements in safety, quality and productivity to our construction customers.”

“We believe the combination of Trimble’s experience and industry leadership in construction technologies and Boston Dynamics’ Spot can transform the way the industry operates,” said Michael Perry, vice president of business development at Boston Dynamics. “The integrated solution will enable any jobsite leader to deploy Spot and Trimble technologies to get an accurate view of construction progress through real-time data collection. With a more comprehensive view of site activity, project managers can take proactive measures to ensure on-time, on-budget and safer project delivery.”

The integrated solution is expected to be available by the second quarter of 2021 through Boston Dynamics, Trimble and select BuildingPoint and SITECH distribution partners in the US, Canada, the UK, the European Union, Australia, New Zealand and Japan. Through Trimble’s Early Experience Program, select customers will have the opportunity to preview development of the solution in advance of general availability. ■

Date	Events in Asia	Organiser & Contact
24 to 27 Nov 2020	bauma China 2020 Shanghai New International Expo Centre Shanghai China	Messe München Tel: +49 89 949 20251 Email: info@bauma-china.com Website: www.bauma-china.com
25 Nov to 1 Dec 2020	Building Construction Technology (BCT) Virtual Exhibition and Webinars 10.00 AM - 06.00 PM / GMT +7 Thailand	Impact Exhibition Management Tel: + 662 833 5315 Email: info@bct-construction.com Website: www.bct-construction.com
9 to 11 Dec 2020	World of Concrete Asia 2020 Shanghai New International Expo Centre Shanghai China	Shanghai Yingye Exhibitions Co Ltd Tel: +86 21 6157 7250 Email: info@wocasia.com Website: www.wocasia.cn
10 to 12 Dec 2020	Myanbuild 2020 Myanmar Expo Hall Yangon Myanmar	AMB Tarsus Events Group Tel: +959 4244 09886 Email: ei@ambtarsus.com Website: www.myanbuild.net
23 to 26 Feb 2021	bauma Conexpo India 2021 Huda Ground Gurgaon, New Delhi India	Messe München Tel: +49 89 949 20251 Email: info@bcindia.com Website: www.bcindia.com
10 to 12 Mar 2021	BuildTech Asia 2021 Singapore Expo Singapore	Sphere Exhibits Pte Ltd Tel: +65 6319 4021 Email: buildtechasia@sph.com.sg Website: www.buildtechasia.com
24 to 25 Mar 2021	Geo Connect Asia 2021 Suntec Convention and Exhibition Centre Singapore	Montgomery Asia Email: effie@montgomeryasia.com Website: www.geoconnectasia.com
15 to 17 Jun 2021	Futurebuild SEA Malaysia International Trade and Exhibition Centre Kuala Lumpur Malaysia	Informa Markets Tel: +603 9771 2688 Website: www.futurebuildsea.com
30 Jun to 1 Jul 2021	Trenchless Asia 2021 Kuala Lumpur Convention Centre Kuala Lumpur Malaysia	Westrade Group Ltd Tel: +44 1923 723990 Email: pharwood@westrade.co.uk Website: www.trenchlessasia.com
28 to 30 Jul 2021	OS+H Asia 2020 Marina Bay Sands Singapore	Messe Duesseldorf Asia Tel: +65 6332 9620 Email: osha@mda.com.sg Website: www.osha-singapore.com
20 to 22 Oct 2021	MBAM OneBuild 2021 Kuala Lumpur Convention Centre Kuala Lumpur Malaysia	MBAM OneBuild Tel: +603 7981 0288 Email: info@mbamonebuild.com Website: www.mbamonebuild.com
Date	**Events outside Asia**	**Organiser & Contact**
8 to 10 Jun 2021	World of Concrete 2021 Las Vegas Convention Centre Las Vegas, Nevada USA	Informa Exhibitions Tel: +1 972 536 6368 Email: contactus@worldofconcrete.com Website: www.worldofconcrete.com
22 to 24 Jun 2021	Hillhead 2021 Hillhead Quarry Buxton, Derbyshire, England United Kingdom	The QMJ Group Ltd Tel: +44 115 945 4367 Email: hillhead@qmj.co.uk Website: www.hillhead.com

Note: *The show organisers may change the dates of the event or postpone/cancel it without prior notice, so readers are advised to visit the show websites regularly for the latest updates.*

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Singapore Geospatial Week+ 2020 held in September

Singapore Geospatial Week+ 2020 recently took place from 7 to 18 September 2020. The event was presented by GeoWorks, Singapore's geospatial industry centre, and managed and operated by the Singapore Land Authority (SLA). Featuring four industries of focus – Built & Infrastructure, Mobility & Logistics, Real Estate & Retail, and Urban & Environment, this knowledge sharing platform brought together more than 80 industry specialists and partners as they shared their vision on the future of geospatial technology, to spur innovation across a multitude of uses from drone solutions and Artificial Intelligence (AI), to 3D scanning and the creation of digital twins.

For the second year running, SLA also organised the Regional Geospatial Youth Forum to generate and build geospatial interest, awareness and a vibrant community among young professionals and students from Singapore and various ASEAN countries and regions.

"Everything happens somewhere. Even when one logs into a virtual meeting, one is doing so from somewhere. We see geospatial technology as a key capability of a smart nation," said deputy secretary for smart nation and digital government, Tan Kok Yam. "Geospatial technology has provided, and will continue to provide, innovations and solutions to cities and countries, that help us contain the ongoing public health crisis, and help us manage the economic and social fallout. This is why Singapore Geospatial Week+ 2020 is an important event, for the geospatial community to share knowledge and exchange experiences, at this time when we urgently need to join hands and minds to solve big common problems."

SLA acting chief executive Simon Ong added, "Geospatial information has become an integral component in driving solutions for businesses, the community and individuals. The current Covid-19 pandemic has led to location-based data being leveraged on for crowd management applications in line with safe distancing measures, thus enabling the public to make informed decisions to protect themselves."

Event highlights

A spotlight feature for Singapore Geospatial Week+ 2020 was the Covid-19 webinar series, showcasing the use of geospatial solutions to better manage public safety efforts in a pandemic. Led by industry speakers including GeoWorks' GeoTechs - CITYDATA, TNO, and GeoPartner Grab amongst others, the webinar series highlighted the use of how geospatial technologies are leveraged in an urban environment and integrated into a new normal for the community.

In addition, the 'GeoInnovation from Around the World' was introduced as a dialogue segment to promote geospatial sharing across borders for industry professionals. Hosted by GeoWorks' GeoCommunity partners from around the globe, this knowledge sharing initiative was led by start-ups and agencies from around the world including Australia, Finland, Japan, the UK and the US to build geospatial interest and expertise sharing.

Geospatial data and analytics in public sector

Geospatial data and analytics have also served as a platform for government agencies and city planners. The public sector sharing segment drew focus on the use of geospatial technologies to achieve better governance and how it has been adopted by public agencies for land and sea planning, development of liveable cities, and even for urban trees and greenery management.

SLA has collaborated with the National Parks Board on the use of location-based information to drive efficiency in the management of green spaces. Leveraging on the OneMap base map as a visualisation tool, maintenance information is streamlined on a single platform to identify gaps and minimise overlaps in service delivery. Featuring updated counts and location information of trees to be maintained, this platform is also used for service and operation planning. ■

Website: www.go.gov.sg/sggeoweek2020

Intermat ASEAN and Concrete Asia 2020 rescheduled until further notice

Impact Exhibition Management, the organiser of Intermat ASEAN and Concrete Asia 2020 exhibitions in Thailand - scheduled to take place from 9 to 11 September this year - have decided to postpone both events until further notice, due to the Covid-19 situation.

The organiser said it has taken this crucial decision after in-depth consultations with key industry players, and given the fact that international and regional restrictions are still in place, along with the mandatory 14 days quarantine requirement, it is almost impossible to hold an international physical trade exhibition.

"Our decision also takes into consideration of our key concerns for your safety, and the safety of your family and colleagues," said Impact Exhibition Management in its statement. "At this difficult times, let us come together to overcome the challenges, and emerge stronger.

"We would like express our thanks to our exhibitors, visitors, partners and everyone who participated and supported Intermat ASEAN and Concrete Asia. We will continue to keep everyone informed on any future developments." ■

Website: asean.intermatconstruction.com / www.concrete-asia.com

The Intermat ASEAN and Concrete Asia exhibitions are held annually in Bangkok, Thailand.

Hillhead to return in June 2021

The next edition of Hillhead - the UK's largest quarrying exhibition - will take place from 22 to 24 June 2021. To be held at the Hillhead Quarry, near Buxton, the exhibition is targeted at professionals involved in the quarrying, construction and recycling industries.

As a member of the Association of Event Organisers, the Hillhead 2021 team has already begun planning the event to fulfil the 'All Secure Standard' - a programme of enhanced measures, approved by the UK government, that sets out industry best practice and guidance for working safely during Covid-19. It is set around the cornerstones of social distancing, cleaning & hygiene, protect & detect and communication.

"Whilst it is likely that some of these measures will be relaxed by June 2021, Hillhead has taken the decision to plan for them at the earliest opportunity, ensuring visitors and exhibitors will be supported in the most effective manner," said Richard Bradbury, the show director. "A comprehensive framework for a safe show is already being put in place, which we look forward to sharing with you in the new year."

The organiser said that Hillhead 2021 would be joined by several new exhibitors that have signed up during the lockdown, including LiuGong Direct UK, Barford, Fox Brothers, John King Chains, Kelly Tanks and DXB Pump & Power. ■

Hillhead 2021 is scheduled to be held from 22 to 24 June at the Hillhead Quarry, near Buxton, the UK. The show is targeted at professionals in the quarrying, construction and recycling industries.

Website: www.hillhead.com

World of Concrete 2021 moves to June

World of Concrete (WOC) 2021 has been rescheduled from mid-January to 8 -10 June (educational session: 7-10 June), following discussions with key stakeholders and feedback from industry-leading concrete and masonry associations, announced the show organiser. The event will take place at the original venue, the Las Vegas Convention Centre (LVCC) in Nevada, the US.

"We have a commitment to our exhibitors and attendees to provide a valuable and productive face-to-face experience at WOC each year," explained Jackie James, group director of World of Concrete. "This is the first time in our 46-year history we have been faced with circumstances that have caused us to reschedule the event. We feel the new June dates will provide everyone with the necessary time to plan effectively, and allows us to reimagine WOC for a different time of the year."

She added, "Moving the event from Winter to late Spring this year will allow for additional outdoor activities everyone can enjoy in the great city of Las Vegas, including top-notch exhibits, new product demos, and exciting spectator events."

According to the show organiser, Informa, WOC will meet the Informa AllSecure Plan at the June 2021 event. This approach is to ensure the highest standards of safety, hygiene, cleanliness and quality for all exhibitors, attendees, speakers and press at the company's events.

In addition to the safety protocols in place for WOC 2021, LVCC has been awarded the Global Biorisk Advisory Council (GBAC) STAR facility accreditation by ISSA, the Worldwide Cleaning Industry Association. The GBAC programme is considered the gold standard for safe facilities, and was designed to control the risks associated with infectious agents, including Covid-19.

The next edition of World of Concrete will now take place from 8 to 10 June 2021.

WOC is one of the first large-scale events to occupy LVCC's US$980 million West Hall expansion in June, which will add 1.4 mil sq ft of space to the existing 3.2 mil sq ft campus. Besides the exhibit hall, the expansion will feature a striking outdoor plaza, a grand atrium and state-of-the-art design and technology. Registration for WOC 2021 will open online in early 2021. ■

Website: www.worldofconcrete.com

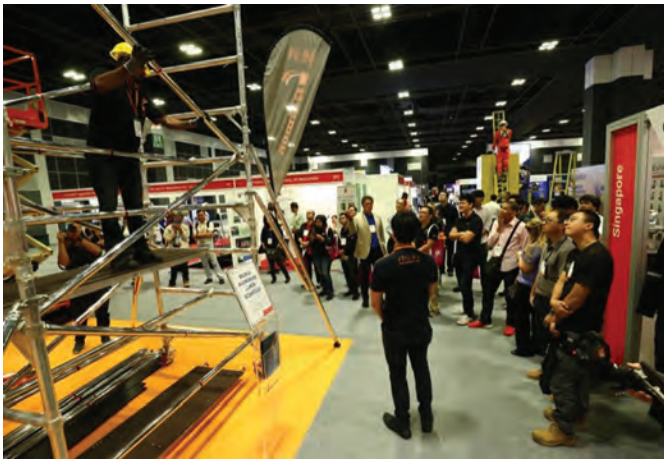
OS+H Asia 2020 postponed to July 2021

The 12th edition of Occupational Safety and Health Exhibition for Asia (OS+H Asia) to be held at the Marina Bay Sands, Singapore, will now take place from 28 to 30 July 2021, instead of December 2020, announced Messe Düsseldorf Asia. The show organiser said rescheduling the event was deemed necessary in the continued fight against Covid-19 and on the back of capacity limitations on MICE events as well as travel and border restrictions.

"We were very much hopeful of going ahead with the exhibition with the necessary safe management measures in place and amidst some travel restrictions being eased, but it became increasingly clear that with guidelines for large-scale business events currently capped at 250 persons and ongoing travel restrictions in key international markets, the exhibition would not be able to proceed as planned," explained Gernot Ringling, managing director of Messe Düsseldorf Asia.

"Thus taking these circumstances into consideration and on close consultation with our industry partners, we have made the difficult decision to postpone OS+H Asia to July 2021. We look to next year with optimism and stronger economic confidence, and believe the new dates will provide both exhibitors and visitors alike with a safer environment and the best market conditions to conduct business."

According to Messe Düsseldorf Asia, OS+H Asia 2021 will focus on three main areas: safety, security and health at work, as well as highlights on pandemic management solutions. These topics will be well placed as industry demand is expected to continue as effective health and safety solutions in the workplace become top priorities for businesses.



OS+H Asia 2021 will focus on three main areas: safety, security and health at work, as well as highlights on pandemic management solutions.

The event will also feature seminars, conferences and forum to provide businesses with an ideal networking and knowledge-sharing platform, optimising participation and engagement from local, regional and international trade attendees. ■

Website: www.osha-singapore.com

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IPAF hosts series of virtual inspection workshops

A series of virtual workshops to assist and support those who regularly carry out third-party inspections of mobile elevating work platforms (MEWPs) and mast climbing work platforms (MCWPs) will be hosted by the International Powered Access Federation (IPAF) to meet demand, which is particularly high across South Asia and the Middle East region.

These virtual workshops will feature different equipment manufacturers each month, presenting the important points to consider when carrying out six or 12-month inspections on MEWP or MCWP equipment. The sessions are designed to assist engineers or inspectors, enhancing awareness of general principles, and increasing specific product knowledge for all those who join the sessions.

The first virtual workshop for MEWP inspectors took place on 29 September 2020, in conjunction with experts from IPAF member JLG. The session delivered general tips and pointers to consider when carrying out a MEWP inspection, as well as specific product information relating to JLG's key machine types.

