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CONSTRUCTION

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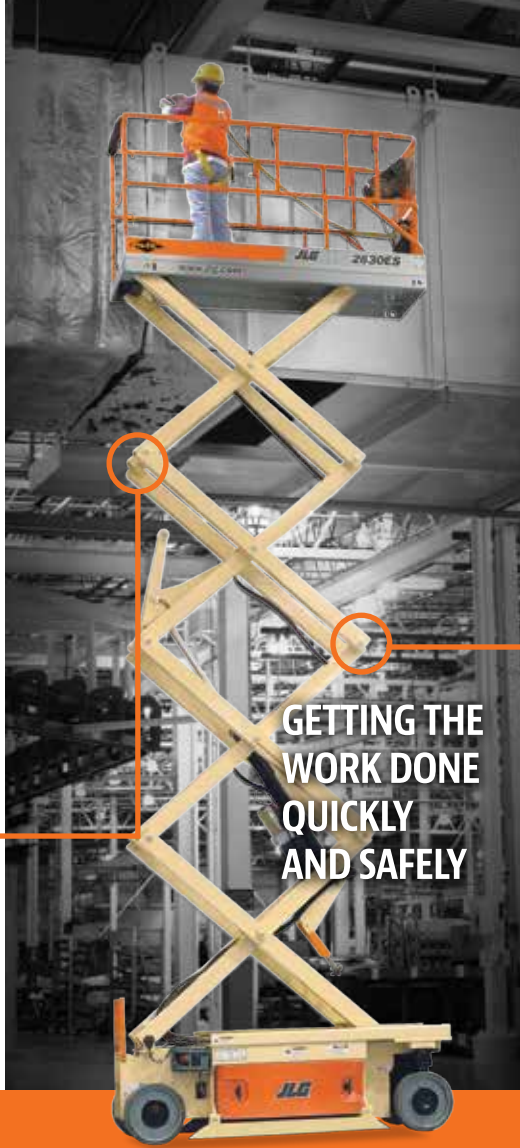
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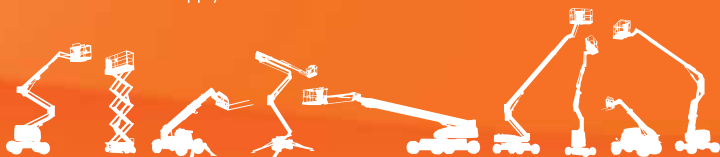
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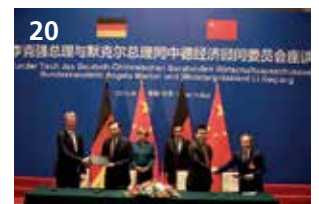
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Kobelco Cranes appoints Vitrac as dealer for Vietnam

Kobelco Cranes South East Asia Pte Ltd (KCSA), a subsidiary of Kobelco Cranes Co Ltd (KCL), has appointed Vinh Phu General JSC (Vitrac) as its new official dealer for Kobelco crawler cranes in Vietnam.

“The continuing Vietnam economic growth is one of the strongest in the Southeast Asia region. We expect this strong economic growth to trend forward in the coming years. Our strategic business alignment with Vitrac is crucial for both of our companies to participate and contribute in this economic growth,” said Takemichi Hirakawa, managing director of Kobelco Cranes South East Asia Pte Ltd.

“Kobelco crawler cranes have earned a reputation for quality and reliability globally. Together with Vitrac’s strength in new machine sales, after sales, spare parts supply and operator training support, we are confident of great growth in this business venture,” said Nguyen Xuan Tuan, Vitrac’s chairman and general director. To support new and existing Kobelco crawler crane customers in Vietnam, Vitrac’s service team is well trained by KCSA’s engineers with a strong spare parts inventory of common fast moving parts.

KCL established a new spare parts depot in Singapore in January 2015. This ‘Kobelco Global Parts Centre’ is a commitment



Vitrac is now an official dealer for Kobelco crawler cranes in Vietnam.

and initiative by Kobelco Cranes Group to support Kobelco crane customers and dealers based in the Asia Pacific region. ■

Leica Geosystems launches direct selling unit in Singapore



Leica Geosystems solutions have historically been offered in Singapore under the DKSH Technology Business Unit. Leica Geosystems Singapore Office has now created its own selling unit in the country and acquired relevant assets from DKSH Technology.

“Leica Geosystems can trace its history in Singapore back to 1971, soon after the establishment of the Republic. Together with Hexagon,

our parent company, we now employ more than 300 employees in the country,” said Matthew Smith, president of Hexagon Geosystems Asia Pacific Region. “With the continued strong development of Singapore, we continue to invest in our local presence to provide best in class service and support for our increasingly sophisticated customer base that covers the survey, civil/construction, tunnelling, railway, utilities, BIM and GIS segments.” ■

HSL Constructor to build Singapore’s third desalination plant at Tuas

PUB, Singapore’s national water agency, has selected HSL Constructor Pte Ltd as the contractor for the construction of Singapore’s third desalination plant at Tuas. The plant is expected to commence operations in 2017 and will add another 30 million gallons, or 136,000 cu m, of water per day (mgd) to Singapore’s water supply. It will be owned and operated by PUB.

“Since its introduction in 2005, desalinated water has helped strengthen Singapore’s water supply resilience. In particular, together with NEWater, it has helped us weather extremities like dry spells in recent years, and this third plant will help us further expand our water supply system to meet the growing demand in a reliable and cost-efficient manner,” said Young Joo Chye, director of Engineering Development & Procurement at PUB.

Singapore currently has two desalination plants, the 30 mgd SingSpring desalination plant, and the 70 mgd Tuaspring Desalination Plant. PUB has also awarded a consultancy services tender for a fourth desalination plant, which will be built at Marina East. ■

US\$150 million investment for Grade A office buildings in the Philippines

ADM Capital and BPE Asia Real Estate, an affiliate of Baring Private Equity Asia (Baring Asia), have invested an initial US\$150 million to finance the construction of Grade A office space as well as complementary infrastructure within the 177 ha Global Gateway Logistics City (GGLC) in the Clark Freeport Zone, north of Metro Manila, the Philippines.

BPE Asia and ADM Capital are leading a consortium of investors to provide the cornerstone capital for the construction

of five Grade A office buildings with a total gross floor area of approximately 142,000 sq m. The project, located directly across from the Medical City Clark Hospital within GGLC’s AeroPark, will be the first office space constructed on the GGLC site, which when fully built-out will provide approximately 5.8 mil sq m of office, logistics, industrial and supporting retail and hotel space.

Construction of the first phase of office buildings on the site was scheduled to commence in November 2015. ■



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Aurecon merges with AUP Consultants

Global engineering consultant Aurecon has merged with Singaporean engineering firm AUP Consultants Pte Ltd. Effective on 1 January 2016, AUP's team will join Aurecon and Aurecon will acquire the assets of the AUP business.

"This merger is part of Aurecon's ongoing strategy to grow our business in Asia," said Anthony Barry, Aurecon's managing director for Asia. "A strong business in Singapore with local leaders and experts is a vital element of that strategy. With increased capacity in Singapore, we can add significant value from our Singapore offices to our clients' projects that are being developed all over the region. As an investment and technology hub, Singapore is a great place to be in business."

According to Aurecon, the merger is one in a series of mergers and acquisitions that the company will undertake in Singapore to enhance its capacity to service large and complex projects in Singapore and across Asia. The merger also means clients can take advantage of an increased range of design skills and the additional bench-strength in building services engineering that both parties can now offer.

Mr Barry added, "Technically difficult projects like super-tall buildings, data centres, sophisticated manufacturing and large healthcare facilities, play to Aurecon's sweet spot. In AUP, we have found a like-minded partner who is as passionate about innovation as we are. We are excited by the market access the AUP team brings to our business, so we can further leverage our global skills and expertise into this market."

Aurecon and AUP know each other well and have previously collaborated on several projects, including the reconstruction of the

famous Golden Pagoda Buddhist Temple on Tampines Link and the development of a cement storage facility at Jurong Port.

AUP's director, LK Koh, commented, "We are delighted to be joining Aurecon, a global company with impressive technical expertise, especially in Building Information Modelling (BIM). Our past collaborations have been successful and shown that we can work together to bring value to our clients' projects. Furthermore, I am thrilled by the opportunities this merger creates for our clients, as well as our employees and business partners by offering a full range of building engineering services including civil & structural, mechanical and electrical, facade and environmentally sustainable engineering."

Established in 1977, Aurecon's operations in Singapore provide consulting engineering services for buildings, transport and infrastructure projects for private and public sector clients.

AUP Consultants Pte Ltd, founded in 1998, is an independent engineering consultancy, offering building engineering consultancy in mechanical and electrical systems.

New infrastructure head in Singapore

Aurecon has also appointed Lee Teck Lun to head its infrastructure business in Singapore. Mr Lee will be responsible for growing Aurecon's market share in rail, aviation, ports, water/waste water and other infrastructure projects.

"I am delighted to have this opportunity to grow Aurecon's infrastructure business in Singapore. This is an exciting time for the industry in Singapore as it continues to develop and improve our infrastructure to



Above: Aurecon's Jean Ong (left) and AUP Consultants' LK Loh celebrate Aurecon's acquisition of AUP Consultants.



Left: Lee Teck Lun will lead Aurecon's infrastructure business in Singapore.

provide a better quality of life. Consequently there is a strong demand for not just technical engineering skills but also commercial acumen to be applied to make these investments viable and sustainable for the long-term," said Mr Lee.

Prior to joining Aurecon, Mr Lee was a senior vice president at Surbana International, where he was responsible for delivering a land preparation project, as part of Changi East Airport Development, for Singapore's future Changi Airport Terminal 5. Before that, he was general manager for Surbana's Middle East business, based in Abu Dhabi for four years. In his career, Mr Lee worked on MRT, residential, hospitality, industrial, institutional, and infrastructure projects in design and project management capacities. ■

BBR wins mixed-use development contract in Singapore

Singapore Piling & Civil Engineering Pte Ltd, a wholly owned subsidiary of BBR Holdings (S) Ltd, has won a S\$116 million design and build contract for the construction of Wisteria Mall and The Wisteria (apartments) from NorthernOne Development Pte Ltd. The latter is the holding company of Northern Resi Pte Ltd and Northern Retail Pte Ltd, the joint developers of the mixed development.

Located at Yishun Avenue 4, the mixed-use development comprises about 60 percent residential and 40 percent retail components. The three nine-storey residential blocks with 216 units will be linked by a three-storey podium and a single level of basement. Shopping mall facilities are located at the basement and ground levels of the podium, whilst the upper two levels of the

podium are for car parks.

Spanning approximately 170,000 sq ft, The Wisteria is believed to be the first prefabricated, prefinished volumetric construction (PPVC) development under the government land sale (GLS) programme. The residential component will harness PPVC technology and prefabricated bathroom units (PBU) for the construction, thereby pioneering the use of modular steel units, which will reduce construction time and dust, increase productivity and improve quality of construction.

Construction work was expected to commence in the last quarter of 2015 and will take approximately 32 months to complete. PPVC and supply of PBUs will be undertaken by BBR's subsidiary, Moderna Homes Pte Ltd, an approved PPVC contractor. ■

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Positive outlook for Thailand's construction industry

After suffering a decline during the economic crisis, Thailand's construction industry is now picking up with a more optimistic future outlook, based on a new report by Timetric's Construction Intelligence Centre (CIC).

In real terms, the industry's output value recorded a compound annual growth rate (CAGR) of -0.23 percent during the review period (2010–2014). This decline was mainly due to socio-political unease, which affected the country's economic growth and foreign investments. The outlook, however, seems more positive, driven by the stabilising political and economic conditions along with new investments in residential, infrastructure and commercial construction projects, and improvements in investor confidence in the country.

Thailand's construction industry is expected to increase in value from US\$17.4 billion in 2014 to US\$19.9 billion in 2019 in real terms, at a CAGR of 2.79 percent. The economic expansion, the country's housing demand and the government investment in public infrastructure are projected to be the main drivers of growth. Moreover, the government's tax incentives aimed to attract investment from foreign companies in agriculture, renewable and alternative

energies, information technologies as well as the tourism sector should boost the construction activities in the coming years.

However, risks associated with the industry's positive outlook are still in place. Economic and structural factors coupled with an absence of modern transport infrastructure and a lack of skilled labour will likely to slow the potential industry growth.

According to the report, residential construction was the largest market in the Thai construction industry during the review period, accounting for 37 percent of the industry's total value in 2014. According to Timetric's CIC, the country's rising population, urbanisation and positive developments in regional economic conditions will support the market over the forecast period.

Infrastructure construction was the second-largest market, accounting for around 24.6 percent of the industry's total value in 2014. The market is projected to grow further supported by the government's eight-year national development plan that aims to develop Thailand's infrastructure by 2022. To implement this programme, the government has allocated THB2.4 trillion to invest in road, rail and port infrastructure. ■

Black & Veatch plays role in Myanmar solar power plant project

Black & Veatch has been appointed by Green Earth Power (Thailand) to provide design and consultancy services for a solar power plant project in Myanmar - it is believed to be Southeast Asia's largest solar power plant. The construction is scheduled to commence in the first quarter of 2016.

The new plant will generate up to 220 MW of power and is located in Minbu, Magway region. It is expected to provide a major boost to local communities and industry. "The plant supports the Myanmar Government's aim to increase electricity production from the present 2,500 to 30,000 MW by 2030," said Pitak Wangvarangkoon, general manager of Black & Veatch's business in Myanmar.

Black & Veatch expects many Asian countries to lead the next wave of renewable energy growth. According to a World Bank report, Asia's performance on renewable energy is strong. Global consumption grew by 4 percent per annum from 2010 to 2012; in Asia, the growth was almost twice as fast at close to 8 percent.

Black & Veatch has recently opened a Yangon office to better coordinate its activities in Myanmar and get closer to its clients. The company's Asian renewable energy execution centres are located in Bangkok, Thailand; Beijing, China; Hong Kong; Jakarta, Indonesia; Singapore; and Pune, India. A specialised Hydropower Centre of Excellence was opened in 2014 in Singapore. ■

Kasto establishes Singapore subsidiary

Kasto has reinforced its commitment to the Asian market by establishing a new subsidiary in Singapore, located at the German Centre. From here, the company plans to expand its presence across the Southeast Asia region.

"We've been active in Southeast Asia since 1991 and have had many loyal customers here for years, from Singapore to Malaysia and Thailand," said Armin Stolzer, managing partner of the family-owned company, which is now being run by the fifth generation. "In addition, the region has become increasingly important as a growth market. For us, it made good sense to establish a subsidiary here in order to strengthen our position."

"Our location has an excellent infrastructure and we're very close to all the other countries in Southeast Asia," said David Van Loo, Kasto's area sales director. "We support users in every phase of a project: from planning and development of a plant through construction and commissioning all the way up to maintenance and servicing. It will be a big advantage for us to be able to get to our customers more quickly."



Headquartered in Germany, Kasto specialises in the development and manufacture of metal sawing and storage equipment. Apart from Singapore, the company also has subsidiaries in England, France and the US. ■

The KASTOwin series, a new generation of automatic bandsaws.

Huatiang wins additional S\$81.3 mil new contracts

Huatiang Global Limited has secured new civil engineering contracts totalling approximately S\$81.3 million, through its wholly owned subsidiary, Huatiang Contractor Pte Ltd. They include site clearance and earthworks for land preparation at Changi Airport Terminal 5; external works for proposed development of Integrated Regional Hospital at Sengkang; earthworks for proposed dry docks; and earthworks for advanced piling, soil improvement and pile extraction works at Depot. The contracts are expected to be delivered over the next three years. ■



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Pakistan to build new section of M-4 motorway

The Asian Development Bank (ADB) has signed a loan agreement with the Government of Pakistan to fund the section of the M-4 motorway connecting Gojra to Shorkot in Pakistan's Punjab province. The project is expected to be completed by November 2019.

The four-lane motorway is expected to boost the flow of trade and travel, while reducing transportation costs and time from Pakistan's textile producing hub in Faisalabad towards Multan, the major trade centre in southern Punjab. It aims to provide a more direct connection between central Punjab and the port cities of Karachi and Gawadar, and open up new opportunities for the residents of Faisalabad, Jhang, Toba Tek Singh and Shorkot, by providing faster access to bigger markets.

ADB is providing a project loan of US\$178 million and will administer a US\$92 million grant from the Government of the United Kingdom's Department for International Development (DFID). The government will provide counterpart support of US\$46 million.

The M-4 motorway is part of a number of investments to upgrade and decongest the country's overburdened transport infrastructure. The Faisalabad to Gojra section of the M-4 was recently completed with funding from ADB and is now open for traffic.

