SOUTHEAST·ASIA CONSTRUCTION

SEPTEMBER - OCTOBER 2021

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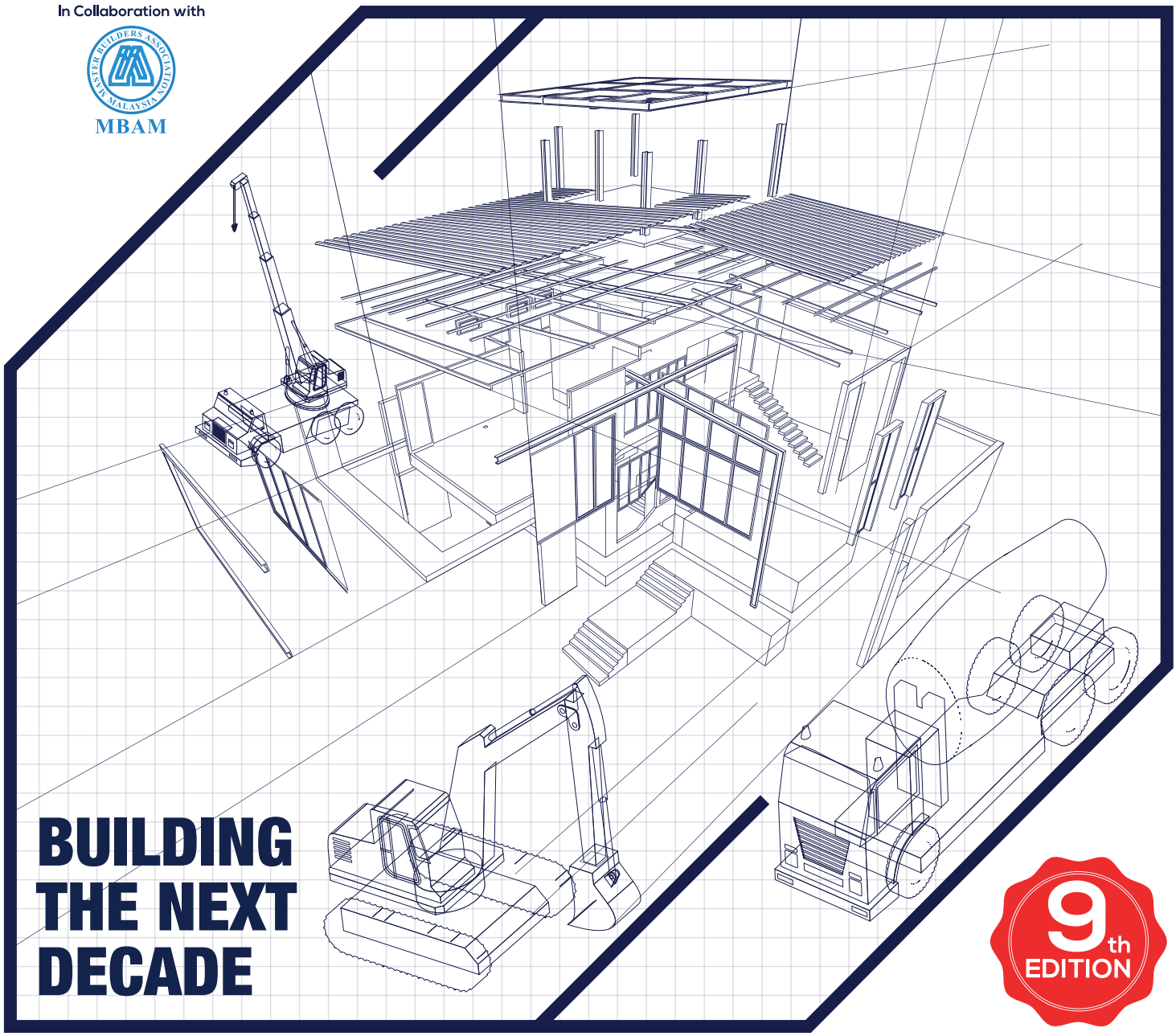

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CapitaLand, CDL unveil residential project in Singapore

CapitaLand Limited and City Developments Limited (CDL) have unveiled the design of their latest joint residential development, CanningHill Piers, located between the historic Fort Canning Hill and the iconic Singapore River in District 6.

Named to reflect its rare hill and river dual-frontage, CanningHill Piers is designed by Danish architecture firm Bjarke Ingels Group (BIG). The development is targeted for completion in 2025.

BIG is also the design architect for CapitaSpring, a soon-to-be-completed 51-storey integrated development by CapitaLand Group in Singapore's Raffles Place CBD. CanningHill Piers is expected to be BIG's first residential project to be completed in Asia.

"The design scheme [of CanningHill Piers] comprises four towers of different heights – a pair of diagonally-facing residential towers and one each for the hotel and serviced residence – set atop a double-storey commercial podium. All four towers are distinctly spaced apart from each other to maximise views and allow the courtyard at the heart of the commercial podium to open to the sky," explained CapitaLand and CDL in a joint statement.

"A single continuous drape adorning the facade ties the various components together into an iconic and sculptural whole. Strategic parts of the facade drape are lifted to unveil building entrances, communal areas and green spaces at various heights, creating a strong and unified architectural identity for the integrated development."

At 180 m, the 48-storey residential tower facing the riverside is set to be the tallest residential development along the Singapore River, while the 24-storey residential tower overlooking Fort Canning Hill stands at 100 m. Housing a total of 696 units, the two residential towers are connected by an iconic sky bridge on Level 24, filled with a wide range of lifestyle facilities.

According to CapitaLand and CDL, the landscaping of CanningHill Piers extends the lush greenery of Fort Canning Hill to its various sky terraces. Part of an existing road that currently separates the project site and the river will be transformed into an attractive riverfront promenade that connects seamlessly with the Clarke Quay lifestyle precinct along the same stretch.

A wide selection of unit types from one- to five-bedroom premium apartments, Sky Suites and a Super Penthouse, ranging in size from approximately 410 to 8,950 sq ft, will be available, said both companies. More amenities and vantage points will be provided on Level 3, where an outdoor jogging track, a bouldering wall and an adventure-themed children's play area can be found.

CanningHill Piers is part of an integrated development that also includes a commercial component with F&B and retail outlets named CanningHill Square, a hotel operated under the Moxy brand by Marriott International, and a serviced residence with a hotel licence operated under the Somerset brand.

"Coupled with its unique location embraced by nature and historical landmarks, we are confident that CanningHill Piers will set a new benchmark in refined urban living and meet the aspirations of city dwellers for style, wellness and connectivity," said Jason Leow, president for Singapore & International at CapitaLand Group.

"With upcoming plans to reposition Clarke Quay as a wellness, lifestyle and F&B destination that is vibrant both in the day and at night, residents of CanningHill Piers can look forward to raising their families in a lively and modern neighbourhood."

CanningHill Piers has four towers with different heights – a pair of diagonally-facing residential towers and one each for the hotel and serviced residence – set atop a double-storey commercial podium.

Both images © CapitaLand

At 180 m, the 48-storey tower facing the riverside is set to be the tallest residential development along the Singapore River, while the 24-storey tower overlooking Fort Canning Hill stands at 100 m.

Sherman Kwek, group CEO of CDL added, "Conceptualised as a vibrant integrated waterfront development, CanningHill Piers seamlessly melds the convenience of urban living with a holistic wellness lifestyle and this icon will dramatically redefine the Singapore skyline.

"Through this timely urban renewal initiative, the former Liang Court site will be transformed into a prominent landmark next to Fort Canning Hill, imbued with the serenity of the Singapore River and the entertainment buzz of Clarke Quay."

CanningHill Piers enjoys convenient access to the CBD via the Central Expressway. It will be directly linked by an underpass to Fort Canning MRT station on the Downtown Line, and a mere eight-minute walk from Clarke Quay MRT station on the North East Line. Water transport to Marina Bay and Robertson Quay is also available via river taxi. ■

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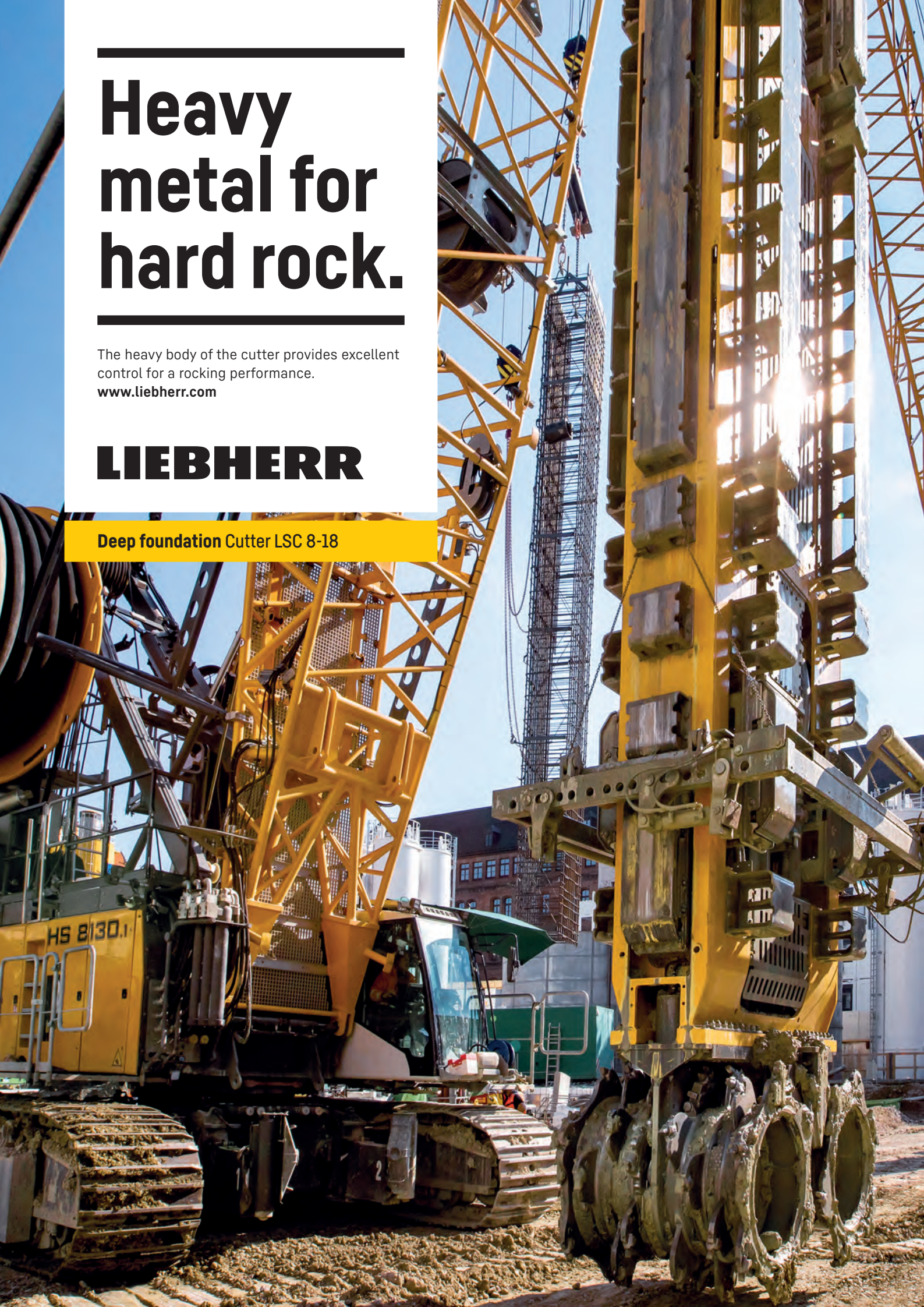

Construction of Indonesia's first floating solar farm starts

Masdar, a renewable energy company based in the UAE, and PT PJBI, a subsidiary of Indonesia's state-owned electricity company PT PLN, recently announced that financial close has been achieved on the Cirata Floating Photovoltaic Power Plant project and construction work has commenced.

The 145-MWac facility, Indonesia's first floating solar power plant, is being developed by PT Pembangkitan Jawa Bali Masdar Solar Energi (PMSE), a joint venture between Masdar and PT PJBI. It is scheduled to begin commercial operation in the fourth quarter of 2022.

"The Ministry of Investment fully supports the investment realisation of the Cirata floating solar project by PT PJBI and Masdar. This is a flagship project of the UAE's investment in Indonesia, and most importantly, it is in line with the Indonesian government target in renewable energy mix of 23% by 2025," said Bahlil Lahadalia, Indonesia's Minister of Investment and chairman of the Indonesia Investment Coordinating Board.

"The designation of this project as a national strategic project (PSN) has been invaluable in enabling us to make such significant progress, and demonstrates that the government recognises the economic and social benefits the Cirata project will bring to the local community and to all of Indonesia," said Mohamed Jameel Al Ramahi, CEO of Masdar.

The new floating solar plant, set to be among the largest in the world, is being built on the Cirata reservoir in the West Java province. When completed, it will provide enough electricity to power 50,000 homes and offset 214,000 t of carbon dioxide emissions per year.

According to Masdar, the construction of the facility will also contribute to the creation of up to 800 jobs. Throughout the development of the project, the company has conducted a series of social initiatives, raising awareness on sustainability issues and strengthening local community engagement.

When completed, the Cirata Floating Photovoltaic Power Plant will provide enough electricity to power 50,000 homes and offset 214,000 t of carbon dioxide emissions per year.

"We see tremendous potential for similar projects in Indonesia, and we look forward to continuing our fruitful collaboration with Masdar to work on more renewable energy projects and help our nation achieve its clean energy objectives," said Amir Faisal, president director of PJBI.

Indonesia, the world's largest archipelago nation, is targeting 23% of its energy mix coming from renewables by 2025 under its Electricity Infrastructure Acceleration Program. The government also recently shared that it aims to increase the proportion of renewable power in its 2021-2030 national electricity plan to at least 48%, from 30% in its previous plan. ■

Newly revamped QSNCC set to open in 2022

The Queen Sirikit National Convention Centre (QSNCC) in Bangkok, Thailand, is currently undergoing renovation work. Scheduled for opening in September 2022, the facility is a key element of the Rama IV district development that ranges from commercial, retails, hotels, hospital, residential to exhibition and convention centre.

Owned and managed by NCC Management & Development Co Ltd, a subsidiary of TCC Assets (Thailand) Co Ltd, a local investment holding and real estate company, the new QSNCC covers a total event space of 78,500 sq m. It will provide two main exhibition halls with over 45,000 sq m, two large conference halls with nearly 10,000 sq m, 50 flexible meeting rooms and an additional retail zone.

The revamped QSNCC boasts five times larger space and a daily capacity of more than 100,000 visitors. Occupying a total area of 280,000 sq m, this new venue will be able to accommodate all types of world-class events on a global scale, according to TCC Assets.