"We'd like to thank all our workshop co-hosts and sponsors, starting with JLG. We currently have a further 14 workshops planned over the next few months. We are grateful to equipment manufacturers, national and regional governing bodies in helping to make these important sessions happen. We share the same goal of teaching others to be more effective when carrying out these vital equipment inspection tasks," said Jason Woods, IPAF's regional manager for Middle East and South Asia.

"At IPAF, our goals are to reduce the risk of accidents and develop a greater understanding of MEWP and MCWP safety across all industries using powered access to perform work at height. We are pleased to offer third-party engineers this chance to get an in-depth look at some of these machines in a virtual, Covid-secure setting, and we hope those who participate will benefit from enhanced, direct communication with some of the powered access industry's leading manufacturers.

The virtual workshops will feature different equipment manufacturers each month, presenting the important points to consider when carrying out six or 12-month inspections on MEWP or MCWP equipment.

"The sessions are designed to enhance specific product knowledge as well as broad best practice for all those involved in inspections of work platforms in the Middle East and South Asia.

"I hope you can join at least one of the workshops over the next few months. Please do not hesitate to get in touch if you have any questions, or if you are an equipment manufacturer that would like to get involved in co-hosting one of the sessions." ■

Enquiry: jason.woods@ipaf.org

Haulotte Shanghai conducts IPAF training for Zhongneng United

Haulotte Shanghai, the first IPAF-certified training centre in China, recently conducted an IPAF aerial work platform safety operation training for Zhongneng United. Fu Weiguo, senior trainer at Haulotte Shanghai delivered the course, which was attended by two executives from Zhongneng United.

"Safety is a priority for Zhongneng United. This IPAF training will be of great benefit to our future work," said Xu Guojie, supply chain centre deputy director and technical director at Zhongneng United. Haulotte provided theoretical explanations, warning cases, theoretical tests, and equipment exercises. Xu Lei, service director at Zhongneng United added, "The IPAF training emphasised the strong cooperation between Zhongneng United and Haulotte. In the future, we will work hand-in-hand to raise safety awareness in the Chinese MEWP industry." ■

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Sandvik presents 'world's first 18-t battery loader'

Sandvik Mining and Rock Technology is introducing its new battery-electric loader, the 18-t LH518B - which is believed to be a first in the world. According to the manufacturer, the machine has been designed entirely around the loader's Artisan battery system and electric driveline to best utilise the possibilities that the battery technology brings. "It was not enough to replace some components or redesign only a part of the equipment, the designers were compelled to rethink the whole machine," revealed Sandvik.

The Sandvik LH518B has been designed entirely around the loader's Artisan battery system and electric driveline.

The LH518B battery-electric loader can fit in a 4.5 x 4.5 m tunnel and carry 18 t loads. In addition to an innovative boom and bucket system, the machine features independent front and rear drivetrains, resulting in high payload capacity while keeping a low overall height.

For excellent productivity, the LH518B has three 2,000 Nm permanent magnet motors. With no torque converter, transmission or engine to rev up, the loader is fast and agile. According to Sandvik, there are no emission restrictions based on installed power to limit the electric motor selection, which enables the use of the most powerful motors available that are suited for underground conditions.

The LH518B is equipped with AutoSwap, a self-swapping system for the Artisan battery pack. This allows for fast and easy battery swapping with minimum amount of manual handling. Sandvik said changing the battery only takes about six minutes, and it can be done in a passing bay or old re-muck bay with no overhead cranes or external infrastructure needed.

The new AutoConnect system on the LH518B makes swapping even easier and faster, by automatically connecting and disconnecting the battery pack to the machine. Aside from unplugging and plugging in the charger, the operator does not need to leave the cabin, thus saving time on the swapping procedure and decreasing effort and risk in the swapping process.

The battery-powered loader also helps to reduce heat and emissions underground, thus helping mines reach their sustainability targets and reduce ventilation costs. The robust battery pack uses Lithium Iron Phosphate chemistry (LiFePO4) and is purpose-designed for use in underground mining.

Currently, Sandvik is expanding the BEV loader and truck offering and prepares to enter new market areas. This move is expected to take place in phases and model by model. The manufacturer said, "When the battery loaders and trucks are introduced to new markets, Sandvik will be ready to provide full product support and aftermarket services for its customers." ■

Website: www.rocktechnology.sandvik

Sandvik reveals concept for autonomous mining equipment

The fully working and autonomous AutoMine Concept vehicle from Sandvik Mining and Rock Technology (pictured) is based on the latest technologies and is equipped with completely new sensing capabilities and artificial intelligence to enhance mining operations.

The AutoMine Concept perceives its surroundings and environment in 3D and reacts to it in real-time. These technologies provide clear customer advantages by allowing vehicles to adapt and plan their own routes, and to find the most suitable paths even in continuously changing environments. The obstacle detection, collision avoidance and 3D online mapping capabilities improve adaptability and increase flexibility.

"The AutoMine Concept is unique, because it has been designed ground-up for autonomous use. It is the world's first fully autonomous underground mining machine built specifically for automation," said Riku Pulli, vice president for automation at Sandvik Mining and Rock Technology. "This technology raises ease-of-use, effectiveness of asset utilisation and adaptability to a new level, resulting in higher productivity. These technologies will truly change the face and pace of autonomous mining."

This game-changing platform is a foundation for using the AutoMine technology in various equipment types and can be applied to any vehicle. The AutoMine Concept vehicle also has a completely new industrial design without a cabin, and with built-in components for high reliability and productivity. This autonomy platform allows for equipment design that is optimised for its primary production tasks without compromises. Furthermore, being fully battery-electric, it drives sustainability in mining without carbon emissions. ■

Vermeer R600T reclaimer for pipeline and large-diameter HDD projects

Vermeer has expanded its horizontal directional drilling (HDD) fluid management equipment line with the new R600T reclaimer. This 2,271.3-l/min mud recycling system can pair with maxi rigs pumping between 1,135.6 l/min and 2,271.3 l/min on pipeline and other large-diameter installation projects.

The R600T features a redesigned linear-motion shaker deck to help reduce weight, increase the available G-force and extend screen life, as well as several other performance and serviceability-enhancing features. With a one-level working deck, fast deploying walkway and centralised main controls area, the new reclaimer can be set up quickly and is efficient to operate.

The R600T is the successor to the popular R9x12T reclaimer that has been widely used in the pipeline industry. "Since Vermeer launched its first reclaimer, the industry has embraced mud recycling systems because these machines help reduce the amount of drilling fluid additives and freshwater required on HDD projects," explained Adam Bates, Vermeer product manager for fluid management equipment.

"Our latest generation of reclaimers, starting with the R250C reclaimer and now the R600T, are excellent machines for contractors because they are so efficient and thorough at separating sand and coarse silts from drilling fluids. Our latest reclaimer model, the R600T, offers excellent jobsite flexibility with its ability to work in conjunction with a range of maxi rig drill sizes."

The three-tank (scalped, middle and clean) R600T reclaimer has a total fluid capacity of 29,257.4 l, and can process 4,163.9 l/min of drilling slurry for a true cleaning capacity suited for HDD projects in the 2,271.2-l/min range. The drilling slurry cycles through two 25.4-cm desanders and a desilter manifold with sixteen 12.7-cm desilters to remove sand and coarse material before being deposited onto the unit's linear motion shaker decks. The innovative design of the desilter manifold reduces turbulence when the liquid exits the hydrocyclone to help minimise recycled sand content and keep spoil/soil moisture levels low.

Contractors also have the ability to choose their own power source for the R600T. They can configure the reclaimer with an onboard generator set or connect it to another power source they are already using on the job.

"Many contractors prefer to rent support equipment on large-diameter pipeline projects," said Mr Bates. "Equipped with quick-connect electrical cables, crews can quickly connect the reclaimer to a rented generator or even a shared gen set that may also be powering the drill's operator cabin." ■

Website: www.vermeer.com

ABOVE AND LEFT: **Vermeer R600T reclaimer can pair with maxi rigs pumping between 1,135.6 l/min and 2,271.3 l/min on pipeline and other large-diameter installation projects.**

New solution for safe descaling in preheater towers

The new Brokk Descaler is a specially designed solution for breaking out refractory, coating and build-up in a number of areas in preheater towers, primarily in cement and alumina plants. With a telescopic boom for excellent reach and remote-controlled manoeuvring, this machine is expected to revolutionise the working method for tearing out overhead material in preheater towers.

Health and safety are a constant challenge and an important issue for cement plants around the world. The hazardous work of tearing out refractory and build-up in cement kilns and coolers has previously put many workers in danger and by using remote-controlled Brokk robots, safety has improved immensely. However, similar issues with overhead refractory and coating has reportedly been the case in preheater towers for years, but with no safe and efficient solution.

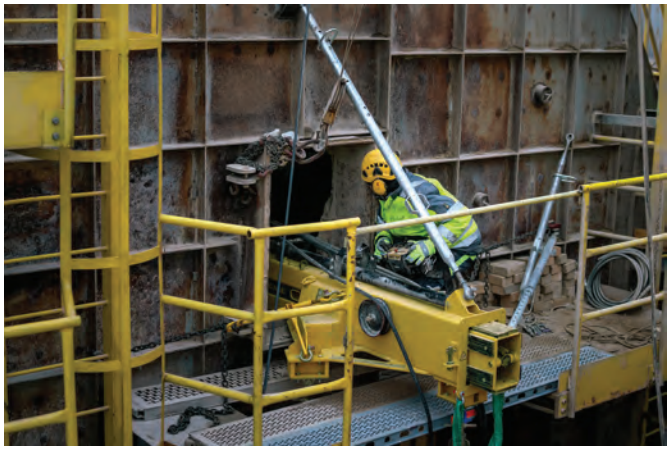
Brokk explained that conventional methods often involve manual pre-inspection before sending workers in on scaffoldings with handheld tools, making the work both critical and time consuming. The company highlighted the advantages of using a Brokk Descaler. For one, with a quick installation, faster demolition and no need to install scaffolding, the shut down time is notably reduced. And since the Brokk Descaler does not require people to go inside the vessel, work can also commence at 80°C.

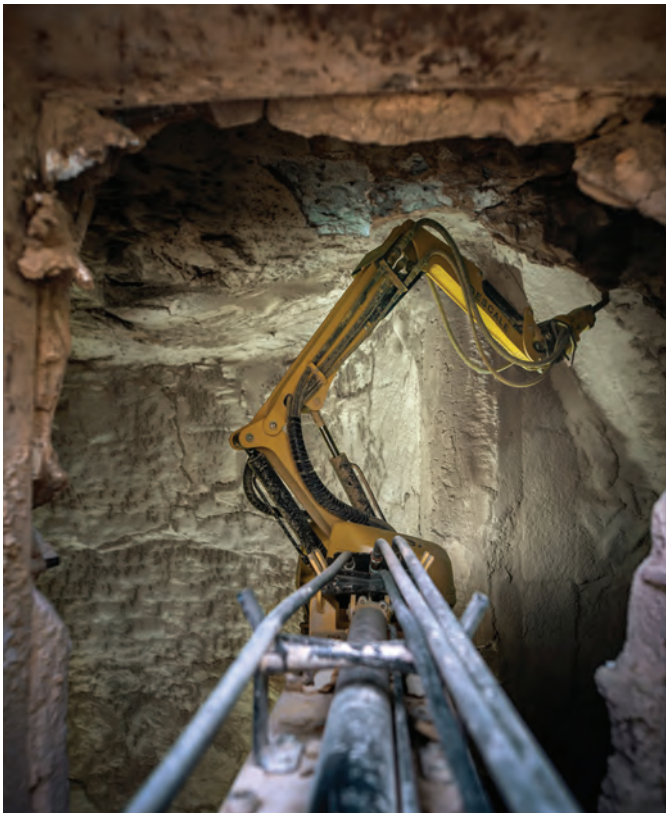
Today, workers are not only exposed to the risk of falling debris but also the silica dust that gets into the body and skin. Furthermore, the vibration from handheld tools is a known problem and causes 'white fingers'. The Brokk Descaler places the operators outside of the vessel and therefore, risks like this have either been eliminated or significantly reduced.

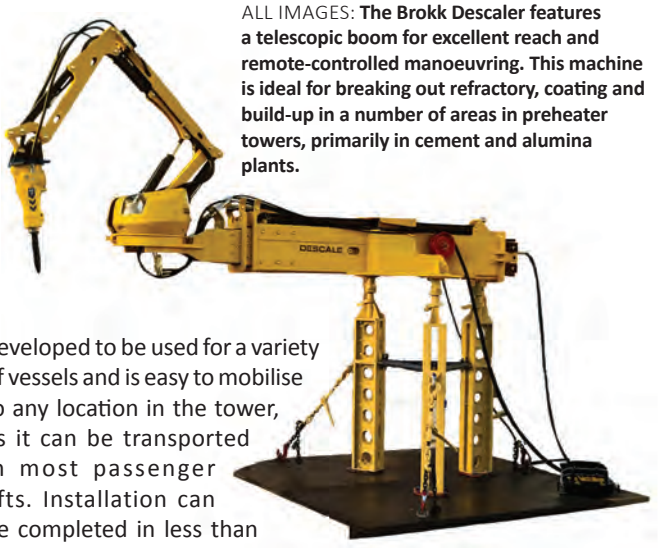
"Brokk robots have been removing people from overhead coating and refractory in cement kilns around the world for ages. With this solution we can also protect the workers in the preheater tower, where the risk of falling debris is as obvious as in a kiln," said Joakim Furtenback, international sales director at Brokk AB.

According to Brokk, the Brokk Descaler evolved from a standard Brokk robot and is modified to fit the application in preheater towers without compromising on power. The telescopic boom is extendable by one or two sections that allows for descaling in vessels up to 9.5 m in diameter.

As preheater towers feature different designs and the build-up appears in various locations depending on the design, raw material and other factors, a flexible solution is required, said Brokk. The company added that Brokk Descaler has been carefully developed to be used for a variety of vessels and is easy to mobilise to any location in the tower, as it can be transported in most passenger lifts. Installation can be completed in less than three hours and once installed, the operator can safely overview the work from outside of the vessel through hatches, which enables precise and controlled demolition.







ALL IMAGES: **The Brokk Descaler features a telescopic boom for excellent reach and remote-controlled manoeuvring. This machine is ideal for breaking out refractory, coating and build-up in a number of areas in preheater towers, primarily in cement and alumina plants.**

"Once you've seen the benefits of using the Brokk Descaler, there is no going back to the hazardous methods previously used," said Mr Furtenback.

Hundreds of tons of overhead refractory can be removed with zero physical contact and at a much faster pace than doing the same task manually. This ensures high productivity as well as safety for the workers, and ultimately, a safer and more efficient worksite. ■

Website: www.brokk.com

Snorkel's heavy-duty construction scissor lifts

The S9043RT is the mid-size model in the new family of Snorkel heavy-duty, rough-terrain construction scissor lifts. It can reach a maximum working height of up to 15.1 m and has a platform capacity of 680 kg. The smaller S9033RT features a maximum working height of 11.8 m and a lifting capacity of 1,134 kg. The largest model in the range, the S9053RT, offers a 17.9 m maximum working height and a 380 kg lifting capacity.

