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NOVEMBER - DECEMBER 2021



## Cover Story:

**Bangabandhu Sheikh Mujibur  
Rahman Tunnel project, Bangladesh**

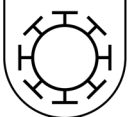
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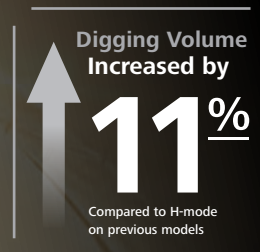
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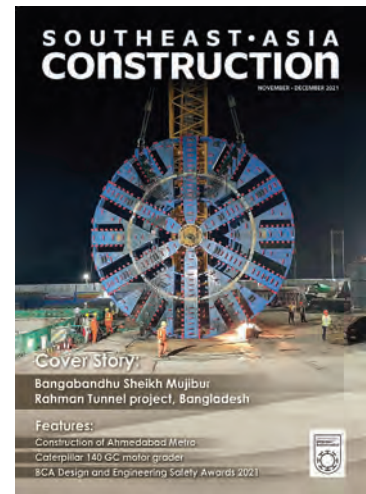
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### On the cover:

Construction of the Bangabandhu Sheikh Mujibur Rahman Tunnel in Bangladesh  
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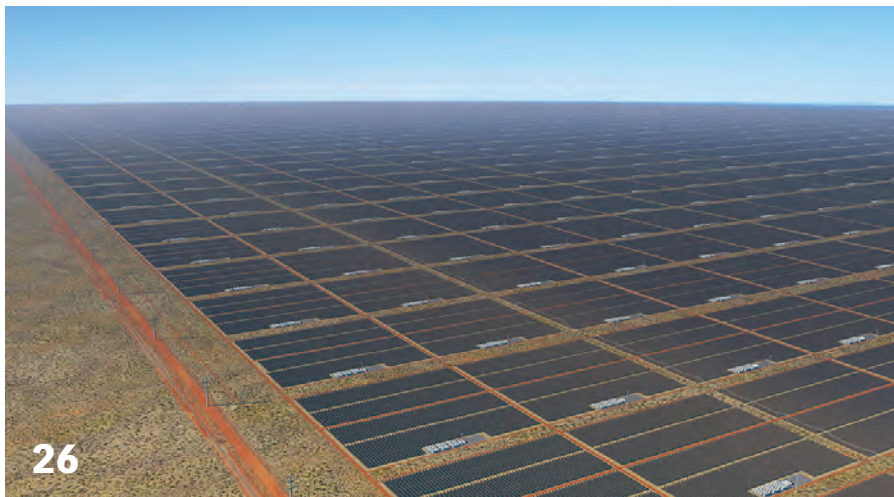
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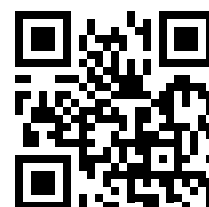
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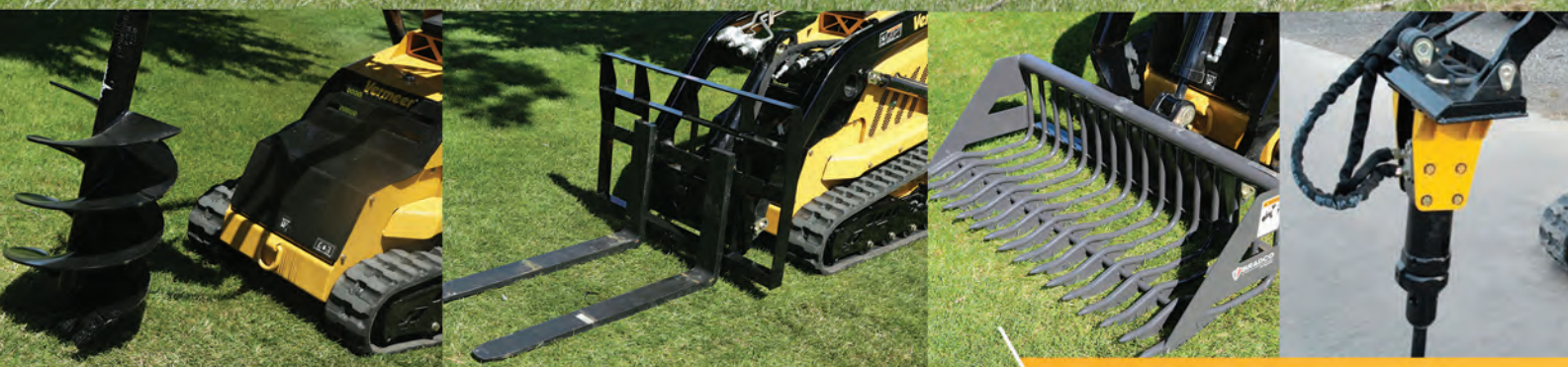
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# Work starts on Philippines' Pasig River hybrid expressway

Philippine conglomerate San Miguel Corporation (SMC) recently broke ground on the 19.37-km Pasig River Expressway (PAREX) project, which is touted to be the country's first green, hybrid expressway. Once operational, it will link the eastern and western cities of Metro Manila and will connect to the Skyway system – realising the vision of an integrated elevated road network that links the north, south, east, and west corridors of the capital, said the company.

The project, a P95-billion investment by SMC, is a six-lane elevated expressway that will run along the banks of the river, from Radial Road 10 in Manila to C-6 Road or the South East Metro Manila Expressway (SEMME) in Taguig.

"I believe this project is bound to be one of the most impactful projects during the time of President Rodrigo Duterte, in terms of integrating the social, economic, and environmental needs of our people. I'm very proud that we have this once-in-a-lifetime opportunity to provide an inclusive, future-ready solution to traffic," said Ramon S. Ang, president of SMC.

"We thank government and especially the Build Build Build team, for allowing us to deliver another game-changing infrastructure, to help ease traffic, boost our economy, and improve the lives of so many Filipinos in Metro Manila."

Secretary of the Philippines' Department of Transportation (DOTr), Arthur Tugade, said, "We are happy because we have a project like this connecting north to south and east to west. Never has this connectivity been thought of, and now it is being implemented. The DOTr fully supports this project because I know it is good for the people and the environment."

According to Mr Ang, PAREX will be built to accommodate more than just motor vehicles. It will feature a bus rapid transit (BRT) system that can benefit commuters all over Metro Manila, as they will have a "comfortable, safe, and reliable alternative to commuting anywhere in the metro."

The expressway will also have dedicated bike lanes, continued Mr Ang, "to encourage healthy, environment-friendly modes of personal transportation, as well as pedestrian walkways to encourage walking or exercise."

Executive Secretary of the Philippines, Salvador Medialdea, commented, "This 19.37 km six-lane road will definitely ease traffic in Manila. This was just a dream before, but now it's becoming a reality. PAREX will be a gateway for the future of urban transport and will address the needs of urban living in today's environment."

The Philippines' Department of Public Works and Highways (DPWH) Undersecretary for planning and PPP service, Maria Catalina Cabral, also highlighted that the project will be significant as it will serve as the east-west connection from R-10 in Manila all the way to Taytay, Rizal.

"It will complete the network of expressways within Metro Manila area and will provide a solution to the growing traffic problem within the metropolis. The travel time from Manila to Pasig will be reduced to just about 15 to 20 minutes, once this project is finished," said Ms Cabral.

## 'Not just an ordinary highway'

In a separate statement earlier, SMC announced that PAREX will be purposely-built around green architecture and engineering principles, with sustainability as its key driver.



Both images © San Miguel Corporation



ABOVE AND LEFT: The groundbreaking ceremony for the PAREX project took place in September 2021.

"PAREX is not just an ordinary highway. It will be the first privately-funded road network in the country that combines sustainability features with the functionality of a safe and efficient transport infrastructure that the country is sorely lacking in," said the company.

The project is planned to have three major segments. The first one (Segment 1) will cover the section from R-10 to Plaza Azul, Manila; Segment 2 from Pandacan to C-5; and Segment 3 from C-5 to C-6. PAREX will also connect to, and utilise a 2.7-km portion of the new Skyway Stage 3 from Nagtahan to Plaza Azul.

Mr Ang further revealed that SMC is engaging the internationally-renowned architect, environment planner, and green urbanism advocate Arch. Felino Palafox Jr. to help in building the PAREX project. Arch. Palafox, regarded as the country's top green urban planner, brings with him decades of experience master-planning some 1,700 projects in 45 countries.

"Traffic congestion is a critical sustainability issue, especially in Metro Manila," explained Mr Ang. "Traffic increases the amount of harmful emissions from vehicles stuck for hours in traffic, drains economic resources, and affects people's health. The PAREX project will ensure it does not only benefit motorists, but more importantly people and the environment."

He added, "We can anticipate a future where perhaps many vehicles are electric. But regardless of what vehicles run on, expressways can adapt and serve their purpose of decongesting traffic, and making private and public transport more efficient. Combined with other ongoing road and rail projects, PAREX will enable us to keep up with the demands of economic development, population growth and the need to protect the environment." ■





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## Kobelco produces 300,000th excavator at Hiroshima factory

Kobelco Construction Machinery (KCM) recently held a ceremony at its Itsukaichi factory in Hiroshima, Japan, to celebrate the production of the 300,000th excavator at the facility.

In April 1983, Kobe Steel acquired the shares of Yutani Heavy Industries and established a hydraulic excavator production site in Hiroshima. Later, through a merger, the development of a unified model was carried out combining the technologies of the two companies, leading to the development of the first machine in the SK series.

The SK series has been attached to the names of many models ever since. According to KCM, the 300,000 units achieved is an accumulated number of construction machines manufactured at the former Gion factory, the Numata factory, as well as the Itsukaichi factory launched in 2012, counting from the first SK model.

“We are now manufacturing them at the Itsukaichi factory with a production capacity of 10,500 units a year, and the accumulated production of 300,000 units was achieved in September 2021,” said KCM. With a site area of approximately 100,000 sq m and building area of about 35,000 sq m, the Itsukaichi factory manufactures 7- to 85-t-class hydraulic excavators as well as environmental and recycling machinery.

“The achievement of the accumulated production of 300,000 units is the result of our creation of an array of products that satisfy the needs of the times, while overcoming challenges and continuing to innovate. Our mission now is to pass on our corporate philosophy of ‘user hands-on approach’, which has been driving our business, to the next generation,” said Yoshinori Onoe, president and CEO of KCM.

The company concluded that “we would not be able to achieve the milestone if it was not for the support of our customers as well as everyone who is involved with us. With a sense of gratitude toward everyone, we will continue to provide high-quality products to customers around the world.” ■



TOP AND ABOVE: Kobelco Construction Machinery celebrates the production of its 300,000th excavator at the Itsukaichi factory in Hiroshima.

## Leighton Asia wins building project in India

CIMIC Group company Leighton Asia has been commissioned by Phoenix IT City Private Limited to construct Equinox, an Indian Green Building Council Platinum-rated commercial complex in Hyderabad, India.

The work will comprise the construction of four commercial office towers, including two 20-storey and two 11-storey buildings, all with three common basements.

“Leighton Asia has a strong track record of delivering building projects in India, including large-scale retail and commercial developments, also in Hyderabad. This is the second building project awarded to Leighton Asia by the Phoenix Group. Leighton Asia will bring its clear commitment to safety and quality, to deliver on our client’s vision for this landmark project,” said Juan Santamaria, executive chairman and CEO of CIMIC Group.

Pedro Vicente, managing director of Leighton Asia added, “Our international



expertise and local experience means we are able to deliver premium commercial and residential projects across India and support the growth of the Hyderabad region.”

The contract includes the delivery of civil and structural works, mechanical, electrical and plumbing services, facade and external works. Construction was expected to commence in October 2021 and complete in the second quarter of 2023.

Joe King, CEO of Phoenix Group commented, “Hyderabad, due to its robust and growing infrastructure is witnessing a strong leasing interest amongst multinational and national clients. Phoenix Group is a strong and important player in Hyderabad, and we value our association with Leighton Asia which will enable us to achieve faster turnaround of our projects whilst adhering to strict safety and quality standards that we have set upon ourselves.” ■

An artist’s impression of Equinox.

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# HKIA third runway pavement works completed

A ceremony was recently held to celebrate the completion of pavement works for the new third runway at the Hong Kong International Airport (HKIA), marking a major milestone for the city's three-runway system (3RS) project.

Speaking at the ceremony held on the new runway, Carrie Lam, chief executive of Hong Kong said, "3RS is an integral part of our vision to transform from a 'city airport' into an 'Airport City'. According to an earlier forecast, 3RS would generate direct, indirect and induced contributions of about 5% of the gross domestic product of Hong Kong by 2030. It demonstrates that 3RS would inject impetus to HKIA, as well as the overall Hong Kong economy in the future.

"Leveraging the advantages of HKIA's unique geographical location and its excellent service, I believe Hong Kong's aviation industry will certainly seize the opportunities arising from various new infrastructures in the city and the significant synergy generated by integration of the airport's core functions and related developments."

Jack So, chairman of Airport Authority Hong Kong (AA) explained, "Construction work of 3RS started in August 2016, which entails the formation of 650 ha of land by reclamation. With the completion of reclamation and runway pavement works, we are confident that the new runway will commence operations next year as planned. Other works including expansion of Terminal 2 (T2), construction of T2 concourse, a new automated people mover system and high-speed baggage handling system will be completed in 2024 on schedule and within budget.

"After its expansion, the airport will be able to handle the targeted annual passenger and cargo volume of around 120 mil t and 10 mil t respectively, enabling Hong Kong to enhance its status as an international aviation hub in accordance with the National 14th Five-Year Plan. The AA is also developing an Airport City, comprising retail, dining and entertainment facilities; as well as office towers, a logistics centre and a mega performance venue. These projects will be completed in phases from 2023 to 2027. Taking full advantage of the Hong Kong-Zhuhai-Macao Bridge, the Airport City will be a unique landmark in the Greater Bay Area." ■



TOP: The three-runway system reclamation works have been substantially completed.

ABOVE AND BELOW: Pavement works for the new third runway were completed in June 2021. It is scheduled for commissioning in 2022.



ABOVE: The ceremony to mark the completion of third runway pavement works at HKIA.

RIGHT: Briefing on the airfield ground lighting installation.



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# BCA and IMDA call for proposals for R&A solutions

Singapore's government has announced a new initiative to encourage the adoption of robotics and automation (R&A) solutions to improve productivity and reduce labour dependency in the local built environment (BE) sector.