Main contractor on the THB 15 billion project is Thai Obayashi Corp Ltd, with Pylon PCL as piling contractor. Beca (Thailand) Co Ltd has been appointed as structural engineer, while Design 103 International Ltd is the architect on the project.

© NCC Management & Development

The new QSNCC will have a daily capacity of over 100,000 visitors.

"Despite the Covid-19 challenges globally, we managed to follow our long-term investment plan to complete the QSNCC remodelling successfully. This fulfils our vision and aspiration to transform the Queen Sirikit National Convention Centre into the leading world-class convention centre in Asia," said Panote Sirivadhanabhakdi, director of TCC Assets (Thailand) Co Ltd. ■

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‘Myanmar’s construction output to shrink by 7.7%’

Myanmar’s construction industry output in 2020 was affected by the Covid-19 pandemic induced supply chain disruptions and labour shortages. In 2021, the industry’s weakness is expected to be further compounded by the ongoing political crisis and its impact on foreign investments and construction progress, with the industry output projected to contract by 7.7% in real terms, according to data and analytics company GlobalData.

GlobalData’s report, ‘Construction in Myanmar – Key Trends and Opportunities to 2025 (H1 2021)’, reveals that after the military seized control in February 2021, construction projects have come to a standstill, resulting in over 500,000 construction workers being made redundant. The cost of imported building materials has increased due to a weakening of the domestic currency, while the price of domestically-produced cement has doubled due to the worsening banking crisis.

Hence, several government-funded infrastructure projects have been suspended. A number of foreign entities, including the World Bank, Asian Development Bank (ADB) and the Japanese and South Korean governments, have halted their aid and ongoing projects. Some multinationals have announced temporary suspensions of developments, including the Yangon hotel project, AEON’s shopping mall, Amata Corporation’s industrial estates and EDF’s Shweli-3 hydropower project.

“Initially, international sanctions were primarily targeted at coup participants, though this developed to sanctions on state-owned conglomerates. Myanmar Economic Holdings Limited and Myanmar Economic Corporation Limited, the two largest military-linked holding companies in Myanmar, were the first to be sanctioned by the US, the UK and the EU,” explained Willis Rooney, economist at GlobalData.

“Both entities have wide ranging business interests in Myanmar, including telecommunications, manufacturing and mining, which are likely to suffer as a result, negatively impacting the construction sector.”

Mr Rooney continued, “Additional sanctions on other state-owned enterprises have followed, most recently by the UK and EU on Myanmar Timber Enterprise. In March 2021, the World Bank and the ADB temporarily froze funds to Myanmar, further affecting the progress on projects dependent on external financing.”

GlobalData expects the construction industry to record growth of 2.3% in 2022 and register an annual average growth rate of 7.1% between 2023 and 2025, supported by investments in transport and energy infrastructure, industrial parks and housing projects. This growth is however predicated on Myanmar regaining political stability and the lifting of international sanctions. Highlighting the extent of the downturn in the local construction industry, real output is not expected to surpass its pre-pandemic levels until 2024 at the earliest. ■

Hiap Heng takes second delivery of Tadano ATF 220G-5 in Singapore

Singapore-based crane and logistics distributor Hiap Heng Heavyequipment Co Pte Ltd has added a second Tadano ATF 220G-5 crane to its fleet.

Tadano Asia Pte Ltd and its local distributor, Multico Equipment & Parts Pte Ltd, delivered the 220-t capacity all-terrain crane to Hiap Heng, which consistently reviews and upgrades its fleets as the company expands and addresses the increasing equipment rental needs in Singapore.

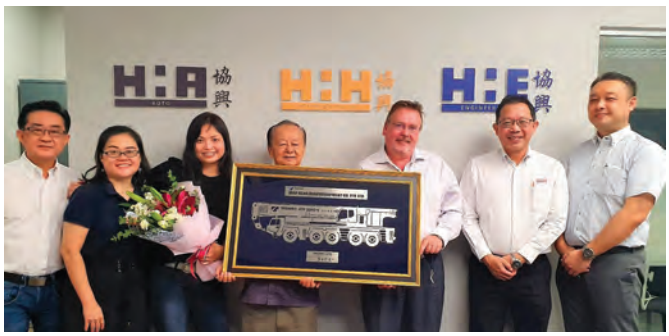
“We have a good working relationship with the sales team of Tadano Asia and Multico. Technical service support is very strong,” said Joyce Foo Hui Chin, director of Hiap Heng.

Hiap Heng offers its customers rough-terrain and all-terrain cranes ranging from 55 to 220 t, catering to a wide variety of jobsite conditions and logistical challenges. Through the years, the company has fostered a reputation for credibility and reliability for heavy equipment and maintenance services that deploy to infrastructure and construction sectors in both mainland and offshore Singapore.

Hiap Heng opted to purchase a second ATF 220G-5 after its impactful experience with the first model. “The first 220 t crane that we have is resilient. The breakdown time is less compared to other brands that we have; customers are happy,” said Ms Foo.

“Our maintenance team is familiar with [them], as we mainly own Tadano cranes. Therefore, our own technicians can troubleshoot and solve minor problems. This, in turn, translates to less down time and lower maintenance costs.”

Ms Foo also noted that the resale price of Tadano cranes are “pretty high,” providing value for Hiap Heng even when the company moves on to newer cranes for its fleet. “Tadano is a reliable brand. That is the reason we have been buying Tadano cranes since day one,” she said. ■



ABOVE (L-R): **Michael Wong, GM of Multico Equipment & Parts; Sarah Lee, senior marketing executive at Tadano Asia; Joyce Foo, director at Hiap Heng Heavyequipment; Foo See Han, MD of Hiap Heng Heavyequipment; Norbert Dudek, director and COO of Tadano Asia; James Teo, senior sales manager at Multico Equipment & Parts; and Kentaro Haruna, deputy GM of Tadano Asia.**

LEFT: **Tadano ATF 220G-5 all-terrain crane has a 220-t capacity.**

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Mace partners with Tpm in major APAC expansion

Global consultancy and construction company Mace has partnered with Tenman Project Management (Tpm), a project management company involved in hospitality, integrated resorts and gaming projects in Asia.

Tpm has been part of the team that delivered the Solaire Resort & Casino and the Marriott Widus Clark Hotel in the Philippines, Marina Bay Sands in Singapore and the Venetian in Macau. The company will be fully integrated within Mace's fast-growing Consult business and its Asia Pacific hub.

Mace's new partnership marks its latest step in expanding across markets in Asia Pacific - from a market entry in the Philippines to a consolidation of the company's offer in Vietnam, Macau and Singapore.

Bringing delivery focus, international expertise and local knowledge, the MaceTpm partnership will help both companies create synergies in their services. It is aimed to deliver service excellence in programme and project management and advisory services for real estate and infrastructure clients in the region across public and private sectors.

This new partnership has a combined track record in creating some of the world's most complex and exciting infrastructure programmes, such as Dubai Expo 2020, Lima 2019 Pan American and Parapan Games and the London 2012 Olympic Games, as well as landmark hospitality, transport and healthcare facilities in Asia Pacific.

"The MaceTpm partnership marks an exciting stage in Mace's Consult business international expansion. I am confident that with Mace's expertise in infrastructure delivery and Tpm's market experience in Asia Pacific, we are in a great position to take the clients' projects and programmes to the next level," said Jason Millett, CEO for Consult at Mace.

"Our teams will unlock unlimited innovation potential in project and programme management, using data and digital to transform outcomes for infrastructure, hospitality, leisure and mixed-use projects. Building on an already strong record

Tpm has been involved in various projects across Asia, including the Marina Bay Sands in Singapore (pictured).

of delivering complex hospitality and retail projects in the region, we are now ready to grow our service offer and redefine the boundaries of ambition."

Mace recently announced its 2026 business strategy, with a target to grow its revenue by 20% year-on-year in the next five years, lower carbon emissions by 10% year-on-year and increase diversity and inclusion across the business. Mace's Consult business has set a target to expand internationally and bring delivery focus to clients in transforming the way they deliver projects and programmes.

Matthew Pryor, managing director at Tpm said, "By joining forces with such a global organisation like Mace, we will completely transform the way we deliver projects and programmes in Asia Pacific. Combining our local knowledge and expertise with Mace's international infrastructure capability and global best practice, we will deliver distinctive value to our clients.

"Working with a strong pipeline of projects in the region we are hitting the ground running, harnessing the capabilities of our joint teams and creating opportunities for them to excel. Together we are driving our ambitions to take our clients' programmes to the next level, by placing sustainability, digital and data and modern methods of construction at the heart of project delivery."

The new partnership is expected to see Mace's Consult business increase its capability with up to 200 more people in the Philippines, Singapore, Macau and Vietnam. ■

SMEC to design axle load control stations across Bangladesh

SMEC has been appointed by the Roads and Highways Department, Bangladesh, to design and supervise construction of 28 axle load control stations, installed at key freight transport depots all over the country.

The Bangladeshi Roads and Highways Department, which constructs and maintains 22,000-km of the country's road network, has seen roads deteriorate ahead of their time and maintenance costs increase due to exceedingly heavy vehicles regularly using the network.

The new axle load control stations aim to reduce road maintenance costs and prevent premature deterioration of the network by developing, calibrating, and validating a freight transport model to establish an effective load control mechanism.

Over the next 30 months, SMEC's specialist teams will review physical infrastructure facilities and develop specifications for all electromechanical equipment. The company will also contribute to sustaining the axle load control system, once complete, by developing an appropriate knowledge, skills and institutional framework. ■

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An artist's impression of axle load control station.

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Lendlease launches data centre project in Japan

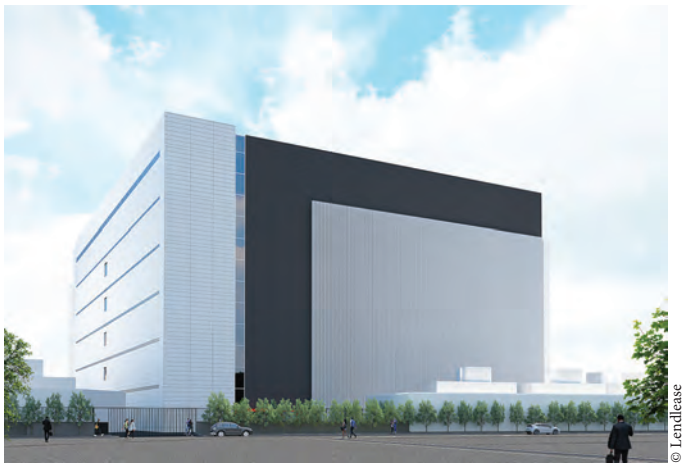
Lendlease has announced its first data centre project in Japan under Lendlease Data Centre Partners (LLDCP). The facility is expected to be one of the largest of its scale in the country.

Located in Greater Tokyo, the new data centre occupies approximately 33,000 sq m of land. This phased development is planned to deliver more than 60,000 sq m of gross floor area, in which close to half of the site has been pre-leased.

Construction of the project is scheduled to commence later this year, with the initial phase to be completed by early 2024. The gross development value of the project is in excess of A$800 million (around US$600 million) upon completion of all phases.

"Demand for data centres has surged during the ongoing Covid-19 pandemic, with digitalisation emerging as a top priority for businesses amid an overall shift to a digital-led economy," said Lendlease. "Japan is well-placed as a key connectivity and distribution hub for global hyperscale cloud providers, which, in turn, is driving high demand from data centre service providers."

LLDCP is funded 20% by Lendlease and 80% by a global institutional investor. The fund's mandate covers Australia, China, Japan, Malaysia and Singapore, and includes both completed assets and new development opportunities. Under the partnership, Lendlease will undertake the development, construction, property and investment management of the project.



© Lendlease

An artist's impression of the new data centre in Greater Tokyo.

"The demand for data centres in the Asia Pacific is set to grow exponentially, with internet-related services usage soaring due to the pandemic. We are excited to launch our first data centre development under Lendlease Data Centre Partners," said Andrew Gauci, Lendlease's managing director of Japan and head of telecoms and data infrastructure Asia. ■

Haulotte inaugurates new support centre in China

Global aerial platform manufacturer Haulotte has officially opened its new customer support centre in Wuhan, the capital city of Hubei province in central China. This new facility will allow the company to better provide after-sales services for its local customers.

The opening ceremony was attended by several guests from the Hubei Construction Machinery Chamber of Commerce, Hubei province and surrounding areas. The guests also had the opportunity to get a first-hand experience with Haulotte equipment such as compact scissor lifts and RTJ articulating booms.

The new centre is aimed to offer a more convenient, efficient and comprehensive customer support in central China. This includes equipment maintenance, refurbishment, refresh, spare parts supply and training.

At the same time, Haulotte signed a training cooperation agreement with the Hubei Construction Machinery Chamber of Commerce. The collaboration sees Haulotte officially set up the Hubei construction machinery training centre at its new facility. Here, Haulotte's experts will provide a wide range of training courses for aerial work platform operators to enhance their skills.

"We go far beyond simple technical training; our objective is to accompany our customers so that they develop a real safety culture," said Tim Mo, marketing manager at Haulotte Shanghai.

Haulotte's Chinese subsidiary is headquartered in Shanghai, with branch offices in Beijing, Wuhan and Guangzhou. The newly established customer support centre in Hubei province and another one in Shandong province reflect the company's commitment to provide customers with a local and personalised service. ■

ABOVE AND LEFT: **The opening ceremony of Haulotte's new customer support centre in Wuhan.**

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Volvo CE introduces Fuel Challenge programme in SE Asia

Volvo Construction Equipment (Volvo CE) has launched a Fuel Challenge programme in Singapore, Malaysia and Indonesia. This initiative will reward customers of Volvo EC200D and EC210D excavators with aftermarket credit for consuming less than the stipulated fuel consumption target for their respective country.

When buying a new machine, a customer can choose to enrol it in the Fuel Challenge programme. The objective is to encourage the use of machines in the right work modes and for operators to consciously avoid using high work modes. This is facilitated by Volvo CE through activating a passcode for the higher modes.

"Fuel is typically the single highest contributor to operating cost, often accounting for 30-40% of a machine's total cost of operation," explained Volvo CE.

Multi Ways Equipment from Singapore, which enrolled two of its Volvo EC200D excavators in the Fuel Challenge programme, has passed its savings onto its customers.

"We enrolled our new EC200D excavators in the Fuel Challenge programme with the intention of adding value to our rental customers by lowering their operating cost – fuel being the most important component," said James Lim, managing director of Multi Ways Equipment.

"Volvo CE worked with our team to achieve our lowest fuel consumption to date with no impact on productivity. Not only did we save fuel but also earned the credit to spend on parts and services."

Volvo CE further mentioned that lowering fuel consumption across various segments, by optimising performance and supporting increased operator efficiency, also contributes to the company's sustainability commitments for the environment.

A customer's Volvo EC200D crawler excavator joining the Fuel Challenge programme.