The M-4 is also a step towards positioning Pakistan to act as a transit artery for goods moving between the port city of Karachi in



The Faisalabad to Gojra section of the M-4 has been completed.

the south to Torkham on the northern border with Afghanistan via the country's major business and population centres. The 1,800-km route will also eventually link Pakistan's ports with the land locked regions of Central Asia, and allow Pakistan to reap dividends of its active membership in the Central Asia Regional Economic Cooperation (CAREC) Program. ■

Atkins assists in revitalising nullah into attractive green river

Atkins was recently appointed by Hong Kong's Drainage Services Department (DSD) to undertake the investigation for the revitalisation of King Yip Street Nullah. The project aims to revitalise the existing nullah into a green and vibrant river. The investigation assignment is expected to take about 20 months.

The main scope of this project comprises the transformation of the existing 1-km-long King Yip Street Nullah into a green and vibrant Tsui Ping River. Atkins will provide solutions to improve drainage hydraulic performance by removing the footbridge ramp, staircase and associated foundation, and stabilising the aged and deteriorating nullah wall to achieve higher flood protection level with a new water retention system in the

nullah for the revitalisation.

The proposed works will amalgamate with the environmental, ecological and landscape upgrading works in the vicinity. Services also include the associated works to match with the project theme such as the beautification of adjoining walkways, enhancement of connectivity, provisions of walkways, landscape decks across the river, and face-lifting of the existing Kwun Tong Road footbridge.

Hong Kong's government launched the Energizing Kowloon East initiative in 2011 and the Energizing Kowloon East Office (EKEO) was subsequently formed with a view to facilitating the transformation of Kowloon East into additional premier core business district (CBD) of Hong Kong. EKEO



Atkins will assist in revitalising Tsui Ping River Nullah.

is also working closely with DSD and other government departments to take forward an integrated urban design approach to revitalise Tsui Ping River and bring synergy to the surrounding areas. ■

Mott MacDonald and CPE extend collaboration to pursue One Belt, One Road projects

Mott MacDonald has extended its partnership with China Petroleum Engineering (CPE) to form a new three party collaboration agreement with China Financing & Investment Property Corporation (CFIPC). This strategic agreement will see the three companies work together to offer comprehensive, customer-focused services across a broad range of sectors.

The three parties intend to pursue opportunities connected to the One Belt, One Road initiative, China's roadmap for building infrastructure and trade ties. Projects will cover ports, energy, oil and gas, utilities, water treatment, waste management plants, roads,

bridges, buildings, pipelines and storage, liquefied natural gas, airports and jetties. The partnership is part of a wider initiative between British and Chinese governments to form closer collaboration on infrastructure. CFIPC will provide funding and management, while Mott MacDonald and CPE will deliver technical, project and cost management services.

The first projects to move forward under the new agreement include a China water treatment development along the Xinjiang silk road in China as well as improvements to ports, roads and infrastructure in Indonesia. ■

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Elematic opens new factory in India

Elematic has established a new factory in Alwar, India, for the manufacture of steel moulds used in precast element production. It will serve local markets in India as well as other parts of Southeast Asia, Middle East and Africa. The new factory comprises 2,000 sq m of modern facilities for efficient precast machinery production, and will initially employ around 20 people. It also follows strict quality standards and all new employees have gone through a thorough six-month training period, said Elematic.

“We believe that the use of precast as a building method is growing in India due to its speed, quality, versatility and sustainability. The Alwar production unit allows us to better serve our local customers with fast and cost-effective deliveries not only in India but also elsewhere in Southeast Asia, Middle East and Africa,” said Mats Jungar, CEO of Elematic.

Elematic offers the latest technology and related services for the production of precast concrete elements for building construction. The technology covers production of precast walls and floors as well as frames and foundations. ■



Elematic's new factory in Alwar, India, will produce steel moulds for precast element production.

XCMG signs strategic cooperation agreement with SAP

Chinese equipment manufacturer XCMG has signed a strategic cooperation agreement with German software company SAP, as part of the signing ceremony for Sino-German Economic & Trade Cooperation Projects recently held in Hefei, capital of east China's Anhui Province.

The collaboration between both parties will help optimise XCMG's R&D and design, installation and commissioning, intelligent logistics and risk precaution in relation to the construction machinery. It will also help strengthen XCMG's abilities in the R&D and design collaboration, intelligent manufacture, intelligent service and risk control in its globalisation process.

Li Qiang, SAP Software's VP and MD of Greater China, said that the Chinese government is currently making great efforts to push forward the business transformations of enterprises. XCMG is working with SAP to explore business opportunities in its transformation from conventional manufacture to service-oriented manufacture. SAP's digitised core platform is also expected to help XCMG take the lead in transformation and update of its business growth in the global equipment manufacturing industry. ■



XCMG and SAP recently signed a strategic cooperation agreement, with the presence of Chinese Premier Li Keqiang and German Chancellor Merkel.

Aurecon strengthens in Macau

Aurecon has opened its first office in Macau, located in China Civil Plaza. It will initially serve clients in the hotel, resorts, entertainment and property development segments. At the same time, it will also seek out opportunities in the transport and infrastructure sectors.

“Opening an office in Macau demonstrates Aurecon's commitment to providing service excellence to our clients. Even though levels of construction activity are down slightly from the recent boom, the outlook is still good. Investors are taking a long-term approach and there is a strong



pipeline of projects in the built environment and infrastructure sectors,” said Ben Coxon, region manager for North Asia at Aurecon.

Apart from the development of Macau Eiffel Tower, Aurecon (and its predecessor companies) already has an established reputation in Macau, having worked for prestigious clients, including Galaxy, Melcro Crown and Venetian Macau. ■

Ben Coxon (left), Aurecon's region manager for North Asia, with Wilson Chan, Aurecon's technical director.

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Kobe Steel launches new compressor company in India

Kobe Steel has established a subsidiary in India named Kobelco Compressors India Pvt Ltd (KCIN), located in Gurgaon, Haryana. This new company recently begun full-scale sales activities, offering the standard air compressors.

Kobe Steel said that its standard compressor business has large market shares in Japan and ASEAN countries. The company expects that KCIN will further contribute to growing its share of the world market. In three years, KCIN anticipates cumulative sales of 500 units. In the future, KCIN aims to achieve sales of 1,500 units per year in India.

Standard compressors are mainly used in factories to provide compressed air for powering equipment and machinery, painting, powder conveying and other applications. This utility equipment is widely used in numerous industries. With a global market scale of US\$9 billion, the Indian compressor market of US\$250 million is anticipated to double in the next several years, according to Kobe Steel projections. To capture a share of the Indian market, Kobe Steel saw the need for a local presence

and formed the new subsidiary.

KCIN is currently marketing the Kobelion series of screw compressors, which are noted for their high efficiency and energy-saving features. In Japan, the Kobelion series has gained a 30-percent share of the market, said Kobe Steel.

Kobe Steel has built up a global network to market and service its standard compressors. The company has manufacturing locations in three countries: Japan, the US and China. Sales locations have been established in Singapore, Indonesia, Malaysia, the Philippines, Vietnam and Cambodia. The opening of KCIN will also further improve access to the Middle East and enhance marketing and after-sales service in the region.

In addition, Kobe Steel said it is the only comprehensive compressor manufacturer in the world that can supply centrifugal, reciprocating and screw compressors. The company has an estimated 50-percent share of the world market for these non-standard screw compressors, or custom-engineered process compressors. ■



The KCIN team is led by Shozo Okada (second from right), the company's managing director.



KCIN is marketing the Kobelion series of standard compressors.

AECOM to design Istanbul's new airport

AECOM has secured a contract to design a new airport in Istanbul, Turkey, which is set to be the world's largest new airport in terms of annual passenger capacity. It will have a planned annual capacity of 150 million passengers.

AECOM will design all the airside works for the project, including the three initial runways, taxiways, apron, associated drainage systems, airfield ground lighting and navigational aids. The company will be supported by its delivery partner, Deltaturk, a Turkish consultancy. AECOM will also deliver construction supervision services.

The fast track programme will require AECOM to deliver its designs within one year, with the airport due to open in early 2018. The works to be designed cover an area of approximately 16 sq km and will be completed by specialist teams in the UK and Turkey. AECOM's client is IGA, a consortium of five leading Turkish contractors comprising Cengiz, Mapa, Limak, Kolin and Kalyon.

IGA won the concession to build the scheme as the engineering, procurement and construction contractor and will also be the operator. "Istanbul New Airport is an important investment for the future of Turkey, expected to contribute more than €32.4 billion VAT to the Turkish economy during construction and in its first 25 years of operation, and create hundreds of thousands of jobs. With flights to more than 350 destinations, the airport will make Istanbul one of the leading global aviation hubs in the world," said Yusuf Akçayoğlu, CEO of IGA Construction.

The airport will be Istanbul's third airport and will have an initial capacity of 90 million passengers per year. It will be located on the European side of the city, 35 km from the centre on a site adjacent to the Black Sea. Subsequent planned phases will expand the airport to include six runways and three terminal buildings. When all phases are complete, the airport will have an annual capacity in excess of 150 million passengers. ■

HLG to build Fakeeh Academic Medical Centre

The Habtoor Leighton Group (HLG) has been awarded a contract to build the first phase of the Fakeeh Academic Medical Centre (FAMC) in Dubai. This is believed to be the first 'smart' hospital in the UAE and the region, which will be located at the integrated free zone park at Dubai Silicon Oasis.

The scope of works includes the construction of a 150-bed

smart hospital and the installation of medical equipment and loose furniture. It also includes the structural works, the architectural and civil works, the mechanical, plumbing and electrical works and the final testing, commissioning and cleaning. Project works will commence immediately with completion expected in October 2017. ■

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Riyadh Metro project in full swing

The FAST Consortium is currently constructing three of the six lines of the Riyadh Metro network in Saudi Arabia, which together will span over a distance of 72.5 km, including underground, ground level and elevated stations, and will operate 69 driverless trains at speeds of up to 80 km/hr. The three lines include Line 4 (Yellow line), which links King Khalid International Airport Road with King Abdullah Financial City, totalling 29.6 km long; Line 5 (Green line), which links King Abdullah Road with the Historical Centre totalling 12.9 km; and Line 6 (Purple line), which links Abdurrahman Bin Awf Road with King Abdullah Financial City totalling 30 km.

One of the consortium's Metro Tunnel Boring Machines (Metro TBMs) - named 'San'ah' - has recently arrived at the Salah Al-Din station, which is located between Orouba and King Abdullah road. The machine has completed 1.2 km out of its designated 5 km within Line 5. The drilling, which commenced in June 2015 - from the new headquarters of the Ministry of Education - will continue to drill the northern section of Line 5 until it reaches Riyadh Airbase Roundabout. There, it will meet the second TBM ('Dhafrah') - the first Metro TBM to start drilling in the Riyadh Metro Project - completing Line 5 12.9 km tunnel.

'San'ah' is a 100 m long machine and weighs around 2,000 t. It is operated by approximately 100 people and drills around 20 m/day. According to FAST, the drilling method was chosen because it is the safest for the employees and neighbours. The machine is specifically designed to overcome local Saudi soil specification. It started drilling from King Abdullah Road on 30 June 2015 and will end its drilling at the Airbase roundabout in 2016.



The 'San'ah' Metro TBM arrives at the Salah Al-Din station, having completed 1.2 km out of its designated 5 km within Line 5.

The FAST consortium is one of three consortiums commissioned by Arriyadh Development Authority to build the Riyadh Metro - believed to be the world's largest public transport project. The consortium's partners are Atkins, FCC, Samsung C&T, Alstom, Strukton, Freyssinet Saudi Arabia, Tyspa and Setec. Atkins was appointed as lead designer for FAST, in a design joint venture (DJV) with Tyspa. ■

Manitou inaugurates new subsidiary in Dubai



Manitou inaugurates its new subsidiary in Dubai.

in the Middle East. The group said its market share and sales of telescopes have already multiplied by three in one year.

"The relationships with our regional partners and user customers will be strengthened through this new establishment in the heart of the region. Because of it, we will be even more responsive and more accurate in providing solutions to our customers' requirements. It is a region that is particularly attentive to local support," said Jean-Marc Chartier, manager of Manitou Middle East.

There is a wide range of projects in the pipeline across the Middle East, such as housing, public works, motorways, railways, etc, despite the fluctuations in income related to the price of oil, explained Manitou. The modernisation of Riyadh is also giving rise to numerous architectural projects. ■

Manitou is strengthening its commitment in the Middle East market with the opening of a new subsidiary in Dubai, Manitou Middle East. It is located at Jafza (Jebel Ali Free Zone).

By offering its three brands - Manitou, Gehl and Mustang - Manitou intends to participate in the development of construction sector and expand in the agricultural, mining and oil & gas industry

Bilfinger to work on ME projects

The engineering and services group Bilfinger has won three new contracts in the Middle East, totalling €40 million.

In Dubai, UAE, Bilfinger is involved in the expansion of an energy-producing and seawater desalination plant - said to be the country's largest. On behalf of Siemens, the company will assume responsibility for planning of the gas supply for two new turbo groups. In addition, the associated conditioning and analysis systems will be designed, manufactured and delivered installation-ready.

In Kuwait, Bilfinger is modernising the seawater intake at the Doha West power plant on behalf of the Ministry for Electricity and Water. New coarse screens and screening units will improve the filter function in the water extraction area and increase plant availability.

Bilfinger has also extended a framework agreement with the Saudi Electricity Company covering maintenance of the boiler and auxiliary components at the Ghazlan power plant complex near Dammam. The company will conduct the inspection works necessary for operation and will exchange individual components when needed. ■



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LiuGong appoints new dealer in France

LiuGong has appointed a new dealer in France, DiviMat, and introduced 'Value for Money (VfM)' machines to French customers. Among the VfM machines are LiuGong excavators (CLG904D, CLG906D, CLG908D, CLG915D, CLG922E and CLG925E), LiuGong wheel loaders (CLG816G and CLG856H) and a Dressta bulldozer (TD-15R). All the machines meet EU Tier IV emission regulations and represent LiuGong's advanced R&D levels and its core brand values of 'control, intuitive operation and extreme duty capabilities.'

"We are introducing a new value proposition on a pretty saturated market, and that hasn't happened in France for decades. Robustly establishing the brand positioning will be crucial," said Xiao, president of LiuGong Europe. "If we manage to establish our core brand values, and at the same time demonstrate that our words are supported by facts, and that this is true for all models, we will have done a great job, paving the way for long-term success."

Established in July 2015, DiviMat was founded by two experienced people with very different backgrounds: the president has a long experience as a finance executive in a large international marketing company, while the general manager offers 40 years' experience in LiuGong's targeted market. After long-term conversation and marketing research they both hold strong prospects for LiuGong's success in French market. "We started to know LiuGong in 2012, and we believe that we have seized a real and unmet market



A team of LiuGong and DiviMat.

opportunity: launching a new brand with a clear core proposition, which makes it unique in France. Of course, the French market is saturated, but no other brand stands as clearly as LiuGong of 'value for money' – this is an unmet proposition, and this is a huge opportunity. VfM is and will always be a major market segment," said Michel Eichwald, president of DiviMat. ■

Kiev's new Sky Towers

The new Sky Towers in Kiev, Ukraine, which is designed by Dennis Lau and Ng Chun Man Architecture & Engineers (HK) Limited (DLN), is set to be one of the tallest and most prestigious commercial developments in Eastern Europe. It comprises two twin towers of 34- and 47-storeys with a gross floor area of 155,400 sq m and a height of 210 m. The mixed-use towers combine grade-A offices to accommodate 17,000 people, a hotel, shops and restaurants.



Located in the Shevchenkivskiy District, the Sky Towers will be in a central position close to Kiev's city centre and the main train station. It is due for completion in 2016 and will further solidify Kiev as an important business hub in Eastern Europe. It is also hoped to support the city's economic growth and further enhance its competitiveness in the region. ■

The upcoming Sky Towers in Kiev.

New headquarters for Controls Group

Controls Group has moved to a new headquarters, located in Liscate, about 17 km from the centre of Milan, Italy. The new site has an internal surface of more than 8,000 sq m and an overall surface area of 22,000 sq m, twice the size of the previous site at Cernusco sul Naviglio, where the group had been based for 30 years. In addition to enjoying more space for R&D, production, logistics and goods handling, the new headquarters has a large area dedicated to services for visitors from all over the world; and an extensive showroom for the presentation of products, training courses and meetings. ■



Above: Controls Group's new headquarters is located in Liscate, about 17 km from the centre of Milan.

Left: Controls Group is one of the global leaders in the production of testing equipment for the construction industry.