Speaking at the 'CEOs in Conversation' during the recent International Built Environment Week (IBEW) 2021, Minister of State for National Development and Communications and Information, Tan Kiat How, invited R&A solution providers to participate in the Call for Proposals (CFP) for Integrated Robotics & Automation solutions by the Building and Construction Authority (BCA) and Infocomm Media Development Authority (IMDA).

"The government, through the BCA and IMDA scheme, will be supporting our built environment firms to adopt these solutions. These are commercially available solutions, for example, material transporter robots, precast automation systems, drones for facade inspections, and so on. We will be supporting up to 80% of qualifying costs to adopt these solutions," said Mr Tan.

He explained that the launch of this initiative is "not just supporting our firms to adopt commercially available solutions, increasing productivity, and raising our standards. It is also about investing in early stage technology – R&D, for tomorrow.

"One good example is 3D concrete printing by HDB, with partners like NTU, Robin Village Development and Witteveen+Bos. 3D concrete printing reduces manpower for volumetric production and improves productivity at the worksite. But the technology is still very nascent. That is why HDB is taking the lead at the Centre of Building Research, to understand the technology, bringing in partners together to build an ecosystem, understand how it can be used and applied in Singapore for the future."

"Another example of things we are working on is 5D BIM," added Mr Tan. "I asked what is 5D BIM because it is the first time I have heard about it. I was told it is 3D BIM with the time component and the cost and budget component added. It harnesses computational power to automate workflows, and lets planners and developers and builders make better decisions, better predict material and labour costs, and supports tasks like planning, budget control, progressive payments, etc.

"All these tasks can be automated, and we can do things better. BCA is working with Hubble Pte Ltd and Rider Levett Bucknall on this project. This is one example of how we are investing in R&D under the Cities of Tomorrow (CoT) programme. So, for companies and solution providers, if you have got a good idea and need R&D support or partnerships, please let us know."

R&A solution providers may register their interest and send their solution proposals to: [info@imda.gov.sg](mailto:info@imda.gov.sg)

## R&A initiative

In its announcement, BCA pointed out that R&A will be a key enabler for industry transformation under the digitalisation pillar of the Construction Industry Transformation Map (ITM) supported by the Construction and Facilities Management Industry Digital Plan (IDP) for broad-based SMEs digitalisation.

"Besides improving productivity, digitalisation can also help build up the BE sector's resiliency. The current Covid-19 pandemic has highlighted the need to accelerate adoption of R&A solutions to reduce dependency on low-skilled manpower," said BCA.

This latest R&A initiative is funded through IMDA's Advanced Digital Solutions (ADS) support. Successful BE SMEs and larger enterprises will be provided with up to 80% funding support for qualifying costs to adopt these integrated solutions. BCA also encourages solution providers with ready R&A solutions to step forward and participate in the CFP.

The R&A solutions would support BE enterprises, offering two major benefits: to reduce reliance on low-skilled manpower and increase productivity, and to improve safety at worksites.

### A). Reduce reliance on low-skilled manpower and increase productivity

The ongoing Covid-19 situation has made it even more pertinent for the need to reduce reliance on low-skilled workers. Adoption of autonomous R&A solutions by BE firms can potentially bring long-term sustainable benefits to the firms and the BE sector.

Potential R&A applications could help to improve productivity by automating and speeding up various labour-intensive and trade specific tasks like painting, drilling and carrying materials on-site.

### B). Improve safety at worksites

The use of R&A solutions could automate trade-specific tasks and provide opportunities to improve workplace safety and health. Specifically, R&A could reduce the risk of falls from height and injuries associated with lifting and transporting heavy equipment within the worksites.

Potential applications of R&A solutions include work at height such as facade maintenance and inspections.

## Ecosystem ready for R&A solution providers

BCA has also put in place an ecosystem to support R&A solution providers from early research and innovation stages through to downstream deployment. Some supporting initiatives include :

### Built Environment Living Laboratory Framework (BE LFF)

The programme was launched last year to facilitate test-bedding of R&A solutions in living laboratories, allowing built environment firms to trial new emerging technologies. According to BCA, more than 30 innovative proposals have been submitted by more than 10 companies. Examples of available test-bedding sites include Punggol Town and Jurong Lake Gardens.

### Building Innovation Panel (BIP)

The programme was formed in 2011 as a multi-agency platform to facilitate in-principle acceptance (IPA) for innovative building solutions that may meet with some regulatory challenges. The scope of the BIP was expanded in 2019 to include areas like R&A, advanced and sustainable building materials, and green building technologies.

According to BCA, the BIP has so far helped obtain IPAs for two R&A solutions, 52 prefabricated prefinished volumetric construction (PPVC) and 46 prefabricated bathroom unit (PBU) systems for adoption in local projects.

One of the two R&A solutions that obtained IPA was an autonomous Robo-Carrier developed by Shimizu. Construction materials up to 1,000 kg in weight could be transported by the robot from the loading bay to the designated location (i.e. same floor or different floor based on a predetermined route planned by builders). The Robo-Carrier is projected to improve site productivity by at least 30% and will be deployed at Mount Alvernia Hospital Extension project in Q4 2021. ■

# New clean energy project to be developed in Riau islands

Singapore's Sunseap Group has signed a Memorandum of Understanding (MoU) with local and international partners to explore and develop solar power systems with a combined capacity of 7 gigawatt-peak (GWp) around the Riau islands, Indonesia, including a previously announced 2.2-GWp floating solar PV in Duriangkang, Batam, also in Indonesia.

Some of the MoU partners include PT Mustika Combol Indah, PT Agung Sedayu, Sumitomo Corporation, Samsung C&T Corporation, Oriens Asset Management, ESS Inc and Durapower Group.

According to Sunseap, the proposed solar power system is one of the largest cross-border interconnect clean energy projects in Southeast Asia and will help Singapore and Indonesia meet their green goals. Other than Batam, one of the islands in the Riau Archipelago being considered for the project is Combol. The plan is to pipe the low-carbon energy to Singapore via a proposed new subsea power cable.

Coupled with multiple energy storage systems totalling more than 12 GWhr, the project is expected to provide 1 GW of non-intermittent low-carbon clean energy for Singapore and Indonesia.

By linking the solar PV systems from the various islands, the consortium hopes to achieve economies of scale and further optimise the capacity of a proposed new subsea cable to Singapore. This will help bring down the cost of transmission, thus reducing the cost of low-carbon electricity imports into Singapore, and ultimately leading to more affordable low-carbon electricity for local consumers.

The consortium aims to match the required low-carbon electricity imports into Singapore of 1.2 GW by 2027 and another 2.8 GW by 2035, as mentioned earlier by Singapore's Minister of Trade and Industry, Gan Kim Yong.

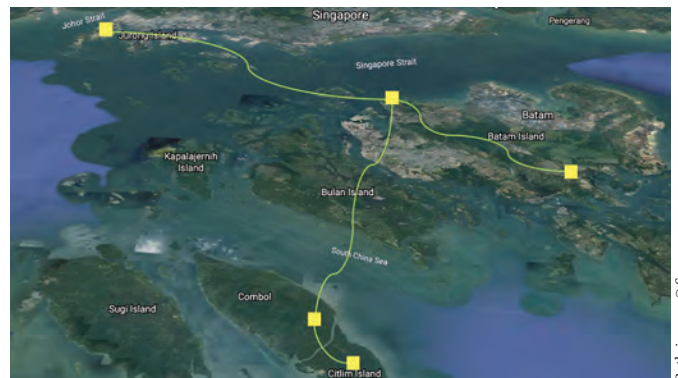
The Energy Market Authority (EMA) of Singapore has said it will issue two separate requests for proposal to import up to 4 GW of low-carbon electricity by 2035. The consortium intends to be one of the parties to help fulfil 20-25% of this target.

Frank Phuan, co-founder and CEO of Sunseap said, "This will be one of the most consequential clean energy projects for Singapore and Indonesia. By linking various solar islands to eventually create a 7 GWp system, we are able to further optimise the subsea cable, leading to reduced cost of transmission and hence bring more affordable low-carbon clean energy to everyone in Singapore and Indonesia.

"Through this arrangement, the combined generation capacity will be able to generate and transmit 1 GW of non-intermittent clean energy for both Singapore and Indonesia, establishing both Singapore and Batam as a clean energy gateway and hub in ASEAN and paving the way towards an ASEAN Green Power Grid."

Durapower, one of the partners, is a global provider of lithium battery storage solutions and is envisaged to jointly contribute and build the energy storage facilities required to create the 1 GW non-intermittent low-carbon electricity in Singapore.

Sunseap said the 7 GWp capacity will be built over time in phases. The company is also exploring more areas around the Riau islands to increase the overall capacity and further optimise the designated capacity of the subsea cable. ■



Both images © Sunseap



ABOVE AND LEFT: The Sunseap-led consortium will explore and develop solar power systems around the Riau islands, helping to provide low-carbon energy for Singapore and Indonesia.

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# HK's first private residential project using concrete MiC

Chun Wo Construction Holdings Company Limited has secured a contract from Hong Kong's Urban Renewal Authority (URA) to build the superstructure of the Ash Street Development Project, which is located in the Tai Kok Tsui area. With the application of the concrete MiC (modular integrated construction) method, it is set to become Hong Kong's first private residential project using this innovative construction technology.

In recent years, the Hong Kong government has been actively promoting the application of MiC in public and private developments (in Singapore, this method is commonly known as prefabricated prefinished volumetric construction, or PPVC in short).

"By adopting the concept of 'factory assembly followed by on-site installation', site construction processes of residential units are moved to a controlled factory environment, achieving better quality control," explained Chun Wo. "In addition, the MiC method enables shortening of construction time as both the site formation and foundation works, and the production of integrated modules can be carried out concurrently.

"The prefabricated modules, finished with most household fittings including pipeworks, kitchen cabinets, sanitary wares, windows, floor and wall finishes, will be completed in a factory, before being transported to construction site for installation. Such construction procedures enable the contractor to minimise on-site construction processes, thereby enhancing site safety and reducing any adverse impact that may cause on surrounding environment."

The Ash Street Development Project covers a site area of about 417 sq m. It will provide a total domestic gross floor area of approximately 3,130 sq m, offering 69 residential units. The foundation works commenced in October 2020 and the project is expected to complete in the fourth quarter of 2023.

"The URA commits to adopting innovative technologies in its construction projects, aiming to establish an exemplary model to bolster confidence among the construction industry in the application of MiC," said Ir Wai Chi-sing, managing director of URA.

"After careful consideration, we chose to adopt MiC in this relatively smaller-scale private residential and self-development project as a pilot. The URA will review every aspect ranging from construction planning, construction methods, the concerned statutory processes and market response in light of experience during the course of implementation for the industry's reference."

Ir Wai continued, "I look forward to working with Chun Wo Construction in promoting the application of innovative technologies in building construction projects. I am delighted to know that Chun Wo Construction has devoted additional resources in transforming its research and development outcomes into practical solutions as approved by the government in the project. This endeavour will drive innovation and transformation in the construction industry, building up Hong Kong as a sustainable and smart city."

Compared with the steel MiC modules mainly used in Hong Kong, the Ash Street Development Project will adopt the 'MiC wall connection technology' of concrete MiC developed by Chun Wo and the P&T Group. "Such technology enables the reduction of the thickness of the structural wall of a residential unit, thereby increasing its internal usable space and flexibility to suit building layouts," explained Chun Wo.

"In addition, concrete-built flats are more durable without



LEFT: The BIM simulation of the URA's Ash Street Development Project applying Concrete MiC.

BELOW: The signing ceremony for the project's superstructure works contract was held in September 2021.



the need for intensive inspection and maintenance, and are able to fulfil the statutory specifications for fire resistance. These concrete-built flats also excel in insulating against sound and heat, addressing market expectations and demand from the private sector."

Boyd Merrett, acting CEO of Chun Wo Construction added, "For many years, Chun Wo Construction has been actively engaged in innovative technological research and development in order to transform and improve the efficiency of the construction industry. Winning the URA's development project, and for the first time applying leading-edge MiC wall connection technology of concrete MiC in a local private residential building development project is undoubtedly a significant milestone for the company's innovative construction technology.

"At the same time, we are very grateful to the URA for its trust in Chun Wo Construction's years of construction experience and P&T Group's professional design solutions. Going forward, we will continue to allocate resources to research and development of innovative construction technologies, and promote the innovative development of Hong Kong's construction industry." ■



# Lendlease launches decarbonisation roadmap for Asia

Lendlease has announced its Mission Zero Roadmap for Asia as part of its commitment to becoming a 1.5°C aligned company and achieving absolute zero carbon by 2040.

The roadmap details steps that Lendlease will take across its business in Asia to achieve its Mission Zero ambitions – net zero carbon by 2025 and absolute zero carbon by 2040.

In Asia, Lendlease will undertake a multi-pronged approach by reviewing the fuels burnt, power consumed, materials and services purchased and tenant emissions at its projects, assets and across operations. These include:

1). Reducing Scope 1 emissions, which are direct emissions from Lendlease-owned and controlled resources, produced directly from fuels burnt.

- Initiatives include trialling alternative onsite fuels, increasing use of electric construction plant and equipment, and use of battery storage and charging infrastructure.

- For example, the team will be using biodiesel on generators at one of Lendlease's redevelopment projects.

2). Reducing Scope 2 emissions, which are indirect emissions from the generation of purchased energy from a utility provider, produced by the power consumed.

- Initiatives include increasing renewable electricity incrementally to reach 100% by 2030, increasing onsite solar generation on Lendlease's assets and integrating renewable energy infrastructure on all new developments.

- Lendlease prioritises the health and wellbeing of its employees and will only occupy high performance buildings for its workspaces. For instance, 100% of Lendlease's assets in Singapore have achieved Green Mark Platinum rating.

3). Reducing Scope 3 emissions, which are all indirect emissions that occur upstream and downstream of Lendlease's value chain, through the review of materials and services procured.

- Initiatives include investing in R&D and collaborating with suppliers to eliminate embodied carbon in construction materials procured.

- For example, Lendlease is part of the Singapore Green Building Council's Embodied Carbon Taskforce and signed the Embodied Carbon Pledge to Act, working with industry peers and partners to reduce upfront emissions from the manufacture of building materials.

4). Reducing Scope 3 emissions from tenants.

- Initiatives include partnering with tenants to reduce their emissions and developing next generation green leases.

- For example, 100% of tenants in Lendlease's malls in Singapore are on Green Leases which promotes energy efficiency.