The Volvo Fuel Challenge programme is open to customers of Volvo EC200D and EC210D crawler excavators in Singapore, Malaysia and Indonesia. Terms and conditions apply and customers are requested to consult their local dealer for more details of the programme. ■

Malaysia's ERE Consulting Group joins Aurecon

Aurecon has announced its strategic investment in ERE Consulting Group, a multidisciplinary environmental consultancy based in Malaysia. This is the company's second investment in the country this year, after GCU Consultants Sdn Bhd in April. ERE is now a member of the Aurecon Group, effective 1 August 2021.

"Under the leadership of Stephane Asselin, we are building our scale and our capabilities across Asia," said William Cox, CEO of Aurecon. "Recently, Aurecon has been recognised as one of ENR's Top 200 Environmental Firms globally. As we welcome ERE to the Aurecon Group, I am confident that this further strengthens Aurecon's environmental, water and sustainable development capabilities across Asia Pacific and will help clients to design resilient solutions that are ready for the future."

Aurecon explained that even as the country continues to face the challenge of the Covid-19 pandemic, economists and analysts are optimistic Malaysia's GDP growth will recover in 2021, underlining the resilience of the country's economy and highlighting the strong scope for growth. According to the World Bank, Malaysia could register 4.5% GDP growth this year.

Senior leaders at ERE (L-R): Lee Hwok Lok, Dr G Balamurugan, and Raja Nur Ashikin Raja Zainal.

Significant investments in water supply, sanitation, waste management and energy are expected in Malaysia and these will present major work opportunities to Aurecon and ERE. More recently, Malaysia's Water and Environment Ministry (KASA) has committed to a Sustainable Malaysia 2030 target. This is in alignment with the UN Sustainable Development Goals, which will be rolled out through its Strategic Plan 2020 – 2030: Environmental Sustainability in Malaysia.

Stephane Asselin, chief executive for Asia at Aurecon commented, "We are excited about the integration with ERE, as it will allow us to accelerate our growth and pursue more opportunities with governments and organisations who are considering how sustainability and climate change will affect their business models, supply chains, infrastructure and investments in Malaysia and internationally."

"We are looking forward to being a member of the Aurecon Group and to work with the team to take on even bigger and more complex projects," added Dr G Balamurugan, managing director of ERE. "We see a positive synergy between us and Aurecon's business, growth strategy, brand values and more importantly, our shared passion to deliver meaningful, sustainable and resilient solutions." ■

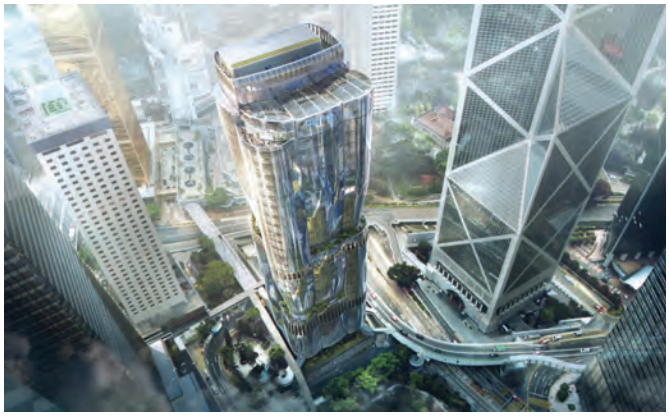
The Henderson - new iconic office tower in Hong Kong

Henderson Land Development Company has announced that its new commercial development at Murray Road, Central, will be named The Henderson. Set to become an "icon amongst icons", this project will be developed into a 465,000-sq-ft super Grade-A office tower designed by Zaha Hadid Architects (ZHA).

Located adjacent to Hong Kong Park and Chater Garden in the CBD, The Henderson is ZHA's first commercial project in Hong Kong. The building features a sculptural, curved glass facade, which is believed to be the first of its kind in the city. "It is made possible by the bespoke four-ply double-curved, resilient architectural glass manufactured in Germany and Spain," said Henderson Land.

"The name we have chosen – The Henderson – underpins our ambition for this significant new development to rank eminently amongst the world's most admired urban architectural landmarks, with sustainability and innovation at its core," said Lee Ka Shing, Martin, chairman of Henderson Land Group.

"The Henderson is the realisation of our bold concept to create a world-class commercial building in the heart of Hong Kong that will also function as a striking master art piece in its own right. Our vision is for this highly original development to be an awe-inspiring intelligent urban complex that exemplifies the role of innovation in driving continuous breakthroughs, which not only enables smart business but also promotes active community enjoyment."



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The Henderson, designed by Zaha Hadid Architects, will be developed into a new 465,000-sq-ft super Grade-A office tower.

The Henderson, which is expected to be completed in 2023, has already received numerous awards and accolades, including platinum pre-certification in both WELL Building Standard and Leadership in Energy and Environmental Design (LEED). ■

Mapei and Elettrondata sign partnership agreement

Mapei and Elettrondata have signed a multi-year partnership agreement to offer equipment and services for quality control, production and transport of ready-mix concrete.

The combination of Elettrondata's process automation technology and Mapei's concrete technology aims to provide the entire concrete industry with an added value resulting from the total quality process and support of CO2 neutrality.

Founded in 1937 in Milan, Italy, Mapei is now one of the world's leading manufacturers of chemical products for the building industry. The company has contributed to the construction of major architectural and infrastructure projects worldwide.

Elettrondata is one of Europe's leading providers of integrated batching systems for the ready-mix concrete, asphalt and precast elements production. Established in 1973, the company has installed more than 7,000 automation systems globally.

In a joint statement, both partners emphasised that a change towards a circular economy is crucial for value creation, economic growth and waste and resource management. "Through Mapei concrete industry solutions, this partnership will integrate raw materials, concrete admixtures, fibres and digital solutions in a circular process of quality and sustainability," they explained.

"Focusing on the total life cycle of a structure, the collaboration will increase the value and reduce the carbon footprint through high-end products and process automation. In addition, thanks to the new ED SM II system, the concrete delivery phase is now part of the quality process."

Marco Squinzi, CEO of Mapei said, "Mapei focuses on a sustainable concrete industry. The partnership with Elettrondata is a winning combination for our customers allowing the successful mix of proven, robust, and user-friendly hardware and software with our chemical products and solutions.

"As the world-leading supplier of admixtures and fibre technology for concrete, we have developed a full range of ancillary products to support all the steps of concrete production and use. Offering the EDSM II is part of this total quality and sustainability thinking, focusing on concrete production from raw materials, mix design, production, transport, casting & curing and recycling."

Marco Squinzi (left), CEO of Mapei and Leonardo Nigro, CEO of Elettrondata.

Leonardo Nigro, CEO of Elettrondata added, "The partnership with Mapei is for us a source of pride and an incentive to continue to innovate. For over 15 years, we have been studying and implementing the SM system for the control of the delivered concrete. Today we have more than 3,000 SM systems installed on as many truck mixers.

"Thanks to the collaboration with Mapei, EDSM II was born, the new system for the control of the concrete during its delivery that integrates the SM system and is improved with further functions, in order to provide the concrete producer with all the data in real time and to act on time."

A dedicated website has been created by Mapei to support customers in exploring the advantages of these new solutions: https://cis.mapei.com. ■

Doosan Infracore sale to Hyundai Heavy Industries completed

The sale of Doosan Infracore to Hyundai Heavy Industries Holdings Co (HHIH) has officially closed, as of 19 Aug 2021. Together the two brands are getting closer to achieving their goal of becoming a global top five player.

Doosan Infracore is now a subsidiary of the newly created Hyundai Genuine (HG) Group alongside Hyundai Construction Equipment (HCE) as two independent construction equipment companies under HHIH. HG will act as the intermediary company of HHIH Group's construction equipment businesses and will be leading both Doosan Infracore and HCE to maximise the company's efforts and focus on the construction equipment industry.

The plan is to manage overlapping investments and invest heavily in areas like future technologies and innovation, said Doosan Infracore in its statement. The company will be working diligently to commercialise Concept-X and develop cutting-edge products such as electric excavators, battery packs, hybrid fuel cells and other next-generation products.

"By focusing on each company's areas of strength, HG will be able to advance the development of these types of products to gain a competitive edge in the global market," explained Doosan Infracore.

Doosan wheel loader and dump truck.

"Independently, the two companies will grow together, complement each other, even compete in good faith in all areas, including technology, production, purchasing, sales, and quality. This will enable our business to expand and associate with other companies operated by the whole HHI Group." ■

New CEO for Goldhofer

Global manufacturer of heavy and specialised transport vehicles, Goldhofer, has appointed Matthias Ruppel (left) as its new chief executive officer. He is also a member of the board at the company.

Mr Ruppel previously served as Goldhofer's chief operating officer (COO). He was in charge of engineering – which has been expanded to include purchasing – with responsibility for development and production.

Prior to that, Mr Ruppel spent 13 years as managing director at Putzmeister Holding GmbH. He has also held various positions of responsibility in production for international markets in the fields of mechanical and plant engineering.

Hans-Joachim Boekstegers, chairman of the supervisory board at Goldhofer AG said, "In Matthias Ruppel, we have gained an accomplished CEO with more than 10 years of experience as managing director of a globally active industrial company in a comparable and equally challenging environment.

"He combines this experience with the ability to get things done in engineering, plus the necessary hands-on mentality. He will continue to drive and consolidate Goldhofer's position as technological leader in the transport and airport markets with a focus on the customer and an eye to the future." ■

Sandvik acquires Rocbolt Technologies

Sandvik's acquisition of DSI Underground, a global leader in ground support and reinforcement products, systems and solutions for the underground mining and tunnelling industries, was closed on 7 July 2021. This included DSI's ownership stake in four joint ventures (Rocbolt Technologies) based in China, South Africa, Mongolia and Australia.

On 3 August 2021, Sandvik signed and completed three agreements to acquire the JV partner's (Jennmar) share of the Rocbolt Technologies JVs in China, South Africa and Mongolia. Jennmar will continue to be a JV partner in Australia.

Rocbolt Technologies will be reported in the ground support division of Sandvik Mining and Rock Solutions. In 2020, DSI Underground had revenues of about €516 million (excluding the four JVs). The three JVs that will now be fully consolidated had revenues of around €80 million in 2020. ■

CALENDAR OF EVENTS

// Events in Asia

Worldbex 2021
23 to 26 Sept 2021
World Trade Centre Metro Manila
Metro Manila, The Philippines
Website: www.worldbex.com

MBAM Onebuild 2021
20 to 22 Oct 2021
Kuala Lumpur Convention Centre
Kuala Lumpur, Malaysia
Website: www.mbamonebuild.com

OS+H Asia 2021 Hybrid
8 to 12 Nov 2021
Devan Nair Institute for Employment and Employability
Singapore
Website: www.osha-singapore.com

ASEAN Super 8
9 to 11 Nov 2021
Malaysia International Trade & Exhibition Centre
Kuala Lumpur, Malaysia
Website: www.super8asean.com

Work Safe Asia 2021
10 Nov to 9 Dec 2021 (virtual event)
24 to 26 Nov 2021 (physical event)
Marina Bay Sands
Singapore
Website: www.worksafeasia.com.sg

Natural Disasters Expo Asia
1 to 2 Dec 2021
Singapore Expo
Singapore
Website: www.naturaldisastersshowasia.com

Trenchless Asia 2022
27 to 28 Jul 2022
Kuala Lumpur Convention Centre
Kuala Lumpur, Malaysia
Website: www.trenchlessasia.com

Cambuild 2022
6 to 8 Sept 2022
Diamond Island Exhibition & Convention Centre
Phnom Penh, Cambodia
Website: www.cambuildexpo.com

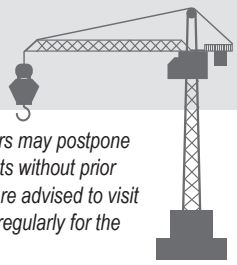
bauma China 2022
22 to 25 Nov 2022
Shanghai New International Expo Centre
Shanghai, China
Website: www.bauma-china.com

// Events outside Asia

World of Concrete 2022
18 to 20 Jan 2022
Las Vegas Convention Centre
Las Vegas, Nevada, USA
Website: www.worldofconcrete.com

Hillhead 2022
21 to 23 Jun 2022
Hillhead Quarry
Derbyshire, England, United Kingdom
Website: www.hillhead.com

bauma 2022
24 to 30 Oct 2022
Munich Trade Fair Centre
Munich, Germany
Website: www.bauma.de



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

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IPAF invites members to join new Int'l Safety Committee

A new International Safety Committee (ISC) has been created by the International Powered Access Federation (IPAF) to assist in globalising standards development and effective implementation, as well as promoting awareness about industry safe practice.

The new committee is born out of the existing IPAF Accident Work Group of the IPAF UK Country Council, which has been instrumental in compiling and analysing incident statistics gathered via IPAF's accident reporting portal, leading to the annual IPAF Global Safety Report, recently published for 2021.

The current members of the Accident Work Group will constitute the core of the new committee, with chair Mark Keily of Sunbelt Rentals UK taking the reins for the first meeting on 22 September 2021. IPAF is now inviting representatives to join the existing members of the ISC. Candidates should be powered access professionals with a passion for improving health and safety. The committee will meet 3-4 times a year, mostly virtually with one physical meeting in conjunction with a major industry event.

Brian Parker, IPAF's head of safety & technical said, "The IPAF Accident Work Group has long worked hard behind the scenes to produce safety guidance based on the accident reporting data we have been collecting and analysing since 2013 when the vast majority of reporting at that time coming from our UK membership.

"With the accident reporting portal now receiving reports from more than 20 countries worldwide, and with IPAF preparing and promoting technical guidance and safety campaigns in almost 80 countries, we felt it was appropriate to expand the remit and outlook of the group, and so have created the International Safety Committee, which will ultimately report to and be represented on the IPAF Council."

Peter Douglas, CEO and MD of IPAF added, "It is clear from the latest IPAF Global Safety Report and the difficulties faced by our industry during the pandemic, as well as new standards being developed and implemented in recent years in places such as the US, Canada, the Middle East and Southeast Asia, that powered access as whole will benefit from clear, consistent and independent leadership in safety globally.

"If any IPAF member company wishes to be represented on the new committee I urge them to get in touch; we look forward to a high calibre of interested parties expressing their interest. In the meantime, I recommend all stakeholders take the time to review the latest Global Safety Report online and of course I urge all operators, managers and users of powered access around the world to keep reporting accidents and near misses in their businesses." ■

IPAF announces new role to oversee development of rental standard

Martin Wraith (left) has been recruited to a new role with IPAF to oversee the development, implementation, and ongoing audit of the IPAF Rental+ standard for hire members.

IPAF Rental+ is the standard for quality and safety in the MEWP rental industry. The IPAF UK Country and Irish councils have both mandated that all new and existing hire/rental company members should be audited to meet the required standard as a condition of continuing membership. IPAF rental member companies are annually assessed against the minimum requirements, which includes Safety Systems in Procurement (SSIP) accreditation alongside IPAF criteria to improve industry safety.