Equipped with powerful four-wheel drive and a 24.9-hp Kubota diesel engine, the new scissor lift family can handle the toughest jobsites with high grip foam filled tyres and 50% gradeability. The S9033RT and S9043RT can both be driven at full height, and the S9053RT can be driven at up to 9.1 m, and comes with four hydraulic stabilisers with automatic levelling as standard.

The spacious 3.58 m x 2.28 m platform includes a single 1.37-m manual roll-out deck extension as standard, which increases the working area to 4.95 m x 2.28 m. The working area can be increased further to 6.7 m x 2.28 m with the dual extension deck option, which is available either as manual or powered roll-out.

Designed primarily for use on construction projects, the large deck scissor lifts can be customised with a range of accessory packages, including a cold weather package and a choice of 2 kW or 12 kW hydraulic generators.

Weighing 5,443 kg, 6,350 kg and 7,484 kg respectively, the new Snorkel construction scissor lift family is designed with ease of serviceability in mind. A side mounted engine with a swing-out tray provides easy access for service and maintenance, and the lifts are fitted with the same on-board diagnostics system as many other Snorkel models, as well as commonality of spare parts with Snorkel's mid-size telescopic boom lift family.

According to Snorkel, the S9043RT is expected to enter production in late 2020, along with the S9033RT and S9053RT. ■

Website: www.snorkellifts.com

The Snorkel S9043RT has a maximum working height of up to 15.1 m and a platform capacity of 680 kg. It is part of the company's new family of heavy-duty, rough-terrain construction scissor lifts.

Kobelco and Leica partner for remote excavator operation

Kobelco Construction Machinery (KCM) has announced a new collaboration with Leica Geosystems to develop integrated 2D and 3D machine control solutions that can be operated remotely, as part of the K-Dive Concept.

KCM is developing a remote control system called K-Dive Concept. By manipulating a dedicated cockpit with displays showing the jobsite from an office, operators can control excavators remotely without going to the real jobsite. So now, with a focus on bringing more efficiency, safety and productivity through digitalisation to the heavy construction industry, KCM and Leica Geosystems are working together to help facilitate the remote operation of excavators. This partnership will leverage Leica Geosystems' know-how in relation to K-Dive Concept's next generation telework system using remote operation technology for operators.

K-Dive Concept will allow a diverse range of operators to work efficiently, having access to any jobsite without being restricted by location. Using a remote system enables contractors to view progress of jobsites virtually and it is also used as virtual training for operators.

"We have great ambitions with K-Dive Concept, and in our search for technology to achieve this, we are excited to work with Leica Geosystems," said Yoichiro Yamazaki, general manager, business development department, corporate planning division at KCM. "Our IoT revolutionises the improvement of safety and on-site productivity, allowing a diverse range of operators to work remotely."

"We are honoured to be chosen as technology partner in our common journey towards an autonomous jobsite," said Magnus Thibblin, president, machine control at Leica Geosystems. "Working with a leading excavator manufacturer like KCM, fulfill our ambition to be on the forefront of technology within the heavy construction industry."

The advanced Leica iCON 3D excavator machine control solution guides the operator using reference models and GNSS in 3D. Design information and real-time cut/fill indications are displayed on the control panel, allowing the operator to rapidly excavate to the reference design on projects, such as large road and infrastructure construction, subdivision building, industrial sites and demolition works. By using this solution via K-Dive Concept, remote operators can easily control excavators' performance on a jobsite in real-time. KCM also revealed that it will adopt high-speed 5G mobile communication systems as the core of K-Dive Concept in the future.

K-Dive Concept is a construction equipment telework service system being developed by Kobelco Construction Machinery, which allows operators to control their excavators remotely without going to the real jobsite.

Leica MC1 3D machine control solution guides the operator using reference models and GNSS in 3D. By using this solution via K-Dive Concept, remote operators can easily control excavators' performance on a jobsite in real-time.

K-Dive Concept enables construction machinery operators to work remotely by providing remote control and connecting data of operators, construction machinery and businesses. KCM highlighted that through such a human-centric work-style innovation, the company aims to create attractive environments where anyone can work and contribute to the creation of a prosperous society.

According to KCM, K-Dive Concept is under development aiming for the practical application in Japan, while the global expansion has not been decided yet. ■

Website: www kobelcocm-global.com

Auger Torque introduces VM mulcher series

Auger Torque has added the VM1000 and VM1500 mulchers to its product portfolio, which are ideal for mounting on both excavators and skid steer loaders. These new attachments are equipped with a drum drop change feature - believed to be an industry first – that enables users to switch easily between fixed tungsten tooth and swinging hammer drum when working on site.

The new VM (Variable Mulcher) series offers a working width of up to 1.5 m. Auger Torque said that since both the VM1000 and VM1500 have the unique feature of being able to change the drum on site, thus adapting quickly between parent machines for maximum versatility and flexibility on the job, costly downtime can be prevented. Users are also able to perform numerous applications with only one piece of equipment.

According to Auger Torque, the VM mulchers are suitable for the construction industry, in addition to the agriculture and forestry industries. The attachments are made from high-grade steel and have been overengineered to cope with the toughest conditions. External grease points, removeable side panels and skid plates allow for easy maintenance, while a triple belt drive system provides users with the reliability they need to get the job done.

Auger Torque said it is possible to have the mulcher set up for skid steer loaders and excavators simultaneously and clear dense low-level bushes with a skid steer, then mulch whole trees from top to ground level with an excavator. The fixed tungsten teeth drum gives a robust blunt cutting edge for grinding through thick timber up to 250 mm diameter, hedges and branches. The swinging hammer teeth drum delivers a cleaner, more precise cut for dense bushes, smaller trees and even slashing grass.

"We are excited to be launching the VM mulcher series today. It is one of our most impressive attachments to date, developed with the direct input of some of our longest standing customers at various sites around the world," said Matt Hencher, Auger Torque's global production manager. "Our aim is to always give customers the versatility and flexibility they need and this mulcher was designed with this in mind." ■

Website: www.augertorque.com.au

LEFT: **From mulching to land clearing applications, Auger Torque VM mulchers are suitable for the construction, agriculture and forestry industries.**

BELOW AND BOTTOM: **The mulcher's ability to attach a skid steer frame and excavator hitch at the same time, along with a removable pressure gauge and push bar, allows for easy adaptation between parent machines on site.**

Carmix Carsilos for enhanced jobsite productivity

Metalgalante Spa, a global manufacturer of self-loading truck mixers and mobile concrete batching plants, offers a range of silos to enhance work productivity at construction sites. Among them are Carsilos – a horizontal cement silo equipped with a screw conveyor and an electronic weighing system - and Carmix Bagger, a steel mini silo with a 3 cu m capacity that facilitates cement loading to ensure an accurate mix design.

Available in three versions (16, 26 and 36 cu m capacity), Carsilos features three main components. Its main structure has a positioning system that does not require the help of lifting machines. Its electronic load cell weighing system is easy to use, thanks to the process control and management display.

Another component of Carsilos is the vibration system, designed to control and regulate the flow of cement. The screw conveyor used to carry and unload material at the specified height, and an electronic control panel comprising all safety systems in compliance with EU standards, both allow Carsilos to achieve a high level of performance at any construction site. ■

Website: www.carmix.com

Carmix Carsilos is available in three versions: 16, 26 and 36 cu m capacity.

Dingli electric boom lifts now available in SE Asia

The electric boom lifts from Chinese manufacturer Zhejiang Dingli include both telescopic and articulating models. They offer load capacities of up to 454 kg and a working outreach of up to 22.65 m.

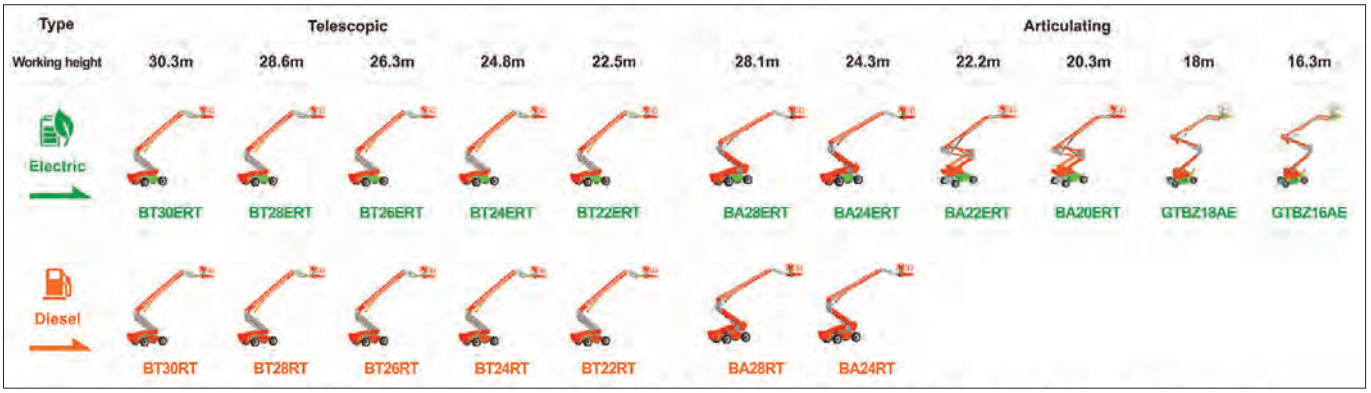
Featuring a modular design, these electric boom lifts are powered by an 80-V, 520-Ah high capacity lithium battery - it is maintenance-free and has a lifespan of eight years, said Dingli - which can be charged quickly for about 90 minutes. After that, the machines are capable of operating normally for up to four days.

The environment-friendly electric boom lifts provide zero emission and reduced noise, making them ideal for use in jobsites with strict environmental requirements, such as power grids, oil refineries and residential areas. The machines have a 30% gradeability (45% gradeability for the engine-powered boom lifts), four-wheel drive and steer, and 100% hydraulic differential lock.

According to Dingli, the electric boom lifts are designed with a dual-path sensing system, smart anti-entrapment system, smart safety valve protection system, and PVG main valve assembly with SI2 certification. Their lower centre of gravity combined with a smart control system also delivers a smooth and stable performance.

What's more, Dingli electric and engine-powered boom lifts are developed based on the same platform. They share 95% of structural and 90% of major components. As such, costs of maintenance, parts inventory and manpower can be greatly reduced. ■

Website: www.cndingli.com



Dingli's electric and diesel engine-powered boom lifts include telescopic and articulating models.

Volvo EC55D for Indonesian market

The latest new machine from Volvo Construction Equipment (Volvo CE) to hit the Indonesian market is the EC55D compact excavator with offset boom, which is ideal for general construction. The machine is now available from the company's local dealer, PT Indotruck Utama, which operates from 35 locations across the country.

The Volvo EC55D combines the Volvo cab, undercarriage and digging equipment from the earlier EC55B Pro model – but with a new design, counterweight, engine, hydraulic pump and travel motors. These upgraded features provide many additional benefits for customers while remaining within the same convenient dimensions and working range.

The EC55D is powered by a new Tier 3-compliant Volvo D2.6A engine for the Indonesian market. It promises the same high fuel efficiency customers came to rely on from the EC55B, except with quieter operation - and thanks to the inclusion of a turbocharger, it performs much better at altitude. The new hydraulic pump delivers 5% higher flow, allowing for faster cycle times and greater productivity. The engine cooling system offers greater durability and ease of maintenance; it now allows ambient temperatures of up to 45°C. The coolers are positioned side by side and the larger suction-type fan has more blades.

All Volvo engines and fuel system within Volvo CE machines work with diesel containing 50% bio-fuel. This meets Indonesia's B50 mandate, which requires the use of diesel containing 50% of bio-fuel.

The EC55D works with the optional EQD05 Volvo hydraulic quick coupler for maximising productivity. Sitting safe inside the cab, operators have full management of the attachment and benefit from locking systems in line with the latest safety regulations and ISO standards. The Volvo hydraulic quick coupler creates a more versatile and efficient machine to quickly and easily connect to a full range of compatible Volvo attachments.

The EC55D excavator is also compatible with Volvo's full line of hydraulic breakers, which are self-greasing and encased in a fully-sealed housing to protect the power cell, prolong their lifespan and reduce noise. The breakers' hydraulic systems are protected from pressure spikes by large capacity accumulators, which also serve to increase impact power.

Inside the cab, operators benefit from an improved air conditioning system with higher condenser, evaporator and blower capacities. This enables operators to stay comfortable and productive even in hot and humid conditions. A new seat and radio with aux-in and USB connectors also helps operators feel at home in their environment. For improved visibility and safety, the turret lights were removed and front cab lights are included as standard.

For ease of operation, all switches have been upgraded and are now common to other machines. This will help operators, especially of multiple Volvo machines, to quickly find their way around the cab. The EC55D also features a new automatic two-speed shift travel motor with increased low and high speeds, for greater productivity. ■

Website: www.volvoce.com/indonesia

Volvo EC55D compact excavator with offset boom is targeted at the Indonesian market.

Antar offers Zoomlion ZCT900 crane in Singapore

The latest addition to Antar's range of products for the Singapore market is a 90-t Zoomlion ZCT900 telescopic crawler crane. The machine has a five-section, U-shaped 47-m main boom. It can be equipped with a 14.2-m fly jib to bring the total boom length to 61.2 m. The fixed jib can be adjusted to 3 offset angle to suit customers' requirement.

The Zoomlion ZCT900 is powered by an imported Cummins QSL9-C280 engine, and fitted with Hirschman LMI (load moment indicator) system and Linder pump and motors for excellent reliability and quality. With a transportation width of 3 m, the crane can be transported easily between jobsites, making it highly efficient and versatile.

For operator comfort, the ZCT900 is designed with a tiltable cabin. This allows the operator to tilt the cabin when performing high rise lifting work, thus reducing fatigue caused by tilting the head and neck for a long period of time. Cost savings can also be achieved through the counterweight self erection feature, as it eliminates the need for additional cranes to carry out counterweight installation.

Antar Cranes Services Pte Ltd was established in 1999 as a lifting solution provider in Singapore. Over the years, the company has been involved in various private and public projects across the country. Antar has also been registered as an approved crane contractor by Singapore's Ministry of Manpower, specialising in mobile cranes including crawler cranes.

The company highlighted, "With a fleet of more than 120 cranes and constantly adding, we seek continuous improvements in safety and efficiency by providing the industry with the latest technology in our machines, such as electric mini cranes, heavy lift crawler cranes and telescopic crawler cranes. We have also expanded our offerings to provide MEWP (mobile elevating work platform) services, in addition to our lifting services." ■

Website: www.jpnelson.com.sg/ANTAR

The Zoomlion ZCT900 telescopic crawler crane has a five-section, U-shaped 47-m main boom. It can be equipped with a 14.2-m fly jib to bring the total boom length to 61.2 m.

Third generation of Sunward SWDM220-3 drilling rig

The third generation of Sunward SWDM220-3 drilling rig features enhanced agility and torque. It has a rotary torque of 240 kNM and 20% higher winch speed compared to its predecessor, thus users are able to improve their work efficiency and productivity to achieve better results.