Justin Gabbani, CEO for Asia at Lendlease said, "In line with our commitment to becoming a 1.5°C aligned company, our Mission Zero Roadmap cuts across our integrated business in development, construction and investments. We recognise the importance of setting targets with a clear plan to set our sights on a more sustainable future and create communities that can thrive."

Meanwhile, Lendlease has again retained its top positions in the 2021 GRESB Real Estate Assessment in the Asia Retail category, maintaining its sustainability leadership in the built environment. ■

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Some models are not available depending on the area.

# Surbana Jurong spearheads infrastructure sustainability assessment in Singapore

Three professionals from Surbana Jurong have become the first Infrastructure Sustainability Accredited Professionals (ISAPs) in Singapore. These include: Eugene Seah, senior director, special projects; Jason Reeve, executive associate, sustainability and resiliency office; and Martin Lim, principal project manager, sustainability and resiliency office. All of them are now qualified to evaluate infrastructure assets ranging from roads and transport to utilities and waste management across the planning, design, construction and operational phases.

The accreditation was conferred by the Infrastructure Sustainability Council (IS Council), an industry body operating in Australia and New Zealand to enable sustainability outcomes in infrastructure. With this accreditation, Surbana Jurong will be able to measure and assess the economic, environmental, social and governance (ESG) impact of critical infrastructure in Singapore including roads, bridges, rail networks and utility structures in a more rigorous and structured manner using the Infrastructure Sustainability (IS) rating scheme.

Singapore is at the region's forefront in setting sustainability benchmarks for buildings, but there is currently no overarching methodology for the assessment of the environmental, social and governance (ESG) impacts of critical infrastructure assets including transport infrastructure, bridges, cabling and signalling systems, and water and waste management systems, explained Surbana Jurong. These assets are typically built over many years and require massive amounts of raw materials to build. The potential impact of these materials on the environment and the communities around which they are built needs to be measured, monitored and mitigated.

"There is a lot of untapped opportunity to measure and set targets for sustainable infrastructure to help infrastructure developers and operators manage their carbon footprint," said Wong Heang Fine, group CEO of Surbana Jurong.

## IS rating scheme 'still new to Asia'

The IS rating scheme is meticulous and comprehensive in that it uses a quadruple bottom line assessment framework comprising economic as well as ESG aspects to evaluate the



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LEFT: Surbana Jurong ISAPs conferment ceremony. The newly accredited professionals in Singapore are Jason Reeve (left), Eugene Seah (2nd from right), and Martin Lim (right).

BELOW: SMEC, a member of Surbana Jurong, has applied the IS rating scheme to several of its projects in Australia, one of which is Sydney Metro's Crows Nest Station (pictured).

overall sustainability performance of infrastructure assets, shared Surbana Jurong. The system's holistic approach sets and quantifies sustainability goals from the design to operation stages ranging from water and waste management to energy consumption, and the adoption of sustainable procurement as well as the usage of low carbon building materials. It is also aligned with the UN Sustainable Development Goals.

The IS Council administers the framework in Australia and New Zealand to assess the sustainability of the planning, design, construction and operation phases of over A\$200 billion infrastructure programmes, projects, networks and assets.

SMEC, a member of Surbana Jurong, has applied the IS rating scheme to several of its projects in Australia including Sydney Metro's Crows Nest Station, the Hell's Gate Dam Feasibility Study, and the Fitzroy to Gladstone pipeline project.

In the case of the Crows Nest Station upgrade, SMEC's sustainability and climate resilience team, which includes accredited professionals, facilitated the station's Green Star rating (six star design rating) and worked with designers to incorporate climate risk mitigation measures into the final design.

Surbana Jurong will be working with the IS Council to introduce and implement the international version of the IS rating scheme in Singapore and across Asia.

"The knowledge that Surbana Jurong Group has gained from our professionals completing the accredited training will boost our ability to design, build and operate sustainable infrastructure with resiliency in mind. This will also enable us to grow our sustainability advisory



© Sydney Metro

business," said Mr Wong. "We will look at how this can be used to value add projects in Singapore and Southeast Asia, especially where there is a need for sustainable financing and some form of platform to measure sustainability for infrastructure. Our clients will stand to benefit from our ability to educate, innovate and apply this effective methodology to our designs."

According to Surbana Jurong, while the IS rating scheme is still new to Asia, adhering to its standards could unlock new value propositions. It will enable the Group to help its clients to access green funds for project financing at more competitive rates through compliance with sustainability processes in design, construction and life cycle management. Additionally, it will lead to projects that have a lower carbon footprint and optimally utilised materials. Post-construction, these projects also have reduced operational and maintenance costs.

"Sustainable infrastructure protects and preserves the ecological processes required to maintain human health, equity and diversity," added Mr Wong. "With infrastructure sustainability gaining momentum across Asia, we need to stay ahead and have our people acquire the expertise that our clients need for maintaining the sustainability of their assets." ■

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## Balfour Beatty builds world's first T-pylon

Global construction company Balfour Beatty recently announced that it has successfully completed the world's inaugural T-pylon on behalf of the UK's National Grid, representing the first new electricity pylon design in Great Britain for almost 100 years. It is the first of 116 to be erected along the 57-km route in Somerset, South West England.

The first 48 T-pylons near East Huntspill will be constructed this year while the remaining 68, north of Sandford, will be built in 2022, according to Balfour Beatty. Upon completion, the newly designed pylons will connect six million homes and businesses in the surrounding area with low-carbon electricity generated at Hinkley Point C, the UK's first nuclear power station in a generation.

The T-pylon design is the result of a 2011 international competition organised by the Royal Institute of British Architects and Government, with the aim of reducing the impact of electricity pylons on the local environment and surroundings.

Standing at 35 m in height, the revolutionary new design forms a 'T' shape and is approximately one-third shorter than the traditional lattice pylon design, explained Balfour Beatty. As a result of its reduced size, the T-pylon has a smaller land footprint and a reduced impact on the local environment.

The company added that while traditional pylons are typically erected in dozens of individual lifts, T-pylons are designed to be assembled in up to four sections, halving the usual construction time from around 10 days to five. Secured in deep foundations and



Standing at 35 m in height, the new pylon design forms a 'T' shape and is about one-third shorter than the traditional lattice pylon design.

reinforced with a steel bolt cage, the four sections are lifted into place with a specialist crane and rig to secure them.

The T-pylons are expected to be ready to connect to Hinkley Point C by the end of 2024 and the project is due for completion at the end of 2025. ■

## Volvo unveils world's first vehicle using fossil-free steel

Volvo Group has revealed the world's first vehicle made of fossil-free steel from SSAB (pictured). The load carrier, designed for use in mining and quarrying, was manufactured at Volvo Construction Equipment's facility in Braås, Sweden. This concept machine is just the start, with smaller-scale series production planned by 2022 – and mass production set to follow.

With a commitment to be climate-neutral and achieve net zero value chain greenhouse gas emissions by 2040, Volvo Group is on the path towards developing sustainable transport and infrastructure solutions of the future. Along with the electrification of its vehicles and machines, the group is determined to reduce the carbon footprint of its entire supply chain and this latest innovation is one step forward on this path.

"This initiative with SSAB sets the benchmark for a fossil-free future. Just as the nations of the world come together at COP26 to address climate change, so too must organisations and industries work in collaboration to develop innovative new solutions for a greenhouse gas emission free future," said Martin Lundstedt, president and CEO of Volvo Group.

A move towards green steel is an important step for Volvo Group, as well as for the transport and infrastructure industries as a whole, particularly considering that around 70% of a truck's weight comes from steel and cast iron, with the figure for Volvo machines even higher.

"Our ambition is to have fossil-free steel used across all our products, with a step-by-step approach," said Melker Jernberg, president of Volvo Construction Equipment (Volvo CE). "This



machine is proof that we really can make fast progress, when we work together in strong partnerships, when we are determined to act and we enable our skilled people to contribute to building the world we want to live in. Not only for our generation, but for generations to come. Our team in Braås is understandably proud to help make this innovation happen."

"Having the world's first actual vehicle made using SSAB's fossil-free steel is a true milestone. Our collaboration with Volvo Group shows that green transition is possible and brings results," said Martin Lindqvist, president and CEO at SSAB. "Together, we will continue reducing climate impact all the way to the end customer while ensuring that our customers get high-quality steel. We look forward to continuing to work with Volvo Group in research and development to produce more fossil-free steel products." ■

# Global construction industry faces mounting climate change and sustainability challenges: Report

With the infrastructure boom set to fuel global economic growth over the next decade, the construction industry must address the mounting pressures associated with climate change and the race to net zero greenhouse gas emissions (net zero), according to a recent report published by Marsh and Guy Carpenter, both businesses of Marsh McLennan, a global professional services firm in the areas of risk, strategy and people.

The report, *Future of Construction: A Global Forecast for Construction to 2030*, written with Oxford Economics, provides a view on the future of construction as the industry recovers from the unprecedented effects of Covid-19 and the key drivers shaping its future over the next decade.

Based on the report, global construction output is expected to grow by 6.6% in 2021 and by 42% by 2030, driven largely by government stimuli and the demand for residential construction. As the sector grows, however, so too does the risk of greater pollution and waste, the report warns. Construction and the wider built environment currently account for around 40% of the world's global greenhouse gas emissions.

Climate change and the race to net zero are arguably the greatest challenges that face the construction industry, according to the report. It is predicted that the need to radically reduce the amount of carbon embedded in new construction will drive the growth of a deconstruction industry that reuses huge existing urban stockpiles of construction materials.

The reports further states that in 2020, environmental, social, and governance (ESG)-related capital for infrastructure grew 28%, which was largely due to a flow of fundraising into sustainability-related strategies. Given that significant equity is usually allocated to infrastructure by major construction companies and developers using their own corporate balance sheets, opportunities exist for those companies that develop new technologies, designs, and processes.

"Climate change and the ESG agenda – and the risks and opportunities they present – are among the biggest challenges the global construction industry faces over the next decade," said Richard Gurney, global head of construction at Marsh Specialty. "These forces are changing risk profiles for the sector. Organisations must adapt in order to harness the sector's massive potential for growth while playing a pivotal role in the advancement of economies and communities around the world."

Simon Liley, co-head of global engineering at Guy Carpenter, added, "The construction and engineering industry is entering a period of exciting opportunity but also one that will require new ways of approaching risk by the insurance and reinsurance sectors. These dynamics call for effective knowledge sharing from industry innovators at one end all the way through to reinsurance actuaries at the other.

"Understanding the shifting profile of exposure, technology, and sources of capital will be important to enable insurers and reinsurers to establish underwriting platforms and offer products that meet the construction industry's changing needs."

Other projections for the industry to 2030 include: predicted average annual growth in construction of 3.6% per

annum – faster than either the services or manufacturing sectors; the next decade for construction will see global growth up by 35% compared to the previous decade, driven by unprecedented levels of stimulus spending on infrastructure and the unleashing of excess household savings (it will represent more than 10% of GDP in North America); global infrastructure construction is forecast to grow by an annual average of 5.1%; and annual growth in UK infrastructure is expected to average 3.7%, rivaling China over the period as UK mega projects provide heightened growth.

Graham Robinson, global infrastructure and construction lead at Oxford Economics and lead author of *Future of Construction*, commented, "It is unusual to see construction outstripping growth in both services and manufacturing over a more sustained period. We would normally expect to see construction growing faster than other sectors of the economy for shorter periods in a cyclical upturn.

"However, it's not surprising that construction is expected to power the global economy over this next decade, considering the unprecedented nature of the stimulus spending on infrastructure by governments and the unleashing of excess household savings in the wake of Covid." ■



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# Global expert team to help build Australia-Asia PowerLink

Australia's Sun Cable has announced the appointment of a global expert team to help build one of the world's largest renewable energy infrastructure projects, the A\$30+ billion Australia-Asia PowerLink (AAPowerLink), which will supply renewable electricity to Darwin and Singapore.

With expertise in different areas, the team includes: Bechtel (project delivery), a global engineering, construction and project management company; Hatch (HVDC transmission), a global engineering, project management and professional services company, and a leader in complex engineering solutions; SMEC (solar generation system), a global specialist engineering and design consultancy, which is a member of Surbana Jurong, a provider of best-in-class infrastructure development solutions; Marsh (risk management), a global insurance broker and risk advisor; and PwC Australia (project advisory), part of the PwC global network, which delivers financial advisory, legal, consulting and assurance professional services, comprising an integrated infrastructure offering.

"Each carefully selected company has a proven track record in developing and delivering complex infrastructure projects, together with a strong commitment to renewable energy gigaprojects and providing global solutions to achieve net zero targets," said Sun Cable. "Their combined experience across environmental, social and governance frameworks will also be essential in delivering a project of such scale and significance."

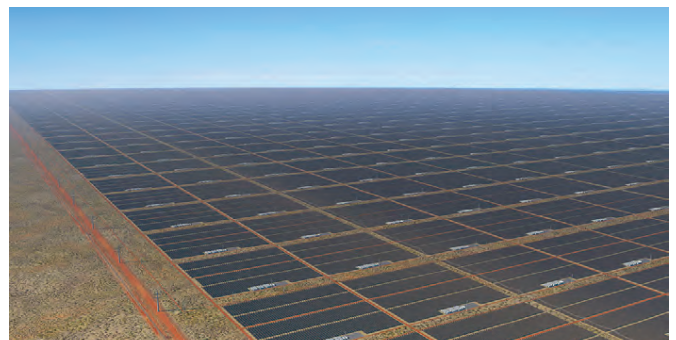
David Griffin, CEO of Sun Cable added that the project "is designed to significantly accelerate the carbon zero ambitions of the region, and we have brought together a dream team to bring it to fruition."

The AAPowerLink will build a game-changing renewable energy infrastructure system. Sun Cable plans to integrate a range of technologies and infrastructure to develop one of the world's largest solar farms, to be located in the Northern Territory, Australia (17-20 GWp); the world's largest battery (36-42 GWh); and the world's longest undersea high voltage direct current (HVDC) cable system from Darwin to Singapore (approximately 4,200 km).

The project will be a high-capacity solar generation, storage, and transmission system that will transmit reliable, dispatchable renewable electricity from the Barkly Region of the Northern Territory to Darwin and Singapore markets. Its key components are: solar farm precinct including energy storage and voltage source converter (VSC); high voltage direct current (HVDC) overhead transmission line (OHTL) from the solar farm to Darwin; VSC and utility-scale battery in Darwin; subsea HVDC cable system from Darwin to Singapore; and VSC and utility-scale battery in Singapore.

Construction of the AAPowerLink is expected to start from late 2023, with first supply of electricity to Darwin in 2026 and first electricity to Singapore in 2027 (full capacity by end of 2028).