As of 9 August 2021, Mr Wraith has been officially appointed as IPAF Rental+ manager, supporting the IPAF operations team. He reports to Giles Councell, IPAF's director of operations.

Mr Wraith is well known in the UK's powered access industry, having served as an IPAF auditor for a number of years and also being a qualified IPAF senior instructor. He has helped to develop and implement training and hosted IPAF safety and training webinars and deliver IPAF professional development seminars (PDS) in the UK and overseas.

Mr Councell commented, "I am delighted to be able to announce this vital new position in the IPAF operations team, and we have found the ideal candidate in Martin to head up this important function. He brings with him more than 20 years of experience in the powered access industry and a strong passion for IPAF's purpose and objectives.

"The IPAF Rental+ scheme is a new gold standard for our industry, it has been a significant undertaking in transitioning our UK hire/rental members on to the accreditation and requires dedication and resources to support our members, to continue to maintain and develop the standard and to oversee the audit programme that underpins it.

"Martin has all the right skills and expertise required to fulfil this role with assurance and I am sure our members will have every confidence in him as he looks to lead the IPAF Rental+ scheme in the UK, as well as developing engagement and awareness among powered access end-users and IPAF members outside the UK. There is growing interest in IPAF Rental+ in Germany, the US and the Middle East."

Mr Wraith said, "I have long had a close association in a variety of roles with IPAF and have supported the federation at events around the world, developing training, giving presentations online and in person, delivering the audit programme of IPAF training centres and instructors, and as a qualified IPAF instructor in my own right.

"I really look forward to this next chapter of my career and can't wait to get out and about meeting members, helping them fulfil and maintain the requirements of the IPAF Rental+ audit and expanding awareness and engagement with the standard both in the UK and further afield.

"I am particularly keen to highlight the benefits of the scheme both to members trying to run a successful, standards-compliant business and to the wider contracting industry, for whom using an IPAF Rental+ accredited company brings real confidence in the levels of customer service, safety and professionalism they will receive." ■

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Bauer Cube System for diaphragm wall construction

Bauer Maschinen GmbH has introduced an innovative cutting system, Bauer Cube System, which was developed in collaboration with the Belgian tunnel construction expert Denys. This solution is expected to open up entirely new opportunities for the future construction of diaphragm walls.

"It is designed as an electrically powered cutting system which builds on a great deal of proven expertise from Bauer, but features an entirely new construction," said Dr Ruediger Kaub, managing director of Bauer Maschinen GmbH.

The system was developed precisely in container dimensions, making it unique, said Bauer. Thus it can be used without any problem in microtunnels with small diameters of just 3.8 m, for example.

"Imagine you are planning a new subway line in a densely populated city. Ideally, you want to plan the new line to allow passengers to get on and off exactly where they want to go. This means that the new subway stations need to be located exactly where there are large office complexes, a large shopping centre or the city centre. But precisely in such locations, it would be very difficult or even impossible to build these subway stations with the technology available to date," explained Dr Kaub.

"It is now possible thanks to our Bauer Cube System, which can be used exactly where the new subway stations need to be constructed: underground, below the existing buildings. This opens up entirely new opportunities for designers and architects."

With the new system, underground expansion of cities, setting up drinking water storage, or transferring cloud servers below ground along with the necessary cooling technology are all conceivable applications. "These examples demonstrate the enormous potential of our cube system," continued Dr Kaub.

The Bauer Cube System offers several advantages. For one, the impact of construction sites on traffic, businesses and residents are minimised. This is because the minimally invasive system only requires a comparatively small access point to an existing microtunnel or auxiliary tunnel. The actual work is carried out underground, essentially invisibly.

Other advantages include its electric drive system, which considerably reduces the ecological disturbance of a cutting site, and its compact dimensions that simplify logistic processes. Its individual elements can be easily transported to their place of deployment as conventional containers. As a result, the Bauer Cube System also sets new standards in terms of sustainability.

"Last but not least, I would particularly like to emphasise the trusting and highly constructive collaboration with our strategic partner Denys as well as our specialists within the Group," said Dr Kaub. "During the development phase, this collaboration delivered crucial input that allowed us to examine nearly every aspect of process engineering, mechanical engineering, logistics or external influences on the site in advance. Based on this research, many ideas were incorporated into the system at an early stage of development."

The first successful tests of the prototype under the most realistic conditions possible have already been conducted on the Bauer plant grounds in Aresing, near the company's headquarters in Schrobenhausen, Germany. This test phase will continue for the next four to six months, which in principle means that an anticipated practical application will be feasible towards the end of 2021. ■

Website: https://cubesystem.bauer.de

The innovative Bauer Cube System could open up entirely new opportunities for the future construction of diaphragm walls. The system has been developed precisely with container dimensions, meaning it can be used without any problem in microtunnels with small diameters.

Both images © Bauer Group

With Bauer Cube System, the surface impact of cutting sites can be reduced to a minimum. This is because the minimally invasive system only requires a comparatively small access point to an existing microtunnel or auxiliary tunnel. The actual work is carried out underground, essentially invisibly.

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Generac offers 'all-in-one' lighting tower solution

Generac Mobile offers its single, multi-purpose lighting tower solution with the introduction of 'Pro' technology. It enables users to have one product equipped with several functions – diesel, solar, battery, and hybrid.

The lighting towers with Pro technology feature an 'all-in-one' power system, allowing operators to choose their preferred working cycle from a number of options: diesel powered (power supply from integrated diesel generator); battery powered (power supply from integrated/rechargeable battery pack); hybrid system (it alternates battery working cycles with diesel recharging cycles, in automatic); and plug-in (plug the Pro unit into an external power source and it's ready to work while charging batteries).

The operators can choose their desired working cycle via a simple switch on the control panel, and the digital controller will adapt the equipment to the selected option.

The Generac Mobile Pro models also incorporate some innovative features for charging the battery pack using external sources. These include: a solar panel kit (a portable and stackable stand-alone kit for green recharging of Pro units); battery pack (easy-to-use external battery pack that allows up to 40 hours of operation without carbon/noise emissions); and other external power sources (connect the Pro unit to any electrical source – such as generator or main – to use and recharge the lighting tower at the same time).

The solar panel kit and battery pack are provided as options, both of which are manufactured by Generac Mobile.

In addition, the Pro models are fitted with a darkness sensor and digital timer as standard. The lighting towers also have a dimmer to adjust the LED light power from 25% to 100%, so operators are able to alter the illumination and, consequently, the total running time of the unit.

V20 Pro and Cube Pro models

Generac Mobile has enhanced its V20 and Cube+ lighting towers with Pro Technology. The new versions are named V20 Pro and Cube Pro.

Thanks to the alternative power supplies and adjustable light power, the new V20 Pro lighting tower can operate in any application field, from simple construction sites to urban areas where the use of equipment that does not produce polluting gases or noise emissions is mandatory. This model has a dedicated new trailer, which features a redesigned retractable drawbar, helping to optimise transportation costs.

The Cube Pro lighting tower can be deployed in an even more environment-friendly way, said Generac Mobile. In combination with the external battery pack, this model is able to guarantee uninterrupted lighting for long hours in absolute quietness and with zero carbon emissions.

Another advantage of the Cube Pro model is its size, which remains identical to that of the traditional Cube+. Therefore, as many as 20 Cube Pro units can be transported on a lorry, ready to use. This is not only cost saving but also more environment-friendly, reducing CO2 emissions from transport and logistics.

The V20 Pro and Cube Pro lighting towers are already available on the market, as of June 2021. Generac Mobile plans to turn to other Pro models in its range by the end of 2021, starting with the Hydro Power Box. ■

Website: www.generacmobileproducts.com

The V20 Pro (right) and Cube Pro (far right) lighting towers from Generac Mobile.

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XpertAssist – real-time remote support from Liebherr

Liebherr has enhanced its remote service app to provide better support for its customers. The company's new XpertAssist combines real-time expert advice from experienced technicians with a wide range of technical tools through an audio-visual connection. Immediate qualified fault analysis and online troubleshooting backed by step-by-step instructions mean assistance can be maximised and on-site attendances can be reduced to a minimum.

Any necessary site attendances are made as efficient as possible through audio-video calls to predefine requirements and so increase the first time fix rate. A debriefing via audio-video conference call to explain the work done, or to address possible findings is part and parcel of this new service. Liebherr said the mean time to repair can be reduced by up to 50%, and field service costs cut by up to 20% per annum.

XpertAssist extends to predictive maintenance advice and reports on individual machines or entire fleets, such as reports on safety or machine and engine utilisation. The interactive performance review and advice on preventive maintenance ensure high machine availability and early budget planning.

Service technicians could spend up to 45% of their time just travelling to/from site, which would be time consuming and costly for all parties, explained Liebherr. Thanks to XpertAssist, availability of experts is increased through elimination of travel, thus giving them more time to attend to customer needs.

Liebherr shared that recent experience in the Middle East underlines the importance of quick and efficient technology when projects are thousands of kilometres away from base. "For our company, which has all operations and projects outside our home country of Turkey, such remote service is perfect," said Levent Ekmekçioğlu, company manager of Rem Engineering Construction and Trade Co Ltd.

"Assistance was provided by Liebherr remotely in Jordan with no travel or accommodation costs and no time delays. The issue was solved immediately to our utmost satisfaction and we are very grateful for this extended assistance."

According to Liebherr, all that is needed for XpertAssist is an annual subscription, available for each individual machine or for entire fleets. As an option, the company offers a ready-to-use pre-installed tablet (LiTAB) enabling digital machine documentation and easy process data download, as well as remote operation monitoring, among its other benefits.

XpertAssist remote service app from Liebherr enables immediate qualified fault analysis and online troubleshooting to be performed. This means assistance can be maximised and on-site attendances can be reduced to a minimum.

A debriefing via audio-video conference call to explain the work done, or to address possible findings is part and parcel of this new service. According to Liebherr, the mean time to repair can be reduced by up to 50%, and field service costs cut by up to 20% per annum.

Further details are available from Liebherr's worldwide network of service partners and online under XpertAssist. This new service is available for crawler cranes, deep foundation equipment and maritime cranes. ■

Website: www.liebherr.com

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Purtop waterproofing systems ideal for various structures

The Purtop range of polyurea membranes from Mapei is designed to protect and waterproof various types of structures. They can be applied by trowel for small areas or spray for larger areas.

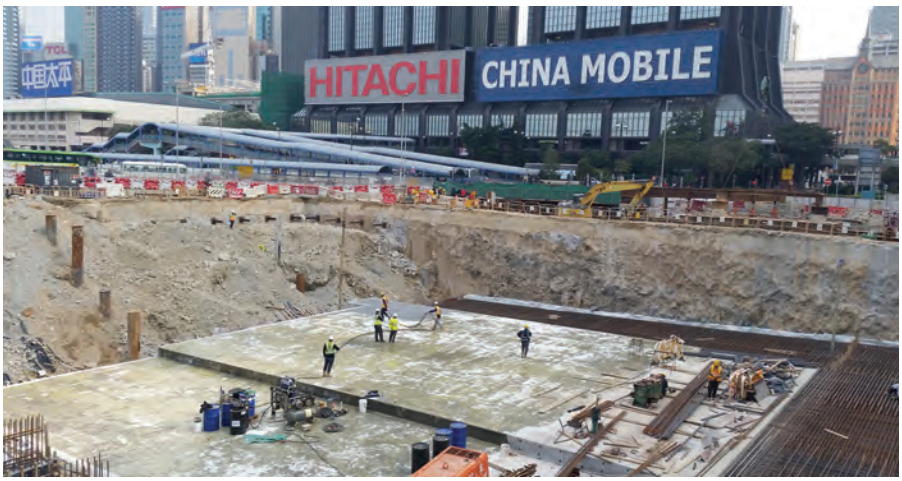
The waterproofing membranes form a seamless coating with no breaks or gaps to ensure maximum watertightness. They are fast-reacting, especially those that are spray applied.

No reinforcement is required for the membranes. They do not generate overloads on load-bearing structures, and possess high crack-bridging ability even at low temperatures of up to -20 deg C.

The Purtop range also features good resistance to aggressive chemicals, high mechanical resistance and a tensile strength of more than 20 N/sq mm. The elongation capacity is between 300% and 500%, making the product strong and long lasting.

In addition, these Purtop membranes provide excellent bond adhesion as long as the substrate is sound and prepared correctly. They are also highly versatile, and can be used as part of the flooring system as well as carpark coating system where waterproofing is needed, such as basement carpark or exposed roof carpark.

There are several systems in the Purtop range, providing different levels of strength. All of them comply with the EN 1504 international standards and can be applied on roofs, hydraulic structures, general infrastructures and buildings.



One of them is Purtop 1000, a two-component, spray-applied, solvent-free, pure polyurea membrane that forms waterproof coatings with a tensile strength of more than 20 N/sq mm and tear strength of more than 80 N/mm.

The Purtop 1000 system is suitable for storage tank basins, hydraulic works, roofs and bridge decks. It is also excellent for roof gardens as the membrane is resistant to root penetration (in accordance with the EN 13948 standards). Moreover, it can be used to waterproof water storage tanks for consumption.

Purtop 500 N is a two-component, spray-applied, solvent-free, hybrid polyurea membrane that is well suited for applications on roofs with foot traffic, inverted roofs and roof gardens, balconies, tunnel roof slabs and tunnel side walls, among others. It has a tensile strength of more than 15 N/sq mm and tear strength of more than 65 N/mm.

Another system is Purtop Easy, a one-component, ready-to-use, elastic polyurethane waterproofing membrane. It is easy to apply on horizontal, vertical and sloping surfaces, and can adhere well to numerous types of substrates - concrete, cementitious screeds, ceramics, fibre-cement boards, old bituminous membranes and metal. This system is ideal for waterproofing roofs, terraces, balconies, walkways and pedestrian areas in general. ■

Website: www.mapei.com.sg

TOP AND ABOVE: **The Purtop 1000 waterproofing membrane being applied on a foundation structure in a project in Hong Kong. The product has a tensile strength of more than 20 N/sq mm and tear strength of more than 80 N/mm.**

LEFT: **The Purtop Easy waterproofing membrane can be applied on horizontal, vertical and sloping surfaces. It can adhere well to numerous types of substrates.**

Zoomlion ZTC600R562 mobile crane comes to Singapore

Antar Cranes Services Pte Ltd now offers the Zoomlion ZTC600R562 for customers in Singapore. This 60-t truck crane is designed with a five-section, U-shaped 11.6 m – 45 m main boom as well as a 14.6-m fly jib that can be offset at three different angles (5°, 25° and 45°). The jib's maximum lifting height is 61.5 m.

The ZTC600R562 has been approved for use on Singapore road, equipped with a Weichai Euro 6 engine to meet the Land Transport Authority's (LTA) requirement. The engine delivers 247 kW of power.