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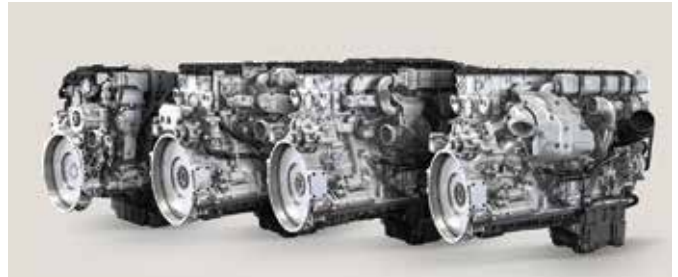
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MTU and Daimler continue partnership on MTU engines

Rolls-Royce subsidiary MTU will continue to co-operate with Daimler on developing and building high-speed MTU-brand diesel engines for C&I (construction & industrial) and agricultural applications. Taking Daimler OM 93x and OM 47x commercial vehicle engines as a basis, MTU and Daimler are to jointly develop MTU Series 1000, 1100, 1300 and 1500 units that comply with the EU Stage V off-highway emissions standard. These engines deliver 100 to 480 kW and are to be available well ahead of the launching of the new EU Stage V emissions standard scheduled for 2019. The two companies also agreed to extend their supply contracts for industrial engines compliant with older emissions stages.

“Industrial engines account for a significant share of our business that we will continue to grow,” said Dr Ulrich Dohle, CEO of Rolls-Royce Power Systems. MTU is a Rolls-Royce Power Systems brand within the Land & Sea division of Rolls-Royce. “By extending our existing supply contracts, we are making industrial engines for all relevant emissions stages available to our customers on a long-term basis. At the same time, we can already unveil our solution for the new EU Stage V legislation. Furthermore, our customers can continue to enjoy all the benefits of high-volume standard production at Daimler,” explained Dr Dohle.

Dr Frank Reintjes, head of the Global Powertrain and Manufacturing Engineering division at Daimler Trucks, commented, “As we announced in March 2014, we will be continuing our close partnership with MTU to consolidate our business in medium and



MTU will continue to co-operate with Daimler on developing and building high-speed MTU-brand diesel engines for C&I (construction & industrial) and agricultural applications.

heavy-duty commercial vehicle engines for use in off-highway applications. We are delighted that MTU is continuing to endorse our engines for meeting the difficult demands of its customers in the C&I and agricultural segment. Our products’ reliability, fuel efficiency and high quality standards have been decisive factors.”

The EU Stage V emissions legislation due to come into force in 2019 for engines used in mobile machinery and equipment will prescribe a reduction not only in soot particulate mass but also number. MTU engines are to meet the more stringent emissions limits by deploying in particular an additional diesel particulate filter. Further in-engine innovations will also be instrumental in lowering fuel consumption. ■

Work starts on Hyundai's new HQ

Work on Hyundai's new headquarters in Tessenderlo, Belgium, has recently begun. The new complex includes a three-storey, 5,400 sq m office building, a 13,000 sq m warehouse, a European training facility, an event hall and a showroom. Construction works are scheduled for completion by the end of 2016 and represent an investment of €30 million. Belgian architecture and design firm Infrabo designed the new building.

“The new facility is an excellent step forward for our European division. On the 81,000 sq m new land we can double the capacity of our machine parts supply, welcome our customers and intensify the commercial and technical training of our dealer network. The premises are ideally located alongside the E313 highway offering good accessibility. It all proves that HHIE is a dynamic and growing company. This investment will create additional jobs in the region,” said JC Jung, MD of Hyundai Heavy Industries Europe (HHIE). ■



Hyundai recently broke ground on its new headquarters in Tessenderlo, Belgium.

'A slice of iconic British history'

Residential developer Stanhope Plc is building a new iconic landmark, Television Centre, in White City, London, the UK. The project is expected to be completed between the end of 2017 and 2018. Located on a 14-acre site, it forms an integral part of the massive White City opportunity area, with a total investment of nearly £8 billion. It will boast up to 950 new homes - 432 of which are being delivered in the next three years - from stylish studios to family homes.

The name, Television Centre, has remained in recognition of its previous life as the headquarters of BBC Television between 1960 and 2012. When initially constructed in the 1960s, it was believed to be the largest television centre in the world. ■



London's new iconic landmark, Television Centre, is planned to be completed between 2017 and 2018.



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Haulotte opens AWP North America headquarters

Haulotte North America has inaugurated its new AWP corporate headquarters in Virginia Beach, Virginia, the US. The 84,000 sq ft facility, with an outdoor yard of over one acre, will be the central hub for its AWP (aerial work platform) corporate offices, product and parts distribution, as well as all in-house customer care activities.

“As our market share continues to grow in North America (NA), this new facility will provide full service to our customers in the United States and Canada,” said Claude Fuger, Haulotte’s NA zone manager. “This investment is part of our long range strategic plan and a further commitment to the NA marketplace.” Aerial work platform manufacturing will continue to take place at the Archbold, Ohio facility,



Haulotte’s new North America headquarters in Virginia, covering an 84,000 sq ft facility.

along with operations and manufacturing of BilJax Scaffolding and Event products, a Haulotte subsidiary.

The new headquarters will provide services such as sales and service training, focused on quality hands-on and classroom education; customer service and technical call centre, providing a single source for satisfying customer needs; parts warehousing and after-sales parts fulfilment; Haulotte Financial Services, offering customised funding solutions; and efficient inbound and outbound machine shipments. ■

LiuGong’s new training centre in Brazil

LiuGong has opened a new training centre at its factory in Mogi Guaçu city, São Paulo, Brazil. It is the company’s ninth training centre and one of the six LiuGong training centres around the world that is qualified to provide Cummins engine training.

With an investment of around US\$300,000, the new centre has an area of 250 sq m and can hold up to 15 students for machine training or a maximum of eight trainees for engine training. It is equipped with full sets of components, tools and parts to support both theoretical and practical training for LiuGong machines as well as Cummins engines along with ZF axles and transmissions. The training centre is open to LiuGong employees and its dealers in the region.

“Through the professional training and standardising service that LiuGong Latin America will provide to its customers, we are confident to bring a better customers experience for LiuGong users in the region and provide a higher added value of LiuGong machines to our customers.” said Tan Zuozhou, general manager of LiuGong Latin America.

Since its grand opening in September 2015, the facility has already held several training sessions, including a two-week training for the Cummins QSB7 engine led by Zhen Yingxin, senior training manager from Cummins East Asia training centre. A total of eight trainees from four dealers came from Chile, Paraguay, Colombia and Brazil to attend the training. ■

Liebherr has new office in Colombia

Liebherr has established a new office in Bogotá, Colombia, for the sales and services of its mobile and crawler cranes. The neighbouring market Ecuador is also being covered and steadily grown from there.

This new office is operated by Liebherr Colombia SAS, which was founded in October 2011, initially as a sales and service company for mining equipment. The company’s head office, which employs around 50 people, is in the port city of Barranquilla in the north of the country. Port mobile cranes are now also sold from there. Since 2012 Liebherr has also had a mixed sales and service branch office in the centrally located capital of Bogotá, which is home to the tower cranes, deep foundation machines and now also mobile and crawler cranes product divisions.

The new facility was developed in response to the rising demand from the mining, energy and oil processing industries, as well as to long-term infrastructure projects. ■



From left: Georg Ries, Libia Rolong, Julio Fuentes and Fernando Simone - all from Liebherr Colombia SAS.

World Bank supports Bolivia’s road rehabilitation

The World Bank (WB) has approved US\$225 million in financing to improve road sector management in Bolivia, as well as management of the primary road network, particularly the Trinidad-Santa Cruz stretch. The Road Sector Capacity Development Project will facilitate the mobility of 3.5 million inhabitants, including 2.6 million in Santa Cruz, 400,000 in Beni and 500,000 in other areas using this corridor.

“This project falls within the 2025 Patriotic Agenda of the Pluri-National State of Bolivia,” said the Minister for Public Works, Services and Housing, Milton Claros. “It seeks to improve asset management, including pavement rehabilitation activities, drainage, road safety

issues, right of way management and routine management; all of this through a performance-based, lump sum package of contracts, called Rehabilitation and Standard Compliance Contracts.”

Specifically, 567 km of the Trinidad-Santa Cruz road will be rehabilitated, resurfaced and maintained for a total of US\$215 million. The Bolivian Road Agency (ABC, in Spanish) will also receive US\$10 million in financing for the development of a rehabilitation strategy for the primary road network, training and certification of technical personnel, support for contract management via a new methodology and the implementation of a comprehensive information and activity system to mitigate climate risks. ■

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China, US and India 'to lead global construction market'

A new report recently released forecasts the volume of construction output will grow by 85 percent to US\$15.5 trillion worldwide by 2030, with three countries – China, US and India - leading the way and accounting for 57 percent of all global growth.

The benchmark global study - the fourth in a series from Global Construction Perspectives and Oxford Economics - shows average global construction growth of 3.9 percent per annum to 2030, outpacing that of global GDP by over one percentage point, driven by developed countries recovering from economic instability and emerging countries continuing to industrialise.

“China’s share of the world construction market will increase only marginally as growth slows in the world’s largest construction market to 2030. In comparison, US construction will grow faster than China over the next 15 years - growing by an average of five percent per annum. Meanwhile, we’re due to see a surge in construction rates in India as it overtakes Japan to become world’s third largest construction market by 2021,” said Graham Robinson, executive director, Global Construction Perspectives.

China construction growth is to slow considerably with a slump in housing and the first ever decline in housing output for China will be registered this year. But, its transition to a consumer and services driven economy provides opportunity for growth in new types of construction in healthcare, education and social infrastructure, as well as retail and other consumer end-markets. The abolition of China’s one-child policy adds impetus to the long-term view.

The construction market in India will grow almost twice as fast as China to 2030, providing a new engine of global growth in emerging markets. India’s urban population is expected to grow by a staggering 165 million by 2030, swelling Delhi by 10.4 million people to become

the world’s second largest city.

“Although globally we see construction growing more rapidly than the overall economy, with developed markets forecast to rebound from their depressed levels, many will not be back to their previous peak levels even by 2030. The current weakness in most emerging countries is likely to be temporary, with higher growth rates soon returning,” said Mike Betts of Global Construction Perspectives.

In the US construction growth will tilt towards the southern states, reflecting the region’s greater catch-up potential and higher population growth. “Fed lift-off, expected as early as December, could mean a risk for construction growth in key emerging markets - Brazil, Russia, Turkey and India - that could all suffer from significant short-term reductions in growth for construction, with some of these countries potentially halving growth,” said Jeremy Leonard, director of Industry Services, Oxford Economics.

Mr Leonard continued, “Whilst there is an interesting relationship between the top three countries, it is important not to forget that we see significant weakness in Brazil and Russia, whilst we see extraordinary growth in Indonesia. In Latin America, we expect Mexico to overtake Brazil, whilst Indonesia will overtake Japan by 2030.”

Brazil risks a ‘lost decade’, as the stranglehold of excessive bureaucracy and the Petrobras scandal continues to hold back the economy and investment. The strong demographics that supported Brazilian growth are reversing, leading to stagnation in demand for construction over the longer-term.

When it comes to Europe, whilst it will not recover to reach pre-crisis levels until 2025, the UK is a stand-out growth market, expected to overtake Germany to become the largest in Europe and the world’s sixth largest construction market by 2030. ■

Terex appoints new CEO



Terex Corporation has appointed John L. Garrison, Jr (left) as its new CEO and president, succeeding Ronald M. DeFeo who will continue to serve as executive chairman of the company until 31 December 2015. After that, Mr DeFeo will continue as a consultant for Terex until 31 December 2016. Mr Garrison will also be a member of the Terex board of directors.

Mr Garrison joins Terex from Textron Inc, where he served as president and CEO of the company’s Bell Helicopter Segment. Prior to that, Mr Garrison was president of Textron’s Industrial Segment and E-Z-GO. He was also president and CEO at Azurix Corporation and held senior leadership positions at Case Corporation, and served as an officer in the US Army.

“I am extremely excited to be leading Terex at such an important time in its history. I look forward to building on the strong foundation the team has built and positioning Terex and Konecranes Terex for success in the future,” said Mr Garrison.

Mr DeFeo said, “I am proud of the company Terex has become in my 23 years as Terex’s leader. With my planned retirement, this day was inevitable and I am confident that John will be able to continue to create value for our shareholders and the shareholders of Konecranes Terex.” ■

Vermeer’s new CEO and president



Jason Andringa (left) is now Vermeer’s president and CEO, succeeding Mary Andringa who will assume the role of chair of the board exclusively. This announcement was first made in August 2014, as part of the company’s family succession planning process.

Prior to this, Mr Andringa served as president and COO, in addition to a number of other roles at Vermeer. Before joining Vermeer in 2005, he was a staff engineer at NASA’s JetPropulsion Laboratory.

“I’m excited, honoured and humbled to have the opportunity to continue my family’s legacy of leadership at Vermeer into the third generation,” said Mr Andringa. “We will continue to fulfil our promise to our customers by capitalising on our strengths - innovative, high-quality products; entrepreneurial dealers; and the diligent practice of continuous improvement while continuing to create opportunities for growth with today’s fast-moving customer expectations in mind.”

Ms Andringa commented, “It’s been a great honour and privilege to be CEO. I am confident in Jason and the entire team who will continue the work that’s been happening here for the last 68 years as they lead this company into a bright future.” ■

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Date	Events in Asia	Organiser & Contact
16 to 20 Mar 2016	Worldbex 2016 World Trade Center Metro Manila Manila Philippines	Worldbex Services International Tel: +632 656 9239, Fax: +632 477 1899 Email: info.worldbex@gmail.com Website: www.worldbex.com
9 to 10 May 2016	Trenchless Asia 2016 Kuala Lumpur Convention Centre Kuala Lumpur Malaysia	Westrade Group Ltd Tel: +44 845 094 8066, Fax: +44 870 429 9275 Email: pharwood@westrade.co.uk Website: www.trenchlessasia.com
12 to 14 May 2016	BuildTech Yangon 2016 Myanmar Convention Centre Yangon Myanmar	Sphere Exhibits Pte Ltd Tel: +65 6319 4037 Email: lingoh@sph.com.sg Website: www.btyangon.com
17 to 19 May 2016	Coat & Corrosion Asia 2016 Putra World Trade Centre Kuala Lumpur Malaysia	ECMI ITE Asia Sdn Bhd Tel: +603 8023 0820, Fax: +603 8023 0830 Email: enquiry@ecmi.com.my Website: www.coatcorrosionasia.com
8 to 10 Sept 2016	Cambuild 2016 Diamond Island Exhibition & Convention Centre Phnom Penh Cambodia	AMB Events Group Tel: +603 4041 9889, Fax: +603 2770 5301 Email: richard@ambexpo.com Website: www.cambuildexpo.com
14 to 16 Sept 2016	Concrete Show South East Asia 2016 Jakarta International Expo Jakarta Indonesia	UBM Tel: +62 21 2930 5959, Fax: +62 21 2930 5960 Email: niekke.budiman@ubm.com Website: www.concreteshowseasia.com
21 to 23 Sept 2016	Concrete Asia 2016 IMPACT Exhibition and Convention Centre Bangkok Thailand	Impact Exhibition Management Co Ltd Tel: +65 6702 3005 Email: theresa.gan@giec.biz Website: www.concrete-asia.com
3 to 5 Nov 2016	OneBuild 2016 Kuala Lumpur Convention Centre Kuala Lumpur Malaysia	One International Exhibition Sdn Bhd Tel: +603 8943 7488, Fax: +603 8943 7599 Email: info@oneinternational.com.my Website: www.oneinternational.com.my
22 to 25 Nov 2016	Bauma China 2016 Shanghai New International Expo Centre Shanghai China	Messe München GmbH Tel: +49 89 949 20251, Fax: +49 89 949 20259 Email: info@bauma-china.com Website: www.bauma-china.com
12 to 15 Dec 2016	Bauma Conexpo India 2016 HUDA Ground, Gurgaon Delhi India	Messe München GmbH Tel: +49 89 949 20251, Fax: +49 89 949 20259 Email: info@bcindia.com Website: www.bcindia.com
Date	Events outside Asia	Organiser & Contact
2 to 5 Feb 2016	World of Concrete 2016 Las Vegas Convention Centre Las Vegas, Nevada USA	Informa Exhibitions Tel: +1 972 536 6379 Email: info@worldofconcrete.com Website: www.worldofconcrete.com
11 to 17 Apr 2016	Bauma 2016 Munich Trade Fair Centre Munich Germany	Messe München GmbH Tel: +49 89 949 11348, Fax: +49 89 949 11349 Email: info@bauma.de Website: www.bauma.de
22 to 25 Feb 2017	Samoter 2017 Verona Exhibition Centre Verona Italy	Veronafiere Tel: +39 045 829 8111, Fax: +39 045 829 8288 Email: info@samoter.com Website: www.samoter.com
7 to 11 Mar 2017	ConExpo 2017 Las Vegas Convention Centre Las Vegas, Nevada USA	Association of Equipment Manufacturers Tel: +1 414 298 4167, Fax: +1 414 272 2672 Email: international@conexpoconagg.com Website: www.conexpoconagg.com

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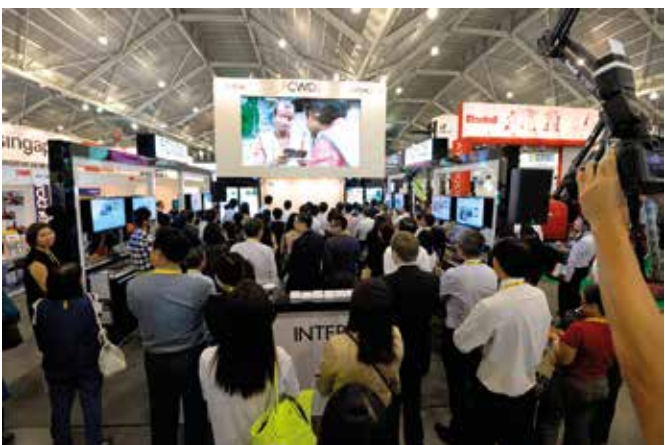
BuildTech Asia spearheads construction productivity

BuildTech Asia 2015 was held from 13 to 15 October 2015, in conjunction with Singapore Construction Productivity Week (SCPW). The show was organised by Sphere Exhibits and hosted by the Building and Construction Authority (BCA).