Following the recent granting of the subsea cable route recommendation from the Indonesian Government and approval to undertake the next stage of the subsea cable survey, the



TOP: Construction of the AAPowerLink is expected to start from late 2023, with first supply of electricity to Darwin in 2026 and first electricity to Singapore in 2027 (full capacity by end of 2028).

ABOVE: The project will include one of the world's largest solar farms, to be located in the Northern Territory, Australia (17-20 GWp).



Another component of the project is a high voltage direct current (HVDC) overhead transmission line (OHTL) from the solar farm to Darwin.



The project is also planned to have the world's longest undersea HVDC cable system from Darwin to Singapore (about 4,200 km).

appointment of the project management team is the next key milestone in the project.

According to Sun Cable, the company is developing the AAPowerLink to provide renewable electricity to Darwin, in support of the Northern Territory’s ambition to develop an A\$40 billion economy by 2030. In recognition of partnership with the NT Government, Sun Cable signed a project delivery agreement with the Chief Minister, Michael Gunner MLA, and was granted major project status in July 2019. Sun Cable is also engaging with the First Nations stakeholders inclusive of Traditional Owners, recognised Native Title Owners, neighbouring communities, and Land Councils.

The AAPowerLink will be capable of supplying up to 15% of electricity needs in Singapore, with full capacity available from 2028. Sun Cable’s modelling shows that the project could reduce Singapore’s emissions by 6 mil t/yr, matching the entire climate abatement gap in the country’s announced 2030 targets.

“By unlocking the vast, world-class solar, and land resources that Australia has

**SUN CABLE**

The AAPowerLink is an industry leading solar, energy storage and HVDC transmission project, which is developing step change renewable energy technology, with a project value of over USD 22 billion.

**Meeting Singapore's Clean Energy Targets**

41% more solar energy is available in the Northern Territory than in Singapore. There is 41% more solar energy (kWh per square metre per year) at the AAPowerLink Solar Precinct, 860 km South of Darwin in the Northern Territory than in Singapore.

Singapore's 2040 electricity demand requires 14x the current available space for solar. If Singapore were to supply its entire 2040 electricity demand with locally produced solar, this would require 14x the land that is currently available for solar PV in the country.

- 17-20 GWp of solar arrays on 12,000 hectares in the Northern Territory
- 36-42 GWh of energy storage to provide 24/7 dispatchable energy.
- 800 Kilometres of overhead transmission line to Darwin.
- 4,200 Kilometres of subsea cable through to Singapore, the longest in the world.
- 1.75 GW of electricity capacity delivered to Singapore

available, Sun Cable is creating the pathway for a new export industry, generating up to A\$2 billion per annum in exports for Australia, and forecasts the potential to directly and indirectly employ tens of thousands in Australia, Indonesia and Singapore,” concluded the company. ■

ABOVE: In Singapore, the AAPowerLink will be able to supply up to 15% of the country’s electricity needs, with full capacity available from 2028.

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# CALENDAR OF EVENTS

## // Events in Asia

### 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](http://www.worksafeasia.com.sg)

### Bentley Year in Infrastructure and Going Digital Awards

1 to 2 Dec 2021 (virtual event)

Website: [yii.bentley.com](http://yii.bentley.com)

### Natural Disasters Expo Asia

1 to 2 Dec 2021

Singapore Expo  
Singapore

Website: [www.naturaldisastersshowasia.com](http://www.naturaldisastersshowasia.com)

### BuildTech Asia 2022

15 to 17 Mar 2022

Singapore Expo  
Singapore

Website: [www.buildtechasia.com](http://www.buildtechasia.com)

### Worldbex 2022

16 to 20 Mar 2022

World Trade Center Metro Manila  
The Philippines

Website: [www.worldbex.com](http://www.worldbex.com)

### Geo Connect Asia 2022

23 to 24 Mar 2022

Sands Expo & Convention Centre  
Marina Bay Sands, Singapore

Website: [www.geoconnectasia.com](http://www.geoconnectasia.com)

### Trenchless Asia 2022

27 to 28 Jul 2022

Kuala Lumpur Convention Centre  
Kuala Lumpur, Malaysia  
Website: [www.trenchlessasia.com](http://www.trenchlessasia.com)

### Cambuild 2022

6 to 8 Sept 2022

Diamond Island Exhibition &  
Convention Centre  
Phnom Penh, Cambodia  
Website: [www.cambuildexpo.com](http://www.cambuildexpo.com)

### bauma China 2022

22 to 25 Nov 2022

Shanghai New International Expo Centre  
Shanghai, China  
Website: [www.bauma-china.com](http://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](http://www.worldofconcrete.com)

### Hillhead 2022

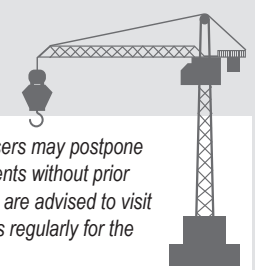
21 to 23 Jun 2022

Hillhead Quarry  
Derbyshire, England, United Kingdom  
Website: [www.hillhead.com](http://www.hillhead.com)

### bauma 2022

24 to 30 Oct 2022

Munich Trade Fair Centre  
Munich, Germany  
Website: [www.bauma.de](http://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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# VR and eLearning extend options to renew IPAF training

New ways to renew and extend MEWP operator training have been made available by the International Powered Access Federation (IPAF), giving operators renewing their PAL Card and training certification or taking their advanced operator PAL+ training further options to use virtual reality simulators (VR sims) and eLearning.

IPAF's extensive network of training centres are able to supplement the way they offer the IPAF MEWP Operator Renewal Training and IPAF PAL+ Advanced Operator Training courses with using new VR sim and eLearning options. Candidates can choose to take their theory test in either eLearning or instructor-led virtual sessions, in addition to the usual classroom-based module. Training centres can also offer renewal practical modules in addition to the existing PAL+ advanced course using a VR sim.

This offers greater flexibility to the candidate and the training centre, and can mean a saving in terms of time. Using VR sims means training is less likely to be disrupted by poor weather, and increases the range of locations where it can be delivered. Training centres could reduce the cost and space required to maintain their fleet of MEWPs.

The new options for delivering the IPAF renewal course or the PAL+ advanced course have undergone extensive trials involving IPAF staff and members firms, including Serious Labs, the Edmonton, Canada-based VR Simulator specialist, as well as IPAF training centres and major contractors. The enhanced range of next-generation learning options has now been approved by IPAF's Training Committee and IPAF Council.

Paul Roddis, IPAF's training manager said, "The pandemic called for greater flexibility in the way IPAF's training centres deliver courses, to provide maximum convenience and bio-security while maintaining the high standards that underpin all of our ISO-accredited training. While the worst of the pandemic is behind us, we are still seeing increased demand for eLearning, as well as instructor-led remote classrooms.



"We hope that these added options will allow training providers, candidates and their employers to tailor delivery of IPAF operator courses to best suit their preferences and requirements, for example by setting up an on-site virtual assessment centre for a contractor client, or leading a group of candidates through their theory eLearning in a virtual classroom led by a real-life instructor.

"Of course, operators will still be able to renew or extend their IPAF training using real MEWPs, but these added options will no doubt be of great benefit to training candidates, IPAF training centres and Instructors alike. As before, those seeking to qualify for their first IPAF PAL Card will be required to successfully complete their practical element and assessment using a real MEWP."

Another update approved recently by IPAF's Training Committee and IPAF Council allows training candidates seeking to renew their training to self-certify that they are an experienced operator by signing a declaration to that effect. They may also use IPAF's new ePAL app's digital log book to demonstrate relevant equipment experience. ■

## New IPAF safety professional membership 'draws a lot of interest'

IPAF has seen a surge of interest in its new safety professional member category, aimed at those in health & safety or related supervisory roles within powered access or wider industry. It was launched officially to coincide with the Vertikal Days event in Peterborough, the UK, on 22-23 September 2021. The first member was officially signed up during the event, as Chris Wraith, powered access safety consultant and former IPAF safety & technical manager, took the opportunity to sign on the dotted line. IPAF has subsequently received a lot of interest in the new membership category, from the UK, US, Mexico, Singapore and the Middle East among other locations.

This new category of membership is targeted at individuals within larger organisations, including those employed by existing IPAF member companies, and is a cost-effective way to benefit from the Federation and its activities, bringing benefits and increasing opportunities to receive direct updates from IPAF about safety and technical guidance, join exclusive webinars and events, and to engage directly with IPAF experts and fellow members.

Benefits of the membership include: free participation in

exclusive safety professional events with leading speakers from the powered access industry; access to a private LinkedIn group to share knowledge and safety good practice; access to the members' area of the IPAF website and the IPAF accident reporting portal members' dashboard; and a free subscription to Health & Safety International magazine.

Paul Roddis, IPAF's training manager said, "It is worth pointing out that this new category of individual membership is also ideally suited for IPAF training centre employees or individual instructors, who are all safety professionals in their own right.

"Individual employees of existing IPAF training members may wish to augment their involvement with IPAF and its committees by adding the safety professional category. Likewise, independent instructors who become employed by an existing IPAF training member company used to have to relinquish their individual membership; now they can sign up to the new safety professional category – available at half-price if employed by an existing IPAF member company – to continue to enjoy the benefits and opportunities they will have enjoyed as an individual member." ■

# IPAF ePAL app rolled out in new territories



A new mobile app for operators of mobile elevating work platforms (MEWPs) and mast climbing work platforms (MCWPs) that brings training certification into the digital era and reduces the environmental impact of issuing the IPAF PAL Card

and training certification is now available in several other territories, following its successful launch in the UK and Ireland earlier this year.

IPAF's new ePAL app is free to use and features a digital IPAF PAL Card, operator logbook and operator safety guide. It allows operators to receive best practice tips and safety information and lets them share qualifications with site managers quickly and easily. It is now available in 26 additional countries and regions: Bahrain, Belarus, the Czech Republic, Denmark, Finland, Georgia, Hong Kong, India, Iraq, Kazakhstan, Kuwait, Malaysia, Myanmar, New Zealand, Oman, Poland, Qatar, Romania, Saudi Arabia, Singapore, Slovenia, South Africa, Sweden, Turkey, UAE and Zambia.

On 22 November 2021, following the translation of ePAL and all associated systems, IPAF will roll out the new app for Argentina,

Belgium, Chile, Colombia, Ecuador, France, Liechtenstein, Mexico, Morocco, Netherlands, Peru, Portugal, Spain, Switzerland and Uruguay. January 2022 will see the rollout for North America, Austria, Brazil, Germany and Italy.

The ePAL app is a major step forward in IPAF's ongoing drive to boost sustainability, as it shifts away from issuing plastic PAL Cards and paper certification to every training candidate successfully completing or renewing an IPAF operator course. The app also speeds up the processing time and reduces the resources required to issue training candidates with their PAL Card and certification.

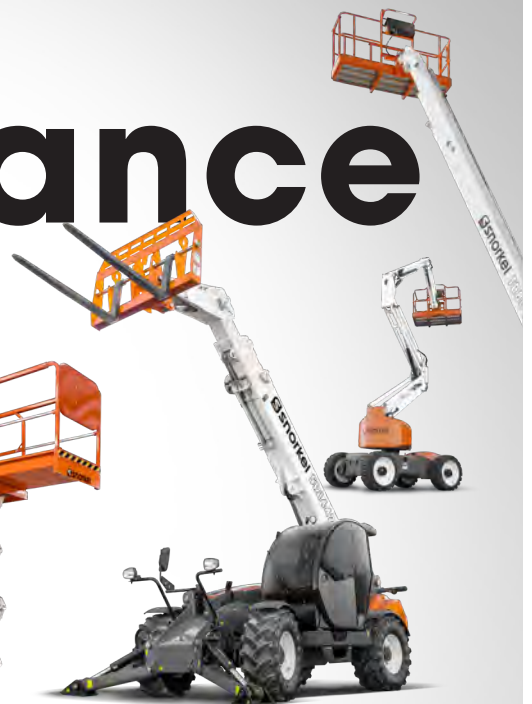
"The new app helps reduce the number of steps in processing a PAL Card, cutting needless delays and carbon emissions involved in shipping items around the globe for all IPAF training centres," said Peter Douglas, IPAF CEO and MD.

Søren Brogaard, CEO of Trackunit, an IPAF member company and specialist in fleet management solutions for construction that helped develop the app, added, "The app is performing brilliantly and allows IPAF to communicate directly with operators, for whom it offers a digital platform to record, show and share their qualifications and operating experience. We are also using the app to encourage and make it easier to report an accident or near-miss incident through the IPAF reporting portal." ■

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# New range of backhoe loaders from Manitou

Manitou Group has launched a new range of backhoe loaders, aimed at the Indian, Latin American, Russian and African markets. The renamed MBL (Manitou backhoe loader) / GBL (Gehl backhoe loader) range features a new design with a completely revised cab and a wide range of equipment to suit various applications.

The machines – comprising three models – are equipped with a new cab that provides greater operator comfort. It has more space and an adjustable suspension seat with armrest, a height adjustable steering wheel and a radio. Safety is also enhanced with 360-degree visibility and a highly robust DCPD hood. The hood can be fully opened and absorbs potential impacts during loading operations, preventing bumps and breakages. Its design facilitates servicing of the machine for better maintenance.

Connected as standard, the MBL / GBL range allows operators to have a digital twin of their machine on their smartphone with the MyManitou app. This service enables users to anticipate maintenance of their machine while optimising consumption.

In order to meet the Indian market’s Bharat IV regulatory requirements, the new backhoe loaders are powered by a 74.5 hp BSIV Kirloskar engine. According to Manitou, both 90 hp and 92 hp versions are also available for the Southeast Asian, Central and Latin American, Brazilian, Middle Eastern, African, and Russian markets.

“We are investing heavily in our product development and manufacturing facilities in order to meet the growing demands of our customers in these strategic areas. The introduction of the new backhoe loaders demonstrates our commitment to serving our customers with the best products and services to meet the requirements of their activities,” said Rahat Uppal, Manitou’s product manager for backhoe loader range.

For carrying out numerous operations such as demolition, propulsion of equipment, excavation and road construction, Manitou offers a variety of versatile attachments, including backhoe and loader buckets of various sizes, as well as trenching buckets for pipe laying. Also available are factory fitted rock breakers for demolition. They incorporate robust advanced features for numerous applications, while increasing productivity and reducing the total cost of ownership for the user. ■

Website: [www.manitoucenter.com.sg](http://www.manitoucenter.com.sg)



ALL IMAGES: The new backhoe loaders from Manitou are equipped with a completely revised cab and a wide range of equipment to suit various applications.