JP Nelson recently delivered its 3G Sunward SWDM220-3 drilling rigs to TPW Engineering Pte Ltd in Singapore. "We are always committed to the continuous improvements of the rig, together with the manufacturer, and providing our customers with the best solution for both performance and affordability," said JP Nelson. ■

Website: www.jpnelson.com.sg

LEFT AND RIGHT: **The 3G Sunward SWDM220-3 rigs.**

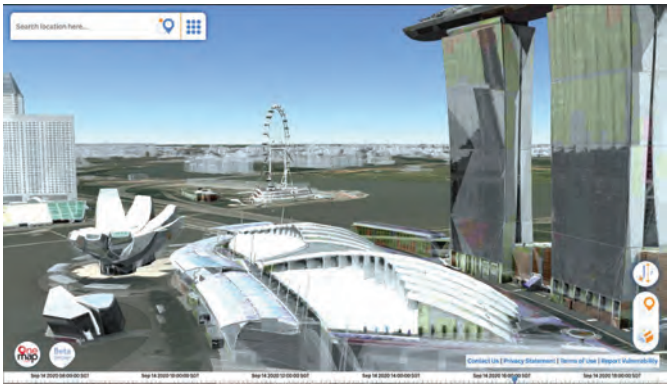
Singapore Land Authority launches OneMap3D Beta

The Beta version of OneMap3D, Singapore Land Authority's (SLA) open-source 3D city map portal, is now available for trial to businesses, developers and members of the public. OneMap3D Beta was launched on 17 September 2020, in conjunction with Singapore Geospatial Week+ 2020.

"With global attention and the trend of digitalisation, we are anticipating steady growth in the geospatial market. This is evident in the effort and resources invested by both the United Nations and the World Bank to strengthen geospatial expertise and adoption around the world. Riding early on the growth through GeoWorks, we envision Singapore to become the GeoHub of the region, with a well-connected industry network, supported by robust geospatial data to drive innovation," said Yeoh Oon Jin, chairman of SLA.

SLA's acting chief executive Simon Ong said, "3D city map provides an immersive view of a user's surroundings and serves as a dynamic visualisation platform. We hope the Beta version of OneMap3D will catalyse more co-creations of innovative solutions using 3D geospatial data. OneMap3D is continuously enhanced and we want to collaborate with businesses, developers and community users to improve the Beta version."

As one of the first pilot co-developers for OneMap3D Beta, BIMAGE Consulting's chief executive officer and managing director Ajith Menon said, "We hope that our partnership marks the path towards enhancing and extending the OneMap3D Beta data to support Virtual Design & Construction requirements needed for the built environment industry. This will not only increase productivity, but will also open up new business opportunities in asset planning and facility management."



LEFT: **Elevated view with Marina Bay Sands.**

BELOW LEFT: **Use of Orthophoto (satellite imagery) as a base map style for the Ang Mo Kio area.**

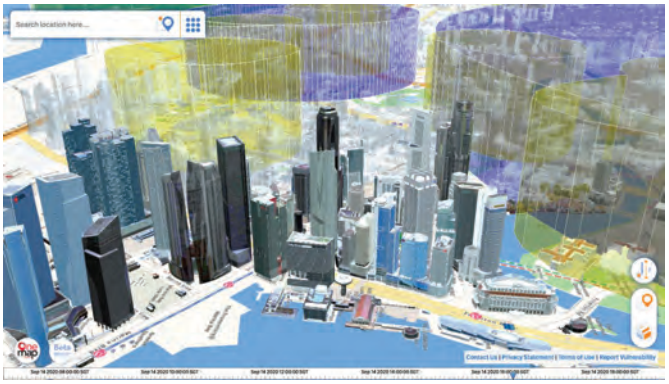
BELOW: **Street view as a navigational reference.**

Since 2010, OneMap has been serving the public as the national map of Singapore with the most authoritative and detailed map information in 2D format. OneMap is a multi-agency collaboration with continuous updates from government agencies for information and services such as navigating for places of interests, hawker centres, parks, sports centres and even heritage trees. Private sector entities and community users have also been leveraging on OneMap's Application Programming Interface (API), to create useful and value-added services.

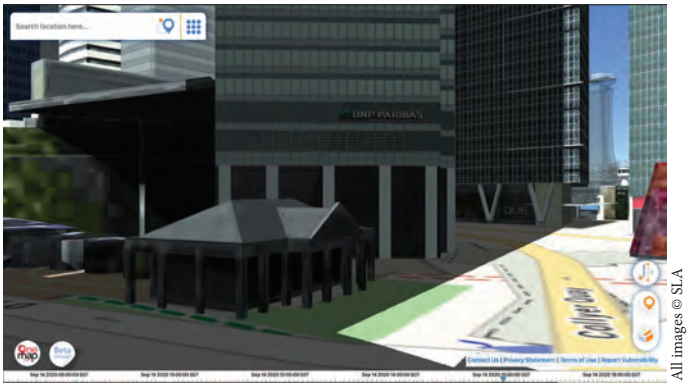
The OneMap3D Beta launch features pilot partners and co-developers with innovative use of 3D models. This follows SLA's initiation in September 2019 for industry collaboration to co-develop the nation's first open-source 3D map portal.

Besides built environment, the OneMap3D Beta is also suitable for other industries. For example, in the area of mobility and healthcare, Garuda Robotics has leveraged on 3D urban data from OneMap3D Beta to facilitate the use of drones to rapidly deliver AEDs to cardiac arrest victims within Singapore's complex urban environment. Garuda Robotics' chief executive officer Mark Yong said, "OneMap3D Beta has accelerated our development and deployment of life saving drones in urban Singapore. As a GeoWorks GeoTech, we have been working on drone solutions with the OneMap platform. The availability of 3D data will provide more possibilities and opportunities as we progress to the next phase of innovation with new and optimised solutions for the industry." ■

Website: www.OneMap3D.gov.sg



3D view of the various no fly zone restrictions.



Simulation of shadow casting on buildings.

All images © SLA

Vögele Super 3000-3(i) paver

The Super 3000-3(i) paver is part of the Premium Line from Vögele, suitable for both medium-sized construction projects and rehabilitation of motorways as well as for paving airport runways, large squares and traffic areas. The machine was unveiled to the global market last year at the bauma exhibition in Munich.

The Vögele Premium Line products are all equipped with the ErgoPlus 3 operating concept – which offers a number of advanced and practical features such as displays, automatic functions and enhanced convenience. Like all 'Dash 3' machines in the Premium Line, the Super 3000-3(i) is additionally equipped with the Vögele EcoPlus low-emissions package and is optionally available with the PaveDock Assistant communication system.

The Super 3000-3(i) is capable of laying down up to 1,800 t of mix per hour. With an output of 354 kW, the diesel engine supplies the paver with sufficient power to tackle large-volume paving jobs with ease. Paving quality is another key factor - it depends, among other things, on the correct height setting of the auger. This should always be adapted to the layer thickness.

Vögele has revolutionised the material transport on the Super 3000-3(i), to guarantee an optimum head of mix in front of the screed when working with different layer thicknesses. The height of the rear section of the chassis including the conveyors and augers can be infinitely varied at the push of a button, which enables material to be transferred to the auger from above. This supports an optimum material throughput and distribution of the mix, even when paving thick base courses.

The Super 3000-3(i) can be combined with the AB 600 extending screed and also the SB 300 and SB 350 fixed-width screeds. These fixed-width screeds ensure maximum surface accuracy, even when working with large pave widths – while paving without longitudinal joints. The SB 350 is capable of paving asphalt surface courses up to 5 cm thick, across a total width of 18 m. It is also able to lay down anti-freeze layers or water-bound bases with layer thicknesses up to 50 cm. The use of telescoping and positioning system for screed bolt-on extensions leads to shorter set-up times when working with varying pave widths.

What's more, the hydraulic bolt-on extensions are versatile when paving. At the push of a button, the pave width can be hydraulically varied by 1.25 m on each side of the screed – adding up to a total adjustment range of 2.5 m. Paver operators are also able to set the optimum tamper stroke of 4 or 8 mm on the paver operator's ErgoPlus 3 console or the screed console, adapting it to the current paving job.

With all these functions, the Super 3000-3(i) covers an extremely wide range of applications. The innovative material transport, hydraulic tamper-stroke adjustment and the wider hydraulic bolt-on extensions for the fixed-width screeds allow users to easily adapt the paver to the current jobsite – without mechanical conversion work. The set values can be saved and retrieved at any time with the automatic AutoSet Plus function. This enhances the efficiency, ease and quality of work processes. ■

Website: www.wirtgen.com

TOP, MIDDLE AND ABOVE: **Combined with the SB 350 fixed-width screed, the Super 3000-3(i) paver can deliver a pave width of up to 18 m. The machine is part of the Premium Line from Vögele.**

RIGHT: **The innovative material transport system, which allows the height of the rear section of the chassis, the conveyor and the auger to be adjusted, guarantees an optimum head of mix in front of the screed when paving in both large and small layer thicknesses.**

Kato introduces SR-500LX crane in Malaysia

Japanese manufacturer Kato Works Co Ltd has launched its new 51-t SR-500LX rough terrain crane in the Malaysian market. The machine features a five-section, 42-m-long boom and a two section, 13.7-m-long super luffing Ejib with strong lifting capacity that makes it suitable for compact jobsites (with 7.0 m fully extended outrigger).

The Kato SR-500LX is equipped with a K-COR data logger system, which records the working status of the crane. Powered by a Mitsubishi 6M60-TL engine, the machine also has an ACS load moment limiter with high resolution display, multiple view colour monitor camera, touch-screen information displays, and Eco-mode to improve energy saving.

The SR-500LX is now available from SH Heavy Machinery Sdn Bhd, the authorised sole distributor for Kato cranes in Malaysia. The company said, "With a strong support from our principal, we strive to provide the best quality in cranes for sales, rentals, parts and services. We are offering an intensive inventory of top industry brands, which bring you the best in hydraulic rough terrain cranes, truck cranes and all-terrain cranes (either new or used models) with capacities ranging from 13 t to 300 t." ■

Website: www.sinheng.com.my

The Kato SR-500LX rough terrain crane is now available in Malaysia, supplied by SH Heavy Machinery Sdn Bhd.

Potain MCH 175 helps transform projects in Shenzhen

China Construction Seventh Engineering Division has deployed two Potain MCH 175 tower cranes (known as the MCH 170 in China) on projects around Shenzhen. One is working on a fire station jobsite on Jingtian Road and the other is on a housing development on Panlong Road. These projects are part of the Chinese government's effort to transform Shenzhen into a global business centre by 2025.

"We selected Potain cranes because they are the top tower cranes in the industry and we are fans of the MCH 175's VVH hydraulic luffing system. The crane has a short out-of-service radius which makes it easy to work in tight spaces, such as downtown construction sites," said Ma Guihong, chief engineer at China Construction Seventh Engineering Division.

Both the MCH 175 cranes are new additions for China Construction Seventh Engineering Division and were put into operation in early February this year. On the fire station project, the first MCH 175 works about 12 hours per day lifting construction materials. Configured with a 35 m jib length and at an 80 m working height, the crane is expected to remain on site until early 2021.

On the housing project, the second MCH 175 works approximately 16 hours per day lifting construction materials, including rebar. Configured with a 35 m jib and at a 130 m working height, this crane is also expected to remain on site until early 2021.

The MCH 175 has a maximum capacity of 10 t, maximum radius of 55 m, and maximum tip capacity of 1.5 t. One of the crane's standout features is its VVH hydraulic luffing technology for raising and lowering the jib. This innovative feature moves the jib from

horizontal to 87° in less than two minutes, for faster work on site. The design also eliminates the need for luffing ropes, which saves on assembly time.

To further reduce on-site assembly time, the crane's hydraulics are pre-connected at the factory, allowing contractors to get to work faster. According to Manitowoc, the hydraulic cylinder that powers the luffing motion offers lower energy consumption than conventional luffing jib cranes. This means it requires a smaller generator, lowering costs for owner. ■

Website: www.manitowoc.com

ALL IMAGES: **Two units of Potain MCH 175 perform lifting work in Shenzhen. This crane model has a maximum capacity of 10 t, maximum radius of 55 m, and maximum tip capacity of 1.5 t.**

Tarmat excels at Cochin airport with Ammann equipment

Tarmat Ltd recently took on the reconstruction of the Cochin airport runway, located in the city of Kochi, Kerala state, India. The project required 3,000 t of asphalt mix to be placed daily – and in a five-hour working window. The resurfacing also included a profile correction of the runway.

"It is tough, demanding work that requires meticulous planning and timely execution with stringent quality assurance," said Jerry Varghese, founder of Tarmat Ltd. "We were issued a timeframe of eight months to complete the project, but have managed to execute over 90% of the work in four months."

To help carry out the job, Tarmat utilised several Ammann products on the project, including two Ammann ABC 140 ValueTec asphalt plants and an Ammann sprayer.

"One of the key success factors is that we did not miss out on our productive hours by even a minute," said Mr Varghese. "I would attribute this high productivity, which was instrumental to our success on the Cochin airport runway project, to Ammann India and its employees.

"The Ammann customer support team has been very cordial and co-operative in extending on-site parts support. Ammann India deployed trained operators and technicians at the site, which helped us significantly in becoming productive instantly."

Mr Varghese added, "Ammann engineers have been monitoring the condition of ABC ValueTec batch plants and machines on a regular basis, almost daily. The plants and machineries were maintained pro-actively, thereby ensuring zero breakdowns.

"The best part is, the maintenance routines were scheduled by Ammann India in such a way that our productive hours were not impacted at all. The suggestions given by Ammann India towards pro-active maintenance were very helpful, and gave our team a new perspective on how to achieve more with Ammann products."

Headquartered in Mumbai, Tarmat has operations spread across the states of Maharashtra, Tamil Nadu, Karnataka, Kerala, Mizoram, Gujarat, Delhi, and Jammu and Kashmir. The company mainly provides engineering, procurement and construction services for infrastructure projects sponsored by the central and state governments. ■

Website: www.ammann.com

ABOVE AND BOTTOM: **Tarmat had to complete the runway project at the Cochin airport within a short timeframe. The job was carried out with the help of Ammann ABC 140 ValueTec asphalt plants and an Ammann sprayer.**

BHS-Sonthofen chosen for Can Tho airport expansion

Dai Nam Construction Machine JSC has supplied a concrete batching plant to Thang Long Gia Lai Company, which was in charge of the Can Tho airport expansion in the Mekong Delta region of Vietnam. The airport was built in 2011, with a capacity of five million passengers per year. In 2018, the airport added another airplane parking area. To complete this task, Dai Nam contacted Van Tuong Minh (VTM) - the official distributor of BHS-Sonthofen in Vietnam - for the most advanced mixing technology.

In the Mekong Delta region, the rainy season typically starts in May and lasts until the end of November. Not only the rainfall can affect construction work, but it also leads to high humidity and heat. "As the concrete production for the airport was scheduled for August, we knew that we will not have many rain-free days to fulfil this task. For our batching plant, we therefore needed a mixer with high reliability. Even a short down-time could jeopardise the project," said Mr Tien, managing director at Dai Nam.