"It's been a long time since a 60-t truck crane could be registered and used on Singapore road," said Antar Cranes, a Singapore-based lifting solution provider involved in various private and public projects across the country. The company has also been registered as an approved crane contractor by Singapore's Ministry of Manpower, specialising in mobile cranes.

The ZTC600R562 has a maximum driving speed of 60 km/hr, gradeability of 47%, minimum turning diameter of less than 23 m and minimum ground clearance of 0.285 m. Tail slewing radius for the crane is 3.93 m.

On more benefits of the ZTC600R562, Antar Cranes explained, "The maximum boom length of 45 m is one of the longest in its class. With an outrigger span of 7.10 m wide, this model is also suitable for Singapore jobsites where parking space for cranes is always an issue due to restricted working areas."

ABOVE: **The 60-t Zoomlion ZTC600R562 truck crane is designed with a five-section, U-shaped 11.6 m – 45 m main boom. The crane is now available in Singapore, equipped with a Weichai Euro 6 engine delivering 247 kW of power.**

BELOW: **The ZTC600R562 has a 14.6-m fly jib that can be offset at three different angles (5°, 25° and 45°). With an outrigger span of 7.10 m wide, this model is suitable for Singapore jobsites where parking space for cranes is always an issue due to restricted working areas.**

The ZTC600R562 features a total length of 13.95 m, width of 2.8 m and height of 3.71 m. The crane provides a maximum counterweight of 11 t with a hydraulic ballast system, slewing speed of up to 22 rpm and hoist speed of 125 m/min. For operator comfort, the spacious cab can be tilted by up to 20° and is fitted with both air conditioning and heating systems as well as USB ports.

Antar Cranes is a subsidiary of JP Nelson Group, a one-stop solution provider of equipment and machines for the construction, marine and offshore, oil & gas and other related industries. Headquartered in Singapore, the Group also has branch offices in several countries across Asia. ■

Website: www.jpnelson.com.sg

Snorkel starts production of five electric RTE scissor lifts

Snorkel has commenced full production of five lithium-ion battery powered compact rough-terrain scissor lift models. They include lithium-ion battery versions of two narrow width units, the S2255RTE and S2755RTE, as well as three standard width units, the S2770RTE, S3370RTE and S3970RTE.

Available for delivery globally, these five 'RTE' electric scissor lifts are being manufactured at Snorkel's assembly facilities in the UK and New Zealand. The machines expand the company's lithium-powered range of zero emission rough-terrain aerial lifts and telehandlers to a total of eight models. They join the Snorkel SL26RTE and SL30RTE electric Speed Level launched in 2019, and the Snorkel SR5719E/SR626E electric compact rough-terrain telehandler launched in 2020.

The new scissor lifts are equipped with maintenance-free lithium-ion battery packs with built-in battery management systems (BMS), which last up to 20 times longer than lead acid batteries, said Snorkel. Suitable for most environments, the lithium-ion battery packs have been tested in climatic chambers between -25°C and 60°C.

Snorkel added that in both test conditions and real-life applications, the standard two battery pack system has been proven to deliver at least an eight-hour shift on a single charge, and in some cases, up to one week between charges, subject to usage. Unlike lead acid batteries, the charging pattern for lithium-ion batteries is designed to seamlessly fit into a normal working day schedule and can be top-up charged during breaks and shift changes.

The five Snorkel models are offered as standard with two 5.75-kWh lithium battery packs, and can be optioned with an additional 5.75-kWh battery pack for extended range for very heavy-use applications or where long-distance driving is required.

Designed for outdoor applications, a powerful and efficient AC electric motor creates efficiencies in the hydraulic drive system with higher torque than a diesel engine, which in turn provides improved gradeability and enhanced performance on rough terrain than traditional combustion scissor lifts.

The electric motor delivers up to 62% less jobsite noise than the diesel equivalent, revealed Snorkel, which enables the lifts to be used indoors or in work environments with noise regulations. Having no engine fan, dust generation is also reduced for safer and cleaner operation in low-emission zones and green cities.

What's more, with minimal battery and electrical system maintenance required, servicing costs are reduced by up to 93% when compared to an engine, while also eliminating the costs and risks of waste oil and filter disposal.

The Snorkel S2255RTE and S2755RTE can reach maximum working heights of 8.5 m and 10.1 m and offer lifting capacities of 420 kg and 300 kg respectively. Popular for their narrow width of just 1.45 m, these lifts feature a spacious 1.4 m x 3.93 m platform with the 1.2 m roll-out deck extension deployed. Weighing less than 2,750 kg, the machines can be towed by a car or light commercial vehicle on a trailer between jobs.

Measuring 1.8 m wide, the S2770RTE can lift up to 580 kg to a maximum working height of 10.1 m, while the S3370RTE can lift 454 kg to a working height of up to 12 m. Reaching up to 13.8 m, the S3970RTE is the largest compact rough-terrain scissor lift in the family and is capable of lifting up to 350 kg.

All five lifts are available with high grip, non-marking tyres for indoor/outdoor use, and have four-wheel drive capabilities with 35% gradeability and an oscillating axle. Four auto-levelling stabilisers come as standard, which benefit from Snorkel's inverted leg design that protects the cylinder rod from damage and debris, and can level up to 6 degrees front-to-rear, and 10 degrees side-to-side.

According to Snorkel, these same models also continue to be offered as 'RT' versions with a diesel engine, or as 'BE' versions with Snorkel's bi-energy solution that enables the operator to switch between an internal combustion engine and lead acid battery power for indoor/outdoor working. ■

Website: www.snorkellifts.com

ALL IMAGES: **Featuring zero emissions, Snorkel RTE scissor lifts can be used for both indoor and outdoor applications. The machines also provide higher torque for excellent rough terrain performance.**

Comansa 3D tower crane models for BIM systems

Comansa offers 3D models of its tower cranes for the BIM (building information modelling) systems. Users can now illustrate and simulate full construction, maintenance and even demolition processes for all kinds of buildings and infrastructure, and they can also include crane specifications. This leads to improved process optimisation and enhanced productivity.

Thanks to this modelling technology, all types of details can be controlled in terms of geometry, the relationship with the space, geographical information, and quantities and properties of the project's components (for example, the details of tower crane manufacturers, like Comansa). Thus users are able to estimate costs, plan their work and coordinate logistics tasks.

By integrating the machinery and components used during construction in BIM planning and project management, occupational aspects, maintenance needs and activities sequences before, during and after the project can be defined and controlled. This computer-aided representation based on objects constitutes a substantial change from traditional methods based on vectorial representation.

In addition to the graphic structure, the BIM systems feed off the parametrisation of the crane and its components. As a result, they provide information such as the load diagram, speeds and performance values of lifting, trolley and turning mechanisms, and any other crane-related data that may be necessary and useful to improve productivity. Apart from outlining the structure, the BIM systems simulate the crane's performance through its life cycle on the project in a graphic environment. ■

Website: www.comansa.com

ALL IMAGES: **The 3D model of Comansa 37.5-t 21LC750 tower crane for a jobsite at the Colorado Convention Centre in Denver, USA.**

Lintec & Linnhoff plants on Pan-Borneo Highway

Asphalt plants from Lintec & Linnhoff are working on a major project to construct several sections of the Pan-Borneo Highway in Sabah and Sarawak, Malaysia.

Here, the Lintec CSD 3000 and CSD 2500B containerised asphalt plants together with the Linnhoff TSD 1500 MobileMix asphalt plants are used to provide high-quality hot mix asphalt, offering lower operating and maintenance costs for the clients, as well as excellent productivity to meet the substantial challenges of the construction.

The ultimate client on the project is the Government of Malaysia and over the four-year period, the CSD and TSD asphalt plants will be producing hot mix asphalt for both the binder course and wearing course for several sections of the Pan-Borneo Highway.

Lee Yen Meng, CEO of Lintec & Linnhoff Asphalt Pte Ltd, said that the customers selected these CSD and TSD asphalt plants for their high portability, productivity, quick installation, good quality mix and reliability.

"Because some parts of the highway are operational, the asphalting works can only be conducted during a short window of time during the day. Hence, these asphalt plants' productivity is maximised during these hours," explained Mr Lee.

"The CSD 2500B can produce up to 160 t/hr, while the CSD 3000 can produce up to 240 t/hr. Both models are equipped with large hot mineral bin capacities to ensure steady batch production."

Mr Lee added, "The Linnhoff TSD 1500 MobileMix offers an additional advantage. With their fast mobilisation and no need for heavy cranes for installation, they can be swiftly relocated to other sections of the highway as required. This is a huge advantage on a road construction project, where mobility and being close to the project site is key."

Maintenance and fuel consumption of the CSD and TSD asphalt plants are reduced, thanks to their screen drum technology. This technology combines the drying and screening of aggregates in one drum, eliminating the need for hot elevators and vibrating screens.

Lintec and Linnhoff asphalt plants are fitted with a pollution control unit, where exhaust gas is filtered and clean air is released into the atmosphere, while the remaining dust particles can be used as reclaimed filler.

Works on the highway began in September 2017. Once the construction is completed, the new Pan-Borneo Highway will improve intercity connections and provide faster and safer travels along the northern part of Borneo.

The Pan-Borneo Highway connects the Malaysian states of Sabah and Sarawak with Brunei and Indonesia's Kalimantan. Within the Malaysia section, over 2,000 km of highway makes up the project, while there is over 3,000 km in Indonesia section and around 170 km in Brunei section.

ABOVE AND LEFT: **With their fast mobilisation and no need for heavy cranes for installation, Linnhoff TSD 1500 MobileMix asphalt plants can be swiftly relocated to other sections of the highway as required.**

Lintec CSD 3000 (pictured) and CSD 2500B containerised asphalt plants can produce up to 240 t/hr and 160 t/hr respectively. They are equipped with large hot mineral bin capacities to ensure steady batch production.

The Pan-Borneo Highway is part of the Asian Highway Network, also known as the Great Asian Highway, a cooperative project between some countries in Asia and Europe with the United Nations Economic and Social Commission for Asia and Pacific (ESCAP) to improve highway systems in Asia. ■

Website: www.lintec-linnhoff.com

Bauer joins Teesta VI Hydro Electric project in India

Bauer Engineering India Private Limited, a subsidiary of Bauer Spezialtiefbau GmbH, has been commissioned by Jaiprakash Associates Limited to carry out specialist foundation engineering and geotechnical work for the Teesta VI Hydro Electric project in India.

Developed by M/s Lanco Teesta Hydro Power Limited, a wholly-owned subsidiary of National Hydro Power Corporation of India, the project is located in the town of Singtam on the Teesta River. This river, which is over 300 km long, rises from the Pahunri Glacier at an altitude of more than 7,000 m in the eastern Himalayas before flowing through the Indian states of Sikkim and West Bengal until it joins the Jamuna River at Fulchhari in Bangladesh.

The scope of work for Bauer Engineering India includes construction of an anchored pile wall, consisting of around 10,000 running meters of piles with a diameter of 800 mm, plus around 60,000 running meters of anchors. The anchored pile wall will enable a 40 m deep excavation for the intake structure on the right bank.

Along the upstream cofferdam, 4,700 sq m of grout curtain will be constructed using the jet grouting technique. In two individual stages on the upstream side of the barrage, 4,600 sq m of diaphragm wall will be built using a trench cutter through the bouldary alluvium after pre-treatment.

"Due to the special location of the Teesta River, it is proving challenging to both harness hydropower and also protect local residents against flooding," said Harish Agarwal, senior vice president of Jaiprakash Associates Limited.

Another challenge is the limited space on site due to the relatively narrow valley and steep slopes as well as working in close proximity to an existing barrage. Construction work will also be performed through substantial bouldary strata and under erratic flooding pattern in the river.

The work executed by Bauer started in April this year and is expected to be completed in the second quarter of 2024. ■

Website: www.bauer.de

© Bauer Group

Bauer is undertaking the specialist foundation engineering and geotechnical work for the Teesta VI Hydro Electric project in the Indian state of Sikkim.

Mapei systems help deliver Hap Seng Business Park

Covering an area of over 8 ha, the new Hap Seng Business Park in Shah Alam, Malaysia, accommodates different building types and sizes to meet the needs of various industries and functions. These include an over 46,000 sq m flatted warehouse, which is the largest building in the complex, as well as semi-detached and detached types. The basement carpark occupies the entire site with more than 900 parking bays.

Completed in 2020, this new industrial development is owned by Hap Seng Land Sdn Bhd. The architect for the project was Asima Architects Sdn Bhd, while the contractor was Nakano Construction Sdn Bhd. Mapei was engaged to provide waterproofing solutions for the driveway and basement carpark.

At the basement carpark, Mapei's Idrostop waterbars and Idrostop SW waterstops were used for sealing the construction joints in the basement slab and retaining wall. The Mapelastic Foundation waterproofing membrane and Polyfond Kit Drain were installed on the retaining wall, while the Idrocrete WP waterproofing admixture helped to enhance the concrete quality of the basement slab and wall.

LEFT AND BELOW: **The driveway was waterproofed with Mapelastic Smart cementitious mortar and Mapetex Sel polypropylene fabric.**

BELOW LEFT: **The Mapefoil DPM 250 separation sheet was applied prior to installation of the topping concrete.**

A view of the driveway (far left) and basement carpark (left) after completion.

BOTTOM LEFT: **The new Hap Seng Business Park accommodates different building types and sizes to meet the needs of various industries and functions.**

The driveway was waterproofed with Mapelastic Smart, a two-component, high-flexibility cementitious mortar, and Mapetex Sel, a non-woven, macro-holed polypropylene fabric designed for reinforcing waterproofing membranes. The Mapefoil DPM 250 separation sheet was overlaid prior to installation of the topping concrete.

For the drains along the driveway, Mapei's Primer SN was deployed as the priming layer and broadcast with Quartz 30/60 sand. The Purtop 1000 membrane (3-mm-thick) was selected as the waterproofing layer due to its long term durability, toughness and ability to withstand direct exposure to hydraulic abrasion. The Kerapoxy epoxy grout was then applied on the Purtop 1000 membrane and broadcast with quartz sand to form the adhesion surface for Mapelastic Smart and Mapetex Sel at the overlap area.

The Mapei waterproofing systems in this project were supplied by Mapei Malaysia. The installation work was carried out between 2018 and 2020 by subcontractor Monarch CC Sdn Bhd. ■

Website: www.mapei.com.sg

Safe and efficient transport using Goldhofer modules

The logistics and heavy haul company Al Faris was recently contracted to transport and install heavy, ultra-long overflow tanks at the Mohammed bin Rashid Al Maktoum Solar Park in the UAE. For the journey from Jebel Ali Port to the jobsite, the company relied on its Goldhofer THP/SL heavy-duty modules.

The safe and efficient transport of 52-m-long loads weighing 235 t involved extensive logistical preparation and various permits. Every journey was made in a convoy of two files, each comprising 30 Goldhofer heavy-duty axle lines and a Mercedes Arocs tractor. This ensured punctual delivery of all the tanks to the solar park.