At the SCPW opening ceremony, BCA announced S\$2.6 million funding for research programmes to drive Design for Manufacturing and Assembly (DfMA) across the sector and additional funding for Virtual Design and Construction (VDC). In line with this push towards technology adoption and Asia's growing demand for building and construction technology, BuildTech Asia displayed various technologies and materials to help industry stakeholders from across the value chain maintain their competitive edge through higher productivity.

BuildTech Asia 2015 attracted over 5,200 visitors from across the region and close to 150 exhibitors. Trade associations and business delegations from more than 13 countries and regions including Austria, China, India, Indonesia, Malaysia, Myanmar, Pakistan, Philippines, Portugal, Russia, Thailand, Turkey and Vietnam, also visited the show. In addition, the inaugural Workplace Health & Safety Conference, themed 'Zero in on Safety', drew nearly 100 industry stakeholders.

One of the highlights at BuildTech Asia was smart drones for safety management, introduced by Singapore-based drone developer Avetics. This technology reduces the need for workers to work at height and allow site surveys to be conducted in days compared to manual methods that take months. Furthermore, the Foreign Construction Worker Directory System (FCWDS) was launched



All images: Scenes from 2015 BuildTech Asia and Singapore Construction Productivity Week.

by Intercorp Solutions in partnership with Singapore Contractors Association Limited (SCAL) and supported by the Ministry of Manpower (MOM) and Infocomm Development Authority of Singapore (IDA). The FCWDS is an online platform that supports the retention of skilled workers in the built environment sector and allows firms to better source workers with relevant skill sets.

Other key exhibits were the drywall prefabricated bathroom units (DPBU) displayed by Singapore construction and interior firm Tong Hai Yong and Eastern Pretech; a series of innovative boom lifts capable of operating within tight space constraints showcased by Spiderlift Asia; and Concrete Canvas, a flexible fabric that hardens to form a concrete layer when hydrated, showcased by the Scott Vickers Group.

Advanced materials such as glued laminated timber (glulam), exhibited by Woodsfield Engineered Wood Systems and CW Construction Australia, and cross laminated timber (CLT) were also some of the highlights. The Skilled Builders Project brought glulam and CLT live to the audience at BuildTech Asia, where visitors witnessed the construction of a mid-rise commercial building structural module on the show floor.

Besides introducing the latest technologies and materials, various industry players announced new initiatives and partnerships aimed at elevating the construction productivity in Singapore and the region. Among them were FinalCAD and Woh Hup; Tiong Seng and Peri; and Tiong Seng and Tekla.

BuildTech Asia is planned to return to the Singapore Expo in October 2016. ■

Website: www.buildtechasia.com



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IPAF eLearning raises standard for AWP operator training

IPAF has launched its new, enhanced eLearning module as part of its full training programme for US and Canadian operators of aerial work platforms (AWPs), also known as mobile elevating work platforms (MEWPs). The launch follows two years of trials and further development and testing. IPAF has now unveiled a high quality eLearning module that delivers flexibility and interactive tools, with the same emphasis on practical training.

“The eLearning technology changes the learning experience for operators and drives the safety message home in a very positive way,” said Andy Studdert, IPAF president and CEO of NES Rentals. IPAF member NES was among the first to push the development of IPAF eLearning and was actively involved in the trials.

Together with supervised written and practical testing of operator skills, the eLearning module can lead to a PAL Card (Powered Access Licence), which proves that the operator has successfully completed the training and is able to operate AWPs safely.

The eLearning experience brings several benefits to operator training. It is flexible, allowing trainees to complete the theory part of the course online – anytime, anywhere, on any device, at their own pace, using the same material as in a classroom session and learning the same subjects.

IPAF’s eLearning uses interactive tools and engages operators by taking them through games, quizzes, videos and simulations to help them retain the required knowledge and skills for their daily operations.

“eLearning caters to different learning styles. It provides diverse tools to help trainees learn in a way best suited to their abilities, aptitudes and interests,” explained Tim Whiteman, IPAF CEO. “For instance, some people are text-based learners who benefit more from a reading/writing/lecture-type environment. Others are kinaesthetic learners who benefit more from activities and practical exercises.”

Operator eLearning does not replace practical training. Trainees who complete the online session must still pass a supervised theory test at an IPAF-approved training centre and must successfully complete a minimum half-day of practical training and testing before being issued a PAL Card as proof of successfully completed operator training.

“The PAL Card still means the same emphasis on practical training and assessment,” said Giles Councell, IPAF director of operations. “Students can choose between classroom and eLearning for the theory part, but do not take theory tests online. They will still have to complete the written theory test and the practical part of the training at an IPAF-approved training centre.”

IPAF’s operator eLearning is being rolled out internationally – following the launch in the US and Canada will be the Benelux and the UK in 2016, and IPAF eLearning will soon be available in several languages.

The IPAF operator training programme is certified by TÜV as conforming to ISO 18878. The training meets or exceeds relevant OSHA requirements and ANSI/CSA standards. This industry-led training programme is offered by leading manufacturers and rental companies, and requires that accredited partner training centres pass initial, annual and unannounced audits as part of the quality management system. Instructors are certified and undertake ongoing professional development, which includes free annual updates to the training materials and use of a central register of trained cardholders. ■

Website: www.ipaf.org/eLearning



Top and above: IPAF’s operator eLearning is being rolled out internationally – following the launch in the US and Canada will be the Benelux and the UK in 2016, and IPAF eLearning will soon be available in several languages.

First speakers confirmed for IPAF Summit 2016

Access and safety experts from Australia, Canada, Spain and the UK will speak at the IPAF Summit, which will be held on 17 March 2016 in Madrid, Spain. The IPAF Summit conference is followed by the International Awards for Powered Access (IAPAs) dinner and awards ceremony.

Confirmed speakers for the IPAF Summit include Brad Boehler, president of Skyjack; Jeremy Fish, managing director of Nationwide Platforms; Tony Smith, senior investigator at the Regulatory Audit and Investigation Unit of Australia’s New South Wales (NSW) Department of Industry; and Pedro Torres, COO of Riwal. Attendance is free and those interested should register in advance at below website. ■

Website: www.iapa-summit.info



Brad Boehler, president of Skyjack, will be one of the speakers.

IPAF operator training heads to New Zealand



Total Access in Auckland is one of the IPAF-approved training centres.

The first IPAF-approved training centres in New Zealand have opened and are ready to deliver high quality training for operators of mobile elevating work platforms (MEWPs).

Accessman, the largest specialised rental company in the South Island of New Zealand, recognised the opportunity to offer IPAF training to meet the demand driven by the Christchurch rebuild, said Lena Harrington, Accessman’s general manager. Training is also being driven by the country’s evolving Health & Safety Act, which has recently undergone reform and is due for release in April 2016, she added.

“IPAF provides a professional alternative to the only option currently available within New Zealand,” said Ms Harrington. “Plus points are the five-year validity of the PAL Card, stringent training guidelines and streamlined processes. IPAF certainly delivers a total package with administrative support and innovative technology that will in time revolutionise the hire industry. The safety of our customers remains our number one priority and with IPAF on board, we have a training system that delivers by going above and beyond.”

Also starting up in Auckland on the North Island of New Zealand is Total Access. The company’s facilities have been audited and its instructors assessed and certified to be able to deliver IPAF training. ■

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Elematic's fully automated wall production line

Elematic's new fully automated precast concrete wall production line, Elematic EDGE, optimises the whole precast wall production from building design all the way to the construction site. The line features advanced software, modern table circulation and state-of-the-art production machinery, and its automated functions cover planning, monitoring and controlling the production process.

This new line offers clear benefits: production optimisation and material management are straightforward as materials are directly synchronised with product design information, and manufacturing execution system shows a number of products in process at all times. Line operations are monitored and controlled from one central location, with real-time production data continuously available for any possible process adjustment needs. The system also shows the location of the finished products, so no time is wasted for needless tracking.

The new Elematic EDGE Wall automation can be integrated with CAD and BIM software. Manufacturing details and deliveries can be tracked at the construction site by using an intuitive 3D view of the building.

In addition to the advanced, high tech systems and products such as automatic Comcaster and ELiPLAN, the Elematic product range is now expanded with automatic shuttering station Elematic E9.

The ELiPLAN, Elematic's enterprise resource planning specifically designed for precast factories, provides support for operative planning of precast production throughout the whole process: sales, material management, production, warehouse management, transportation planning and machinery maintenance. ELiPLAN works seamlessly together with factory manufacturing systems.

The manufacturing execution system helps optimising the use of factory production capacity, monitoring the production status and controlling the operations from one centralised location. Automatic table nesting supports the creation of production plan through an intuitive user interface and optimises the use of available table surface space.

The automatic shuttering station Elematic E9 enables fast and accurate shuttering process. The station functions also include demoulding, cleaning, oiling and plotting.



Left and below: The new Elematic EDGE Wall automation can be integrated with CAD and BIM software. Manufacturing details and deliveries can be tracked at the construction site by using an intuitive 3D view of the building.

The automatic Comcaster E9's precisely controlled dosing makes it easy to cast a different height of layers as well as to secure smooth finishing of the components. Casting speed is up to 2,000 l/min with self-compacting concrete. Casting is automatically operated to ensure high process efficiency.

The Elematic EDGE Wall is designed for the production of sandwich panels, cladding panels, solid panels and solid slabs. ■

Website: www.elematic.com



XCMG's new XE210WLL excavator



The new XCMG XE210WLL wheeled excavator is designed for excellent manoeuvrability and stability. The machine is used mainly for earth excavation in applications such as highway slope paving, river channel dredging, deep trench dredging, etc. ■

Website: www.xcmg.com



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Bomag's fifth generation single drum rollers

Bomag's new single drum rollers are available in the 11 to 26 t weight class. The Ecomode function reduces fuel consumption by up to 30 percent, whilst delivering the same compaction performance, said Bomag. The optional Ecostop function is also fuel saving and reduces engine wear.

The BW 213, 219 and 226 models feature Bomag's compaction system, Variocontrol (BVC). The system can be fully adjusted using just one rotary switch integrated in the arm of the seat. In manual mode, the operator chooses the required amplitude; in automatic mode, the operator can specify EVIB values and Variocontrol takes over control of the amplitude. The control panel displays clear icons and therefore, the operator can see immediately whether it is manual or automatic compaction mode. There is also a clear indication when maximum compaction has been reached.

Variocontrol ensures that energy is constantly transmitted at the optimum level and that the operator's work is under control. This prevents over-compaction and minimises the number of passes required, which in turn increases productivity and the quality of compaction performance.

The machine's cab is spacious fitted with large windows, allowing the operator to have a good view of the jobsite. A new loading function on the speed switch makes loading of the roller safer and easier.

A highlight of the high gradeability DN versions is their pump system, which incorporates two pumps supplying two engines. This makes the machines far more stable during operation on steep slopes, according to Bomag. The excellent gradeability of over 60 percent can be achieved when moving forwards and backwards. In addition, long servicing intervals, easy access to maintenance points and maintenance-free components are other advantages of the new rollers. All models in this range are powered by Tier IV compliant engines. ■

Website: www.bomag.com



Above: Ecomode and Ecostop functions make these new generation Bomag 11 to 26 t single drum rollers trendsetters in energy efficiency and cost-effectiveness.

Left: The Variocontrol compaction system can be fully adjusted using just one rotary switch integrated in the arm of the seat.

Brokk Ex demolition robots for hazardous environments

The new Brokk Ex demolition robots are explosion protected, designed for use in hazardous environments such as applications within tunnelling, oil and gas, and mining industries as well as other environments where there is risk of explosive gas being present. The Brokk Ex range is available for all sizes of Brokk machines, from the extremely compact Brokk 60 to the large Brokk 800.

The Brokk Ex machines feature compact size, powerful attachments, flexibility of the three boom system and precise remote operation. Designed to tackle a wide range of different demolition tasks, the machines bring safety, efficiency and versatility to almost any job.

The Brokk Ex machines are classified up to Equipment class 3G IIA T3, according to the ATEX 1994/9/EC directive. This means that they can be used in what the ATEX directive calls 'Zone 2', where explosive gas, vapour or mist is not likely to occur in normal operation, but could occur for short periods of time. ■

Website: www.brokk.com



Right: The new Brokk Ex demolition robots are explosion protected, designed for hazardous environments.

The new 'STAR' of Haulotte

The new range of Haulotte STAR vertical masts, STAR 8 and STAR 10, are ideal for day-to-day works at heights, both indoor and outdoor. The machines are highly versatile and suitable for use in restricted areas. The STAR 8 can accommodate up to two operators.

The STAR range has a tight turning radius and a 3 m outreach vertical jib. The asynchronous motors allow precise control over the machine to access the most difficult places. These motors do not require routine maintenance, said Haulotte. The upper control box integrates a new joystick for precise positioning and greater safety for the operator, especially when driving in confined spaces. The zero tail swing allows the machine to work safely on 360°.

The Haulotte Activ'screen on-board diagnostic offers real-time critical information, saving time and facilitating maintenance operations. For a complete diagnostic, the STAR is compatible with the Haulotte Diag universal tool. There is also centralised battery filling; at the push of a button, the batteries will be filled and the operation is done automatically, eliminating any risk of accident.


In addition, the STAR machines are covered in high-strength composite, and all the components (axles, bushings, fasteners, painting, etc) have received special treatments to ensure a high level of corrosion protection. The machines can also be loaded and unloaded easily, thanks to their integrated chassis forklift, easy slinging and stowage, and 25 percent gradeability to climb truck ramps. ■

Website: www.haulotte.sg



The new range of Haulotte STAR vertical masts, STAR 8 and STAR 10, are suitable for use in restricted areas, both indoor and outdoor.

Leica iCON Excavate iXE2



Easy elevation and dual slope control
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Liebherr XPower generation wheel loaders

The new Liebherr XPower generation wheel loaders are available from the L 550 to the L 586 models, with standard bucket sizes from 3.2 to 6 cu m. The XPower concept offers greater reliability and a longer lifespan than previous Liebherr wheel loader generations, said Liebherr. Each machine has stronger axles, as it is partly fitted with axles from the next model up in the earlier range. For example, the L 556 XPower is equipped with the axles of an L 566 of the previous generation.

The power-split, Stage IV/Tier 4f compatible drivetrain at the heart of the XPower is particularly robust, with excellent performance and fuel efficiency. The drive concept combines a hydrostatic drive and a mechanical drive. The new Liebherr XPower drive system is powered through the interaction of the two drive paths with the performance and torque of the diesel engine always distributed along both paths. The load is therefore also distributed over the two drive paths, which results in a much longer component lifespan.

The power-split transmission manages the interaction of the two drive types. It is adjustable and continuously adapts the mixing ratio of the two drive paths without noticeable switching and without interrupting traction power. In this way, the power of the wheel loader adapts to the specific requirements of the particular operation.

The Liebherr-Power-Efficiency plays a key role in the drive system. The most important components, including the diesel engine, power-split transmission and operating hydraulics, are proactively coordinated by an intelligent system. This results in high levels of efficiency and significant fuel savings. Liebherr said its comparative tests have shown that XPower wheel loaders require up to 30 percent less fuel than conventionally-driven wheel loaders, resulting in considerable operating cost savings.

In addition, the Liebherr SCR technology facilitates more efficient exhaust gas treatment and reduces the emission of pollutants. The new wheel loaders have almost no brake wear as the XPower drivetrain independently supports braking so that the operating brake has only a support function. Tyre wear is reduced by up to 25 percent as the continuous force control in combination with the automatic self-locking differential prevents the wheels from slipping.