A DKXS 4.00 twin-shaft batch mixer from BHS-Sonthofen was finally selected by Dai Nam, which has a capacity of 200 cu m/hr for ready mix concrete and 120 cu m/hr for the zero-slump high strength concrete. The concrete batching plant was built in Dai Nam´s factory in the Dong Nai province. It had to produce 18,000 cu m of concrete within 45 days in this project.

The plant and the mixer were shipped to the airport construction site and installed within 15 days. The concrete type was unusual: zero slump and MAC 350 (350 kg/cu cm) with big stones up to 40 mm in diameter were used – a challenge for the mixing gear.

"The arrangement and design of the mixing tools, together with individual drive configurations and speed options, makes the DKXS 4.00 mixer the optimal machine to achieve consistent homogeneous mixtures in less time with no breakdowns," said Philipp Parnitzke, area sales manager for Asia Pacific at BHS-Sonthofen. "So this special mixer is perfect for a time-critical project like the airport expansion."

The BHS mixer reportedly fulfilled the task without a single down-time, so the 18,000 cu m of concrete could be produced in the requested time of 45 days. Specifically, the BHS mixer was running at its maximum designed capacity - 4 cu m per batch - and this was considered by the operator as 'unique' because they always run 85%-90% capacity for safety when they used other brand mixers.

According to BHS-Sonthofen, after finishing the project in Can Tho, the plant and mixer were moved to Lam Dong Province for another project - the Lien Khuong airport parking lot expansion with a total of 20,000 cu m of required concrete. ■

Website: www.bhs-sonthofen.de

ABOVE: **The concrete batching plant with the DKXS 4.00 twin-shaft batch mixer from BHS-Sonthofen produced 18,000 cu m of concrete.**

LEFT: **The DKXS 4.00 mixer has a capacity of 120 cu m/hr for the zero-slump high strength concrete.**

The concrete mixture with big stones of up to 40 mm in diameter was a challenge for the mixing gear.

The DKXS 4.00 mixer was running at its maximum capacity of 4 cu m per batch, so that the airport expansion could be finished in the requested time.

All images © Dai Nam Construction Machine JSC

Haulotte plays role in Yunnan to Laos railway construction

A Haulotte HA16 RTJ articulating boom lift has been involved in the construction of a section of the Yunnan to Laos railway project. The main line is 508 km long, with 18 new stations and two reconditioned stations.

As the line passes through high tunnels (8 to 11 m), the project team opted for the HA16 RTJ to perform a safe and efficient work on electric lighting, mechanical ventilation, and fire protection.

Designed to tackle the most demanding jobs, the HA16 RTJ features fully proportional and simultaneous movements to reach the work area quickly and precisely. The unit provides an excellent work envelope with an outreach of 8.3 m.

"The ultra-fast elevation speed enables us to gain productivity. Our team felt confident while working at height and worked in complete safety," said Mr Wang, the project manager. A service engineer from Haulotte Shanghai also went on site to train the operators and promote the safe and effective use of the machine. ■

Website: www.haulotte.com

RIGHT: **Haulotte HA16 RTJ articulating boom being used in the construction of a section of the Yunnan to Laos railway project.**

Liebherr machines meet challenges in Germany

The Deutsche Bahn (German Railway) is extending the suburban railway network in Munich, with the construction of a second core line between the Laim and Leuchtenbergring stations. A central entrance to the tunnel is in the Altstadt at Marienhof. Here, the joint venture VE 41 - comprising Implenia and Hochtief - is carrying out slurry wall work using Liebherr equipment.

The challenges lie in the large dimensions of the slurry walls and the extremely confined space on the construction site. Due to the partially historical buildings in the immediate surroundings, an application with low vibration is necessary for the installation of the slurry walls. At the same time, it must also meet the high demand for compactness and verticality. For this task, the contractor chose a Liebherr LSC 8-18 L slurry wall cutter.

The cutter's high weight, high cutter frame and low centre of gravity provide the optimum basis to achieve the necessary verticality. Maximum process safety is delivered through the full integration of the verticality measurement in the Liebherr control system. Furthermore, 12 independently controllable steering flaps can correct the cutting direction should any possible deviations occur. The actual position of the flaps is displayed in real time on the monitor in the operator's cab. In order to deal with the confined spaces of urban construction sites, the cutter can be positioned over the bite using a continuous hydraulic turning device.

The Liebherr LSC 8-18 L cuts its way through 33 cu m of soil per hour and requires eight hours for a primary trench. A total of 108 trenches measuring 1,500 x 3,200 mm with 30 cm overlap must be installed on the project. The second core line is scheduled to open in 2028.

Besides the cutter, a Liebherr HSG 5-18 hydraulic slurry wall grab is used on the project as well. It is also fitted with verticality measurement and a turning device for the frame, mainly used for the initial excavation of the trenches. The carrier machine for both the grab and the cutter is a Liebherr HS 8130 duty cycle crawler crane.

The joint venture is using the SPC 600 C separation plant, which Liebherr offers as part of a complete package for slurry wall applications. Other machines working on the project include Liebherr LB 24 and LB 44 drilling rigs, plus a Liebherr LR 1250 crawler crane.

In another development, a Liebherr LB 45 drilling rig is being used for the rebuilding of the Neckartal Bridge at Heilbronn, as part of the A6 motorway upgrading project.

The A6 motorway crosses through southern Germany, stretching between the French and the Czech borders. The upgrading work includes the rebuilding of the Neckartal Bridge, between the Untereisesheim and Neckarsulm junctions. Here, Hochtief Infrastructure GmbH installed the foundation piles using the LB 45 drilling rig. The machine has a nominal torque of 450 kNm.

Foundation piles were also required on the 'Neckar Island', which lies about 100 m from the riverbank. The drilling rig was transported there by pontoon. Following transportation, Hochtief built a pontoon bridge from the pontoon elements so that site traffic could cross. However, the drilling rig was too heavy for the pontoon bridge.

After completion of this construction phase, the bridge had to be rebuilt back to a pontoon so that the LB 45 could return across the Neckar. The simple handling of the machine proved to be a huge advantage both when operating it and when facing such logistic challenges.

Liebherr LSC 8-18 L slurry wall cutter is currently working on a railway expansion project in Munich. It cuts its way through 33 cu m of soil per hour and requires eight hours for a primary trench.

ABOVE AND LEFT: **Liebherr LB 45 drilling rig at the rebuilding of the Neckartal Bridge. The machine has installed 106 foundation piles during the six-month piling work.**

During the six-month piling work, Hochtief installed 106 foundation piles using the Kelly drilling method with auger and rock drilling bucket. The company handled 170 t of steel reinforcements and 2,000 cu m of concrete in the process. On average, the piles are 11.5 m deep and have a diameter of 1.5 m.

Depending on the density of the rock and the drilling depth, Hochtief required about two hours for each pile; including concreting, 2.5 piles could be installed per day. The bridge is expected to be open for traffic in mid-2022. ■

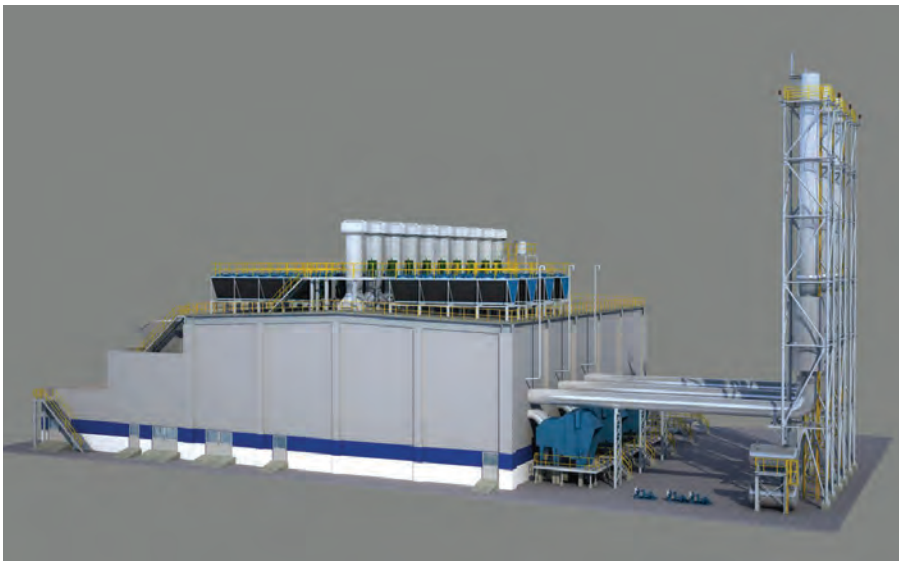
Website: www.liebherr.com

Rolls-Royce joins Dhamra LNG terminal project in India

Rolls-Royce has secured a contract to deliver the engineering, procurement and construction (EPC) of a 29 MW gas-based power plant for an LNG terminal, located on the eastern coast of Odisha in India.

The contract was awarded by Dhamra LNG Terminal Pvt Ltd (DLTPL), a joint development between Indian multinational conglomerate Adani Group and French energy major Total SA. The LNG terminal will function as a reception facility for import of LNG, where LNG tankers can directly unload cargo and converting the LNG gas from liquid state to gaseous state.

The highly efficient power plant will meet the baseload capacity of the LNG terminal and offers reliability and availability of more than 98%. The core equipment for the new gas-based power plant includes three 9.6 MW gensets, based on the 20-cylinder Rolls-Royce Bergen B35:40 gas engines. These medium-speed gas engines are characterised by high availability and low operating costs. The engine's efficient combustion technology, in addition to being fuelled by a clean LNG fuel, also ensures low environmental impact coupled with improved performance.



ABOVE: **When commissioned in the end of 2021, the Dhamra LNG terminal is set to be the second LNG plant in India that is powered by Rolls-Royce Bergen medium speed engines.**

BOTTOM: **Core equipment for the new gas-based power plant will include three 9.6 MW gensets, based on the 20-cylinder Rolls-Royce Bergen B35:40 gas engines.**

SP Singh, CEO of Dhamra LNG said, "We are delighted to have a Rolls-Royce company supplying us with the critical power system for our upcoming terminal in Odisha. Rolls-Royce's selection followed a thoroughly competitive tendering process and we are reassured by their extensive experience in the area of power systems both globally and for Indian LNG terminals."

When commissioned in the end of 2021, the Dhamra LNG terminal is set to be the second LNG plant in India that is powered by Rolls-Royce Bergen medium speed engines. Rolls-Royce has earlier supplied and commissioned a 28 MW power plant in 2018, running on LNG fuel to the Indian Oil Corporation LNG terminal at Ennore, Tamil Nadu.

Designed for an initial capacity of 5 mil t per annum (MTPA), expandable up to 10 MTPA, the proposed Dhamra LNG import and regasification terminal will initially have two full containment type tanks of 180,000 cu m capacity each. Rolls-Royce will be managing the engineering, procurement, and construction of the new gas power plant for the LNG terminal. ■

Website: www.rolls-royce.com/bergen

CONSTRUCTION PROJECT ADVICE & SITE CHECKLIST

By: Linesight

As the construction industry across Asia transitions towards reopening, it continues to face challenges and disruption due to Covid-19. The measured easing of restrictions in recent weeks implies that stakeholders must understand the implications of the latest guidelines and interpret them appropriately for their construction projects. Here, we focus on three core areas that are fundamentally important in the successful reopening of construction projects: supply chain management, procedures for sites that are reopening, and new ways of working.

Supply chain management

The impact on the supply chain has been one of the key considerations and vulnerabilities for the construction industry. Significant disruptions to delivery schedules, reopening of manufacturing facilities, and material supply remain a challenge. This is especially true in the case of diversification of supply chain, where the focus on local suppliers has increased and become a fundamental objective. Strength and resilience within the supply chain has become crucial given the risk of financial instability, strain on resources, reduced efficiencies, lower working capacities, and increased sanitation checks leading to longer lead times. On a positive note, the adaptability of suppliers has become visible, and Covid-19 has undoubtedly spurred the digitalisation of supply chain management and resource planning, thereby supporting increased communication and enhanced supplier relations.

The below steps are the core considerations with regards to supply chain management for site resumption:

- ✔ Seek to protect and maintain good business relationships. Most businesses within the supply chain are dealing with similar issues, under similar stress, and likely to be suffering similar impacts. Collaborate with contractual partners to maintain goodwill, while recognising that potential losses may need to be shared.
- ✔ Review with the contractor/sub-contractors the opportunity to identify the suppliers who are continuing to manufacture/supply components/material for the project, with capacity and even possibly shared resource pools, and organise warehousing and increased inventory/supply of same during this challenging period to minimise disruptions.
- ✔ Liaise with key suppliers to establish the status of supplier materials/products, and the supplier risk and contingency recovery plans they have in place for post-Covid-19 recovery of order/delivery times.
- ✔ Employ the use of a Collaboration Strategy to maintain close contact with contractors, sub-contractors, and suppliers during this period, facilitating cashflow payments where appropriate.
- ✔ Liaise and collaborate with the contractor to consider arrangements for conducting real-time, remote video Factory Acceptance Testing, where suppliers are able to continue with plant/factory testing and fabrication of materials, so as to verify that the supply chain will continue producing and that key equipment, when delivered to site, has been tested, and can be speedily installed.
- ✔ When considering interim cashflow arrangements with contractors/sub-contractors where appropriate, look at implementing arrangements that can continue to facilitate key supply chain delivery, if legally possible, even while sites are not fully operational.

Procedures for sites that are reopening

As sites reopen, a range of measures and procedures can be employed to secure a seamless transition.

- ✔ Use the site downtime to review all issues and future Covid-19 potential issues, and working protocols which may emerge as the industry continues to reopen. It will help in preparing as projects near full capacity once again.
- ✔ The suspension of works on-site enables employers and their professional teams to review programme delivery challenges and consider how programme issues might be addressed and how the key critical path activities might operate when sites reopen.
- ✔ Establish and implement planning sessions to develop a revised project programme when work resumes on-site. When preparing the programme, assume resources and workforce densities will be limited, screening measures will be imposed, and stringent procedures will be required to be put in place. There is a need to model how these measures might be implemented, the likely effect they may have on progress and timelines, and measures that might be implemented to mitigate any programme delays, including shift work and weekend working.
- ✔ Liaise with professional team and contractor to consider possible applications to building control and planning authorities, to seek short-term exemptions around restriction on working hours to facilitate shift work and weekend working when sites reopen and works resume whilst Covid-19 restrictions remain in place.

- ✔ Liaise with the contractor to consider any potential programme, resources, sub-contractor, and materials or equipment bottlenecks that may arise, and establish whether arrangements may be possible for pre-delivery of potentially scarce/unavailable materials/equipment.
- ✔ Liaise with the professional team or contractor to review all supply chain challenges and consider alternative products/ suppliers that might address concerns.
- ✔ Consider and seek legal advice as to what post-Covid-19 precautions and restrictions may still need to be implemented on-site after sites reopen and works resume. Consider the impact of continued social distancing on-site and screening or testing of workforce.
- ✔ Liaise with your professional team and the contractor to agree a re-mobilisation procedure and programme, to clearly identify the activities that need to take place before the site reopens.

New ways of working

The pandemic has become a tipping point for remote workers in organisations and caused an unequivocal shift in how professionals conduct their work. Most organisations are encouraging employees to work from home. This, according to Gartner research, constitutes 88% of the workforce, and the construction industry has not been spared from being part of this statistic.