# Bauer unveils electric drilling rig

Bauer Maschinen GmbH has introduced its first electric drilling rig, the eBG. Using electrical power instead of a diesel engine, the machine does not require any fossil fuels and operates quietly, making it suitable for urban areas.

“We have been working with electrification for some time now,” said Christian Heinecker, head of drilling equipment division at Bauer Maschinen GmbH. “In the past, however, this was tailored to specific customer requests or projects.”

The new electric eBG 33 falls in the mid-range segment of the drilling rig series with a drive power of more than 400 kW, which puts it on the same scale as Bauer BG 28 to BG 36 and thus within the range of 280 to 390 kNm torque. As a result, it covers a wide range of applications on site.

Apart from traditional Kelly drilling, the eBG 33 can be used for high-performance methods, for example soil mixing techniques such as cutter soil mixing (CSM) or double-head system drilling. A Bauer trench cutter can also be attached to the machine.

To deliver the same capacity as a conventional Bauer BG with a diesel engine, the eBG 33 has been developed using a direct power supply solution. This is because the currently available battery systems would not be able to manage the capacity in this size class, revealed Bauer. Accordingly, the preparatory work on site must be planned over a number of months to ensure that the power supply is also provided.

The eBG is ideal for large-scale and long-running construction sites, since the overall benefits, such as significantly reduced operating costs, can be fully exploited over the longer period of time, said Bauer.

The manufacturer highlighted that the average diesel consumption is significantly higher for the BG 28 and larger equipment when compared to smaller equipment types. This is why the use of the electric eBG machine could enormously reduce the operating costs for long-term operations.

The eBG’s electrical engine requires a full 690 V, while 400 V is needed for air conditioning and heating. A 230 V socket provides the option of plugging in additional attachment parts on site, like percussion tools. The on-board controls require 24 V as usual.

Bauer’s energy efficient power (EEP) system is also available for the electric eBG. Another highlight is the EEP winch concept, which enables it to recover energy during retraction into the bore hole. ■



Both images © Bauer Group



TOP: The new Bauer electric eBG 33 falls in the mid-range segment of the drilling rig series with a drive power of more than 400 kW.

ABOVE: Equipped with an electric engine, the eBG 33 is ideal for large-scale and long-running construction sites.



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Website: [www.bauer.de](http://www.bauer.de)

# Link-Belt introduces 120|HT hydraulic truck crane

Link-Belt Cranes has introduced its new 110-mt (120 USt) hydraulic truck crane, the 120|HT. This model made its public debut at the company's customer event, CraneFest 2021 that was held in September. Production units are set to begin shipment in the fourth quarter of 2021.

The four-axle 120|HT features a new, wider single occupant cab that reflects design elements of the Link-Belt 175|AT all-terrain crane. The 120|HT also comes with a new air-ride suspension design, which is believed to be the first-of-its-kind for truck crane customers.

Link-Belt revealed that the 120|HT's suspension and braking system is a result of a two-year collaborative design process with suspension manufacturer Hendrickson International. "Air disc brakes, another first for the hydraulic truck crane market, will improve brake performance and reduce maintenance time," said the company.

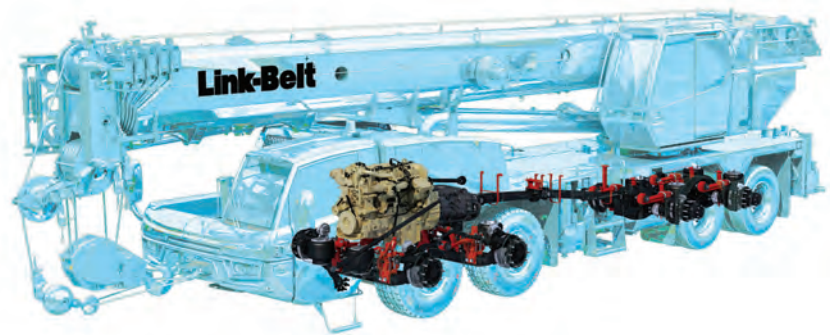
"Superior ride quality is going to be one of the first things anyone that's ever driven in a truck crane before will notice," added Andrew Soper, product manager for all-terrain and telescopic truck crane at Link-Belt.

Counterweight payload increases from 7,257 kg on the Link-Belt HTC-86110 to 9,268 kg on the new 120|HT without a boom dolly. Full counterweight for the 120|HT is 22,271 kg. According to Link-Belt, increased counterweight payload is due to a strategic design approach to reduce the 120|HT's gross vehicle weight coupled with an increased rating on the front steering axles to 26,000 lbs (about 11,793 kg) each.

Fuel efficiency has increased with the introduction of Cummins X12 single overhead cam engine that is EPA 2021 compliant. Top speed on the 120|HT is 99 km/hr. Link-Belt has also improved upon access for daily service checks such as fill points, filters, and grease points.

The 120|HT delivers outstanding reach with a six-section 11.6 – 50 m pin and latch formed boom. An available two-piece 10.7 – 17.7 m or three-piece 2.89 – 10.7 – 17.7 m on-board offsettable fly provides greater flexibility and range, and manually offsets at 0, 15, 30 and 45 degrees. Two 4.9-m lattice insert extensions provide a maximum tip height of 79.8 m.

Features like Link-Belt SmartFly, Link-Belt's one-person fly erection technology,



ALL IMAGES: The four-axle Link-Belt 120|HT hydraulic truck crane features a new air-ride suspension design, which is believed to be the first-of-its-kind for truck crane customers.

and a wireless rigging remote to control the outriggers, outrigger beams and jacks, boom hoist, and winches make setup quicker and easier with increased efficiency.

The new operator cab has been designed for comfort, offering wide-entry access and egress, USB and 12-V power supply, and increased storage with interior lighting. Pulse 2.0 with its 25.4-cm touch display is at the heart of this crane with features and controls that are intuitive, adaptable, and in easy arm's reach. The view from the seat is uninhibited in all kinds of weather with

large sweeping wipers in the front and top, and strategically-placed vents for fast-acting defrost.

Additional features of the 120|HT include Link-Belt's 'Smart Stack' counterweight detection system; Link-Belt Pulse 2.0 with improved carrier diagnostics, monitoring, and now also displays real-time outrigger jack ground bearing pressures; Link-Belt Site Vision incorporating camera and working lights package; V-Calc with 81 outrigger positions; and iCraneTrax for better fleet management and maintenance scheduling. ■

Website: [www.linkbelt.com](http://www.linkbelt.com)

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# Snorkel's first lithium-powered rough-terrain boom lift

Snorkel has unveiled the ninth model in its lithium-ion battery powered family of rough-terrain mobile elevating work platforms (MEWPs) and telehandlers. The new A46JRTE recently made its global debut at the Vertikal Days exhibition in the UK, becoming the company's first lithium powered boom lift.

The A46JRTE joins eight other lithium-powered Snorkel models which have been introduced since late 2019, including the SL26RTE and SL30RTE electric Speed Levels; the S2255RTE, S2755RTE, S2770RTE, S3370RTE and S3970RTE electric rough-terrain scissor lifts; and the SR5719E/SR626E electric compact rough-terrain telehandler.

Utilising the same lithium-ion battery pack solution as the other MEWPs in the family, the A46JRTE delivers a true zero-emission rough-terrain solution, without compromising on the reliability and four-wheel drive capabilities of the diesel equivalent, explained Snorkel. The model comes as standard with three 5.75-kWh lithium-ion battery packs, which satisfies many applications, including heavy-use.

The automotive-quality lithium-ion battery packs are produced in the North East of England, and are individually equipped with the latest battery management systems (BMS). According to Snorkel, the battery packs require zero maintenance and have been tested in climatic chambers between -25°C and +60°C, making them suitable for use in most environments.

Depending on usage, Snorkel said its lithium-powered MEWPs are delivering extended duty cycles per charge, when compared to similar models. Based on typical use in rough-terrain under test conditions, a single charge can last for more than one week, and in light use on elevation jobs with minimal driving, this increases to more than two weeks on a single charge.

Featuring a powerful AC electric motor, which creates efficiencies in the hydraulic drive system, the A46JRTE benefits from higher torque, which results in increased traction and improved rough-terrain performance. Snorkel added that the electric motor also delivers 62% less jobsite noise and with no engine fan, dust generation is reduced for safer and cleaner operation in low emission zones and green cities.

The company further highlighted that 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. Plus, less servicing reduces the load on service engineers.

The original diesel-powered Snorkel A46JRT is a globally popular articulated boom lift, known for its long working life and exceptional working envelope. Capable of reaching a maximum working height of 16.3 m, the A46JRT has a working outreach of 7.35 m and benefits from a zero tailswing and 1.5 m jib boom for excellent manoeuvrability in confined spaces.

The new lithium-powered four-wheel drive A46JRTE expands the A46 family to three models. Snorkel continues to offer the diesel-powered four-wheel drive A46JRT model, as well as its two-wheel drive electric powered A46JE, which is suited to indoor and outdoor work on concrete slab and is popular in industrial applications.

"The launch of our first lithium-powered boom lift is an exciting next step in our development of zero-emission alternatives to diesel. The compact and mid-size aerial lift and telehandler segment is a sweet spot for electrification, and our lithium-battery



TOP AND ABOVE: The new zero-emission Snorkel A46JRTE boom lift features powerful four-wheel drive. The machine is available for the global market.

LEFT: Simple to charge, the A46JRTE also boasts long duty cycles.

technology is proving to be a zero-compromise solution in this product category, delivering zero emissions, reduced noise and equivalent or better performance than the diesel," said Matthew Elvin, CEO of Xtreme Manufacturing and Snorkel.

At the same time, Snorkel also used the Vertikal Days as a launchpad for its new lithium-focused website. Designed to aide customers in the switch from diesel to lithium equipment, the site features a range of resources including diesel vs lithium cost calculators for both rental companies and contractors, as well as frequently asked questions, photos, videos and region-specific information on market drivers and adoption. Snorkel is also offering direct training for its rental customers, to help them educate their customers on the benefits of this new technology.

All nine models in the Snorkel lithium-electric family are now in full production and available to order globally. ■

Website: [www.snorkelnetzero.com](http://www.snorkelnetzero.com)



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# Tadano expands Flex Base system to Demag AC 130-5

The five-axle Demag AC 130-5 all-terrain crane now features the stepless variable outrigger system, Flex Base. It offers more flexibility and a competitive edge when working in confined spaces by calculating crane capacity based on each outrigger's extension point, rather than a fixed position.

As Flex Base enables outriggers to be positioned right up to an obstruction for calculating crane capacity, the system delivers more lifting versatility when working in confined areas, such as crowded construction sites, inside structures or in congested urban areas.

The AC 130-5 is added to the growing list of Tadano all-terrain cranes offering Flex Base, which also includes the AC 45 City, AC 55-3, AC 60-3 and the recently introduced AC 4.080-1 models.

Stepless outrigger positioning works in conjunction with the IC-1 Plus control system. Containing all the lift charts for every crane configuration of the AC 130-5 crane, IC-1 Plus determines lift capacity in real-time, based on outrigger setup, counterweight, superstructure angle, main boom length and telescoping sequence. With Flex Base, no longer are crane capacities calculated from fixed outrigger positions and 360-degree load charts. This delivers maximum possible lift capacities in any outrigger configuration, even asymmetrical.

Flex Base and IC-1 Plus allow cranes to carry out more lifts from



positions that are otherwise unreachable, expanding the range of potential applications. To further increase on-site lifting efficiency, the online IC-1 Lift Plan tool offers lift preplanning, so owners can determine the crane's exact position and configuration required to perform the lift.

The 130-t Demag AC 130-5 features a compact design, with a total length of only 14.4 m and width of 2.75 m. The all-terrain crane also offers an 86.5-m maximum system length. ■

Website: [www.demagcranes.com](http://www.demagcranes.com)

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# Hamm HP pneumatic-tyre rollers for global market

The pneumatic-tyre rollers from Hamm HP series have been on the market across the world. The machines are equipped with a large, newly designed water tank (650 l), so that they have sufficient capacity for a full working day without the need to refill.

There are different models to suit regional demands, which include the HP 180 or HP 180i with a minimum working weight of 8 t and maximum operating weight of 18 t, plus the HP 280 or HP 280i with working weights ranging from 10 to 28 t.

The HP 180i and HP 280i models (both with Easy Drive operating concept) comply with the EPA Tier 4 and EU Stage V emissions standards, while the HP 180 and HP 280 models are designed for Tier 3 markets.

The HP pneumatic-tyre rollers feature a simple and intuitive operation, along with an ergonomically optimised driver's platform. When combined with the shape of the asymmetrical frame, this results in excellent visibility – for models with a cab as well as those with ROPS.

The machines' hydrostatic rear-axle drive, coupled with a sensitive control system, allows the right speed to be set in every working situation. The specified working speed can be easily adjusted using the rotary knob here – an important prerequisite for homogeneous compaction. The intelligent drive control enables smooth, even acceleration and braking, thus preventing uneven compaction.

## A variety of options

For the HP series, Hamm offers a wide range of options, making the machines adaptable to each individual market and application. The thermal aprons have always been a classic piece of equipment for the pneumatic-tyre rollers, and they are available for all models in the HP series.

The diesel-powered tyre heating is a new feature for the HP 180i and HP 280i models. According to Hamm, the integrated tyre heating is not operated using gas, but rather with diesel from the fuel tank. This means that the often costly transport and the time-intensive replacement of the cylinders can be avoided. With such solution, the manufacturer has also eliminated a source of danger because there are no naked flames and, as a result, no risk of ignition, when it comes into contact with oil or the additive, for example.

Another permanent feature of the new tyre heating is an automatic temperature control. After preselecting a minimum and maximum value, the control maintains the temperature in this range. The driver can view the current temperature via the display. The tyre heating also does not affect the ballasting of the machines. The maximum permissible operating weight can be achieved, irrespective of this.

## Innovative additive-sprinkling system

When paving special asphalt that is quite difficult to process, the sprinkling of the pneumatic tyres with additive is essential



ABOVE AND LEFT: Hamm HP pneumatic-tyre rollers are equipped with a large, newly designed water tank, so that they have sufficient capacity for a full working day without the need to refill.

BELOW: The HP 280 model with thermal aprons.



for high-quality compaction, explained Hamm. By completely redesigning the additive-sprinkling system, the manufacturer is creating optimal prerequisites for easy handling and the highest level of compaction quality.