Furthermore, customers can choose between Z-bar linkage and industrial linkage for the XPower L 550, L 556, L 566 and L 580 models. The revised Z-bar linkage provides up to 20 percent higher breakout forces compared to previous generations, meaning that



All images:
The new Liebherr XPower generation wheel loaders feature the power-split, Stage IV/Tier 4f compatible drivetrain.

an XPower wheel loader can move heavier loads than its predecessors, said Liebherr.

The industrial lift arm option is available for no additional cost and offers high torque in the upper lift arm position, which makes it possible to lift the load along the entire lifting range without corrective movements. The bucket design has been revised in line with lift arm optimisation. In the new state-of-the-art design, the bucket structure and bearings have been reinforced, making it possible to increase the volume of standard bucket by between 0.2 and 0.5 cu m, depending on the machine type. Machine operators can therefore move more material with each load cycle and the enhanced penetration capability of the new buckets facilitates fast and efficient filling.

The new Liebherr XPower wheel loaders have been developed for markets where Stage IV/Tier 4f engine applies. According to Liebherr, they will be available in the European Union, Switzerland, Norway, the US, Canada, Australia and Turkey. Introduction in overseas regions will be staggered. ■

Website: www.liebherr.com



Compact and lightweight ATN aerial platforms

ATN's Mygale 23 (MG23) is a compact and lightweight spider lift with a 23 m working height, featuring a telescopic riser, telescopic top boom, articulated jib and a 'speed-up' system that enables the user to rise from 0 to 23 m in under 1 minute. Equipped with both a Kubota diesel engine and AC power, the MG23 provides the flexibility of bi-energy allowing operation outside and inside of buildings. In addition, the MG23 comes with a visual self-diagnostic system as standard. With a stowed width of only 1.19 m, a gross weight of 3,100 kg, low ground pressure and non-marking tracks the MG23 is ideal for use in areas with difficult access and restricted or challenging ground conditions.

The ATN P1af 1010 is designed based on the popular P1af 1000R self-propelled mast boom, which replaces the wheels of the P1000R with non-marking tracks. As a result, the P1af 1010 can be used in areas requiring low ground pressure or rough terrain capabilities. This new model completes the range of P1af on tracks, with the existing P1af 810.

The ATN P1af 660R adds a stock picking facility to the range; this latest development of the ultra-compact electric self-propelled mast lift features a height adjustable load tray with an 80 kg capacity, suitable for warehouse, logistics and retail environments. ■

Website: www.atnplatforms.com

Right: ATN's MG23 spider lift.



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Volvo rolls out new compactor for Indonesian market

Volvo Construction Equipment (Volvo CE) has introduced its new SD110B single drum compactor to the Indonesian market. The machine delivers powerful, efficient performance and has a range of features to ensure outstanding efficiency from operation through to servicing and transportation.

The road building plans are part of a huge infrastructure plan in Indonesia, labelled the Master Plan for the Acceleration and Expansion of Indonesia's Economic Development (MP3EI). Many contractors are looking to the latest equipment to help them tackle their growing workloads and increasingly tight deadlines. With this in mind, Volvo CE is expecting high levels of interest in its SD110B.

The SD110B is optimised to deliver dual amplitude and centrifugal force – matching the drum's performance to any application. The choice of high or low amplitude is easily selected, giving the operator the flexibility to adjust the drum's dynamic force depending on the application. The combination of high force and heavy weight facilitates excellent compaction to ensure material target density is achieved in fewer passes.

There is both a smooth and padfoot drum available with the padfoot able to adapt to all ground conditions. Compared with previous designs, the padfeet on the SD110B have been repositioned closer together to ensure a smoother performance. The heavy-duty drum has been designed and manufactured with durability in mind. The large diameter, thick drum shell is engineered from high strength steel for longevity and performance.

The SD110B is equipped with a premium Volvo D5 engine that meets Tier 3/Stage IIIA requirements, delivering high torque at low rpm for superior performance. In conjunction with Volvo's ECO mode, it delivers lower emissions and increased efficiency without compromising on power. There is also a 20 percent reduction in fuel consumption compared with previous Volvo models in this category. For excellent gradeability, the Volvo traction system provides outstanding climbing and traction capabilities in difficult applications such as steep inclines or slippery surfaces, and the system prevents wheel or drum spin.

The SD110B features a convenient foldable open ROPS with a roof that can be raised and lowered by the operator without the need for tools. This provides an excellent transport height of only 2.3 m. The roof is mounted on gas spring shocks, allowing for safe



The machine has a new control panel for an improved operator experience, and its fully adjustable seat slides and turns to enhance visibility and operator safety and comfort.



Above and below: Volvo SD110B single drum compactor delivers dual amplitude and centrifugal force.



operation by a single operator. The fully adjustable seat slides and turns to enhance visibility and operator safety and comfort, and the ROPS/FOPS certified Volvo cab is pressurised to increase the efficiency of the air conditioning system and prevent dust from entering the operator environment. With floor to ceiling cab windows, the operator has an excellent forward drum view as well as superior rear visibility.

The machine features a new control panel, created for an improved operator experience. The single lever propulsion and vibration control is conveniently located within the operator's zone of comfort and reach. Designed for hassle-free service access, the engine hood lift is electronically controlled for easy and convenient access to the engine. The hydraulic pressure test ports are grouped together remotely and key service check points are grouped on one side to ensure regular maintenance and inspections can be conducted more efficiently – increasing overall productivity and reliability.

The SD110B road compactor was recently displayed at Konstruksi Indonesia, which took place in November 2015. During the show, the first unit of SD110B in Indonesia was handed over to PT Sederhana Karya Jaya (SKJ), one of the biggest road contractors in North Sulawesi. SKJ has an equipment fleet that includes a number of Volvo units including soil and asphalt compactors as well as excavators. Volvo has an extensive sales and service network in Indonesia, from Aceh to Sorong and from Pontianak to Sofifi via its dealer partners, IPPS and ITU. ■

Website: www.volvoce.com



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Shantui's powerful bulldozers and roller

The SD20-5LNG natural gas bulldozer is the industry's first LNG-fuelled bulldozer from Shantui, designed for digging, backfilling and modelling of earthwork and handling of other materials. It is suitable for use in roads, railways, land developments and mines. The machine has an operating weight of 19.9 t and is equipped with a 149 kW Weichai WP12 LNG engine. The liquefied natural gas engine is energy-saving and environment-friendly; it also conforms to the national emission regulation, with the fuel cost saved by more than 30 percent, the carbon emission reduced by more than 50 percent, and the inhalable particle emission basically at zero, said Shantui.

The SD20-5LNG is fitted with a straight tilting blade that features accurate controls and strong adaptability. The optional semi U-blade and ripper are available to meet different working needs.

The Shantui SD16YS low ground pressure fully hydraulic bulldozer is powered by a 120 kW Cummins engine, and offers an operating weight of 17.44 t. The machine is mainly used for digging, backfilling and modelling of earthwork under general and wetland conditions. The power angle/tilt (PAT) blade and single-joystick palm command system are simple and easy to operate. The sealed shock-absorbing cab has broad visual field and reduces the interior noise to as low as 79 dB for comfortable driving

environment. The safe locking function for travelling and working devices and the machine safety passage system are provided to improve the operation safety. The wetland long tracks deliver low ground pressure and improved manoeuvrability, and meet the operating need under wetland condition.

The Shantui DH17 is a new generation standard fully hydraulic bulldozer. Thanks to its small turning radius, the machine can achieve outstanding performance in narrow sites. The sealed shock-absorbing cab is spacious and features high safety, excellent comfort and low noise.

Both the SD16YS and DH17 bulldozers are fitted with the two-circuit electronically controlled static pressure drive system that can adapt to the load variation and realise loaded steering and pivot steering, offering high flexibility and low fuel consumption. The machines also feature a modular structure to allow easy maintenance.

The Shantui SR14D-3 tandem vibratory roller has an operating weight of 14 t and is powered by a 113 kW Cummins engine. The machine's vibration system provides both 51 Hz and 67 Hz, improving operation efficiency by over 34 percent, said Shantui. The 0.3 mm small amplitude is suitable for compression on thin layer and bridge, while the 0.8 mm large amplitude on thick layer. The roller is designed for road base, small and medium backfilling construction as well as asphalt and concrete pavement. ■

Website: www.shantui.com



Clockwise: The SR14D-3 tandem vibratory roller; SD16YS low ground pressure fully hydraulic bulldozer; SD20-5LNG natural gas bulldozer; and DH17 standard fully hydraulic bulldozer.

Caterpillar offers hand and foot controls option

Hand and foot controls will be offered on Cat D-series skid steer, multi terrain and compact track loaders. Operators who prefer this type of control can now take advantage of the full suite of features and benefits that the Cat D-series loaders deliver. With extensive input from hand and foot control users, Caterpillar has designed a set of controls that competitive users can quickly adapt.

Single-axis joysticks were chosen in order to provide the fore/aft movement operators are used to. They were also engineered with components that provide the resistance and feel operators expect. In addition, the shorter joystick travel compared to traditional hand levers means operators can fully use the armrest for increased comfort and reduced fatigue.

The Cat hand and foot controls can be customised. There are multiple control modes that allow operators to tailor the drive and implement response to their skill or task.

The fully sealed and pressurised cab, a differentiating feature of the Cat D-series line, is maintained with the new hand and foot controls. A sturdy centre step provides low cab step-in height for easy entry and exit, while traction dimples ensure firm footing. The recessed foot pedals are adjustable to provide a comfortable and ergonomic operating angle.

The Cat hand and foot controls option will be available for the 226D, 232D, 236D, 242D, 246D and 262D skid steer loaders; the



The Cat hand and foot controls option offers multiple control modes that allow operators to tailor the drive and implement response to their skill or task. This option will be available on Cat D-series skid steer, multi terrain and compact track loaders.

257D, 277D and 287D multi terrain loaders; and the 239D, 249D, 259D, 279D and 289D compact track loaders. ■

Website: www.cat.com/handandfootcontrols

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carmix.com

New Boom Booster kit for Terex Superlift 3800 crane

Terex Cranes is now offering a Boom Booster for its Superlift 3800 crawler crane, which increases the main boom's stiffness, boosting the crane's lifting capacity by up to 30 percent. The Boom Booster kits for Superlift 3800 cranes are available in lengths of 24 to 84 m.

The welded steel structure consists of up to seven sections with a length of 12 m, comes with the Terex fall protection system as standard and is designed for being directly mounted on the crane. When equipped with the Boom Booster kit, the Superlift 3800 can reach a maximum hook height of 174 m and lift loads of up to 80 t. As such, the crane can be used for erecting large wind turbines, which usually require lifting heights of more than 140 m.

The structure has an overall width of only 3.50 m, making it easy to transport. Two additional boom sections can 'slide' into the Boom Booster kit during transportation, eliminating the need for at least one truck that would otherwise be required.

Another highlight is the optionally available Superlift Split Tray with quick coupling technology, which can be used when setting up the main boom with or without the Boom Booster kit. Once the main boom is set up, the counterweight that is no longer required can easily be uncoupled, after which the crane can move with only the superlift counterweight that is still needed. The Split Tray reduces the amount of assembly time and personnel required and eliminates the need for an assist crane for this particular procedure, making it possible to reduce costs by up to €10,000 per lift, according to calculations by Terex.

In addition, a 3.5 m long extension for the superlift mast enables an increase to the superlift radius from 19 to 21 m and allows to lift off long boom systems from the ground without an assist crane. Finally, the optional Flex Frame solution, which replaces the usual tele-cylinder, allows easy setting of the superlift counterweight radius from 13 to 21 m with full counterweight on the tray. This reduces the need of restacking counterweight, saving valuable time.

Terex Cranes also offers a new, higher-capacity double hook block for Superlift 3800 cranes with Boom Booster kits. Together with the crane's standard hoist 1 and hoist 2, this hook block not only makes it possible to reach a lifting capacity of up to two times 90 t, but also increases the maximum lifting height by yet another 2 m. ■

Website: www.terex.com/cranes



Terex Cranes offers a Boom Booster for its Superlift 3800 crawler cranes, boosting the crane's lifting capacity by up to 30 percent.

Snorkel secondary guarding system

All new Snorkel boom lifts with platform heights of 12.1 m and above are now fitted with Snorkel Guard, the company's secondary guarding solution. This simple, mechanical system features a spring-loaded rail that sits above the upper control panel, which cuts out machine operations when compressed, for example, in the case of the operator being involuntarily pushed against the controls.

The operator can override Snorkel Guard using a switch in the platform, in the event that the system is activated in error. When Snorkel Guard is activated, the lift can be operated from the lower control panel. The Snorkel Guard system can also be easily retrofitted to most Snorkel booms in the field. ■

Website: www.snorkellifts.com

New Snorkel boom lifts with platform heights of 12.1 m and above are now fitted with Snorkel Guard as standard.



K-Tec's largest construction pull scraper

Canadian manufacturer K-Tec Earthmovers has recently launched its largest construction pull scraper for massive scale earthmoving. According to the company, the K-Tec 1263 ADT is also the largest earthmoving scraper available on the market today, with a heaped capacity of 63 cu yd and an empty tare weight of 61,000 lbs.

The K-Tec 1263 ADT is designed to be pulled with a 40 t (and larger) articulated dump truck. The hitch system transfers 32 percent of the scraper load weight directly to the point where the truck is designed to carry weight. An exclusive digital display screen is included in the cab for visual operating details, tracking load count productivity and troubleshoot serviceability. The 1263 ADT has a bolt-together design, which enables overseas container shipment and ease of maintenance.

To maximise the 1263's capacity, a push dozer in the cut is recommended to utilise the standard roller push-block innovation. In addition, for contractors with excavators, the K-Tec 1263 ADT works well as a haul wagon with the large target area making for easy and efficient loading. The K-Tec 1263 ADT was enhanced from its predecessor, the K-Tec 1254 ADT. The extra 9 cu yd capacity comes from a 15.25 ft long bucket and larger gate belly to contain more material.

With the introduction of K-Tec 1263 ADT, K-Tec now has a scraper for every contractor in any dirt application, whether it is an owner/operator outfit, or a large-scale earthmoving project. K-Tec's scraper models range from 25 to 63 cu yd capacities. The company's offerings include direct mount, train and ADT scrapers in a variety of model specifications to fit any construction project. ■

Website: www.ktec.com



The new K-Tec 1263 ADT is the largest construction pull scraper from K-Tec Earthmovers, designed for massive scale earthmoving. It is to be used with a 40 t (and larger) articulated dump truck.

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- when it has to be right



JCB marks 70th anniversary with limited 'platinum' edition

To mark its 70th anniversary this year (2015), JCB offers a limited edition version of its iconic 3CX backhoe loader - the company's most famous machine. A total of 70 units will be made in striking livery, which features red buckets, full white cab and red wheels instead of the customary black and yellow finish – a livery last seen on the 3CIII model in 1979.

And in a nod to the demands of the modern operator, the colourful machines will also be equipped with in-cab coffee makers. These limited 'platinum' edition 3CX backhoes - which have a top speed of 40 kph - will be powered by 109 hp JCB Tier 4f Ecomax engines manufactured at JCB's plant in Derbyshire, the UK.

Since JCB's first was manufactured in 1953, the company has produced more than 600,000 backhoes and now sells them in 120 countries. JCB has also reportedly been the world's biggest manufacturer of backhoes for 15 years in succession with a range that spans 40 models from the compact 1CX through to the large 5CX.

The backhoe loader was the building block for the success of JCB. Although



To mark its 70th anniversary in 2015, JCB has produced a limited edition version of its famous 3CX backhoe loader. There are only 70 units available.

the company now produces many other different types of machines for construction, agricultural and industrial machines,

backhoe loader remains one of its most important products. ■

Website: www.jcb.com

Hyundai HL900 series wheel loaders

The Hyundai HL955 and HL960 wheel loaders, powered by Cummins engines, offer up to 5 percent increase in productivity and up to 10 percent greater fuel-efficiency over their predecessors, the 9A series.

The Eco pedal on the HL900 series facilitates the operator's choice between power and economic operation modes with an added benefit of reducing unnecessary fuel consumption, and the electro-hydraulic control allows for easy handling of the machine. The engine automatic shutdown function turns off the engine when the machine goes into idling stage, and the five-speed lock-up clutch system helps reduce fuel consumption. In addition, the Eco gauge guidance on the control panel makes it easy for the operator to monitor the status of engine torque and fuel efficiency using colours and gauge level.

The HL900 series loaders are suitable for tough working environments due to their high-strength design and robust structure. The Sinter brake disc, hydraulic hose and sealed drive line centre bearing are the major features that make Hyundai wheel loaders robust, durable and safe.