So how will the industry evolve going forward? Below are some possible outcomes:

✔ **Continued work from home**

Construction companies have successfully retained operations for the most part over the past five months, with their teams working from home across the globe. While most of these roles would fall under the administrative or project management categories, organisations have discovered that productivity has either been maintained or increased with this arrangement, and companies now see numerous benefits including potential overhead savings in continuing work from home arrangements.

✔ **Agile work environment**

Successful remote working is dependent not only on the software and tools that are made available, but also on the ability of people within an organisation to coordinate teams across divisions to work together. It is crucial to have a solid infrastructure in place for connectivity and productivity; as well as properly manage and resource work across departments. This lays greater emphasis on the role that project management professionals play within an organisation.

✔ **Redefining 'home' in work from home arrangements**

Whilst most organisations focus on productivity, staff morale and well-being are also key considerations that contribute to continued delivery. Although there is great promise of savings and mutual benefit with this arrangement, it is important to check what local guidelines are in place for moving staff during these uncertain times before companies move in this direction. There are considerations around permit rejections and re-entry approvals for staff who will eventually return, as local governments announce their firmer stance in this regard. Organisations must monitor Government response, as this will continue to change and evolve at a considerable pace as we emerge from the crisis. This consideration is especially important, as it relates to organisations' use and treatment of the alternative workforce, particularly in industries that rely heavily on them.

Conclusion

There are numerous considerations to be made as sites reopen and projects resume on a gradual and controlled basis. While the landscape for supply chain management has shifted dramatically, an effective approach and employment of diversification tactics within the supply chain is all the more pertinent in light of the tumultuous times. Ultimately, with changes seen in the year, there is a requirement for increased adaptability and a more collaborative approach from all stakeholders, to secure a successful and stable future for construction.

In addition to the above adjustments, there is a constant push to embrace digitisation. The aim is to make data collation and data analysis a key strategic asset when managing projects, while forcing the industry to become more structured as well as resource and time focused. It also brings to the fore the need to future proof buildings should another pandemic of this scale arise. ■

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FOUR PROFESSIONAL ENGINEERS WIN BCA AWARDS

Four Professional Engineers in Singapore have won the BCA Design and Engineering Safety Awards 2020. These awards, given by the Building and Construction Authority (BCA), honour the engineers and their teams for their innovative designs and engineering solutions to challenging projects.

DfMA concept for iconic building

One of the winners, Engineer (Er.) Kam Mun Wai from Meinhardt (Singapore) Pte Ltd is recognised for his engineering solutions in the construction of the iconic Singapore Management University (SMU) Connexion, an on-site net-zero energy teaching block in the city.

SMU Connexion is believed to be the first building in Singapore that incorporates a hybrid steel-cross laminated timber (CLT) floor system. This innovative solution was chosen for its quick and efficient installation process, in order to mitigate the challenges of onsite space constraints and construction in close proximity to existing occupied buildings.

Er. Kam also used prefabricated modular column-beam steel frames for the main building structure. As the frames were designed to be self-supporting, the project team avoided the need for temporary propping during construction. The frames were also of a standard design, allowing faster and safer installation on site. The end result was substantial time savings and reduction of building costs, as there were no need for temporary works. Likewise, the use of CLT panels further reduced construction time as the panels were lightweight, prefabricated to actual dimensions and easy to install.

Speaking during a press conference, Er. Kam explained that given the challenges, SMU Connexion could not be designed as a conventional building due to its short construction duration. So the project team decided to adopt the DfMA (Design for Manufacturing and Assembly) concept for this development.

In addition, Er. Kam and the project team had to overcome the challenge of constructing a two-storey link building over Fort Canning Link carriageway, which had to be temporarily closed for the building works to take place. The project team had to erect the structure quickly and safely, while minimising disruptions around the area. This was accomplished using a similar hybrid steel-CLT slab solution. As such, the project team avoided the need to erect temporary support structures over the carriageway.

To support the building of the link, a pair of modified pratt trusses, spanning 27 m across the road, were employed. The lower segments of the trusses were meticulously designed and engineered to support incremental loads from the construction of the upper trusses, floor beams and CLT slab panels. This enabled the concurrent installation of the upper truss segments and CLT flooring. The entire link building structure was completed in a record time of seven days.

Preserving heritage through innovation

Another winner, Er. Aaron Foong from KTP Consultants Pte Ltd - a member of Surbana Jurong - was the Professional Engineer in charge of the building works at the iconic Maxwell Chambers Suites, previously known as the Red Dot Traffic Building. A key challenge for Er. Foong was the construction of a 20-m overhead bridge linking the Maxwell Chambers Suites to the Maxwell Chambers.

In order to support the additional load of the bridge, there was a need to strengthen the existing buildings. However, because both were conserved buildings, conventional strengthening methods such as adding new independent columns at the exterior or enlarging existing beams and columns to support the link bridge were not allowed, as these would alter the external facade of the buildings. An additional challenge included having to lay the foundation within the confines of an existing electrical substation that was in operation.

Er. Foong devised an elegant solution by designing a novel Z-profile steel brace that could support both existing loads from the existing structures and the incremental loads from the new construction. When bonded with the integrated frame on the facade, this allowed the structural strengthening system to support the new overhead link bridge without any modifications made to the exterior facade of the conserved buildings. This also enabled works to be done safely from the interior of the building.

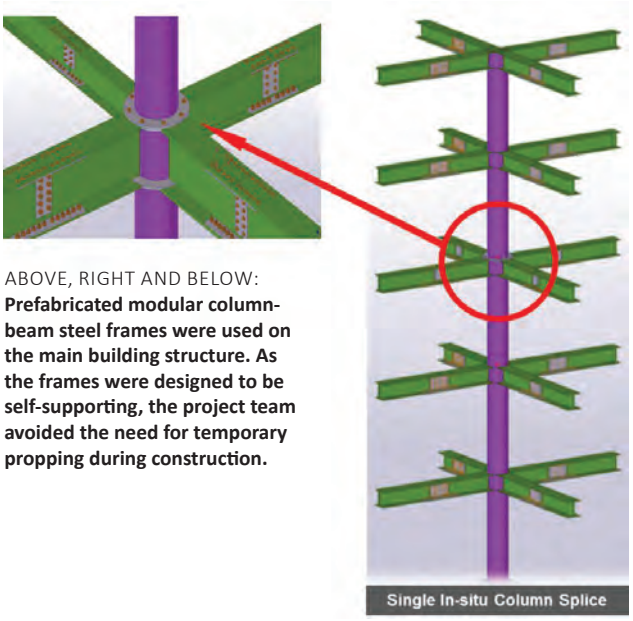
According to Er. Foong, the overhead link bridge is lightweight, weighing about 10 t, and was installed in just one night with the help of a mobile crane. He mentioned that prior to selecting the Z-profile steel brace solution, the team explored a number of options but none of them could meet the requirements.

Furthermore, Er. Foong implemented an innovative foundation strengthening solution within the live electrical substation, working within the tight working space of Maxwell Chambers. This was done by adding new micro-piles under the existing footing foundation. By making this careful modification, it safeguarded the integrity of the existing foundation that supports the weight of the existing building in operation and directed the new incremental loads to be safely transferred to the new micro-piles. This also minimised disruption to existing operations at the Maxwell Chambers.

Two other award winners, Er. Jason Tan Bok Leng and Er. Tan Yoong Heng, both from Arup Singapore Pte Ltd, are also recognised for their engineering achievements in the Outram Community Hospital and Thomson-East Coast Line Contract T203 TE2 Woodlands Station projects respectively.

The BCA Design and Engineering Safety Awards include six categories: Residential, Commercial, Institutional and Industrial, Civil Engineering, Small Scale Projects (cost < S$30 million), and Overseas. The awards specifically aim to inculcate a strong safety culture among building professionals in developing Singapore's built environment; give recognition to Qualified Person for Structural Works [QP(ST)] and their firms for engineering achievements; and provide an avenue through which competition for work excellence can be enhanced. ■

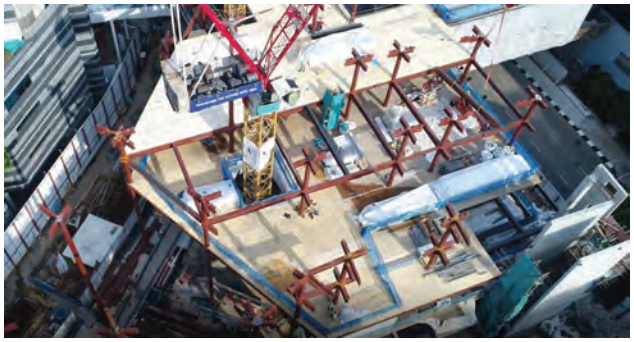
The Singapore Management University (SMU) Connexion project



ABOVE, RIGHT AND BELOW: **Prefabricated modular column-beam steel frames were used on the main building structure. As the frames were designed to be self-supporting, the project team avoided the need for temporary propping during construction.**

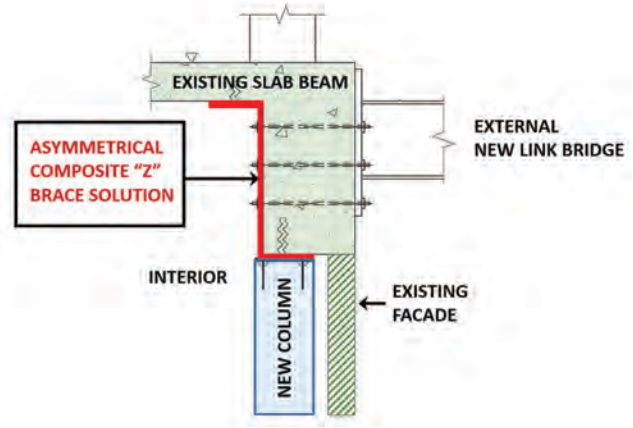
ABOVE: **A pair of modified pratt trusses, spanning 27 m across the road, were employed to support the link building.**

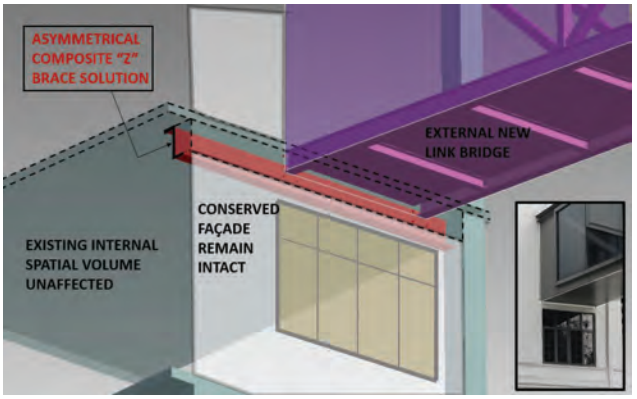
BELOW: **SMU Connexion is believed to be the first building in Singapore that incorporates a hybrid steel-cross laminated timber (CLT) floor system.**



Images © Singapore Management University

The Maxwell Chambers Suites project





Images © KTP Consultants

A novel Z-profile steel brace solution was adopted on this project, which could support both existing loads from the existing structures and the incremental loads from the new construction. When bonded with the integrated frame on the facade, this allowed the structural strengthening system to support the new overhead link bridge without any modifications made to the exterior facade of the conserved buildings.

Details of the four winning projects can be read in the following pages.


© Singapore Management University

Institutional and Industrial Category

Singapore Management University (SMU) Connexion – Excellence

Qualified Person:
Engineer Kam Mun Wai

C&S Consultants:
Meinhardt (Singapore) Pte Ltd

Builder:
Lian Ho Lee Construction (Private) Limited

Developer:
Singapore Management University

Architectural Consultants:
MKPL Architects Pte Ltd

KEY CHALLENGES

• First on-site net zero energy and WELL pre-certified building in the city.
• Fast track programme – 15 months construction including piling, main building and ID fitting-out work.
• Construction of a two-storey link building over Fort Canning Link carriageway to connect to SMU School of Law.
• Extremely tight site and close proximity to sensitive buildings and services.

SOLUTIONS

• Innovative hybrid structural steel – cross laminated timber (SSCLT) system, adopting extensive off-site fabrication of steel frames and CLT floor slabs for the superstructure. The prefabricated components were erected on site with simple mechanical connections. This system is extremely lightweight, highly buildable and productive. SMUC is the first project in Singapore to employ this hybrid system.
• Structural design innovation using the lightweight, highly buildable SSCLT system, coupled with a well-strategised sequence enabled the successful erection of the link building structure within seven days over the Fort Canning Link.
• Safeguarding and integration of critical underground infrastructure services into the new building design to avoid diversion and saved time.
• Adoption of Design for Manufacturing and Assembly (DfMA) for other major components - like staircases, steel roof, modular M&E and building facade - further improved manpower productivity on site.


© Maxwell Chambers

Commercial Category

Maxwell Chambers Suites – Excellence

Qualified Person:
Engineer Aaron Foong Kit Kuen

C&S Consultants:
KTP Consultants Pte Ltd

Builder:
Guan Ho Construction Co (Pte) Ltd

Developer:
Ministry of Law, Singapore

Architectural Consultants:
W Architects Pte Ltd

Gazetted as a conservation building in 2007, Maxwell Chambers Suites has a rich heritage and historical significance. Built in 1928, the building was first used as barracks for the police force, until it became the Traffic Police HQ between the 1930s and 1999. After the building was vacated, it underwent a refurbishment and reopened as the Red Dot Traffic Building with a signature red facade in 2005. The extensive restoration of Maxwell Chamber Suites started in 2017 and preserved the building's heritage character while repurposing it for its use today as a global dispute resolution centre.

KEY CHALLENGES

• Sensitive restoration of a century-old heritage building with stringent conservation requirements to create new connectivity, improve accessibility and spatial specifications for modern commercial use.
• Intricate structural strengthening solution to enable a new overhead link bridge structures through two conserved heritage buildings' facade without removal of any periphery facade elements around the connection.
• Strengthening of existing foundations within the live electrical sub-station in a safe manner.

SOLUTIONS

• Rigorous engineering analysis with carefully considered loading scenarios and designing detailed construction sequences ensured high margin of safety for the structural integrity of the newly integrated structures, while maintaining the key historical features intact at all times.
• Innovative bonded 'Z' steel plate detailing served as an elegant composite strengthening solution to support the new overhead link bridge without encroaching into the conserved facade of the heritage buildings, and also enabling works to be done safely from the inside of the secured buildings.
• Combined foundation strengthening with micro-pile composite foundation cored through the existing shallow foundation, which achieved a robust integrated foundation and safe working space with zero disruption to the critical electrical substation operations.
• A highly modular and optimum composite structural steel system using a single beam and single column.

Institutional and Industrial Category

Outram Community Hospital – Excellence

KEY CHALLENGES

• A 19-storey building with four basement levels, located next to a live hospital campus and critical roads used by ambulances.
• The site was constrained by railway reserve line restrictions, and soil strata composed of Jurong Formation made excavation challenging.
• A 300-m underground tunnel linking the hospital's basement to an existing basement meandering under structures, such as the 100-year-old Bowyer Block, a national monument of Singapore.