The additive-sprinkling system provides several advantages. One of them is the time-saving filling of the additive concentrate, whereby no premixing is required. The dosage can then be regulated in different levels from the driver's platform. The water and additive are mixed automatically, which guarantees a lasting optimal mixing ratio without demixing. The driver always has the option to monitor the fill level via the display on the control panel. Hamm said it is also possible to convert the sprinkling from water to additive at any time from the driver's platform. ■

Website: [www.wirtgen.com](http://www.wirtgen.com)

# Sunward low-mast rotary drilling rig for Singapore market

JP Nelson offers the Sunward SWDM320HL low-mast rotary drilling rig for customers in Singapore. The machine has a maximum drilling diameter of 2,500 mm and maximum drilling depth of 43 m.

“The advantage of low-mast rotary drilling rigs is that they have a flexible and versatile multi-sectional combination drilling mast to meet different height requirements,” explained JP Nelson. “The Sunward SWDM320HL fulfils the demand from local customers for low-headroom rigs, especially contractors who have to carry out their work under a rail (MRT) track, given the height limitation of 16 m on the job site.”

The SWDM320HL delivers a maximum torque of 328 kNm, and it can be equipped with multi-sectional drilling rods for use in various geological conditions. “The machine also has a large-diameter drum for single-layer winding of steel wire rope, increasing its service life by 50%,” added JP Nelson.

The main winch provides a maximum lifting force of 320 kN and maximum lifting

speed of 80 m/min. With a large-flow pump valve, the main winch can be lifted and lowered easily.

The hydraulic system features a load sensing technology as well as a power control technology that offers ‘total power’ and ‘limited power’, resulting in better efficiency and saving more energy for the machine.

In addition, the SWDM320HL can be operated with a wireless remote control to ensure greater safety. The drilling mast is made of high-strength steel with a lightweight design, and the telescopic chassis is built for high durability and stability.

JP Nelson recently delivered one unit of SWDM320HL for use in the construction of Singapore's Jurong Region Line MRT project. Due to stringent safety requirements on the job site, the contractor needed a low-headroom rig and thus it deployed the Sunward SWDM320HL with a height of up to 15 m.

JP Nelson is a distributor of Sunward drilling rigs in Singapore. Sunward Intelligent



Equipment manufactures a wide range of low-headroom drilling rigs, including the SWDM160HL, SWDM220HL, SWDM300HL, SWDM320HL, SWDM410L, SWDM420L, SWDM450L and SWDM550HL. ■

Website: [www.jpnelson.com.sg](http://www.jpnelson.com.sg)



ALL IMAGES: The Sunward SWDM320HL low-mast rotary drilling rig is available in the Singapore market. The machine has a maximum drilling diameter of 2,500 mm and maximum drilling depth of 43 m.

# Goldhofer's biggest wind turbine blade transporter

German heavy haulage specialist Goldhofer has unveiled its biggest ever blade lifter – the FTV 850 – designed for maximum safety and stability when transporting wind turbine rotor blades. This trailer can be used not only in the standard 3-m width but also with split combinations in widths of up to over 4 m.

Depending on the configuration, even the latest generation of rotor blades requiring a load moment of up to 850 meter-ton can be picked up and transported with full flexibility in the towed or self-propelled mode, according to Goldhofer.

With the split-combination option and mounting behind the loading area, the FTV 850 offers significantly high stability combined with low ballast weight. This results in a transportation system with a low centre of gravity and maximum protection from tipping. It also ensures low axle loads and cost-effective operations.

The FTV 850 has been launched as the “big brother” to the popular Goldhofer FTV 550. Depending on the job on hand, a wide range of options is available with adapters for various parallel combinations. This makes the FTV 850 ideal for transporting extra-long rotor blades for turbines on sites with low wind speeds, said Goldhofer.

The new FTV 850 is Goldhofer's latest addition to its portfolio of dedicated products for rotor blade transportation. Based on the same concept as the FTV 300 and FTV 550, these highly flexible transport systems can be used in both the towed and the self-propelled mode.

The mounted rotor blade can be freely rotated around its own axis and raised up to an angle of 60 degrees so that tight bends, buildings and roadside trees are no obstacle, added Goldhofer. “That is the key to much more environment-friendly operations than with conventional solutions.”

Moreover, the FTV 850 features fast and efficient set-up of the desired configuration and can be combined with a large number of Goldhofer modules, such as the PST/SL-E, THP/SL and ADDrive.

The first Goldhofer FTV 850s are already on their way to several companies worldwide, including Anipsotiki, Denzai and Laso. ■

Website: [www.goldhofer.com](http://www.goldhofer.com)



All images © Anipsotiki



**TOP: The new FTV 850 blade transporter features the same concept as the FTV 550 (pictured) and FTV 300.**

**ABOVE: The FTV 850 in test configuration with THP/SL split.**

**LEFT: Greek specialist transportation company Anipsotiki receives an FTV 850.**

# Linnhoff asphalt plants excel on Trans-Sumatra Toll Road

A varied cross-section of Linnhoff asphalt plants has now produced well over 1.5 mil t of hot mix asphalt, and is continuing its work to ensure Indonesia's Rp 500 trillion (US\$35 billion) Trans-Sumatra Toll Road remains on course for completion by 2024.

The project comprises over 2,000 km of toll roads connecting Bakauheni in the far south of the island with Banda Aceh at its northernmost tip, plus three supporting corridors that link the main corridors with the west coast. Approximately a quarter of this ambitious 10-year project is now officially in operation.

Indonesia's road connectivity has long been highlighted by the government as a vital springboard for economic advancement. So with plans to boost growth in Sumatra through a new road network, it was vital for PT. Hutama Karya, which is overseeing the project, to guarantee the success of the project.

A total of nine Linnhoff asphalt plants – seven TSD1500 MobileMix, one CMX1500 CompactMix and one TRX1300 TransitMix – have been working on several segments of this toll road to meet the target.

## Hit the road

Having moved from one section of the project to another, the high mobility potential of the Linnhoff TSD1500 MobileMix asphalt plants has more than justified their selection.

Configured from four main mobile modules, the Linnhoff TSD MobileMix asphalt plants are ideal for short-term or remote projects. Each module features a built-in chassis and quick-coupling cables for plug-and-play convenience, ensuring rapid mobilisation and deployment. Heavy and time-consuming concrete foundations are not required, while setup and dismantling can all be achieved without the need for heavy cranes thanks to the hydraulic self-jacking support system.

The most popular plants supporting the project are Linnhoff's mid-range TSD1500 MobileMix model. It offers a production capacity of up to 120 t/hr (at 3% moisture) and is equipped with the company's innovative screen drum technology. This technology combines both drying and screening of aggregates in one drum, eliminating the need for hot elevator and vibrating screens which, in turn, greatly reduces maintenance and fuel consumption.

## Modular design

In addition, two stationary Linnhoff asphalt plants from the CMX CompactMix and TRX TransitMix range are working on this project. With their modular structure, these asphalt plants are still relatively portable and easy to relocate. Each module is designed to be shipped in a shipping container, and the design is focused on reducing setup and dismantling time and costs for owners, as well as providing easy maintenance access to all levels.

Supporting construction at several sections in Palembang and Lampung in the southern part of Sumatra, the compact,



ALL IMAGES: Linnhoff asphalt plants – including the CMX1500 CompactMix (above), TRX1300 TransitMix (left), and TSD1500 MobileMix (below) – have been working on several segments of Trans-Sumatra Toll Road. The project is expected to be completed by 2024.



economical and reliable TRX1300 TransitMix and CMX1500 CompactMix asphalt plants share the same highly efficient screen drum technology as the portable TSD MobileMix design. The TRX1300 TransitMix, the largest in this range, features a 1.3 t mixer that provides a production capacity of up to 80 t/hr, while the CMX1500 CompactMix is able to produce up to 120 t/hr (at 3% moisture).

"With such a long 'point-to-point' project like this – where different sections are constructed simultaneously – the portability of the asphalt plants is just as important as reliability," said Teo Siang Leong, general manager (sales) at Lintec & Linnhoff Asphalt Pte Ltd. "Linnhoff's TSD MobileMix asphalt plants have proved to be the perfect solution for quickly getting new sections underway as work elsewhere is completed. And the stationary asphalt plants are really living up to their reputation for solid performance." ■

Website: [www.lintec-linnhoff.com](http://www.lintec-linnhoff.com)



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# Ammann paves the way for smooth road in S. Korea

An AFT 700-3 large premium tracked paver from Ammann has been used on a road in Seosan City, South Korea. The project, 120-km south of Seoul, involved paving testing ground access roads for Hankook Tire. It also consisted of paving work adjacent to the main test roads. Handling the job was Daero Construction Co Ltd.

The paving crew utilised a Moba Big Sonic Ski with sensors for precise placement and smoothness. The ski can work as wide as 13 m, though this project called for passes of 12 m. The crew worked at a pace of about 5 m/min, placing roughly 200 t/hr. The project was expected to be completed in the first quarter of this year.

The AFT 700-3 paver utilised a high-compaction screed, which employed tamping and vibrating features as the mix was placed. The operator, Mr Baek, described the asphalt used as “typical road pavement mix.” He said the paver is powerful and its tracks grip well. He also praised the intuitiveness provided by PaveManager 2.0, a CAN-based automated system that constantly monitors the paving process and gives feedback to operators.

The PaveManager 2.0 system is connected to both the main operator control and the screed remote control panels, providing a complete overview. It automates many key functions and allows slope and/or crowning to be programmed. The AFT 700-3 paver meets US EPA Tier 4 Final and EU Stage 4 emissions standards.

Mr Baek further appreciated the ease of operation that results from the integration of the auger and sonic sensors. Ammann large premium tracked pavers feature efficient and consistent material feeding that ensures proper auger coverage and mix distribution across the screed. Automated processes lead to consistency throughout the operation.

A reversible twin conveyor system enables material to flow consistently from the hopper. The material conveyor is tunnel-shaped to optimise flow and limit segregation. Also utilised is proportional speed control with a paddle sensor system.

The auger system delivers consistent distribution of material across the screed, essential to placing a quality mat with minimal segregation. The system features sonic sensors that provide proportional speed control. The left and right augers are independently driven and reversible.

Daero is known for its high-quality construction work and advanced capabilities on large-scale paving projects. The company specialises in road pavement construction, including a high volume of governmental work. ■



ALL IMAGES: Daero Construction recently carried out paving work on a road in Seosan City, 120-km south of Seoul. To help deliver the job, the company opted for an Ammann AFT 700-3 large premium tracked paver.

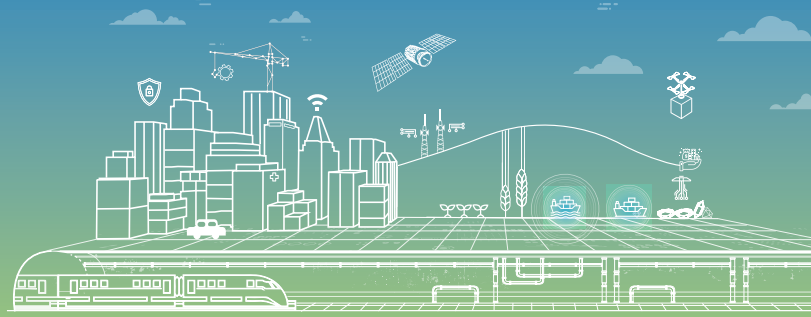


Website: [www.ammann.com](http://www.ammann.com)

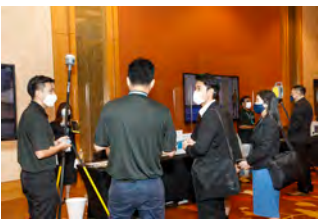


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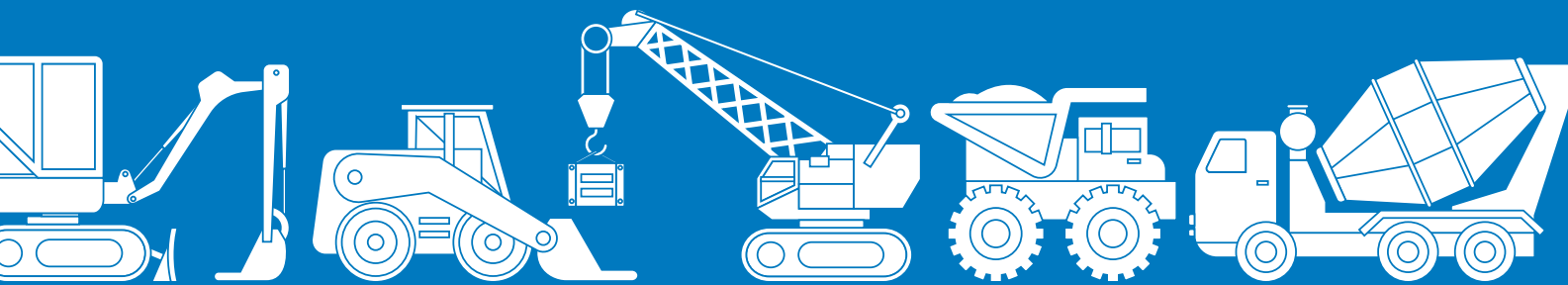


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# Mapei solutions chosen for Cityplaza project in HK

Cityplaza is a shopping and office development by Swire Properties in Taikoo Shing, Hong Kong. Covering a floor area of 1.11 mil sq ft, the complex includes three 22-storey office towers and a six-storey shopping centre that houses more than 170 shops and restaurants.

With easy access to the Tai Koo MTR station and transportation network, Cityplaza is not only a hub for leisure but also a popular business district. Here, Mapei supported the waterproofing works and replacement of full arrest systems on the roof of two buildings.

For the Cityplaza 3 tower, Mapei supplied its Purtop 1000, Mapefloor Finish 451, Primer SN and Mapeflex PU45 solutions. These high-performance and fast-installation systems were used on a roof area of 1,200 sq m.

Purtop 1000 is 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. This 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).

At the Cityplaza 1 tower, Mapei proposed its Aquaflex Roof Premium, Mapelastick Smart, Ultratop and Planitop HB40 solutions, among others, for a roof area of 1,000 sq m.

Ultratop is a self-levelling mortar featuring special hydraulic binders for abrasion-resistant floorings. The system offers high mechanical strength and resistance to abrasion. It is used internally in public and industrial buildings for levelling and smoothing new or existing concrete and ceramic substrates, in thickness from 5 to 40 mm.