The 7-in-wide intelligent touch screen, together with

centralised switches, gives the operator speedy and ready access to vital equipment data, while providing him/her with improved connectivity with mobile devices. This all leads to increased efficiency and productivity for the operator.

The HL900 series wheel loaders also have an ergonomically designed cabin. It is fully soundproof, ensuring a minimised noise level of 68 dB, and is spacious with a fully adjustable seat armrest, electro-hydraulic implement control lever, new air conditioning system and centralised access to service points. Moreover, the engine room is fully sealed with a retractable hood to facilitate easy maintenance and to prevent fire due to inflow of foreign materials. Both the HL955 and HL960 wheel loaders are powered by Tier 4f/ EU Stage IV compliant engines. ■

Website: www.hhi.co.kr



Hyundai HL900 wheel loaders are suitable for tough working environments due to their robust structure.

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Sany SAC2200 all-terrain mobile crane

Sany's SAC2200 all-terrain mobile crane has a main boom length of 62 m and 103.5 m (with the jib). Its maximum lifting capacity is 220 t and the jib offset is between 0° and 40°. The crane features 360° rotation with a slewing speed of up to 1.8 r/min.

The five-axle chassis design and multi braking modes ensure excellent manoeuvrability. The crane has a maximum travelling speed of 81 km/hr, maximum gradeability of 58 percent and minimum ground clearance of 325 mm. The outrigger span is 9 x 8.5 m.

The crane's superstructure is powered by a six-cylinder diesel engine, with a 170 kW rating and fuel tank capacity of 260 l. The crane's chassis is fitted with a 390 kW, 500 l eight-cylinder diesel engine. ■

Website: www.sanygroup.com

Right: Sany SAC2200 all-terrain mobile crane.



HammerHead R600 completes Roughneck rock drill range

The Roughneck R600 is the largest pneumatic percussion drilling system from HammerHead Trenchless Equipment for use in horizontal directional drilling (HDD) applications. Designed for drilling solid rock with bit diameters of 7.25 to 8 in, the R600 gives HDD contractors the ability to complete larger diameter bores in fewer passes as well as access to a wider range of single-pass boring applications.

The R600 completes the range of existing HammerHead Roughneck rock drills available to HDD customers. It joins the R400 designed for 5.25-in straight and offset bits and the Roughneck R500 for straight and offset bits to 6.25 in in diameter.

All three Roughneck hammers turn any horizontal directional drill in the construction industry into a high-production rock drilling machine. Capable of penetration rates of 150 ft or more an hour, the rock hammers feature heavy-duty, high-flow housing; pullback kit; control station/oiler; and drill conversion kit. Their heavy-duty housing permits directional drilling in varying rock conditions without changing out the housing. The larger bore diameter of



Full line of HammerHead Roughneck rock hammers - R400, R500 and the new R600.

the Roughneck housings allows the hammer to send more air to the internal piston for maximum efficiency, resulting in faster and harder blows. Standard API thread makes housing connections easy. And a pinned-on lid design and isolation package secures and protects electronic investment.

The offset rock bit design increases steering precision, allowing the operator to navigate a wide variety of ground conditions. Integrated face-cleaning exhaust ports of the hammer ensure reliable performance, and the check valve located within the bit eliminates ingestion of debris.

The control station utilises the drill's existing mud pump to efficiently deliver air,

oil and fluids down hole, reducing footprint size and weight. Integrated electronics facilitate the drilling operation and provide the operator with control and increased productivity without leaving the drill operator's station.

All Roughneck control stations can be installed with a tee and a ball valve on the high pressure side of the mud pump, which directs airflow to the drilling fluid supply line. In addition, the Roughneck system is equipped with spanner wrench holes in the front and rear of the hammer, reducing the number of breakout tongs required to change out the bit or service the tool. ■

Website: www.hammerheadtrenchless.com

Hansa-TMP variable displacement closed loop axial piston pump

Among Hansa-TMP variable displacement closed loop axial piston pumps is the TPV 1500 series, which has a displacement of 17-24 cm³/n and peak pressure of 400 bar. The pump has low noise, making it suitable for use in residential and urban areas.

The power and strength of the pump are controlled by an integrated feed-back control and a full range of onboard electronic sensors such as pressure sensor, speed/RPM sensor and swash plate angle sensors, which are customised based on customer needs.

By utilising a 'back-to-back' structure with central distribution line, the TPV 1500 series pump features a compact dimension. The single pump is only 170.5 mm long, while the tandem pump is 285 mm - the latter is approximately 60 mm shorter than the competitors' standards, according to Hansa-TMP.

The TPV 1500 series pump is able to increase uptime and endure the most challenging working conditions, said Hansa-TMP. In particular, the high pressure level allows the downsizing of the power transmission components, reducing the size and guaranteeing a low consumption in fuel and energy by up to 8 percent. ■

Website: www.hansatmp.it



Right: The TPV 1500 series closed loop axial piston pump.

LINNHOF COMPACTMIX ASPHALT PLANT

Linnhoff CompactMix Asphalt Plant (CMX) is a modular-based plant; each CMX module is container-fitted and plant installation is done module-by-module.

The modular system of CMX allows this plant type to be ideal for both stationary and portable uses. With container-fitted modules, transportation cost is lowered and eased. Plus, with the patented Linnhoff Screen Drum system that combines drying and screening systems, Linnhoff CMX plant is able to provide better values by reducing fuel consumption and maintenance, which reduces overall plant operating costs.

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Dingli updates JCPT0607DC series scissor lifts

The recently upgraded Dingli JCPT0607DCI and JCPT0607DCS scissor lifts - which belong to the JCPT0607DC series - feature a maximum working height of 5.9 m, safe working load of 240 kg and maximum working platform of 1.89 x 0.7 m.

The upgraded scissor lifts are equipped with an automatic pothole protection system, a 400 W drive motor and front steering wheels to ensure good manoeuvrability in narrow spaces. The scissor lifts also adopt an intelligent ECU control system and integrate the level sensor, button switch, key switch, emergency stop switch, buzzer, hour metre and touch screen into one. A potentiometer is used to replace the exposed elements, such as upper and lower limit switch, anti-pinch switch and angle sensor, thus reducing fault points and facilitating maintenance.

According to Dingli, significant improvement has also been made in terms of energy saving and environmental protection. In addition, the company said the upgraded scissor lifts have passed the European CE and American ANSI certifications, and their mass production was scheduled for the end of 2015. ■

Website: www.cndingli.com



Above and bottom left: The upgraded Dingli JCPT0607DC series scissor lifts, including the JCPT0607DCI and JCPT0607DCS models, feature a maximum working height of 5.9 m and safe working load of 240 kg.



TW 700 high pressure triplex pump



The Tecniwell TW 700 high-pressure pump features a user-friendly design to simplify operations and maintenance. The pump can reach injection pressure of up to 900 bar with a 700 hp engine using three interchangeable plungers. In addition, the pump features a maximum flow rate of 875 l/min and high-pressure output diameter of 50 mm. It delivers a piston stroke of 177.8 mm and maximum stroke rate of 130 spm. Foundation Associates Engineering Pte Ltd (FAE) is a Tecniwell distributor in Singapore. ■

Website: www.fnapl.com

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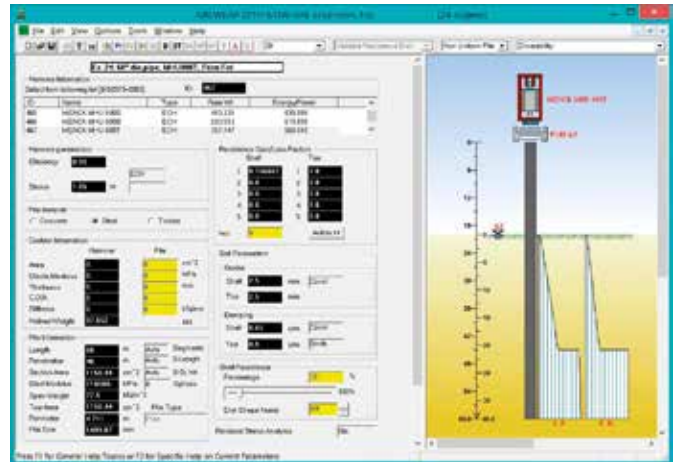
Pile Dynamics updates GRLWEAP programme

GRLWEAP (Wave Equation Analysis of Piles) is one of the most widely used softwares for the simulation of pile driving process and for establishing the driving criterion. For each assumed pile capacity, it calculates the corresponding driving resistance (blow count) and stresses during driving. It also helps check the adequacy of pile driving equipment. Furthermore, GRLWEAP is also helpful for designing dynamic load tests on drilled foundations.

A key feature of GRLWEAP is its database of almost 1,000 pre-programmed pile driving hammers. Pile Dynamics recently performed a major update of the database, working closely with hammer manufacturers to incorporate the latest information on efficiency and other important characteristics.

The latest database is part of GRLWEAP 2010-6, which includes other improvements to the software and help functions as well. According to Pile Dynamics, the upgrade to version 2010-6 is complimentary for those with licenses of GRLWEAP-2010 (either standard or Offshore Wave versions). ■

Website: www.pile.com/grlweap



Pile Dynamics has released a complimentary update of GRLWEAP programme.

New radio remote control for Sandvik Ranger series

The Sandvik Ranger series of surface top hammer drilling rigs features a revolving superstructure that enables large drilling coverage. This ranges from the standard 17.6 sq m model to the optional 26.4 sq m. As well as being able to rotate, the rig's stability is guaranteed thanks to its innovative structure that keeps the counterweight at all times on the opposite side of the boom. In addition, the series features a Rock Pilot+ drilling control system that automatically adjusts to changing rock formations, thereby sending an optimal amount of power to the rock. This has been designed to ensure smooth rotation, solid rock contact and fast penetration in different rock conditions.

The Ranger drilling rigs reduce operating costs significantly due to their low fuel consumption rates that are achieved through a new advanced eco-package and engine RPM adjustment. The rigs are powered by a Tier 3 or Tier 4 Final engine. The Ranger series also comes with the recently upgraded HL820T rock drill as standard; changing it to a high frequency HF320T rock drill will ensure even higher penetration rates.

Full radio control is a completely new feature introduced to the Sandvik Ranger series at the beginning of 2015. The full radio control option has been designed with safety in mind and contributes to improved productivity. This is especially of use when the rig is used to work on steep slopes and risky benches where safety is particularly an issue. Now using the new full radio control the operator is able to handle these tasks from a safe distance away, thereby improving productivity as the operator possesses clear visibility of the undercarriage and winch control at all times.

The use of the radio controller is smooth and precise. This means that basic functions that can be handled with the radio controller include drilling and tramping, where the operator can choose between one or two hand tramping control modes, as well as boom control, rod handling and roll over control (Ranger DQ500). The new full radio control option is now available on all Ranger series drill rigs. ■

Website: www.construction.sandvik.com



Top and above: The Sandvik Ranger surface top hammer drilling rigs.



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LiuGong's construction equipment for various applications

LiuGong's 890H wheel loader gives its operator maximum control over the equipment. The machine's engine perfectly matches its multiple working and gear shifting modes, providing maximum traction and speed. The electronic fuel injection system offers a wide range of combustion options and helps to reduce cost-in-use. The 890H features a Cummins engine and the latest ZF automatic electro-hydraulic transmission, making the loader's shift a smooth process. The machine also has a spacious cab and provides a car-like operating experience.

The LiuGong CLG950E excavator provides a 50 t capacity and is suitable for large-scale quarrying and mining projects. The machine features an advanced PC control system, which delivers high levels of efficiency and low fuel consumption. The machine is durable, easy to operate and maintain, reliable, environment-friendly and comfortable to drive.

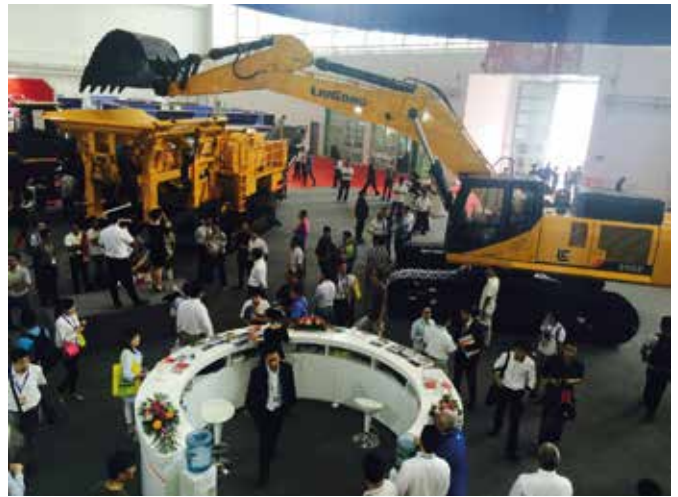
The LiuGong CLG509A paver is widely used in construction projects such as roads, parking lots and airports for paving road bases and surfaces. It is suitable for bituminous concrete, stabilising soil, lime-ash soil and all kinds of road materials. With its four closed-loop working modes (paving forward and backward, moving forward and backward), the CLG509A improves its moving and paving stability, and features high performance in either linear or steering pavement. Its dual throttle handle maximises the controllability and locked up function can effectively avoid speed loss during operation. It features a filter cover over the radiator ventilation surface, which prevents small stones from being sucked into the radiator, enhancing heat dissipation. The CLG509A has an advanced electronic system and steadily controls the mixing of materials with the help of a load sensor, proportioning value and reducing segregation.

The LiuGong CLG5100-2 cold planner is equipped with a Dongfeng Cummins engine and can reach 153 kW net power. The large torque reserve can satisfy both asphalt and cement pavements' milling requests. The 370 l diesel tank ensures continuous operation for more than 12 hours. The radiator can be easily maintained and the hydrostatic drive system can be changed for working/walking modes. According to LiuGong, the CLG5100-2 is one of the first machines in China to use a hydraulic milling system. It is widely used in municipal constructions such as highways, airports and roads.

The LiuGong TC550A crane features an H-shaped outrigger chassis that enhances the crane's stability. The lifting operation



The 890H wheel loader in action.



The CLG950E excavator on display at Bices 2015 exhibition in Beijing.

is powered by an independent engine in the upper part of the crane. The variable displacement pump controls the displacement according to the load change and identifies dynamic power, reducing fuel consumption by 10 percent, while still delivering excellent performance. The U-shaped jib strengthens its lifting capacity. The slewing platform provides overall support for the lifting operation and is always ready for any extreme duty. The platform is covered with an all-shielding frame, which features an upward tilting engine hood in the back. The hood can be easily controlled by an air spring to increase accessibility to the engine and allows easy maintenance. The crane provides an additional GPS monitoring system that offers services like remote fault diagnosis etc. The wide-bodied cab for TC550A is spacious and its full-view glass provides a safer environment for operators.

The LiuGong-Mesto LM J106 mobile crushing station is ideal for crushing hard stones and recycling building materials. Its relatively low operating costs have helped to maximise its value for customers and LiuGong's partnership with major components manufacturers helps guarantee superior cost performance. In addition, the excellent design and manufacturing of structural parts optimises its overall performance. ■



The CLG509A paver.

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Manitowoc's cranes excel in Asia projects

Manitowoc's Grove GMK4100 all-terrain crane recently helped with the construction of a new Mass Rapid Transit (MRT) metro line in Singapore. The four-axle crane was used on the new Thomson Line T209 at the Lentor Station project site. Its compact size made it ideal for the job, with its carrier length measuring just 10.75 m.

The 100 t capacity GMK4100 has a 52 m telescopic boom and a retrofitted data logger. The data logging capability is a requirement for cranes working in Singapore. The crane was used primarily to lift components for the tunnel boring machine. Singapore-based crane rental company Hiap Tong Crane & Transport Pte Ltd supplied the crane to main contractor, China Railway.

In Vietnam, South Korean lifting company Chunjo Construction has used its 2,300 t Manitowoc 31000 crawler crane to help build a petrochemical refinery in the Thanh Hoa province. A consortium of Vietnamese and Japanese companies oversaw the plant's construction, during which the crane erected a variety of heavy process equipment.

The 31000's Variable Position Counterweight (VPC) enables it to use far less counterweight than cranes offering similar capacities. This not only cuts transportation costs, but also means that less ground preparation is needed on the jobsite, further saving time and money for the company. On the jobsite, the 31000 was set up with steel mats, as opposed to traditional timber mats, which further lowered the ground-bearing pressure from 70 per sq m to only 30 t per sq m. This saved additional preparation costs on the project.



Grove GMK4100 being used at the Lentor MRT Station jobsite in Singapore.

The Manitowoc 31000 lifted xylene columns, at weights up to 983 t. It was rigged with 90 m of boom and only 964.11 t of counterweight. The crane's compact footprint, enabled by the VPC, allowed it to fit into narrow working quarters to complete the lifts. It arrived at the jobsite in August 2015, working steadily through September 2015.