SOLUTIONS

• A structural steel system was used for the superstructure – with steel columns designed in tiers of three floors – reducing cranage requirements, improving productivity, and avoiding site-welding and prolonged work at height.
• Pushing boundaries with the adoption of high-strength Grade 100 concrete-encased steel composite columns, improving productivity, construction speed, and reducing column footprints.
• Earth Retaining Stabilising Structures (ERSS) design, with rigorous site monitoring and numerical analyses, ensured the hospital and MRT operations remained unaffected. A semi top-down method was chosen for basement construction, primarily to achieve speed of excavation and for the stiffness the ERSS required to limit ground movement.
• Bold designs were applied for the 300-m underground tunnel, including excavations under and next to existing roads, skybridge, buildings, tunnels and a historic building; carefully considered road diversions, underpinning works, and modifications to existing structures.

Qualified Person:
Engineer Jason Tan Bok Leng

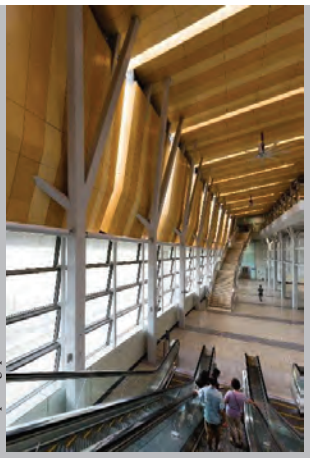
C&S Consultants:
Arup Singapore Pte Ltd

Builder:
Penta-Ocean Construction Co Ltd

Developer:
Ministry of Health, Singapore

Architectural Consultants:
B+H Architects
CIAP Architects Pte Ltd

Specialist Consultant:
WSP Consultancy Pte Ltd



Civil Engineering Category

Thomson-East Coast Line Contract T203 TE2 Woodlands Station – Excellence

KEY CHALLENGES

• TE2 is a two-level underground station with crossover tunnels connected to Woodlands station NS9 interchange via an elevated transfer link. It is also one of the biggest Civil Defence stations in Singapore.
• Constructing the station founded in mixed-face geology profile and around social and transport infrastructure that are operational.
• Designing around and next to a greenfield earmarked for future development.

SOLUTIONS

• Optimising the rail alignment on both ends of TE2 to reduce potential construction risks from the outset, and delivered considerable benefits and conveniences for commuters.
• Placing commuter convenience at the heart of TE2's design, a seamless intermodal transport ambition was achieved with two critical links: an optimised alignment of a slender transfer link bridge between TE2 and NS9, and an underground link from the MRT stations to the bus interchange.
• Considering circular economy principles for the adjacent greenfield, the ERSS wall was designed to be reusable for future excavation and additional knock-out panels were also catered for future construction. This would reduce costs and carbon footprint for future developers.
• As part of the excavation works, maximum safety during detonation was achieved with a rock blasting simulation, and enhanced vibration monitoring at potentially impacted structures. A solid protection system was also implemented to prevent and control fly rock.

Qualified Person:
Engineer Tan Yoong Heng

C&S Consultants:
Arup Singapore Pte Ltd

Builder:
GS Engineering & Construction Corp.

Developer:
Land Transport Authority

Architectural Consultants:
Aedas Pte Ltd

MANGGARAI STATION

The Jakarta metropolitan area in Indonesia, known locally as Jabodetabek, is expected to become the world's largest city by 2030. Home to 35.5 million people, it is already one of the most congested cities in the world.

The city's commuter rail system is under extreme pressure, causing Indonesia's national rail operator Kereta Api to invest in improvements to increase capacity, provide greater reliability, and deliver a better experience for the over one million daily users across its network.

The Manggarai Station is currently a transit station on the Commuterline Jabodetabek and Soekarno - Hatta Airport Rail Link. Due to its future potential to cater for increased capacity, the station is being redeveloped and will replace Gambir Station as the terminus for long-distance trains serving the city in late 2021.

To achieve this goal, Indonesia's Ministry of Transportation appointed PT. Waskita Karya (Persero) Tbk (Waskita), in a joint venture with PT. Pijar Utama, as a contractor on Phase II of the project.

Many challenges

Waskita made it its goal to construct a new bridge connecting the second floor of the station's main building with the existing mainline at grade, together with new track panels above and below the bridge. However, the company encountered various challenges on the project. In addition to construction, the client required Waskita to take on the design review of the existing contract drawings due to discrepancies with current standards and existing conditions.

As a result of the high amount of train traffic in Manggarai Station, the team faced constraints on the method of construction that it could use, running the risk of incurring additional time on the contract. Waskita also needed to pay particular attention to the prestressed concrete beam bridge segment, which accounted for 30% of the contract's value.

The project's success hinged on three main objectives: quality compliance, cost, and time efficiency. Therefore, Waskita needed a software solution that would help make every decision throughout the 720-calendar-day contract period both timely and accurate. For this reason, the company decided to adopt BIM workflows and a digital twins approach using Bentley technology.

Multidiscipline BIM coordination model

Key to Waskita's successfully overcoming many of the engineering challenges on the Manggarai Station project was its creation of a multidiscipline BIM coordination model using Bentley technology. With OpenRail Designer, OpenBridge Designer and ContextCapture, Waskita transformed its traditional 2D paper-based processes into 3D clash detection and resolution digital workflows, enabling engineers to measure true distances between designed structures

ABOVE AND OPPOSITE IMAGE: **Reality models showing the Manggarai Station revitalisation project built with MicroStation, ContextCapture and OpenRail Designer from Bentley Systems. PT. Waskita Karya (Persero) Tbk, in a joint venture with PT. Pijar Utama, has been appointed as a contractor on Phase II of the project.**

and existing assets to ensure adequate clearance and right-first-time construction.

Geometry control capabilities in OpenBridge Designer enabled Waskita to calculate accurate geometry and coordinate information for each bridge segment, then export the data directly to the manufacturer. This practice helped mitigate against the significant risks associated with ordering segments of the wrong size or number.

With significant constraints that included the need to keep lines on the existing railway operational throughout the construction schedule, and due to its ability to visualise and clearly communicate planned activities to other team members and stakeholders, Waskita adopted Bentley's Synchro software to perform 4D construction modelling on the Manggarai Station project.

"Setting up a digital twin with Bentley's technology is very convenient," said Marsa Achadian Tyarpratama, BIM junior expert at Waskita. "When the client urged us to give options concerning what outcome that they wanted to achieve in this project and how much it will cost, there was no better way to point those options out than visualising it with the digital twin."

Making better, more informed decisions

Combining design information for tracks, civils, bridges, and structures, with a 3D reality mesh of the existing ground, Waskita's BIM coordination model has helped the company and different stakeholders on the project to make better, more informed decisions.

Having helped identify budget shortages within the design review, Waskita's coordination model allows the company to clearly visualise different alternatives in terms of project scope and cost. It is proving to be a critical part of Waskita's ongoing work and negotiations with its client for project amendments.

The use of OpenBridge Designer, OpenRail Designer and ContextCapture for clash detection and resolution on the project meant that Waskita has avoided issues that might not have been discovered until construction commenced. Because it could identify potential problems earlier in the process, the company avoided additional time and cost overheads of approximately 0.3% per month. Waskita's use of geometry control functionality in OpenBridge Designer has helped mitigate the risks and avoid the unnecessary cost and delays associated with incorrectly cast bridge spans.

In response to demands for more clarity on construction sequences, Waskita's use of Synchro helped shorten the construction schedule by optimising the resources available. Adoption of this digital workflow enabled right-first-time construction, as well as provided valuable insight for Waskita and other stakeholders on the project. ■

Website: www.bentley.com

Note: For this project, PT. Waskita Karya (Persero) Tbk has received a special recognition award (in the Comprehensiveness in Transportation Digital Twins category) at Bentley's Year in Infrastructure (YII) 2020 Awards.

OROVILLE DAM

LEFT: **In operation since 1968, the Oroville Dam is an earthfill embankment dam just east of the city of Oroville, California, in the scenic Sierra Nevada foothills.**

RIGHT: **On 7 February 2017, as the rain water continued to pour down, California state engineers noticed concrete erosion on the flood-control spillway at the Oroville Dam. Strengthening and repair work was soon carried out, with the help of Mapei system.**

February 2017 was an unusually rainy season in California, the US. As the water continued to pour down, on 7 February state engineers noticed concrete erosion on the flood-control spillway at the Oroville Dam. In operation since 1968, this earthfill embankment dam is situated on the Feather River, just east of the city of Oroville, in the scenic Sierra Nevada foothills. At 235 m high and 2,109 m long, with a volume of 59,635,279 cu m, it is known as the tallest dam in the US, separating Lake Oroville from the thousands of people living downstream in Oroville.

Additional storms were being predicted, so engineers inspected the spillway further and uncovered more erosion. The California Department of Water Resources then stopped the spillway flow and the worst was revealed: the structure was badly damaged and in need of immediate repair. An emergency spillway was soon created and the water flow was diverted to it. Rocks were carried by helicopter to the damage site to help shore up the erosion.

However, the water kept rising and state officials had to issue

evacuation orders for 200,000 people living downstream. There was a risk of the dam failing and sending Lake Oroville crashing downhill.

The problem became a state of emergency, calling in heavy equipment and construction workers from around the state. As water continued to pour from the emergency spillway, over 125 crews worked around the clock in an attempt to lower the lake level.

Strengthening the dam structure

The dam had to be reinforced before the rain began again and the water levels in the lake started to rise. To help with the job, Mapei supplied its Planigrout 755 solution (its counterpart on the international market is called Mapefill) to fill voids in the concrete and strengthen the repaired structure.

"There was one product for this job," said Rob Dyer, the Mapei coordinator on the project. "They knew it would work. We knew it would work. And so, there was a lot of Planigrout 755 delivered to this jobsite." The crews began to pour the concrete on 17 February.

The project specifications required the installation of about 8,000 pieces of no. 10 rebar on the spillway to reinforce the heavily eroded structure. "Each piece of rebar was sized between 4.57 and 7.62 m in length," said Mr Dyer.

Planigrout 755 (Mapefill) is a high-flow, non-shrink, cementitious grout ideal for precision anchoring of machinery and metallic structures. The product does not contain metal aggregates or aluminium dust, and offers several advantages including high impermeability to water and excellent adhesion to iron and concrete. It is also resistant to dynamic/mechanical stress, and its modulus of elasticity and thermal expansion coefficient are similar to those of high quality concrete.

"We pumped Planigrout 755 in to fill the voids between the pieces of rebar and the outer wall of the core," explained Mr Dyer. "We used about 16,000 bags of 22.7-kg product during the entire project."

Fortunately, the rain held off and the water levels in the lake dropped during the repair process. "This minimised the possibility of a dam failure during the quick fix on the damaged spillway and then on the repair/replacement that immediately followed," said Mr Dyer.

Mapei was involved in the project from 2017 to 2018. The Planigrout 755 (Mapefill) supplied to the Oroville Dam is manufactured and distributed in the US market by Mapei Corporation, the local subsidiary of the Mapei Group.

The article courtesy of Realta Mapei International no. 81

ABOVE: **Planigrout 755 (Mapefill) was pumped in to fill the voids between the pieces of rebar and the outer wall of the core.**

RIGHT: **Mapefill is a high-flow, non-shrink, cementitious grout ideal for precision anchoring of machinery and metallic structures.**

"This was a great project to be a part of. How often do you get the chance to help save an entire town?" summed up Mr Dyer. ■

Website: www.mapei.com.sg

‘Autonomous transport will happen in quarries and light mining first’: Volvo

After developing steadily, step-by-careful-step, for more than 100 years, the automotive world is currently in the grip of a two-sided revolution, revealed Volvo Autonomous Solutions. On the one side it is under pressure to reduce emissions by going electric, and on the other it is striving to reach the Holy Grail of transport – the vehicle/machine that doesn’t need an operator.

While great strides have been taken in the switch to hybrid and all-electric drive, creating autonomous transport is proving harder to perfect. “Automation has struggled in the mainstream automotive world because they are trying to get autonomous vehicles to work everywhere and safely coexist with all the variables of life – cars, trucks, bikes, people, dogs, cats – you name it,” explained Perjohan Rosdahl, head of Off-Road at Volvo Autonomous Solutions.

“Solving all these issues at the same time is proving to be an enormously complex challenge, even for the world’s biggest automotive and technology companies. Our approach is to start small, in a tightly confined environment and build on our successes over time. A perfect place to start is quarries, which have clearly defined load-and-dump locations over generally short circuits.”

TOP AND ABOVE: **Volvo autonomous hauler.**

‘Not just selling a machine’

The move to autonomous machines will not be simply a case of replacing a machine with an operator to one without, Volvo pointed out. Autonomous machines will prompt the automation of the whole process and require a new way of looking at the entire operation.

Volvo Autonomous Solutions is a new business unit created on 1 January 2020 to develop and commercialise autonomous transport solutions for the whole Volvo Group. As well as providing adapted machines from within the Group, the new business unit will support customers with solutions to autonomous machines’ other challenges, namely the supporting infrastructure, control towers, repair and maintenance, virtual drivers and even run the operations if needed.

“It’s as much about a new mindset as it is about developing autonomous machines,” said Uwe Müller, sales and marketing lead for Off Road Solutions at Volvo Autonomous Solutions. “We are

talking about automating a transport process, not just selling a single machine. Because of that, we need to develop a total solution to manage this full process."

Volvo Autonomous Solutions is working closely with the Volvo Group's other business areas, especially Volvo Construction Equipment (Volvo CE) in the off-road segment. This ensures that new machines, whether developed specifically to be autonomous – like Volvo's award-winning TA15 hauler – or traditional operator-based equipment, use the same autonomous drive platforms, coding languages etc. As such, it allows them to be 'talked to' in the same way, as well as offering the ability to scale up easily. Not all machines will be autonomous, but being 'autonomous enabled' allows Volvo Autonomous Solutions to supercharge the standard products into operator-less machines, using its own proprietary autonomous drive kit.

Quarries and mines

"To reduce the complexity of the world, we need to standardise the process as much as possible," said Mr Müller. "In quarries we can do this as they are in a confined area, are highly regulated and it's easier to separate autonomous transport from other processes. Involving loading and dumping, the process itself is simple and repetitive."

"We are starting small with less complex use cases and will build on our successes," added Mr Rosdahl. "With the right customer partners, the next step could be underground mining and tunnel applications – autonomous machines (especially electric ones) work just as well in the dark as in the light, and it's good to remove people as much as possible from these hazardous locations.

LEFT: **Perjohan Rosdahl, head of Off Road at Volvo Autonomous Solutions.**

RIGHT: **Uwe Müller, sales and marketing lead for Off Road Solutions at Volvo Autonomous Solutions.**

"From there we could focus on large earthmoving projects that are still contained but have more variables to cope with, as our technology becomes more embedded over time."

Improved process optimisation, lower energy consumption and improved safety are just three of the benefits of autonomous machines, highlighted Volvo. "There are lots of R&D challenges to be overcome – and they will be. But it won't be a technical innovation that makes the breakthrough – that requires changes in legislation and a new mindset as to how the whole process can operate more effectively.