The installation of Mapei systems on the Cityplaza project was completed in 2019. ■

Website: [www.mapei.com.sg](http://www.mapei.com.sg)

ALL IMAGES: Several products from Mapei were applied on the roof of Cityplaza 1 and 3 towers in Hong Kong, covering an area of 1,000 sq m and 1,200 sq m respectively.





# Cat 140 GC makes the grade

**T**he Cat 140 GC motor grader from Caterpillar is designed for high performance with low owning and operating costs. The machine's powerful Cat C7.1 engine, 6F/3R automatic powershift transmission (which eliminates the inching pedal), and precisely designed hydraulic system ensure balanced performance in all operating situations.

An Eco operating mode and demand-fan reduce fuel consumption, and extended maintenance intervals further minimise operating costs. Operators of all skill levels can quickly achieve high production with the 140 GC, and options that include adjustable seats and efficient heating/cooling systems guarantee comfort.

With 45 years of refinement, the 140 GC's conventional steering wheel and lever controls are familiar to operators and ensure positive control. The control console adjusts to the operator's preference, and the powerful heating and cooling system option dehumidifies and pressurises the cab while circulating fresh air to seal out



TOP AND ABOVE: The 140 GC's powerful Cat C7.1 engine, 6F/3R automatic powershift transmission (which eliminates the inching pedal), and precisely designed hydraulic system ensure balanced performance in all operating situations.

dust and keep windows clear. Seat upgrades include mechanical or air suspension; static seat is standard.

The 140 GC's standard no-spin differential activates with no operator input to increase traction in poor ground conditions, and to protect drivetrain components from damage. The optional Digital Blade Slope Meter takes the guesswork out of slope control and keeps the jobsite safer by eliminating manual grade checks. Cat Detect with Vision System (optional) uses a rearview camera to show a wide view behind the machine.

Other features of the 140 GC motor grader include: standard drawbar circle mouldboard that provides a long service life, with replaceable wear strips that maintain the system's integrity; oil-bath, multi-disc service brakes that are hydraulically-actuated for smooth, predictable braking and lower operating costs; and a variety of attachments, like scarifiers, rippers and front blades, which increase machine versatility.

There are also circle-drive slip clutch option that protects the pinion drive and circle teeth from potential damage; and circle saver option that reduces daily greasing requirements and protects the circle and pinion, significantly reducing the potential for damage.

In addition, optional guarding protects the 140 GC from damage in demanding applications, and optional secondary-steering system automatically activates if main pump pressure drops. ■

Website: [www.cat.com](http://www.cat.com)



ABOVE AND LEFT: With 45 years of refinement, the 140 GC's conventional steering wheel and lever controls are familiar to operators and ensure positive control.



The 140 GC's standard no-spin differential activates with no operator input to increase traction in poor ground conditions, and to protect drivetrain components from damage. The Eco operating mode and demand-fan reduce fuel consumption, and extended maintenance intervals further minimise operating costs.

# *Pride of Bangladesh*

## **THE COUNTRY'S FIRST UNDERWATER TUNNEL**

The Bangabandhu Sheikh Mujibur Rahman Tunnel – also known as the Karnaphuli River Tunnel – in the port city of Chattogram (formerly called Chittagong), Bangladesh, features 2.5 km-long, 11-m-diameter twin tunnels under the river and 250-m-long cut-and-cover and open-cut tunnels connecting both ends. When completed, it will be the country's first underwater tunnel, which is being developed by the Bangladesh Bridge Authority.





**T**he project includes over 5 km of connecting roads and will be a game changer for southeast Bangladesh, connecting the region to the rest of the country. It is also part of China's One Belt One Road initiative and a key link in planned cross-country transport corridors.

SMEC, in a joint venture collaboration, was appointed to supervise the design and construction of the project in 2016, partnering with COWI A/S, ACE Consultants Ltd and DevConsultants Ltd. The contractor on the project is China Communications Construction Company Ltd.

Works began in early 2018. An important milestone was achieved on 7 October 2021, when the tunnel boring machine (TBM) successfully broke through at the west bank working shaft of the second tunnel. The first tunnel was completed on 2 August 2020.

### Complex tunnelling work

"With the rapid development of southeast Bangladesh, especially in the regions south of Chattogram, the two existing bridges over the Karnaphuli River are inadequate to accommodate the increase in traffic," explained Gavin Strid, SMEC's chief



TOP, ABOVE AND OPPOSITE: **The Bangabandhu Sheikh Mujibur Rahman Tunnel is currently under construction. Due to the geology of the site and the requirement to tunnel under a river, the slurry shield method of tunnelling was adopted for the main tunnels with approaches using cut-and-cover method.**



technical principal - project management and project manager of the joint venture consultant team. "Having a population of over six million, the heavily congested city of Chattogram is closely surrounded on the east by the Chittagong Hill Tracts and the west by the Bay of Bengal, making an additional bridge type crossing of the Karnaphuli River unviable."

The solution? "The Bangabandhu Sheikh Mujibur Rahman Tunnel - the first tunnel in Bangladesh." The name of the tunnel was chosen in honour of the founding father of Bangladesh and the country's first president.

Mr Strid highlighted that the tunnel is located under a very wide river near to the coast and will traverse varying layers of sand, silt, and clays. "Because of the geology of the site and the requirement to tunnel under a river, the slurry shield method of tunnelling was adopted. This is a very difficult form of tunnelling exacerbated by the challenging and sometimes risky coastal environment the project is located in."



**TOP:** The progress of tunnelling was slow, as the slurry shield method brings with it many risks. The TBM movement and its shield were affected by several factors, including the varying ground conditions, overburden depth, slurry pressure, primary grouting pressure, and over-excavation.

**ABOVE:** An aerial view of the slurry treatment plant.



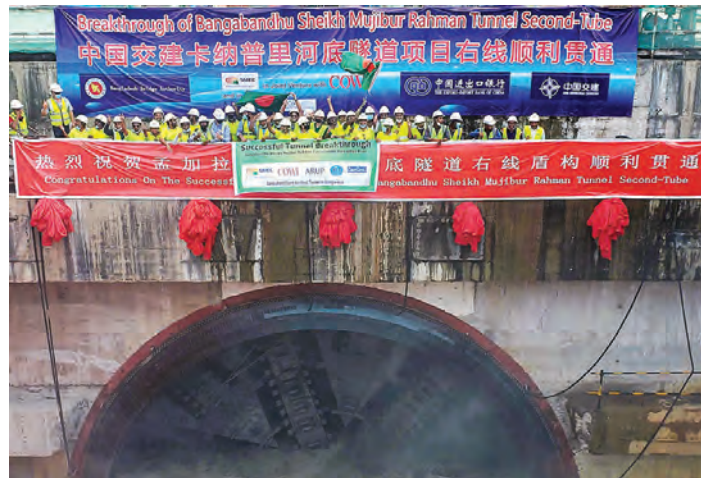
The progress of tunnelling was slow, as the slurry shield method brings with it many risks, explained SMEC. The TBM movement and its shield were affected by several factors, including the varying ground conditions, overburden depth, slurry pressure, primary grouting pressure, and over-excavation.

In slurry shield tunnelling, the TBM operators rely totally on instrumentation and sensors to guide the machine. "As the operators are unable to see what they are tunnelling, it requires a lot of experience in judging what is happening at the TBM face. Our consultants worked closely with the contractor to mitigate the risks, leveraging our teams' significant experience in this specialised form of tunnelling," said Mr Strid.

"Notwithstanding, both tunnels have been completed despite the ongoing challenges of the Covid-19 pandemic. The breakthrough of the TBM is another huge milestone which we, together with our partners, client, contractor, and all Bangladeshis are very proud of."

### Training future tunnel engineers

"What makes this project even more meaningful is that we are training and developing Bangladesh's future tunnel supervision engineers," shared Mr Strid. "As this is the first tunnel in the country, there is a national skills gap in this area and with more tunnelling projects coming on line, it is important that we upskill the next generation of Bangladeshi tunnel engineers."



LEFT, BELOW AND BOTTOM: An important milestone was achieved on 7 October 2021, when the TBM successfully broke through at the west bank working shaft of the second tunnel.



Having been with SMEC for more than 30 years, working across 15 countries, Mr Strid knows too well what it takes to deliver a successful project.

"Anyone who has managed a complex, large-scale project will tell you that success isn't only about being experienced, it often comes down to how well a diverse group of people communicate and work together towards a common goal. This is even more important when there are different languages and cultures involved. On this project, we have worked together using three languages.

"In addition to our formal communication system, we've been taking advantage of apps like WeChat and auto-translation technology to facilitate better communication. Through 24/7 group chats, we are aware of any issues straight away and this has allowed us to always be on the front foot to tackle issues in their infancy."



ALL IMAGES:  
This large-scale project includes over 5 km of connecting roads and will be a game changer for southeast Bangladesh, connecting the region to the rest of the country.

“What makes this project even more meaningful is that we are training and developing Bangladesh’s future tunnel supervision engineers. As this is the first tunnel in the country, there is a national skills gap in this area and with more tunnelling projects coming on line, it is important that we upskill the next generation of Bangladeshi tunnel engineers.”

Gavin Strid, SMEC

Mr Strid mentioned that the project team has also established a strong document management system, so that it can remotely interrogate and access all project data generated including drawings, letters and test data from both Bangladesh and China.

“An interesting aspect of the project procurement is that all the precast concrete tunnel lining segments are made in China and shipped to Bangladesh. We maintained a team in China that ensured the quality of the 20,000, 12-t segments being cast for the project.”

Another innovative development was the establishment of a new tunnel management system, added Mr Strid, which enables the project team to collect, interrogate and analyse all data gathered on site, including the data coming from the TBM. “We can maintain a strong historical record of everything that happens on site and analyse it when required. This information is not only invaluable from a governance viewpoint but is also an important reference for future projects.”

Along with the Chittagong Outer Ring Road and the Dhaka Chattogram Expressway – both of which were designed by SMEC – the Bangabandhu Sheikh Mujibur Rahman Tunnel is poised to be a catalyst for the economic transformation of southeast Bangladesh into an industrial hub. The project is also expected to create major employment opportunities for the region, boosting its economy and ultimately benefitting the whole country. ■

Website: [www.smeccom](http://www.smeccom)



ABOVE: SMEC, in a joint venture collaboration, was appointed by the Bangladesh Bridge Authority to supervise the design and construction of the project in 2016, partnering with COWI A/S, ACE Consultants Ltd and DevConsultants Ltd. The contractor on the project is China Communications Construction Company Ltd.



As this is the first tunnel in the country, SMEC is also training and developing the next generation of Bangladesh’s tunnel engineers.



The project involves working across different languages and cultures, so technology is key to facilitating better communication. Some of the project team members can be seen in this picture, taken in 2019.



# Ahmedabad Metro

**A**hmedabad is the most populous city in the state of Gujarat, India. Over the last few decades, it has developed into an important economic, industrial and educational hub. To keep up with the growing population, the road and rail networks in the city needed to be expanded.

With that in mind, the Gujarat authorities are investing heavily in an infrastructure project for a metropolitan transport system to connect Ahmedabad and nearby Gandhinagar, the capital of the state.

Construction of the new rail network, developed by Gujarat Metro Rail Corporation (GMRC) Limited, will be carried out in two phases: phase 1, which is already underway and scheduled to be completed in 2023, and phase 2, for which the tender process is currently ongoing.

Phase 1 consists of the north-south and east-west lines, with a combined total length of approximately 40 km. They are planned to connect the four cardinal points of the city, including outlying residential and industrial zones. There will be 32 stations (15 along the north-south line and 17 on the east-west line), 13 of which will be located underground.

Phase 2 comprises a further 28 km of track and 24 stations. Once the Ahmedabad Metro system is fully completed, it will have a total length of 69 km and a daily capacity of 1.5 million passengers. Contractors on the project are Larsen & Toubro and Afcons Infrastructure Limited.

## Mapei solutions

Although the first phase of the project is still under construction, several sections of the network have been completed, including a 6-km section of the east-west line which was inaugurated in March 2019. Part of the work involved underground excavation using an EPBM-type (earth pressure balance machine) TBM (tunnel boring machine).

Mapei, through its Indian subsidiary, was engaged to provide concrete admixtures, waterproofing systems and other products for underground work. During excavation of a twin-bore tunnel, the solutions from the company included Polyfoamer FP and Polyfoamer FLS high-performance, liquid foaming agents for ground conditioning; Mapedisp FLS liquid dispersing agent for mechanised tunnelling and drilling; and Mapeblox T tail sealant, applied in the excavation of tunnels with shielded TBMs.

To construct a diaphragm wall, Mapei's modified acrylic-based super-plasticising admixture Dynamon SX404 (which is manufactured and distributed on the local market by Mapei India) was used to produce concrete with high mechanical properties, excellent workability and durability. This admixture was also added to the concrete used to build several structures in the metro stations.

To waterproof the tunnels excavated using the NATM (New Austrian Tunnelling Method) technology, Mapei supplied its Mapeplan TU S – a single-layer, synthetic membrane with an in-built signal layer. This system was also employed for waterproofing operations at the intersection between the two lines of the metro. Mapeplan TU S is manufactured by Polyglass, a subsidiary of Mapei.

The access ramps to the stations and various areas of the station buildings were waterproofed with Purtop 1000 – a two-component, solvent-free, polyurea membrane applied by spray using a high-pressure, bi-mixer type pump – after treating the substrates with Primer SN.

Primer SN is a two-component, fillerised epoxy resin-based primer. Thanks to its special formulation, this system features the ability to penetrate into substrates and may even be applied on moderately damp surfaces.

Mapei India was supporting the Ahmedabad Metro project from 2018 to 2020. ■

Website: [www.mapei.com.sg](http://www.mapei.com.sg)



OPPOSITE: One of the tunnels excavated using Mapei underground tunnelling solutions.

LEFT: The EPBM-TBM tunnelling machine used to excavate the twin-bore tunnels.

# Three engineers honoured for innovative solutions on Singapore projects

Three Professional Engineers (PEs) have won the BCA Design and Engineering Safety ‘Excellence’ Awards this year. Given by the Building and Construction Authority (BCA), these awards recognise the engineers and their teams for their innovative designs and engineering solutions to some of Singapore’s most challenging projects.

## Tekka Place: Building sustainably through innovation

Fourth time award winner Engineer (Er.) Aaron Foong of KTP Consultants Pte Ltd (a member of Surbana Jurong) was recognised for his engineering solutions to a delicate building project - the redevelopment of Tekka Place, an existing building with two basements seated on soft marine clay located within the LTA Railway Protection Zone and hemmed in by conserved shophouses.