In addition, Shubham Civil Projects Pvt Ltd is using a Potain MCi 85 tower crane to help construct a number of local government buildings in Pune, India. The crane is being used to lift steel bars and concrete formwork, as well as for pouring concrete. It has been positioned to access all three buildings, which are situated in close proximity and arranged in a semi-circle.

The MCi 85 lifts 1.3 t at its maximum jib end of 50 m and has a maximum overall capacity of 5 t. The crane offers great versatility too, with the ability to configure its jib between 25 m and 50 m, allowing it to work comfortably on smaller congested city jobsites, while still offering the capability to work on larger projects spread over a wider area. With a freestanding height of 34.5 m plus an ability to climb much higher, the MCi 85 is suited to many of the high-rise projects currently underway in India.

Several Potain MCi 85 A tower cranes are also being used by Shree Balaji Construction on residential and commercial high-rise construction projects of up to 50 stories across Mumbai, India. The MCi 85 A can fit in most standard lift shafts and can be erected within their often confined limits. The crane then climbs as the building is being built. ■

Website: www.manitowoccranes.com



Manitowoc 31000 works on a petrochemical refinery project in Thanh Hoa province, Vietnam.

Expanding Singapore Changi Airport with Volvo fleet

Work on Singapore Changi Airport's Terminal 4 is under way and it is scheduled to open to the public in 2017. The airport currently welcomes around 66 million passengers a year but the introduction of Terminal 4 will see that number boosted by around 16 million passengers a year.

Machines from Volvo Construction Equipment (Volvo CE) can be seen on a variety of projects that make up the development. One contractor with a large fleet on the job is Hwa Seng Builder Pte Ltd (HSB), which is involved in three main areas: a new parking bay; an underpass for taxis; and infrastructure and external works for the new terminal building. For the new parking bay and the construction of the underpass, HSB was appointed as the main contractor. For construction

of the main building at Terminal 4, the company is working as a subcontractor for international contracting giant Takenaka.

For the parking bay, HSB chose several Volvo EC210B and EC330BLC excavators, plus a Volvo SD110 compactor. The parking bay was completed in 2015. For the construction of the taxi underpass, which is still ongoing, HSB is also using mostly Volvo machines, including an EC480DL, which has a vibro attachment for sheet piling work, and an EC330BLC with a long arm attachment to excavate to depths of between 3 m and 8 m. On the construction of the building at Terminal 4 the company has numerous Volvo excavators, again EC210B and EC330BLC models make up the majority.

When completed, Changi Airport's Terminal 4 will be a two-storey building measuring around 25 m high with a gross floor area of around 195,000 sq m. ■

Website: www.volvoce.com



Left and above: Volvo machines being used by Hwa Seng Builder Pte Ltd to work on Singapore Changi Airport's Terminal 4.

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Goldhofer modular vehicles in Indonesia's mega projects

Two Goldhofer PST/SL self-propelled trailers have been used by PT Guna Teguh Abadi (GTA) Construction to work on three mega projects in Indonesia, which involve construction of a fertiliser production plant, a natural gas processing plant and expansion of a chemical production facility.

The natural gas plant, which covers about 1 sq km, is located some 25 km from the town of Luwuk in Central Sulawesi, on the island of Sulawesi, which lies between Borneo and New Guinea. It is being built by a consortium led by a state power utility company and consisting of several international corporate partners.

GTA Construction's PST/SL 22 self-propelled module, supplied by Goldhofer, was used to transport the main cryogenic heat exchanger, with a weight of 242 t, from the unloading point to the plant. With a length of 48 m, an overall travelling height of more than 6.5 m and an overall width of more than 5 m, the operation was challenging. However, the manoeuvrability of Goldhofer's 22-axle self-propelled vehicle ensured that no problems were encountered.

Construction of the fertiliser production plant began in mid 2012 in the Indonesian province of South Sumatra. The project, to which the Ministry of Industry has allocated a budget of about US\$1 billion, is due to be completed by the end of 2016. In addition to completing construction of the production plant, the project includes the construction of warehouses, office buildings and other items. In this project, GTA's two Goldhofer heavy-duty transporters were used for different operations, starting with the transportation of a 630 t carbon dioxide absorber and then a HPLP flash chromatography column that weighed 515 t, from the port to the construction site in Palembang.

With a length of more than 55 m and an overall width in excess of 6 m, the absorber operation was a special challenge for the GTA team. Because of the width of both the absorber as the first load and then the column as the second, a parallel combination with 2x26 axle lines was employed for both loads. For the subsequent transportation of an ammonia converter, a single self-propelled combination with 26 axle lines was used to handle a total laden weight of 787 t.

Lastly, the transportation of a propylene fractionator from place of fabrication to delivery at a chemical production facility in Banten province, West Java, was conducted in two sections. This was due to the challenges presented to GTA of operating in a 'live' environment,



Goldhofer trailers transporting the carbon dioxide absorber in Sumatra (above) and cryogenic heat exchanger in Sulawesi (below).



where the facilities' operational capacity was being increased, whilst production continued unaffected at the site.

The first and lower section of the fractionator weighed 258 t and features 48 m in length, 5.5 m in width and 5.4 m in height. The second section was similar, weighing 222 t with dimensions of 49 m in length, 5.5 m in width and 5.4 m in height. Due to the extreme space confines of the facility, GTA supported each section using two Goldhofer multi-axle units, in order to manoeuvre each one into position for subsequent erection. The 490 hp self-propelled unit was deployed at one end of the fractionator, while the 210 hp self-propelled unit at the other end, both using a six-axle, side by side configuration with turntable trailers.

Founded in 1994, GTA Construction has become one of the market leaders in Indonesia with its particular line of business in construction and maintenance. The company's activities include heavy lifting and haulage, mechanical work, maintenance and piping work within oil and gas refineries, the petrochemical industry, power and cement plants and manufacturing factories throughout Indonesia. ■

Website: www.goldhofer.com



Loading the propylene fractionator on to the Goldhofer self propelled trailers.



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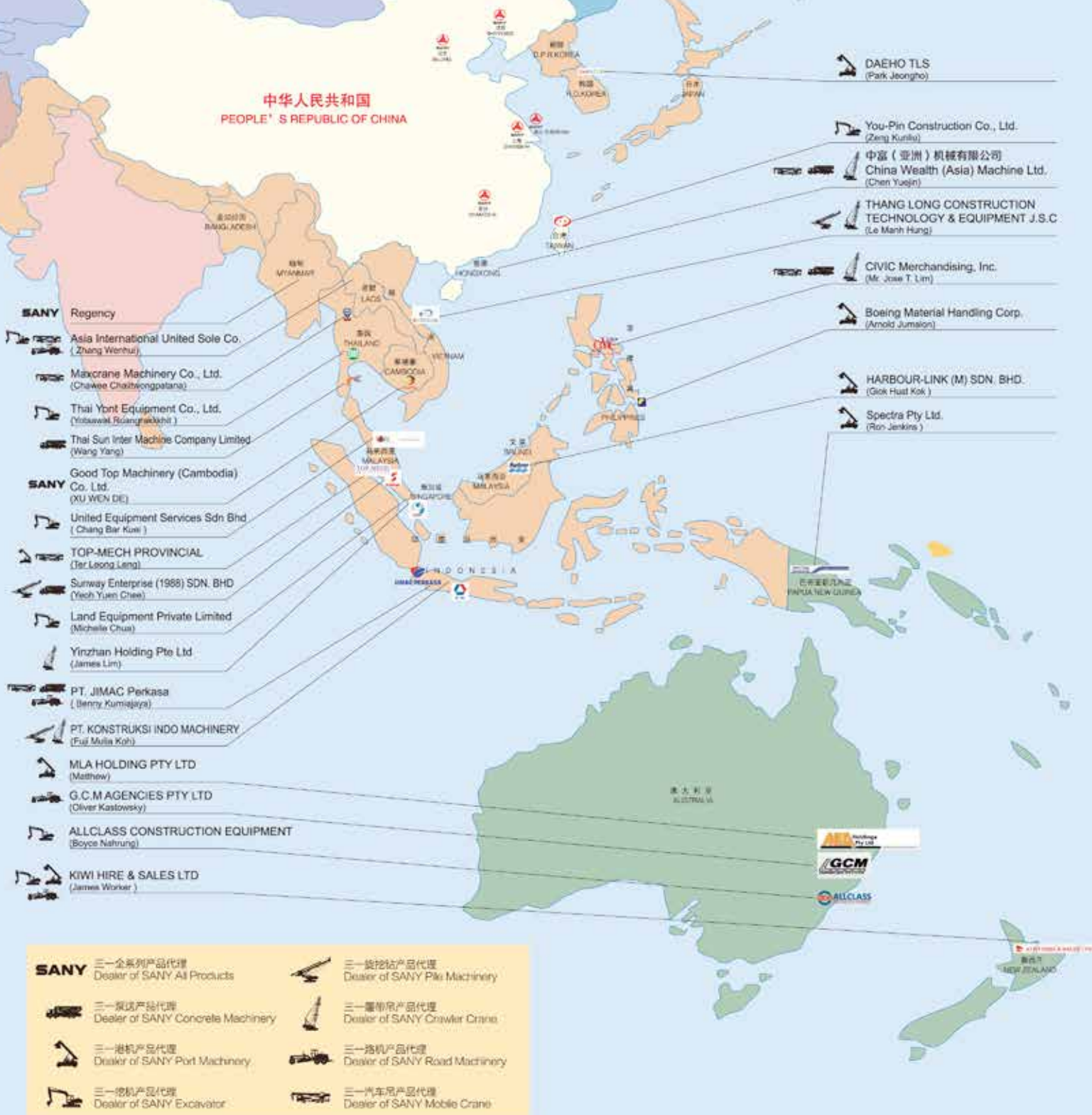


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Peri overcomes challenges on Singapore's mixed-use project

SBF Centre is a new commercial development located at the heart of Singapore's prime financial and commercial hub. Designed by DP Architects, the 31-storey building is expected to be completed by June 2017, featuring a medical centre and modern offices. Garden terraces are spread across several levels to offer a refreshing rounded ambience to the office environment. A sky garden and a 20 m lap pool are some of the highlights. The contractor on the project is Woh Hup Pte Ltd.

The curvature of the building was a challenge that was successfully managed by Peri. Special RCS-P platforms were designed for the corners, and special lipped channels for the platforms were fabricated to suit the requirements of the building.

The Peri RCS protection screen consists of 20 platforms with a maximum platform length of 8 m and typically covering a 5 m floor-to-floor height. To cater for the sky terrace areas, Peri provided a specially designed transfer truss system for the RCS-P platforms to overcome the high void.

The structure of the building shows four lift cores that join together. A total of 15 units of CB 240 and CB 160 climbing systems were installed at three of the lift cores between basement 2 and the rooftop. Nine further units were applied to the lift core that ends at level 9. The CB climbing systems support the wall panels with the brackets providing high bearing capacities. The climbing platform accessories are strong back connectors, carriages and adjustable braces.

The PD8 tableforms are preassembled modular slab formwork units that can be easily moved between floors with a single crane lift. The hoisting platform and material lifter were used on this project to allow quicker and simpler transportation of the PD8 tableforms between the different casting levels.

The different types of galvanised cross braces allow frames to be positioned the most economical way – closer to each other under thick slabs and deep slab beams and further from each other under regular thin slabs. At the same time, higher spindling lengths of up to 880 mm allow the tableforms to be moved underneath deeper beams without the need to disassemble the units.

For the non-typical high void areas at the sky terraces, the ST100 stacking towers were used. The ST100 stacking tower shoring system is easy to assemble as each tower



Above: Peri systems being used at the SBF Centre, a new commercial development in Singapore.

Below, left: View of the hoisting platform and material lifter, with the PD8 slab table ready to be lifted to the next level. The RCS protection screen encloses and protects against falling when working at great heights. This safe working condition results in high productivity.

Below, right: Module tableforms serve as transportable units and leave space for walking ways.



consists of five parts only. These shoring towers can be erected up to a height of 22.29 m; no extra elements are required in case the height has to be reduced. The ST100 towers have a high loading capacity that allows this system to be used under slabs

and deep beams. The swivel head spindles can incline up to 4.4 percent, eliminating the need for timber box-outs. In most cases, the ST100 towers are used as loose form towers, said Peri. ■

Website: www.periasia.com



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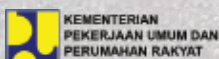
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Sennebogen 6130 HD cranes build foundation for HK skyscraper

Two Sennebogen 6130 HD duty cycle crawler cranes are currently building the foundation of a new skyscraper in Hong Kong. On site, the cranes are used by Tysan Holdings Ltd to dig bore holes to a depth of 90 m.

Combined with a Leffer VRM 3300, with a deadweight of 65 t, pipes with a diameter of up to 3.3 m are driven into the ground. The casing machine is connected mechanically to the crane and is driven hydraulically with a capacity of approximately 800 l/min. Sennebogen's local sales and service partner, Robinson Equipment Ltd, handles the maintenance and regular service.

The 6130 HD features the latest E-series technology and a 708 kW diesel engine. The ergonomic Maxcab, together with four surrounding cameras and numerous LED headlights, offers an excellent overview of the working area and a high level of safety. ■

Website: www.sennebogen.com



The 6130 HD crane performs foundation work for a new Hong Kong skyscraper.

Haulotte scissor lifts assist in Philippines factory expansion

SunPower Philippines Manufacturing Limited, a solar panel manufacturer, was expanding its existing factory at Laguna Technopark in Biñan, the Philippines, with the help of Haulotte scissor lifts. The machines were used for three months starting in August 2015.

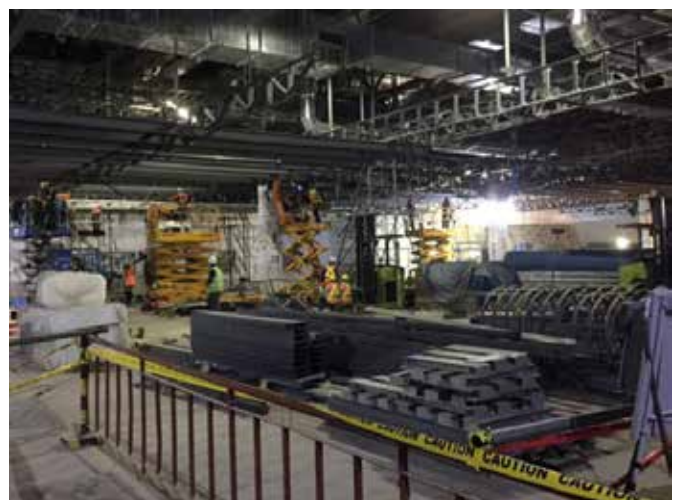
Through Haulotte's dealer, Wilan Merchandising Philippines Inc, SunPower rented both Compact 10 and Compact 12 scissor lifts for metal works, which included the installation of steel truss and piping for fire water.

The Compact 10 is 2.45 m long and 2.26 m high. It features a

working height of 10.15 m and a lifting capacity of 230 kg, with a lifting speed of 22 seconds. The Compact 12 is 2.45 m long and 2.38 m high, featuring a working height of 12 m and a lifting capacity of 300 kg. The scissor lifts also have an extendable platform size of up to 1.20 m.

Both Compact 10 and Compact 12 are 1.20 m wide, making them perfect for use in restricted areas. Along with their robustness, reliability and easy-to-maintain design, the scissor lifts also come with a pothole protection that ensures maximum safety. ■

Website: www.haulotte.sg



Left and right: SunPower uses Haulotte Compact 10 and Compact 12 scissor lifts to help expand its factory in the Philippines.

XCMG completes roadworks on 4,200 m highland

A fleet of XCMG road equipment has completed works on the Gongyu Road, which spans over 630 km long. Crossing the permafrost regions, the road runs from Qiabuqia Town, Hainan Autonomous Prefecture, Qinghai Province, and connects with the section of Beijing-Tibet Expressway (Gonghe Road to Chaka Road) before finishing at Jiegu Town (Xinzhaidong), Yushu County. The altitude of the entire route is above 4,200 m and the permafrost section is 227.7 km, accounting for 35.8 percent of the entire route. The project represents an investment of more than 10 billion yuan.