The tanks are used together with an expansion tank as part of an overflow storage system, in which the expanded thermal fluid can be stored and reused. With a generating capacity of 5,000 MW, the plant in Seih Al Dahal is believed to be the world's largest single-site solar farm.

The biggest challenges in this heavy haul project were keeping loading times as short as possible and planning the optimum route from the port to the solar park. Strict specifications had to be met due to time restrictions and the storage volume in the port.

The route itself had to be meticulously planned in terms of modifications to the roads, detours and temporary bypass roads so as to avoid any obstacles for the transport. As the ideal solution for such a demanding journey, Al Faris chose towed heavy-duty modules in Goldhofer's THP/SL series, which combine a high bending moment for extremely heavy loads with easy handling and an impressive suspension stroke. This avoided any problems with uneven terrain on the construction site. In view of the length and weight of the tanks, Al Faris decided on a parallel combination with 30 axle lines each.

"Our planning was 100% successful and we were able to move the tanks to their destination within a very short time," said Mr Pinto, founder and managing director of Al Faris Group. On arrival at the site, the tanks were offloaded and moved about 100 m by a 400-t crawler crane and placed on the awaiting foundations.

"When it comes to transporting ultra-heavy and voluminous cargoes on and off- road, the THP/SL modules are often the most economical solution. They are the key to extremely high payloads in combination with long continuous operations," said Dean Exner, Goldhofer's regional director of sales for the Middle East. ■

Website: www.goldhofer.de

Both images © Al Faris

ABOVE AND BOTTOM LEFT: **Goldhofer THP/SL heavy-duty modules with 30 axle lines safely transport heavy, ultra-long overflow tanks from Jebel Ali Port to the Mohammed bin Rashid Al Maktoum Solar Park in the UAE.**

KaTRIS

Driving digitalisation in Singapore's construction industry

Kajima Technical Research Institute Singapore (KaTRIS) is the global R&D hub of Kajima Corporation, a leading construction company in Japan with operations around the world. Established in September 2013, KaTRIS not only promotes Kajima's technologies but also proposes solutions to create new values for buildings and infrastructures.

Come 2023, KaTRIS will be part of The GEAR (Kajima Lab for Global Engineering, Architecture & Real Estate) in Singapore - which will serve as the company's Asia Pacific headquarters. Here, KaTRIS will conduct R&D and open innovation on advanced construction technologies, including robotics, digitalisation and automation, as well as testbed sustainable and wellness technologies.

Dr Chae Soungho, chief research engineer at KaTRIS, shares some of the latest digital technologies that have changed the construction landscape in Singapore and the role of KaTRIS in this new era.

The changing landscape of Singapore construction

In recent years, the Singapore government has been putting emphasis on the integrated digital delivery (IDD) process. "It is one of the key thrusts for the construction industry in empowering the private sector to adopt related technologies," explained Dr Chae Soungho, chief research engineer at KaTRIS.

"As a result of such initiatives, Singapore has established one of the most advanced environments for the construction industry, particularly in areas such as infrastructure, solutions, and databases to implement digitalisation. This is evident from the swift adaptation to new requirements around worker management as a result of the Covid-19 pandemic last year.

"Personally, I would find it difficult to assume that the construction industry will make a quick recovery from the current situation. With border control measures still being enforced and supply chains still recovering from the aftermath of the pandemic, there is a crucial need for companies to invest in innovative digital technologies and processes to mitigate the impact of the pandemic, accelerate productivity, and improve revenue."

One of the latest digital technologies that has changed the landscape of the construction industry in Singapore is reality capture, revealed Dr Chae.

KaTRIS has developed a suite of solutions with its industry partners to improve productivity in PPVC installation. This construction method is increasingly popular in Singapore.

"Reality capture technology has dramatically improved over the years, becoming more affordable and more automated, accessible to everyday users, not just specialists. 3D reality capture enables users to replicate the on-site environment and turn this into virtual 3D models that can be viewed and accessed remotely.

"This allows for detailed overviews of construction projects, which can be shared with multiple stakeholders such as architects, designers and site engineers to identify design errors before construction starts."

According to Dr Chae, KaTRIS was the first in Singapore to invest in Leica's BLK2GO handheld 3D imaging laser scanner, which is very easy to use with 'push button' simplicity to capture detailed point cloud data in tight spaces and areas.

"In one of our projects, we used Leica BLK2GO to map out interference points of an old heritage tree. Using Leica's Cyclone Register and Publisher software, we processed the point cloud data to produce a highly accurate BIM model, which allowed us to adapt our design without having to damage or cut the tree," said Dr Chae, highlighting the benefits of the technology.

"This provided increased accuracy at significantly shorter survey times as BIM models could now be generated in minutes instead of days. Previously, we would need to get a surveyor to manually take hundreds of reference points to perform verification checks, making it an extremely long and tedious process prone to human error."

Another construction method in Singapore that is growing in popularity is prefabricated prefinished volumetric construction (PPVC). "It enables contractors to manage workers off-site despite the pandemic and social distancing measures that needed to be implemented," noted Dr Chae.

"Our investments in sensing technologies, such as Leica's BLK2GO's GrandSLAM technology, have allowed us to further increase productivity of this construction methodology by checking the assembled PPVC modules for tolerance in a significantly shorter amount of time."

KaTRIS acts as a 'technical bridge'

With Singapore's construction industry undergoing digital transformation, accelerated by the pandemic, KaTRIS is set to play an important role in this new era.

"We see KaTRIS' role as being a technical bridge to connect and support both the technology and site team. At KaTRIS, we have the knowledge and know-how to spearhead the use of new technologies for streamlining the workflow processes. This includes clarification of on-site issues, feasibility study, solution planning and designing, on-site testing, training, and supporting workers," explained Dr Chae.

"We have worked with industry partners such as Leica Geosystems to pilot and introduce innovative technologies, like light detection and ranging (LiDAR), simultaneous localisation and mapping (SLAM), and Scan-to-BIM technologies to help drive productivity in this sector."

In addition, KaTRIS has recently rolled out a zero-energy building design method for one of the construction projects in Singapore. "Using a mix of smart construction technologies and solutions, we supported the implementation of a hybrid cooling system that allowed for sustainable outcomes in the construction industry," said Dr Chae.

"We've also developed a suite of solutions with our industry partners to improve productivity in PPVC installation. One instance of this is the adoption of Leica's BLK2GO handheld imaging laser

TOP AND ABOVE: **The 3D reality capture technology enables users to replicate the on-site environment and turn this into virtual 3D models that can be viewed and accessed remotely.**

> ***With border control measures still being enforced and supply chains still recovering from the aftermath of the pandemic, there is a crucial need for companies to invest in innovative digital technologies and processes to mitigate the impact of the pandemic, accelerate productivity, and improve revenue.***
>
> **Dr Chae Soungho**

scanner to increase the quality of our PPVC models' installation, such as through the collection of accurate point cloud data for tolerance checks and the scanner's ease of integration with BIM."

Dr Chae shared that KaTRIS plans introduce more new technologies, including construction robots supporting manual processes like concrete finishing, rebar tying and material handling.

"Traditionally, workers had to use various manual construction tools for concrete finishing, such as polishers, grinders and brooms to achieve the desired results. This resulted in longer project times with added cost to labour. With the concrete finish robot, we hope to automate this process and cut down the time required to execute this process.

"We are also looking to roll out 5D project control solutions to integrate the entire project life cycles' management through accurate data models to drive smarter and more informed decisions."

The construction of The GEAR in Singapore is expected to be the first known application of a comprehensive suite of robotics solutions by Kajima outside Japan. "These robotic solutions are developed alongside our collaboration partners which look to automate the process of working with concrete, finishing and inspection," said Dr Chae.

"For example, we are looking to deploy an autonomous laser scanning solution that combines Leica's reality capture technologies with an agile mobile robot to increase scanning efficiency and productivity.

"Similarly, by incorporating some of our latest construction developments, such as VR/AR solutions for the remote project control and autonomous material handling robots on site, we hope that this project will demonstrate the practical effectiveness of robotics solutions in supporting the future of construction."

LEFT: **KaTRIS office in Singapore was established in September 2013, serving as the global R&D hub of Kajima Corporation.**

BELOW: **An artist's impression of The GEAR (Kajima Lab for Global Engineering, Architecture & Real Estate) in Singapore. Come 2023, KaTRIS will be part of this new facility.**

Asia calling

Dr Chae pointed out that when KaTRIS was founded in 2013, Singapore was chosen as the location due to its advanced environment in the construction sector as well as ease of deployment of Kajima's technologies in the region. "The country also has an advanced pool of talent that can support the drive for digitalisation in the sector."

KaTRIS has since extended its footprint in Southeast Asia through collaborations with universities and companies. This is part of a wider effort to expand its presence further in the region.

In Malaysia, KaTRIS has implemented image analysis technologies to study geological conditions in tropical regions in order to mitigate geological risks before construction. Additionally, in Indonesia, KaTRIS has participated in a governmental research grant with local partners to introduce its methane fermentation technology in order to realise a sustainable waste-to-energy society.

"Similarly, we are looking towards developing better visualisation of data by harnessing the concept of digital twin technologies. With Leica's BLK2GO handheld all-in-one imaging LiDAR system, we are leveraging the potential of having up-to-date real-world data for better data-driven decisions to improve the construction process."

As digital technologies are making their way across Asia, the future of the construction industry in the region looks promising. KaTRIS is well positioned to ride on this wave.

"We are currently looking at plans to explore different markets in Asia and the region beyond Singapore and Japan. While no concrete decisions have been made, we are looking at venturing into innovations and technologies in further fields with regional industry partners from a long-term perspective," said Dr Chae.

"As a vibrant and diverse region, Southeast Asia provides immense potential for us to share our technical expertise and solutions to meet the different needs of each country. In that same vein, we also take these opportunities to collaborate and learn from our partner countries to drive innovation and sustainability within the industry." ■

Website: www.kajima.co.jp/english/tech/katris

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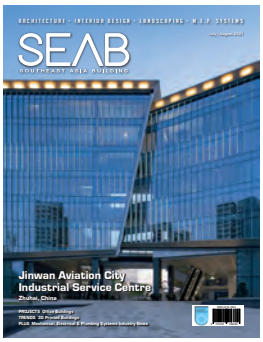

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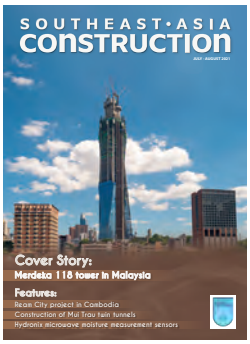

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Jaso unveils new hydraulic luffing crane

The newly launched IJ198HPA from Spanish manufacturer Jaso is one of the biggest hydraulic luffing cranes on the market, featuring a maximum load of 18 t. Its fully optimised boom starts at 30 m and can be increased in 5 m increments to a maximum jib length of 55 m.

According to Jaso, this latest model fulfils the need for higher capacity hydraulic luffers in the mid-range segment (200-350 tnm), suitable for urban projects or high-rise construction in congested inner cities. The crane has a maximum tip load of 1.6 t at 55 m, and minimum out of service (OOS) position of 8 m.

The IJ198HPA has been designed for easy and fast set-up by optimising weights and maximising pre-assembly. The complete upper part can be transported using three lorries and for a freestanding crane, just five transport units are needed.

The hydraulic ram is now preinstalled. It is located at the rear end of the tower – which is one of the main characteristics of Jaso's design – thus extending the mechanism's durability.

All platforms are also preinstalled and foldable. The weights of the components have been optimised and kept to a minimum. The heaviest part is the tower head/slewing table at 12.1 t, but the erection process can be adapted to any job site conditions, said Jaso. The manufacturer added that the component weight can be reduced to as low as 6.8 t.

TOP AND ABOVE: **The new Jaso IJ198HPA hydraulic luffing tower crane features a maximum load of 18 t. This model is suitable for urban projects or high-rise construction in congested inner cities.**

The IJ198HPA is able to operate in direct pull only with a special slim line hook block giving a 6 t maximum load, and 1.8 t at 55 m. The crane also offers multiple load chart options to combine maximum load and maximise jib length and tip loads in two-part line providing maximum loads of 8 t, 10 t or 12 t. The change can be performed easily on the job site.

The swing radius with concrete or optional steel framed counterweight is 8.2 m. With slim line steel counterweight, this can be reduced to 7.9 m for greater safety. The reduction can be seen in the width of the counterweight, allowing further pre-assembly of counter jib for even quicker set-up and it also enables the crane to get closer to the building.

The J198HPA uses the standard 1.75 x 1.75 m tower system with 12-, 6-, and 3-m-long sections, providing a maximum freestanding height of 38.1 m. To increase it, the crane can fit the 2.16 m tower system and 1.87 m tower for three beam climbing.

For the base, Jaso is offering cruciform types 4.5 x 4.5 m and 6 x 6 m, featuring maximum hook heights of 38.9 m and 44.8 m respectively with 30 m booms.

The hoist winch is integrated into the boom. There are two options available: a 45 kW hoist delivering a maximum speed of 154 m/min, and a 65 kW high-speed hoist with a maximum speed of 227 m/min. The hoist drum can be specified with Lebus grooving.

The J198HPA comes with the Eco mode system. In normal mode the crane runs on full power, but when switching to Eco mode it uses 75% of the power. The Super Eco mode operates with 50% of the normal power consumption. It allows cranes with a bigger hoist motor to also work on less current. This helps on sites with restricted power supply.

The Eco and Super Eco modes reduce the hoist speed but only when hoisting up. Lowering the hook is at same speed as when working in normal mode. ■

Website: www.jaso.com

TOP, MIDDLE AND ABOVE: **The lJ198HPA has been designed for easy and fast set-up. Its fully optimised boom starts at 30 m and can be increased in 5 m increments to a maximum jib length of 55 m.**

A TALL ORDER

The Merdeka 118 tower in Kuala Lumpur, Malaysia, is set to be the tallest building in Southeast Asia upon completion. At 644 m, it will also rank as the second tallest building in the world. The engineering team on the project, Arup, shares several innovations that have been developed to help deliver this iconic landmark.

The Merdeka 118 tower features a multi-faceted diamond-shaped facade and unique spire design. Its form was inspired by the outstretched hand gesture made by Malaysia's first Prime Minister in 1957, Tunku Abdul Rahman, when he declared the nation's independence in Stadium Merdeka, which is part of the Merdeka 118 precinct.

The project is being developed by PNB Merdeka Ventures Sdn Berhad and is scheduled for completion in 2022. Arup, as the civil and structural engineer of record, has played an instrumental role in the structural, civil and geotechnical designs, in collaboration with the architects, RSP Architects Sdn Bhd and Fender Katsalidis Architects. Samsung C&T Corporation UEM Construction JV Sdn Bhd (SUJV) is the main contractor on the project, while Turner International Malaysia Sdn Bhd is the project manager.