"Make no mistake, autonomous solutions are coming, and they will be disruptive to current business models." ■

Website: www.volvoce.com

REACHING NEW HEIGHTS

MANITOU ASIA RECENTLY INTRODUCED SEVERAL BOOM LIFT MODELS, SUITABLE FOR USERS IN THE REGION. THESE INCLUDE THE 220 TJ-X AND 220 TJ+-X, AS WELL AS THE 260 TJ-X AND 280 TJ-X.

220 TJ-X and 220 TJ+-X

Capable of reaching a height of 22 m, the 220 TJ-X and 220 TJ+-X have a basket capacity of 230 kg and 350 kg respectively. This capacity remains regardless of the articulated arm's position or the telescopic extension, said Manitou.

The machines' compact dimension results in excellent manoeuvrability, especially on construction sites with heavier load of machines. With an overall fold up size of only 8.04 m, the 220 TJ-X is built to facilitate transportation and meet the expectations of rental companies.

These compact boom lifts provide a working outreach of 17.6 m (220 TJ-X) and 17.8 m (220 TJ +-X). They are powered by a four-cylinder 26-kW diesel engine (stage IIIA) with a variable speed pump. A built-in system automatically adjusts the engine's power accordingly to minimise fuel consumption and total cost of ownership (TCO). Manitou said the engine can reduce noise during operation to as low as 106 decibels.

Both models are also installed with a hydraulic block to provide smooth and rapid movements with complete safety. The jacks taper off before stopping, giving added comfort and eliminating risks arising from jerky movement. A system patented by Manitou automatically adapts the speed according to the degree of extension of the boom to maintain constant speed, regardless of the basket's position.

Designed for use in tough conditions, the 220 TJ-X and 220 TJ+-X are ideally suited to handle uneven ground and environments with high salt content and high temperatures. One such example is the San Juan viaduct bridge project in the Philippines, a tight working environment with multiple crossings. The default four-wheel steer of the 220 TJ+-X enabled operators to manoeuvre it around with ease. The machine's superior rough terrain capability

TOP AND ABOVE: **The 220 TJ-X and 220 TJ+-X models are capable of reaching a height of 22 m, with a basket capacity of 230 kg and 350 kg respectively.**

The 260 TJ-X model is able to lift to a height of 25.9 m, with a basket capacity of up to 400 kg.

also tackled all kinds of crossings on site, while its versatility made it possible for the machine to be used on a floating platform during construction as the viaduct was built on a canal.

Like all new Manitou machines, the 220 TJ-X and 220 TJ+-X boom lifts are connected machines to enable users to optimise usage and maintenance of their machines. This allows Manitou to accurately analyse data and ultimately reduce the TCO for the operators.

260 TJ-X

Manitou's 260 TJ-X boom lift is equipped with a supersized basket that can accommodate three operators (capacity of 400 kg) up to a height of 25.9 m. Targeted at operators requiring a large working area and flexibility of use, this model is built with an offset of 19.7 m, pendulum travel of +/-70°, and capacity for continuous 360° rotation of the turret. The machine's excellent off-road and four-wheel drive abilities also assure a high-crossing capacity across difficult terrains.

The 260 TJ-X features high-precision hydraulic movements for maximum operator comfort, and its system to reduce noise to 106 decibels effectively moderates noise pollution. The remote control function gives users a clear view of the entire machine and the ability to steer the basket to the optimal position.

The 260 TJ-X is also designed to help reduce the TCO. It is fitted with a diagnostic aid for faster maintenance operations and minimal machine downtime. The machine's overall unfolded length of 7.88 m allows for easy transportation. Optional features of the 260 TJ-X include the Easy Manager system and the SMS (Safe Man System), an operator protection system that is fully compliant with industry safety standards.

With its outstanding performance, the Manitou 260 TJ-X has already benefited Kwan Yong Construction on its school building project in Singapore. Limitations in the company's previous machine had undesirably increased the frequency of transferring raw materials to the specified height, causing delays in the project timeline. After switching to the 260 TJ-X, Kwan Yong was able to lift significantly more raw materials with one transfer, along with tools and other heavy equipment, owing to the boom lift's 400-kg-capacity basket. Such time-saving proved crucial in enabling the contractor to complete the project on schedule.

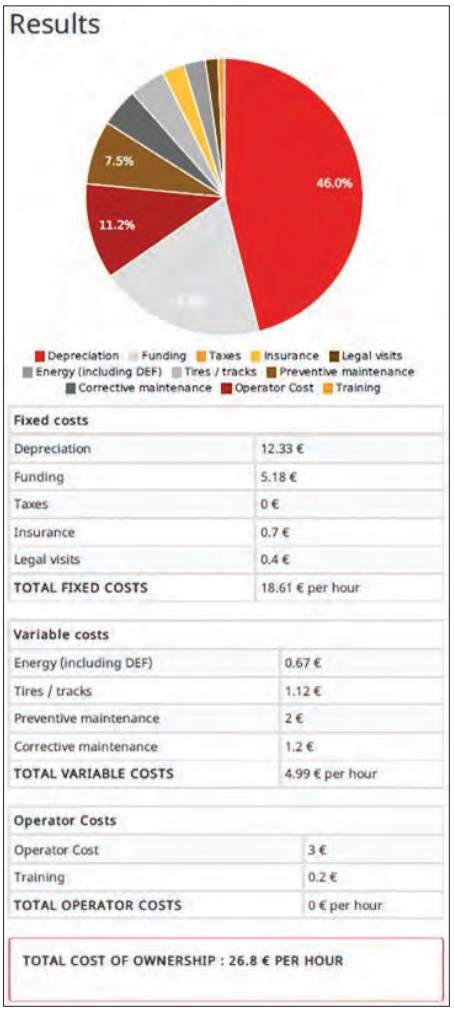
280 TJ-X

The 280 TJ-X boom lift is Manitou's aerial work platform (AWP) with the highest working height. Powered by a 45-hp engine, the machine is capable of lifting a 350 kg load to a height of up to 28 m. Its continuous turret rotation and working offset of more than 21 m facilitate a wide range of movements without having to move the platform. This results in larger working areas, higher operational efficiency and comfort of use for operators.

The 260 TJ-X features an offset of 19.7 m, pendulum travel of +/-70°, and capacity for continuous 360° rotation of the turret.

Featuring a compact four-wheel drive with a lower-than-standard weight, the 280 TJ-X is easy to transport and manoeuvre even at congested construction sites. Its high ground clearance also increases ease of crossing over any terrain, even rough ones occupied by substantial obstacles.

Equipped with a hydraulic step-less engine speed control, the 280 TJ-X is able to operate with reduced noise and fuel consumption. It also offers an unrivalled average TCO, giving users the best resale share.



Fixed costs	
Depreciation	12.33 €
Funding	5.18 €
Taxes	0 €
Insurance	0.7 €
Legal visits	0.4 €
TOTAL FIXED COSTS	18.61 € per hour

Variable costs	
Energy (including DEF)	0.67 €
Tires / tracks	1.12 €
Preventive maintenance	2 €
Corrective maintenance	1.2 €
TOTAL VARIABLE COSTS	4.99 € per hour

Operator Costs	
Operator Cost	3 €
Training	0.2 €
TOTAL OPERATOR COSTS	0 € per hour

TOTAL COST OF OWNERSHIP : 26.8 € PER HOUR

Furthermore, users can use the Manitou TCO Calculator to perform project planning and budget forecasts for AWPs like the 280 TJ-X. According to Manitou, in fast-growing Southeast Asian economies - such as Indonesia - where there is a rising awareness of the TCO of machines, operators welcome the calculator's computational accuracy. By setting varied applications, requirements and parameters, Manitou is able to correctly work out TCO per hour and annual cost based on total fixed costs, total variable costs and total operator costs.

Manitou mentioned that during a joint product presentation of the 280 TJ-X with its dealer in Indonesia, PT Indo Traktor Utama, the customer was amazed at the affordability and value of the machine. Costing as low as S$42.80 (€26.80) per hour, the Manitou 280 TJ-X offers remarkable value to users throughout its project lifecycle. ■

Website: www.manitoucenter.com.sg

TOP LEFT AND ABOVE: **The 280 TJ-X model can rise to a height of 28 m, offering a basket capacity of 350 kg. The machine's continuous turret rotation and working offset of more than 21 m facilitate a wide range of movements without having to move the platform.**

TOP RIGHT: **Users can use the Manitou TCO Calculator to perform project planning and budget forecasts for AWPs. The image shown here is an example (note that results obtained using this TCO tool are not contractually binding; they are provided for information purposes only and represent an overall estimate).**

Fulfilling Asia's offshore wind potential

By: Peter Thompson – East Asia Energy Leader, Arup

Blessed with long coastlines and favourable government policies, Asia looks set to grow its offshore wind significantly over the next decade and beyond. As the region makes the most of its opportunities, this promises to be a very busy time – both for developers and for design teams with the local expertise to meet these regional needs.

The International Renewable Energy Agency (IREA) estimates that by 2050 Asia will be a global leader in wind power and will account for over 60% of all offshore wind capacity installed globally. The Global Wind Energy Council expects the Asian offshore market to have installed nearly 100 GW of offshore wind capacity by 2030.

Long coastlines, favourable policy

As Japan, Korea and Taiwan continue to move away from nuclear after the Fukushima disaster in 2011, they are looking to the offshore wind potential around their long Pacific coastlines.

Japan has the seventh longest coastline in the world and has challenged itself to establish 10 GW of offshore wind power by 2030. Taiwan has approved more than 5.7 GW of offshore wind projects. Across Japan, Korea and Taiwan, 40 GW of offshore wind projects are planned in the next 10 years.

Governments have been moving to ensure policy encourages offshore wind development. In late 2017, for example, the Japanese government changed its Ports and Harbour Law to enable offshore wind farm developers to occupy zones within Japanese territorial waters close to existing ports.

This led to the development of the first ever large-scale commercial offshore wind farm close to the Akita and Noshiro Ports. Comprising a total of 34 wind turbines installed on monopile foundations, plus associated onshore substations, the two clusters will have a combined capacity of 145 MW.

Overcoming industry challenges

Arup's structural, geotechnical and maritime design teams in Tokyo, London and Hong Kong collaborated on the Akita-Norisho projects, which included the first approval by the local statutory checking authority. Until then there had been no existing design guidance or prior approval experience in Japan for offshore wind turbine foundations.

Since then, more legislation in Japan has enabled development further offshore in international waters and we have continued to work with developers in Japan, Korea and Taiwan. Although challenges concerning high seismicity and deep water remain in both Japan and

Although the principals of designing offshore wind turbines are universal, conditions in the Asia region require specific, local expertise as well as experience of local regulations.

Taiwan, these are being overcome through advanced soil/structure interaction modelling and the development of innovative solutions.

Global knowledge with local skills

Although the principals of designing offshore wind turbines are universal, conditions in the Asia region require specific, local expertise as well as experience of local regulations. For example, strong technical skills for seismic, wind and wave engineering are particularly relevant for Japan and Taiwan – due to their close proximity to the ring of fire along the pacific plate boundary and direct exposure to the Pacific Ocean.

We've sought to build skilled teams within Asia. With over 3,500 staff in the Asia region, including over 140 geotechnical engineers in Hong Kong alone as well as growing teams of wind specialists in Japan, Korea and Taiwan, we realise the importance of local teams that understand not only the technical aspects but also the local culture and language.

Exporting expertise to Asia

As Asia becomes the focus of growth in global offshore wind, it has the opportunity to fast-track its development by exporting long-established expertise from the established European market. Within our own firm, we've seen how skills can be transferred from Europe to local teams in Hong Kong and Japan – enabling us to win some of the increasing number of design and owner's engineer assignments in the region.

For a 187 MW offshore wind farm in Japan, our designers drew on the lessons from our numerous projects throughout Japan as well as across Asia, and our experience from over 50 offshore wind farms in Europe.

There is clearly much potential for offshore wind in Asia, and some exciting opportunities to help the region fulfil this potential. If developers and investors can take full advantage, Asian countries will soon be reaping the rewards in the form of abundant, affordable low-carbon energy. ■

Website: www.arup.com

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KATARA TOWERS

The new Katara Towers will be a distinctive landmark for Qatar. Scheduled for completion in May 2021, the development will boast two luxury hotels, apartments, office space, shops and restaurants.

Symbolically intertwined with Qatar's heritage, this iconic architectural design integrates the traditional scimitar swords from the national seal into a striking pair of symmetrically arched towers, rising 36 storeys from the podium level to a height of 211 m.

The new Katara Towers in the planned city of Lusail, Qatar, will be a distinctive landmark for the nation. Symbolically intertwined with the country's heritage, this iconic architectural design integrates the traditional scimitar swords from the national seal into a striking pair of symmetrically arched towers, rising 36 storeys from the podium level to a height of 211 m.

The architect for the project is Dar Al-Handasah, and the contractor is Hamad Bin Khalid Contracting Company (HBK Contracting Co WLL). Construction work started in September 2018, and it is scheduled for completion in May 2021. The

For erecting the core walls in the towers, Doka's formwork solutions have been chosen, including the SKE50 self-climbing system and the 150F climbing formwork. The building is structurally divided into five areas and has a total of eight core walls.

development will boast two luxury hotels, apartments, office space, shops and restaurants.

Rapid cycles with Doka climbing systems

The central component of the project is the striking pair of symmetrically arched towers 2 & 4. They cover an area of 2,315 sq m, featuring 36 storeys, and the clear height of the slabs ranges from 4.45 to 9.15 m.

For erecting the core walls in the towers, climbing formwork systems from Doka have been selected. The building is structurally divided into five areas and has a total of eight core walls.

The four core walls (1 & 2 and 7 & 8) are rising upwards with the use of Doka SKE50 automatic climbing formwork. For the crane-lifted core walls 3 & 4 and 5 & 6, the Doka 150F climbing formwork and a shaft platform are being used to support the Doka Top 50 large-area formwork.

"We are happy to be working with Doka on this project," said Jawan Medinas, senior construction manager at HBK Contracting. "They have developed a reputation in this country for being able to deliver formwork solutions that aid the delivery of the overall project. Thanks to the SKE50 hydraulic climbing system and the delivery of the core walls, we're progressing faster than anticipated, which is of great help."

The more complex storeys 1 to 15 were completed in a 14-day cycle; and storeys 15 to 36 in eight days. According to Doka, the biggest challenge arising from the structural design was to install the formwork on the protruding slabs while adhering to the construction schedule. Doka's TLS table lifting system was used to accelerate the slab cycle, moving the Dokaflex tables in the two high-rise towers two storeys upwards. Due to the inclined facade of the building, the table lifting system had to be modified.

A versatile approach was needed to manage the different slab configurations in each storey and the use of table lifting systems, explained Doka. To achieve the required flexibility in the table configuration, the 10,000 sq m of Dokaflex tables were delivered in customised sizes.

Doka's Staxo 40 load-bearing towers were used to reach the 6.10-m-high mezzanine level on the ground floor. The D3 load-bearing towers supported the 22-m-high Tower 3 hall area with 4.80-m-deep transfer beams. ■

Website: www.doka.com

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