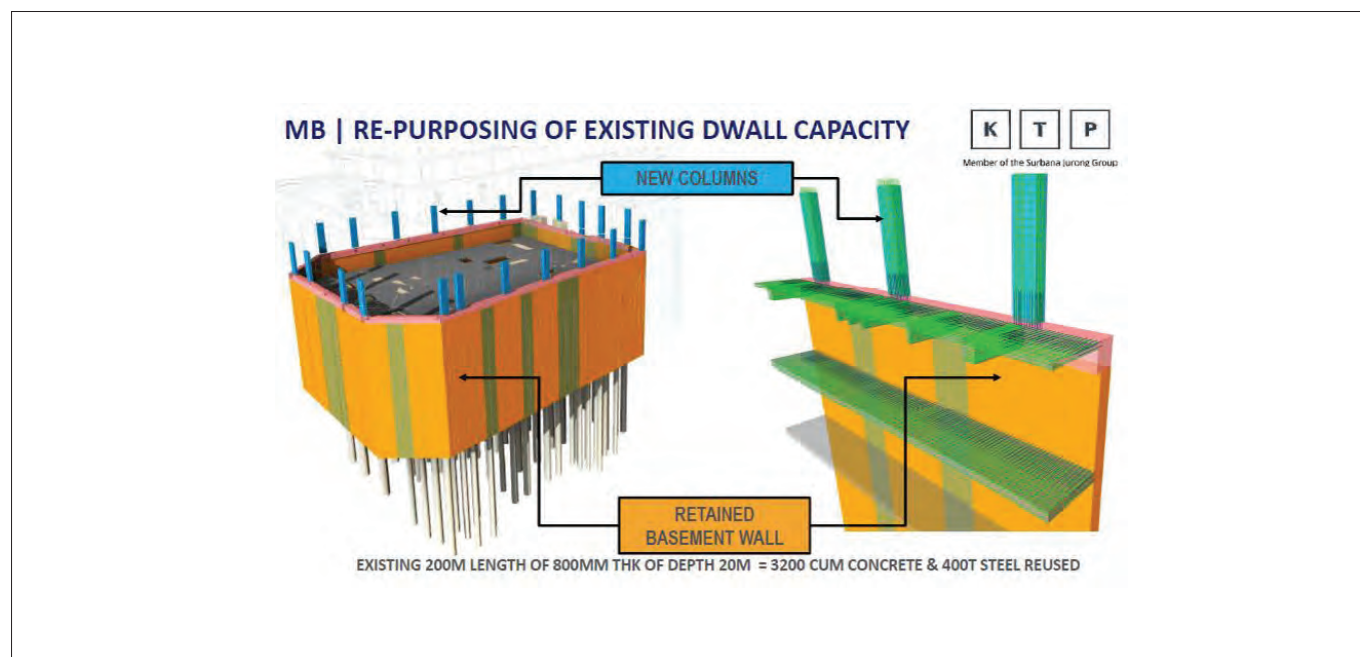
To build sustainably, Er. Foong re-engineered the existing basement diaphragm wall so that it could have a dual function of supporting both the construction works of new substructures (below ground) and the increased loading from new superstructures (above ground) in the redeveloped main block. With this re-engineering approach, there was no need to build

new conventional periphery basement earth retaining walls and the accompanying foundation piles, saving 3,400 cu m of concrete and 400 t of reinforcement steel.

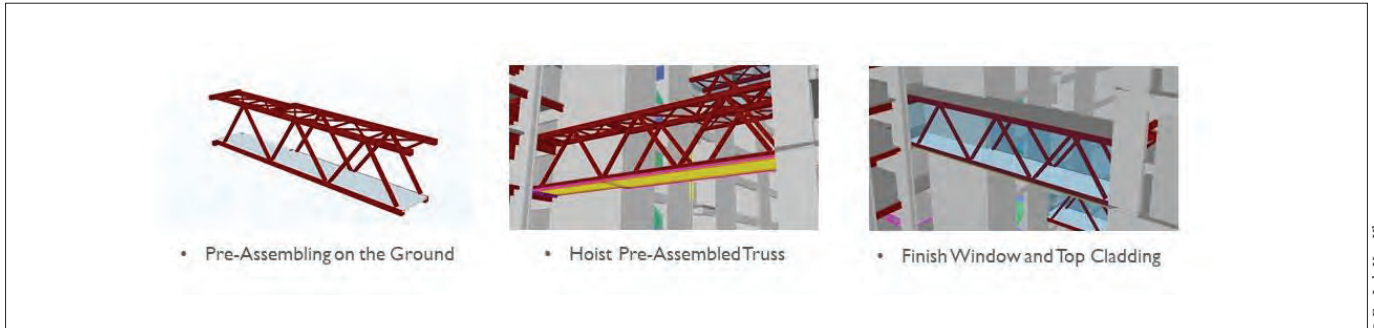
These savings in concrete and steel quantities were substantial – equivalent to the amount of concrete and steel used for all the concrete structures supporting the entire 320-room Citadines Rochor serviced residences above the Tekka mall. Beyond savings in cost and carbon footprint, this innovative structural engineering design enabled the construction period to be reduced by six months without compromising safety standards, thus minimising disamenities to surrounding residents and traffic flow along Sungei and Serangoon Roads.

## State Courts: Turning challenge into solution

Er. Loh Kar Kheng of CPG Consultants Pte Ltd was recognised for his engineering solutions in the construction of the iconic State Courts. Due to the narrow open space between the court and office towers, a wind tunnel study was conducted to understand the effect wind would have on the towers and link bridges of the project, which would affect the building’s deflection as well as human comfort.



Re-purposing the existing basement diaphragm wall capacity on the Tekka Place project.



© Er. Loh Kar Kheng

Link bridge erection on the State Courts project.



© Er. Joanne Ee

The prefabricated hybrid timber-concrete slab system (CREE) on the Eunoia Junior College project.

To overcome the challenge of constructing the slender office tower, 39 link bridges were planned to span the circulation space connecting the office tower and the stockier court tower. These link bridges in turn provided lateral stability to the office tower.

Each link bridge was prefabricated and delivered to the jobsite as one unit, and then hoisted and placed into position on temporary supporting corbels before final connections were made safely. This allowed the project to be constructed within a constrained space, reducing disamenities, and also minimised the need for working at height, improving safety on site.

**EJC: Using prefabrication in an inventive way**

Another winner, Er. Joanne Ee, formerly from CPG Consultants Pte Ltd but now with BCA, was recognised for her engineering solutions in the construction of Eunoia Junior College (EJC). EJC is the first project in Singapore to integrate mass engineered timber (MET) with concrete for a high-rise building.

This project adopted a prefabricated hybrid timber-concrete slab system (CREE) for slab construction, and a unitised facade system with internal cross laminated timber (CLT) panels for external walls. As CLT panels have a lower carbon footprint compared to steel or concrete, the project’s environmental friendliness was enhanced.

In addition, with 70% of the project being prefabricated prior to installation, productivity was increased by 55%, reducing the overall construction period. By relying on prefabrication with work done off-site, it also resulted in less disturbance to the project’s surroundings, including the nearby Bishan-Ang Mo Kio Park. The prefabricated components were installed on-site with simple connections and were extremely lightweight, environmentally sustainable and met all requirements for strength, fire, waterproofing and durability.

A total of three Excellence and four Merit winners were recognised for their engineering achievements this year. ■

Details of the Excellence winners can be found in the following pages  
 For a complete listing of the winners and their projects, please visit: <https://go.gov.sg/bca-desa-ebooklet-2021>

# TEKKA PLACE - EXCELLENCE

## Commercial Category



*Qualified Person:*

Er. Aaron Foong Kit Kuen

*C&S Consultant:*

KTP Consultants Pte Ltd

*Builder:*

Lum Chang Building Contractors Pte Ltd

*Developer:*

Corwin Holding Pte Ltd

*Architectural Consultant:*

Ong & Ong Pte Ltd

© KTP Consultants Pte Ltd

The Tekka Place is an integrated hospitality and retail redevelopment being built on the site of the former The Verge Mall at 2 Serangoon Road. The project comprises a new 10-storey Main Block (MB) with link bridges across Clive St connecting to the seven-storey existing Annex Block (AXB) with a new rooftop deck. The MB is a new reinforced concrete mid-rise structure founded on bored pile foundation, with the new perimeter superstructure columns supported by the repurposed existing diaphragm wall which was also effectively reused for earth retention in the basement. The AXB underwent thoughtful addition and alteration works to maintain most of its existing reinforced and prestressed concrete structures in a sustainable manner.

### CHALLENGES

- To achieve sustainable redevelopment of the Main Block into a new mixed-use commercial hotel and retail by way of overcoming the constraints from the existing building with two basements seated on soft soil geology located within the LTA Railway Protection Zone and hemmed in by conserved shophouses.
- Making a conscious decision to sustainably retain the existing Annex Block structures by upgrading of the spatial quality with double volume spaces on the lowest floor for commercial activities and increasing the load carrying capacity at the roof level supported by the existing critical prestressed transfer structures at the lower levels.

### SOLUTIONS AND FEATURES

- Rigorous engineering analysis with carefully considered loading scenarios and innovative redesigning out of the as-built structural capacities to drive an overall sustainable approach in the redevelopment.
- On the Main Block, an engineering-driven solution by informed repurposing of the existing basement diaphragm wall and capping beam structures achieved a sustainable design of the new substructure works with flexibility to support new load intensities from the perimeter columns of the new superstructures.
- On the retained Annex Block, in enabling the increased loadings from an entirely new rooftop deck, an innovative engineering solution by stitching of existing prestressed structures has avoided the need to disrupt and reconstruct the existing system of prestressed transfer beam, transfer column and foundation. ■



# EUNOIA JUNIOR COLLEGE - EXCELLENCE

## Institutional and Industrial Category



*Qualified Person:*  
Er. Ee Hwee San Joanne

*C&S Consultant:*  
CPG Consultants Pte Ltd

*Builder:*  
Kimly Construction Pte Ltd

*Developer:*  
Ministry of Education

*Architectural Consultant:*  
CPG Consultants Pte Ltd

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Eunoia Junior College is a 10- and 12-storey building, with a five-storey elevated sports running track and field, located next to the Kallang River.

### CHALLENGES

- Situated on a smaller site at 4 ha, which is about a third of the conventional site area for junior colleges.
- To design and construct an elevated sports running track and field over future Cross Island Line Rail tunnels and overhang the Kallang River with three mega tree columns sitting in the river.

### SOLUTIONS AND FEATURES

- Innovative hybrid timber-concrete slab system (CREE) and unitised facade system with internal cross laminated timber (CLT), adopting extensive off-site fabrication for the superstructure of the teaching blocks. The prefabricated components were erected on site with simple connections. These systems are extremely lightweight, highly buildable and productive. They are highly environmentally sustainable as well as meeting the specific requirements such as strength, fire, waterproofing and durability.
- Design transfer piled raft system with tensioned piles located at the zones available for piling to support the elevated sports track and field. The piles were designed to accommodate future tunnelling and address any volume lost effect.
- Long-span (up to 36 m) precast half-shell post-tensioned beams were used, to give more column-free space required below the sports running track and field.
- Adopted precast with cast-in I-beam for bolted connection for the 13.3-m branch columns to the mega tree columns supporting the sports running track and field.
- Extensive use of precast such as double-tee slabs and planks at the elevated field deck and beam, slab, column, and wall system for teaching blocks. ■

# STATE COURTS - EXCELLENCE

## Institutional and Industrial Category



© CPG Consultants Pte Ltd

*Qualified Person:*

Er. Loh Kar Kheng

*C&S Consultant:*

CPG Consultants Pte Ltd

*Builder:*

Samsung C&T Corporation

*Developer:*

State Courts of Singapore

*Architect:*

CPG Consultants Pte Ltd

*Architectural Design Consultant:*

Serie + Multiply Consultants Pte Ltd

The new 35-storey State Courts comprises two towers, the court tower and a very slender office tower. At 178 m high, it is the tallest government building in Singapore to date. The court tower has an open-frame building facade, with courtrooms stacked on each other, creating aesthetically pleasing slender court tower columns, consisting of long-span floor slabs/beams and columns sizes befitting the facade.

### CHALLENGES

- As the site is in close proximity to a conserved building, an underground MRT station, and a building gazetted as a national monument, the construction of deep basement (consisting of three basements) required intricate planning and execution.
- To counter the wind tunnelling effect that the narrow open space between the two towers would create on the link bridges, as the interaction between the towers and bridges may affect the building's deflection as well as human comfort.

### SOLUTIONS AND FEATURES

- Circulation spaces linking the two towers were utilised structurally with 39 link bridges connecting the two towers together, with the court tower providing lateral stability to the office tower.
- The link bridges were prefabricated and delivered to site as one unit, and then hoisted and placed into position on temporary supporting corbels before final connections were made safely.
- Steel-concrete composite columns with twin H-sections orientated along weaker axis were used for slender court tower columns. Grade 460 steel was chosen for columns and was cast with high strength self-compacting concrete.
- A deep deck system (CAP Deck) which can span longer, was used for floor system supported by composite beams resulting in material/cost savings and reduced construction time.
- A robust earth retaining structure comprising diaphragm walls and a semi top-down construction method were adopted for basement construction to minimise wall deflection, ground movement and water drawdown. This has resulted in safe construction of three levels of basement, with minimal impact to the neighbouring buildings which are susceptible to soil movement. ■

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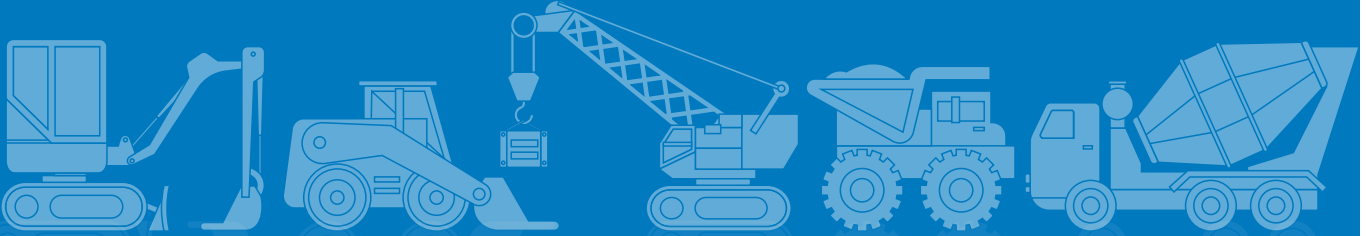
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