Careful excavation

With a gross floor area of 292,000 sq m and 118 storeys, the Merdeka 118 tower sits adjacent to two of Malaysia's historical landmarks – Stadium Merdeka and Stadium Negara – and is directly connected to an MRT station. As such, Arup has taken

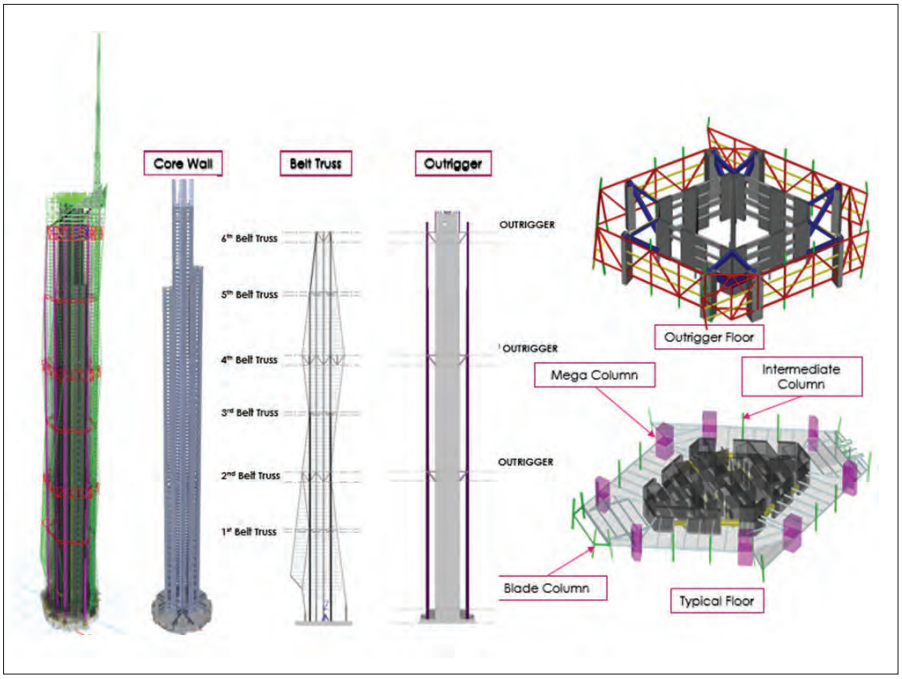
great care to preserve the integrity of the neighbourhood with careful excavation and extensive geotechnical monitoring.

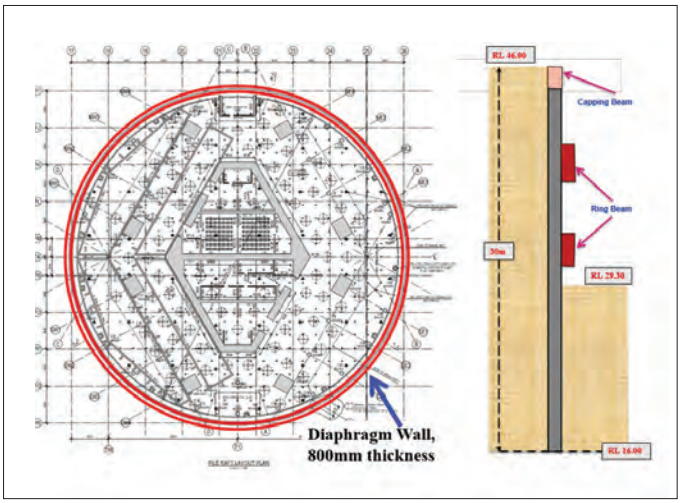
To carefully minimise any settlement or lateral movement, Arup designed an 800-mm-thick circular-shaped cofferdam wall that serves as an embedded retaining system for excavation. "This circular shape allows the cofferdam to be self-supporting through the hoop stress mobilisation, removing the need for any struts or ground anchors," explained Arup. The excavation work began in 2015.

Enhanced safety

Arup revealed that almost a quarter of the tower's height consists of the intrinsically slender and flexible spire, which is subjected to vibration due to wind load. "To minimise the vibration, we adopted 3D space truss framing and its wind load distribution has been ascertained by state-of-the-art aeroelastic wind tunnel testing," said Arup.

"Our Advanced Technology and Research team also conducted in-depth fatigue assessment of the spire and related connections to ensure the spire structures can withstand accumulated damage from day-to-day wind events during its design lifetime."

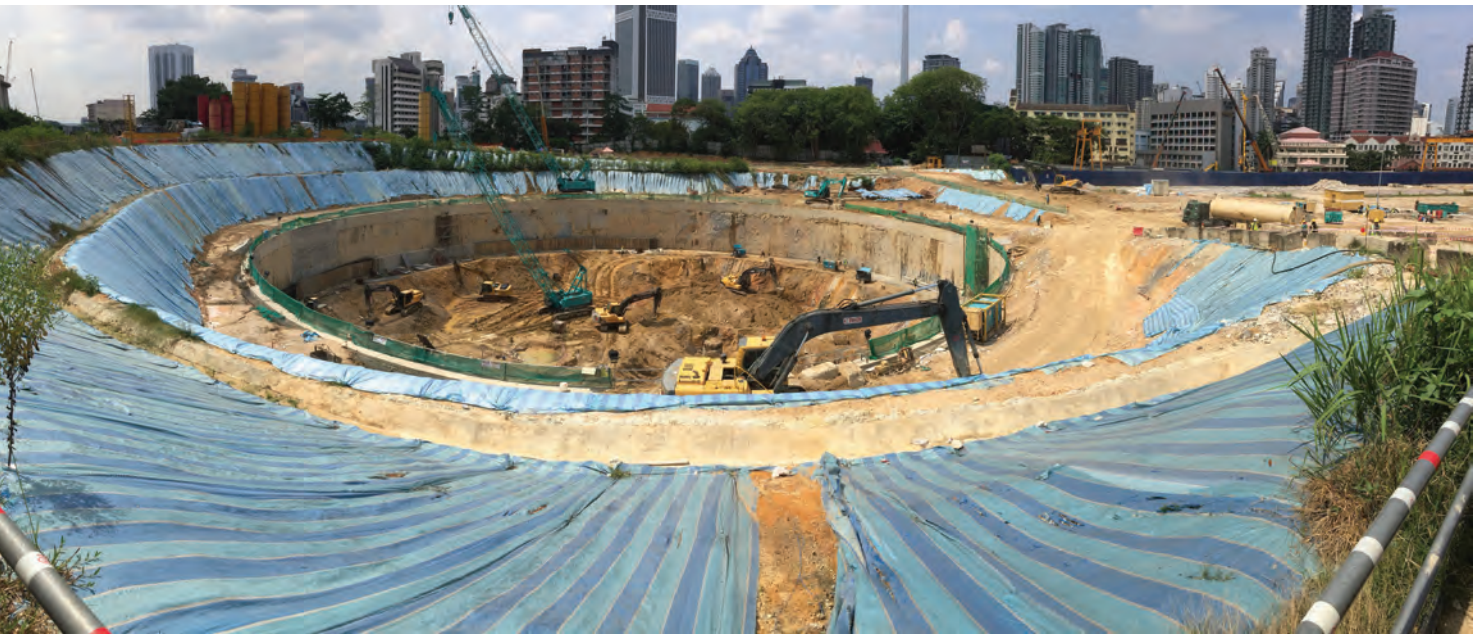




ABOVE: **The structural system of Merdeka 118 comprises eight mega columns, central core walls, intermediate columns, three sets of single-storey belt trusses, three sets of triple-storey belt trusses and three sets of triple-storey outriggers.**

BELOW: **The excavation work began in 2015. To carefully minimise any settlement or lateral movement, Arup designed a circular-shaped cofferdam wall that serves as an embedded retaining system for excavation.**

RIGHT: **A diagram showing the 800-mm-thick self-supporting, circular cofferdam wall.**



High-performance concrete

Working together with the project contractor, SUJV, Arup co-developed a high-performance concrete (HPC) with record-breaking pumpability to enhance the tower's overall constructability. The HPC was applied on the tower core and mega column elements.

The superior pumpability of the HPC enabled the project team to meet a "record-breaking height for direct high elevation concrete pumping," shared Arup. "It also has a high modulus of elasticity to better resist lateral wind loads, high slump flow for excellent workability, high strength and minimal heat of hydration."

Coupled with three sets of three-storey-deep outrigger structure, Arup's engineering innovation achieves structural stiffness with high resistance to wind loads. The size reduction of the columns and core walls results in more usable premium space for the client, reducing both environmental impact and cost.

"Our advanced approaches to engineering design have improved one of the world's tallest towers – it's more useful, attractive and commercially sustainable while keeping occupants safe and comfortable," concluded Wan Anuar Wan Endut, project director and Kuala Lumpur office leader at Arup. ■

Website: www.arup.com

TOP: **In collaboration with the project contractor, SUJV, Arup co-developed a high-performance concrete (HPC) with record-breaking pumpability to enhance the tower's overall constructability. This innovation has enabled more usable premium space for the client, reducing both environmental impact and cost.**

ABOVE: **Slated for completion in 2022, the Merdeka 118 tower features a multi-faceted diamond-shaped facade and unique spire design. Its form was inspired by the outstretched hand gesture made by Malaysia's first Prime Minister in 1957, when he declared the nation's independence in Stadium Merdeka.**

PAVING THE WAY TO KLIA

Kuala Lumpur International Airport, or KLIA in short (IATA airport code: KUL) is the largest airport in Malaysia with a capacity of 75 million passengers per year. It has three runways, each about 4,000 m long.

The first two runways were completed in 1998, while the third in 2014. Then, in 2018, Malaysia Airports Holdings Berhad announced it would begin rehabilitating the runways under the KUL Runway Sustainability Master Plan to ensure that KUL's flight operations remain safe and offer a consistent level of service over the long term.

In 2020, the airport's runway 3 underwent a complete rehabilitation programme. Later, in the fourth quarter of the same year, the rehabilitation work on runway 1 was given the go-ahead, including the adjacent taxiways. The first step in this process was removing 44,000 cu m of asphalt.

To deliver the project, contractor Nippon Road opted for a fleet of machines from the Wirtgen Group, comprising Wirtgen cold milling machines, Vögele pavers and Hamm rollers.

Efficient removal of asphalt

The large-scale asphalt removal operation on runway 1 was performed by Wirtgen milling machines. These included several large models with a milling width of 2 m – two W 195s, one W 205 and two W 1900s – as well as a W 1000 compact milling machine with a milling width of 1 m.

TOP AND ABOVE: **The rehabilitation of runway 1 at Kuala Lumpur International Airport involved a total of 44,000 cu m of asphalt to be removed and repaved. A fleet of machines from the Wirtgen Group worked on this project, including Wirtgen cold milling machines, Vögele pavers and Hamm rollers.**

Providing a total output of around 2,200 kW, the machines milled an area of approximately 4,000 m in length and 60 m in width. The W 195 and W 205, equipped with a 2-m standard milling drum, can each mill to a depth of 33 cm. The milling drum speed on these models can be set to 104, 116 or 129 rpm, depending on the requirements, via a selector switch directly from the operator's platform.

Due to the much higher load in the central part of the runway caused by the weight of the landing aircraft, Nippon Road defined two areas, each with a different milling depth. The first area encompassed the central corridor measuring 18 m wide, and the contractor decided on a milling depth of 25 cm for this section, which was continuously milled in two passes – first at a depth of 10 cm, then at a depth of 15 cm. The two outer strips of the runway, each 21 m wide, formed the second area – here, the contractor removed a 7.5 cm thick asphalt layer in a single pass.

One of the challenges was the bitumen-modified – and therefore extremely hard – asphalt that had been in use for many years. This meant that selecting the right round-shank pick for the job was also essential in order to achieve maximum milling performance and a long tool life. In this case, the project team agreed on the use of genuine Wirtgen round-shank picks with a high-performance carbide tip.

High-precision levelling system

The intuitive Level Pro Plus levelling system – developed in-house by Wirtgen – produced a uniformly milled, even surface without requiring any time-consuming finishing work whatsoever. It is fully integrated into the machine's control system and continuously compares the current milling depth with the preset target value.

If the system detects deviations, they are dynamically and proportionally corrected. The actual milling depth is determined via optical or mechanical sensors that continuously scan a reference surface. In this context, a wide variety of sensors can be used: cable, hydraulic cylinder, sonic, and slope sensors or laser and ultrasonic ski sensors as well as multiplex systems.

"Operating Level Pro Plus is both simple and convenient. Thanks to this system, the milled surfaces were immaculate – the cold milling machines produced a uniformly milled, even surface at Kuala Lumpur International Airport. This was a top priority for us, as it enabled us to pave the new asphalt layer smoothly and without any expensive subsequent finishing work," said Ir Wan Zainuddin Wan Omar, general manager of Nippon Road and also KUL project manager.

ABOVE: **The Wirtgen large milling machines, each with a milling width of 2 m, ensured that the asphalt was removed quickly and smoothly.**

LEFT: **The Level Pro Plus levelling system offers easy and intuitive one-hand operation using the rotary knob, and the menu can be configured as desired.**

Environment-friendly recycling

Front-loading the milled material optimised truck logistics throughout the entire milling operation – continuously filling the waiting trucks kept the milling process flowing smoothly as the trucks rotated on the fly. The milled asphalt material was then reused in an environment-friendly manner at a nearby road construction project.

The scheduled milling work, including surface cleaning, has now been completed. "We know from years of experience that Wirtgen cold milling machines are extremely productive and versatile machines. Our new W 195 and W 205 are especially impressive thanks to their tremendous engine power with rapid advance rates and exceptional milling performance. As expected, the machines from the Wirtgen Group performed extremely reliably and, when needed, Wirtgen Malaysia promptly sent spare parts, components, or qualified service personnel to the job site," said Ir Wan Zainuddin.

At the end of the construction project, Vögele pavers and Hamm rollers also helped to deliver the job. By precisely paving and professionally compacting the new asphalt surface, the machines successfully completed the rehabilitation of runway 1, including the adjacent taxiways, at KLIA. ■

Website: www.wirtgen-group.com

BE PREPARED: DESIGNING RESILIENT BUILDINGS IN SOUTHEAST ASIA TO FUTURE-PROOF AGAINST EARTHQUAKES

By: Adam Peacock, Buildings Structures Practice Leader, Aurecon

The principal of 'prepare for the worst, hope for the best' is never more relevant than when designing buildings to withstand earthquakes. However, when faced with the (potentially-avoidable) collapse of million-dollar mega-structures and the loss of hundreds or thousands of lives, could we be doing more in Southeast Asia?

When it comes to designing resilient buildings, certain countries are way ahead of the curve. Unfortunately, many in Southeast Asia are not among them. It is a peculiar shortcoming, when you consider China, Indonesia and the Philippines all make the list of the top 15 'at risk' countries for earthquakes in the world.

Consider also that we know that countries with advanced building codes and compliance systems to legislate for better design to protect against earthquakes have a strong track record in better preserving their cities and populations in the wake of earthquake events.

Expect the unexpected

The first point to make is that increased seismic activity risk is very real in Southeast Asia (and worldwide) – and it may be getting worse. Several theories suggest that climate change may be fuelling this increase, creating changes and disturbances that nudge faults in the earth's crust to rupture earlier.

For instance, as glaciers melt due to global warming, this reduces the stress load on the earth's crust below, which could trigger a seismic event. As water levels rise (a particular threat for Southeast Asia), this puts higher pressure on fault lines, which could, again, cause a tremor or worse.

A further knock-on effect of climate change is that the low-lying lands of Southeast Asia may become increasingly uninhabitable due to rising sea levels. Densely populated areas will experience heightened levels of immigration, amplifying the consequences should the unthinkable happen.

Although most new buildings in Southeast Asia are routinely designed to resist the cyclones that are a common occurrence here, because of the limited availability of seismic data they tend to be designed for a nominal seismic coefficient, exposing them to potentially devastating consequences.

Much of Asia is water-bound, with a high-water table, such that the effects of a tsunami following an earthquake could be considerable. Combined with the geotechnical considerations such as liquefaction, where the ground suffers a reduction in load-carrying potential, it becomes clear why this topic demands our attention.

In our region, the countries sitting above the boundary between the Indo-Australian and Eurasian plates (Myanmar, Philippines, Indonesia, Japan and China) are most vulnerable. There is no question that the devastating death toll earthquakes

can inflict gives cause enough to design for them, but it is also worth considering the immediate and long-term economic consequences.

One study suggests that GDP per capita reduces by 1.6% eight years after a severe earthquake in a heavily populated area. In Asian countries that have not reached the levels of development seen in the West, that impact is likely to be higher.

Learn from the best

The good news is that there are already best-practice approaches to creating earthquake resilient designs that could be easily adapted for this region. Countries such as New Zealand, USA and Japan (among others) are leading the way, having experienced destructive seismic events. These countries understand the devastation, downtime and rebuild costs of earthquakes, and have developed strong practices to adapt to them and minimise their impact.

As Southeast Asia's economies continue to evolve, they place an ever-increasing emphasis on the health and safety of their population. We believe this should include more stringent seismic requirements for the design of new structures and funding to strengthen (or demolish) non-compliant building stock. What is also interesting to observe is that this push for greater health and safety is not always driven by the government. In many cases, businesses have their own requirements.

For example, in New Zealand, the government's guidelines around a structure's ability to withstand earthquakes is laid out in formal legislation, (Earthquake-Prone Buildings) Amendment Act 2016. This stipulates that a minimum seismic rating of 34% is required for all structures and provides timelines for compliance. Engineers' professional bodies recommend that developers and building owners meet the level at 67%.

Many corporate entities and government departments in New Zealand have developed policies stating they will not lease premises unless it has a minimum of 80% of NBS, therefore forcing the hand of developers and building owners. When you add in the fact that it is difficult for owners to obtain insurance for buildings deemed to be earthquake prone and there is talk that insurance premium discounts may be introduced for owners and occupiers of seismic resilient structures, the business case begins to make even more sense.

Understanding is critical

In countries where there is a strong cultural and legislative set-up to protect against earthquakes, many government departments and clients fully understand the need to design seismically resilient buildings and carry out whole-of-life cost/benefit analysis. Clients appreciate that a low-damage design, with reduced cost of repairs and associated reduction in downtime, could more than offset the higher initial build cost. Methodologies for these assessments are reported in many engineering papers and advisories.

These countries will also have a support network to assist. This will include local universities offering courses in designing for seismic resilience and regularly undertaking research to produce structural engineers, architects and designers with the right skills. These universities can work alongside consultancies and research facilities to share their research, which will then influence future building codes and seismic assessment guidelines strengthening the industry further.

Consider, for example, the 2011 Christchurch earthquake in New Zealand. During this seismic event, the ground motion was greater than what was expected in the then-applicable building code NZS1170.5:2004. This prompted a reassessment, and an increase in the code's seismic coefficient from 0.22 to 0.3.

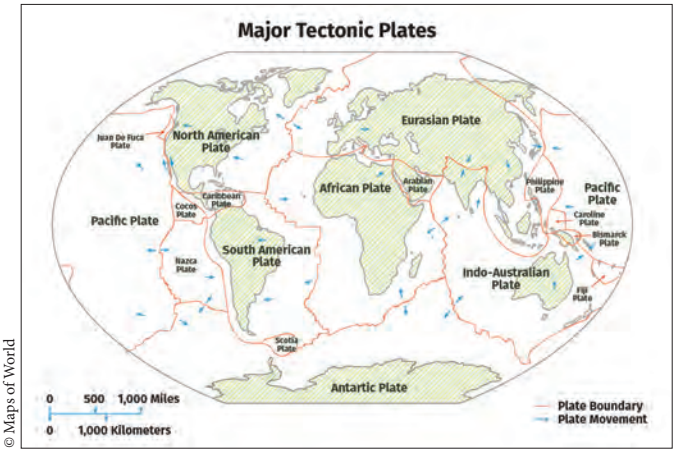
The lessons learnt from the 2011 Christchurch earthquake along with the 2016 Kaikoura earthquake, resulted in a significant update to New Zealand's 'The Seismic Assessment of Existing Buildings', to which Aurecon has contributed.

Prompting change in SE Asia

Looking to countries with established programmes for designing seismic-resilient buildings highlights the opportunities available in Southeast Asia. At present, few governments provide funding for research into seismic resilient technologies, meaning there is a shortage of universities offering relevant courses and a skills gap further down the line. For many clients, investing up-front in seismic resilience is rarely considered because there is little historical practice of it in this region.

However, as Asia continues to attract growing numbers of foreign investors, such considerations will play an increasingly important part in where capital flows. Just as many companies have policies that forbid staff from traveling with airlines with inadequate safety ratings, their purchasing or leasing decisions for facilities will increasingly favour buildings with a higher level of seismic resilience.

Rather than wait for this shift to trickle into the engineering practice in Southeast



© Maps of World

ABOVE: **Aurecon was appointed as structural engineer for the significant refurbishment and structural strengthening of the Dunedin Law Courts in New Zealand.**

LEFT: **Locations of major tectonic plates, as shown on Maps of World, 15 October 2018.**

Asia, we see an opportunity to make voluntary strides now. As a bonus, this would also negate the need for any future changes to be fast-tracked into retroactive measures following an unexpectedly disastrous event. This needs to start with governments – and clients – being alert to the advantages of seismic resilient design (and its whole-of-life cost benefit) and, in response, introducing amended building codes to achieve increased levels of seismic resilience.

The good news is, in the first instance there is no need to reinvent the wheel. Using the US code (for example) as a foundation for a country to develop its own code would be a great start for many countries in Southeast Asia. In fact, it has already happened in some countries such as Indonesia and the Philippines – but we need the remaining countries to follow suit.

If this happened, it would also create a need for the region's construction industry to be better educated in seismic resilient design, prompting the upskilling of university lecturers. With the introduction of appropriate courses and facilities (with equipment such as shake tables), a new generation of engineers, architects, designers, fabricators and contractors will emerge in this region.

Passing the pain point on cost

Inevitably, to deliver better seismic-resilient performance in buildings means an increase in capital cost at the outset. Yet while the perceived expense of seismic resilient techniques often limits its use to prestigious, high-budget buildings, in most cases it adds only a small percentage to total building costs (approximately 5-7% and can be even less). This relatively minor increase in cost needs to be considered in the context of significantly improved business continuity following a seismic event.

It is not only new buildings that should consider increased seismic resilience either. Upgrading existing buildings to meet a good level of new code levels is also going to bring resilience benefits but inevitably incur costs. However, when one considers the role that many buildings play in communities (temples, historical centres and more) it's easy to see that the process of preserving and protecting them extends far beyond the functional. For many populations, local buildings define their heritage, identity and sense of belonging.

Other key structures that would benefit from retrospective seismic-resilience design include those that are critical for continuity in the wake of an earthquake. These include key institutions such as power stations, hospitals, utilities, ambulance and fire stations. Needless to say, it is vital these facilities maintain their post-disaster functionality even if much of the other infrastructure has been destroyed.

Smart engineering solutions

As the process of building seismic resilience is not new (just relatively new to most of Southeast Asia), there are a number of smart engineering techniques we can harness. These include opportunities to embrace the ever-emerging possibilities that digital engineering offers.

As a start, using digital tools will make it easier to show clients and other stakeholders the impact of earthquakes and how seismic resilient design can mitigate the effects. Further down the line, digital engineering should also lead to the development of tools and software to help those less familiar with seismic resilient design.

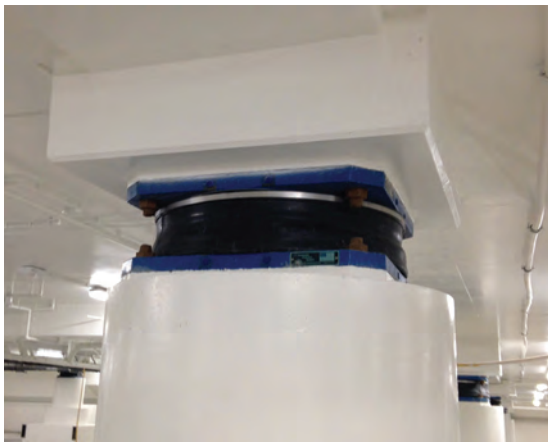
When it comes to the design stage, there are a number of techniques that can be harnessed. These include base isolation which Aurecon successfully used in the Christchurch Art Gallery.

Based on observations carried out following the 2011 Christchurch earthquake, the buildings equipped with base isolators performed extremely well. Base isolators separate a building's superstructure from the ground through a mechanism that helps the building 'hover'. This reduces the effect of ground motions on the superstructure, which in turn reduces the seismic forces the superstructure is designed for.

Aside from base isolators, another option is the use of an eccentrically braced frame with replaceable active link within the structural steel design of a building. Aurecon has also employed this design technique for a hospital in Auckland and it involves adding suitably well detailed active links to allow the structure to undergo inelastic deformation and dissipate energy.

The remaining members are designed for the over-strength of the active link. What this means is that the inelastic deformation is concentrated and controlled in the active link (like a fuse in an electric circuit). While these active links absorb the damage caused by an earthquake, they are easily removed and replaced in preparation for any future incidents post-event.

Other seismic resilient design techniques include 'PRESSS' or rocking technology, ringfeder springs, sliding hinge joints and damping mechanisms. Aurecon was the first consultant to incorporate sliding hinge joints into New Zealand building designs.



Base isolator used in the Christchurch Art Gallery. This technique reduces the effect of ground motions on the superstructure, which in turn reduces the seismic forces the superstructure is designed for.

It pays to think ahead

For governments in particular, the advantages of keeping crucial infrastructure operational may well be the only incentive needed to implement some form of seismic resilient legislation. More generally, safer building stock will help to minimise the impact of an event, requiring less disruption, and reducing the long-term effects on the economy.

Even before an earthquake strikes, building owners will be far better placed to attract foreign investors who place greater store in higher seismic resilience, and can even use this to demonstrate greater design resilience and long-term operational benefits. Should the unthinkable happen, the lower damage levels will enable the building to return to operational normality far quicker.

While our age of disruption has taught us to 'expect the unexpected', the events of the past years have shown us just how severe the impact can be if we are not prepared. Seismic threats to Southeast Asia are real, and so are the consequences of not mitigating against them. We can take steps to make a change. We can learn from others. Ultimately, we can create a future built environment that is smarter, safer and engineered for life. ■

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Ammann rollers provide compaction force on Taiwanese highway

Two Ammann ARX 110 heavy tandem rollers, featuring an operating weight of 10,310 kg, were chosen to handle the compaction work on the Provincial Highway 1 in northwestern Taiwan.

Yong Li Asphalt Industry Corp Ltd recently carried out milling, paving and compaction work on the Provincial Highway 1 in Taoyuan, a municipality in northwestern Taiwan. The company opted for two Ammann ARX 110 heavy tandem rollers to handle the compaction job.

"Two compactors were used in order to speed up the process," said Kuo Chin Hung, owner of the business. The machines have an operating weight of 10,310 kg, maximum weight of 11,750 kg and drum width of 1,680 mm. They are powered by a Deutz 74.4 kW engine that meets the EU Stage IIIA / US EPA Tier 3 emission standards.

The six-month project was demanding, with heavy traffic in neighbouring lanes a constant challenge and tight deadlines. "There was minimal time allowed for milling and paving," Kuo said. "There was precise time control."

The project started with milling of about 10,000 t. A paver then placed a base layer of 5 cm, followed by compaction with the Ammann rollers. The machines, in vibratory mode, made about six passes on the thick base layer. Temperatures were closely monitored.

Due to a demanding schedule, the paver moved at a brisk pace and therefore the speed of the rollers had to be fast as well. Next came a surface layer, with a depth of 1.8 cm and aggregate size of less than 0.8 cm. About 4,000 t of mix were placed.

"We will use the rollers again on highway projects," Kuo said. The ARX 110s were simple to use and well-liked by operators, plus their amplitude and vibration were easy to adjust. "Visibility was good, too – this is an open platform roller." ■

Website: www.ammann.com

Towering above Hangzhou

The 196-m-high Huaye information software industrialisation base is a new addition to the skyline of Hangzhou high-tech industry zone, China. This new office building features 43 storeys, slated for completion in August 2021. Contractor on the project was Zhejiang Zhongnan Construction Group.

Here, an 18-t version of 21CM335 tower crane from Spanish manufacturer Comansa was chosen to help deliver the project. This flat-top model has been upgraded to a maximum capacity of 20 t, providing a tip load capacity of 2,700 kg or 2,970 kg with PowerLift.

According to the manufacturer, the 21CM335 is one of its most popular crane models thanks to a wide range of mechanisms, which allows the unit to work at high speeds and on very tall projects.

Comansa's China factory supplied the crane to the project, and also provided maintenance and servicing. "Due to the high construction difficulty and tight

construction period, the contractor selected the 20-t 21CM335 as the core equipment of the project," explained Comansa.

The 21CM335 has been working on site for the past two years. The external climbing system was used to mount the crane, which has a tower height of 210 m with a 74-m reach radius.

Comansa, which also has a headquarters in China, offers a variety of options beyond the standard lifting mechanisms. These include the ultra-high lifting cable capacity drums that enable the crane to work at high speeds and on very tall projects, such as this new skyscraper. In this project, a 50-kW mechanism was used, with 790 m of cable capacity. ■

Website: www.comansa.com

ALL IMAGES: **The new Huaye information software industrialisation base in Hangzhou, China, features 196 m high and 43 storeys. A Comansa 21CM335 flat-top tower crane was used by the contractor to help complete this project. The crane was upgraded to a maximum capacity of 20 t.**

SOUTHEAST•ASIA CONSTRUCTION

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

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