The XCMG equipment was used onsite for paving and compaction of stable soil base, paving and compaction of asphalt surface and roadbed levelling. The models include an XD131 tandem roller, an XS223J single roller, a GR180 grader and an RP952 paver, as well as XP301 and XP303 rubber-wheel rollers. ■



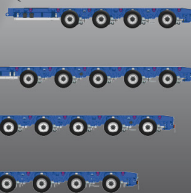
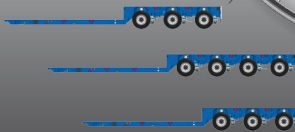
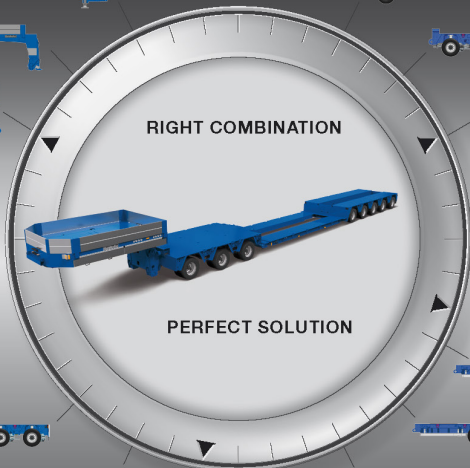
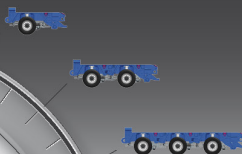
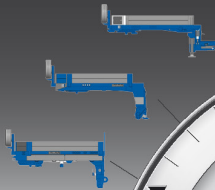
Website: www.xcmg.com

XCMG road equipment works on the Gongyu Road.

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Comansa CM's flat-top cranes gain popularity in Philippines

Comansa CM's flat-top tower cranes have been used widely in the Philippines by Megawide Construction Corporation. The cranes are supplied through Comansa CM's local dealer, Boommate Incorporated.

Among the popular models is the 21CJ290, which is currently working on the construction of University Tower P. Noval, a 47-storey residential building in Manila. The crane, with a maximum load capacity of 18 t, is suitable for the jobsite's narrow space. The crane also uses Comansa CM's internal climbing system, which is tied to the structure of the building and allows the crane to gain in height along with the tower.

In addition, the 21CJ290 has been used for the construction of 43-storey Grass Residences Tower 4 in Quezon City, and more recently the Proscenium complex in Makati City, which includes two towers with 47 and 49 floors respectively.

The other models, Comansa CM's 8 t 10CJ140 and 6 t 11CJ132 tower cranes are also well suited to the Philippine market.

Comansa CM is a sister company of



Comansa CM's 21CJ290 flat top tower crane on the University Tower P. Noval project.

Spanish tower crane manufacturer Linden Comansa. Based in China, Comansa CM offers a wide range of flat-top tower cranes

with maximum loads ranging from 8 to 24 t for various types of construction projects. ■

Website: www.lindencomansa.com

Sandvik VSI produces high quality sand for Taiwanese market

Taiwanese company Chung Kang Aggregate Enterprise operates an aggregate plant and one plant for production of high quality sand used in road construction and civil engineering work. The material is produced from crushed gravel with a work index of 20 and abrasion index of 0.57. The material produced is in great demand as Taiwan suffers from frequent earthquakes and therefore, the specification on the concrete used in buildings and bridges has to be of very high quality.

The sand must be produced in a VSI crusher to meet the required standard. Chung Kang required the production of 60 tph of 0-5 mm sand, and to achieve this the company opted for a Sandvik VSI CV218. The crusher is capable of an average production of 70 tph of 0-5 mm sand. It is a single drive crusher with a 220 kW electric motor, complete with an automatic grease lubrication system and hydraulic tension of the v-belts.

The CV218 is suitable for many applications such as manufactured sand, premium shaped aggregates, recycling industries, industrial minerals industry and the mining industry. Introduced in 2002, Sandvik's line of autogenous crushers, of which the CV218 is but one model, utilises a rock lined rotor to accelerate material. This is then impacted in a highly energised rock lined crushing chamber; this impacts with material falling through the biflow system. The crushers incorporate the Sandvik Hurricane rotor, which became a major breakthrough in VSI autogenous rotor design due to its decreased vibration levels and wear part design, which results in increased crusher bearing life combined with reduced maintenance. Operator safety has also been accounted for, as standard Sandvik VSI crushers are fitted with a timed trapped two key system, which



Sandvik VSI CV218 helps Chung Kang Aggregate Enterprise to produce high quality sand.

ensures the safety of maintenance personnel combined with electrical isolation. Also supplied, and fitted as standard, are a vibration detection switch and a pre-start alarm siren. ■

Website: www.construction.sandvik.com

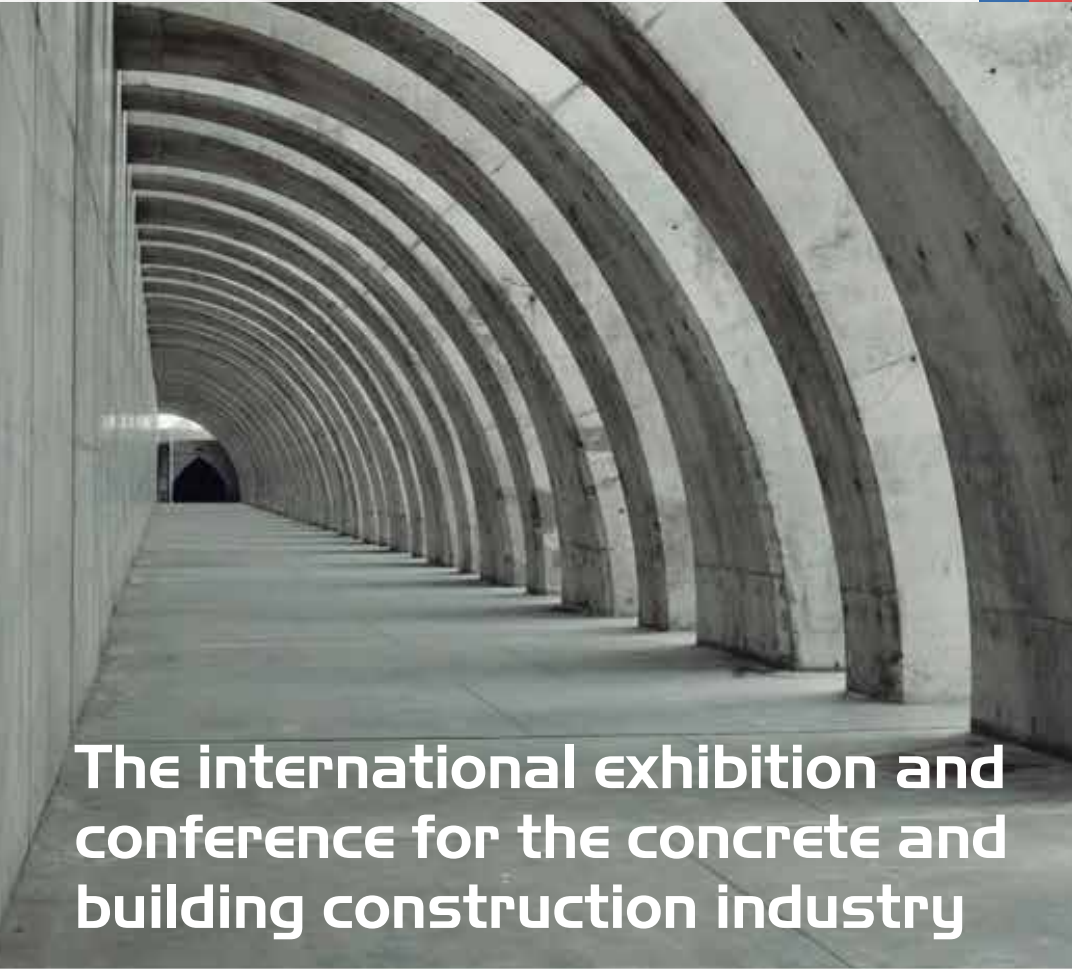


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New Istanbul airport to deploy 58 Liebherr tower cranes

The new Istanbul Airport (İstanbul Yeni Havalimanı) in Turkey, currently under construction, is expected to be the largest airport in the world with around 150 million passengers passing through it every year from 2020. Liebherr has received an order for 58 EC-H series tower cranes for the project; the first of these cranes were recently delivered and will remain installed at the airport until 2018. According to Liebherr, this is the largest single order in the history of Liebherr's tower cranes division.

Preparation on the 9,000 ha site, 35 km to the north from the centre of Istanbul, started in June 2014. Six runways and 165 passenger bridges will be built at this new transport hub. The airport building itself will have a roof that stretches over the halls like a gigantic tent, based on the plan. Skylights at various points will provide daylight to the interior.

The building work will be carried out by Turkish contractor İGA Havalimanı İşletmesi AŞ. A total of 32 cranes of the 280 EC-H 12 Litronic type will work with 16 cranes of the 200 EC-H 10 Litronic type, and will be supported by a further 10



The order from Turkey is the largest single order in the history of Liebherr's tower cranes division.

cranes of 154 EC-H 6 Litronic models. All of Liebherr Litronic cranes have precision, high performance drive units and an intelligent crane control system. Both features ensure a

high level of safety for people and material at hook heights of between 30 m and 60 m with maximum load capacities of up to 12 t each. ■

Website: www.liebherr.com

BME to reduce blast vibrations for Singapore rail project

South African company BME is supplying advanced detonators and expertise to Rock Busters Pte Ltd, a blasting specialist subcontractor to Samsung C&T, for the construction of Singapore's Caldecott MRT Station (contract T213 of the Thomson-East Coast Line project), to blast with the least possible vibration impact protecting nearby tunnels, skyscrapers and other sensitive structures on the land constrained city-state.

According to Umesh Chhika, general manager for Asia Pacific and strategic projects at BME, the company has been engaged to provide electronic detonation systems and related technical advice to ensure low-vibration blasting in the 35-m-deep box cut, from which three more rail tunnels will be developed.

The electronic delay detonators are used in conjunction with the company's in-house AXXIS digital initiation system and supporting software. The timing flexibility of the AXXIS system supports the detonation of small, multiple charges in each blast hole to keep vibration levels down, and the accuracy of the timing between individual charges allows vibrations to be predicted accurately and reliably, explained Mr Chhika.

To further enhance its controlled blasting techniques, BME employs its own BlastMapIII software to plan complex timing designs and also analyse the results for each blast. ■

Website: www.bme.co.za



Left and right: BME plays a role in Singapore's Caldecott MRT Station project, providing electronic detonation systems and related technical advice to ensure low-vibration blasting in the 35-m-deep box cut, from which three more rail tunnels will be developed.

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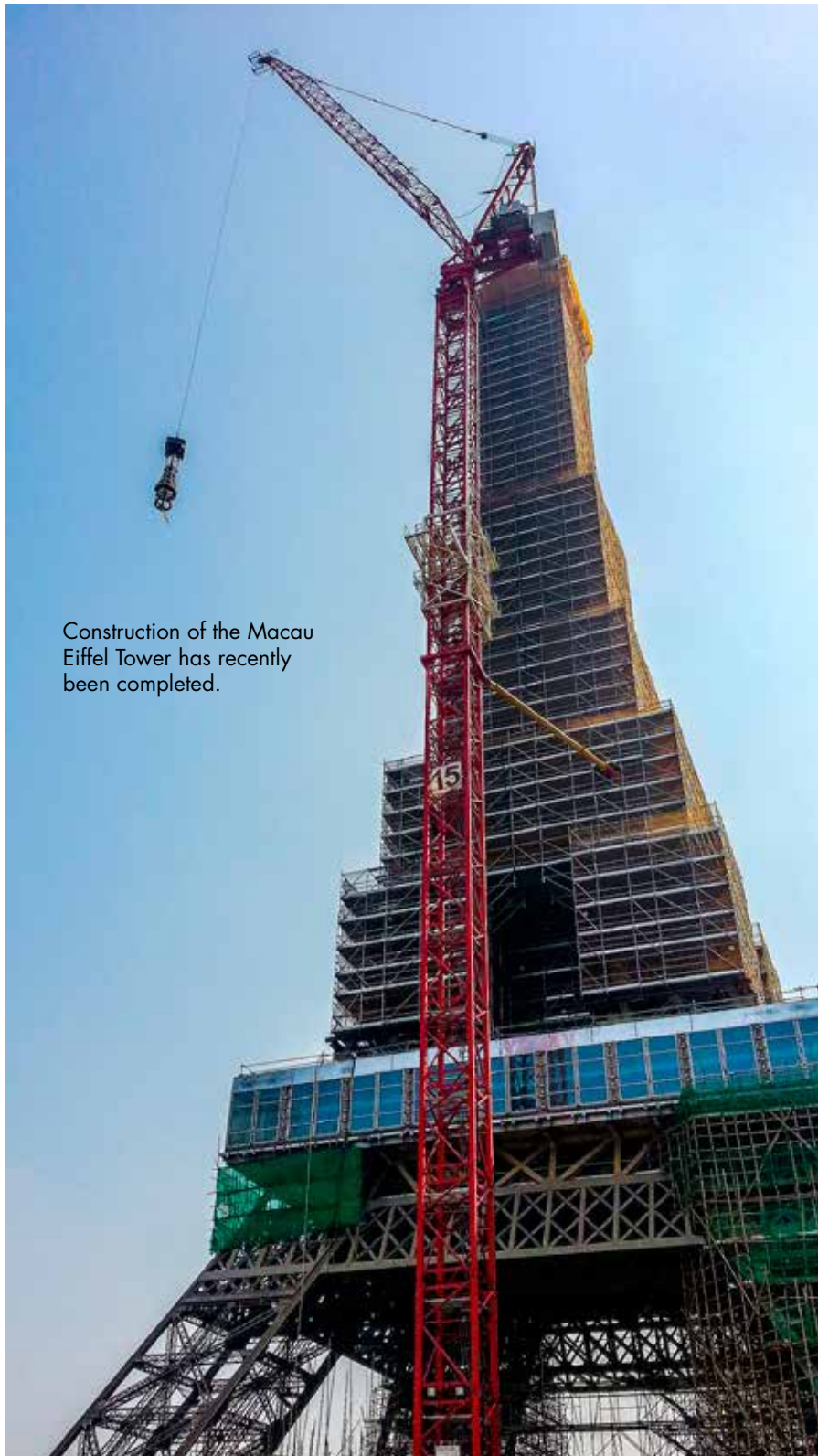
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The PARIS of ASIA



Construction of the Macau Eiffel Tower has recently been completed.

© Aurecon

Construction of the replica Eiffel Tower in Macau has recently been completed. It will form part of the Parisian Macao, an integrated resort currently under development by Sands China Ltd, a subsidiary of Las Vegas Sands Corp. The Macau Eiffel Tower is half the scale of the original.

Global engineering consultant Aurecon was closely involved in the planning and design for this distinctive new structure. The company provided full structural engineering consultancy on the job, and helped manage the difficulties of maintaining an authentic design while addressing the challenges caused by extreme weather, a congested construction site and the anticipated high number of visitors.

At the project's outset, Aurecon provided the drafting of the tower using Revit software, which allowed the team to visually represent the complicated design connections in 3D. This made it easier to detect any potential challenges or clashes that might arise during construction even before building work had begun. As a result, this ensured time-consuming amendments at the shop drawing preparation or fabrication stage were avoided.

According to Dr Aleks Chong, Aurecon's project leader on the Macau Eiffel Tower, a close co-operation between the design and construction teams started at the earliest stages of the project, and has delivered efficiency improvements from the beginning. "The original structural performance criteria for this project were specified at an early stage and were largely based on the criteria commonly used for conventional office or residential buildings," he said.

"However, given that the tower behaves as a slender, open-lattice structure, some of the serviceability performance criteria were too conservative and after consultation with stakeholders, these were subsequently relaxed. So, clear communication between the design and construction teams, supported with sound technical evidence, delivered an outcome that would allow the design team maximum flexibility."

Seasonal typhoons and visitor traffic

Among the biggest challenges for the design team was addressing the issue of typhoons, which occur seasonally in Macau.

In particular, the design team had to ensure it made the correct critical wind loading calculations for the tower in the event of a direct hit from a typhoon.

“We used the Equivalent Static Wind Loads (ESWL) approach developed for towers to determine the critical wind loads,” said Dr Chong. “We also ran a series of studies to investigate the wind-induced dynamic response at the tower’s top peak at various wind speeds. And we then looked at the subsequent impact on human comfort in terms of potential vibrations. Our thorough investigations and scenario planning allowed the project team to ensure not only an aesthetically pleasing and accurate design, but also a safe one.”

A further challenge for the design team was accounting for the very high number of visitors the attraction is likely to draw. In particular, said Dr Chong, the team focused on the footbridge that will connect the tower with an adjacent casino complex.

“After discussions with the developer we knew that anticipated visitor traffic on the footbridge would be high as it is the main access point between the hotel complex and the tower. As a result, we adopted an acceleration-based vibration assessment method to review the bridge’s design taking into account the loading caused by crowd walking. We used superposition to look at responses caused by various vibration modes to get to an overall vibration response, which we then established was within acceptable human comfort levels,” explained Dr Chong.

Large steel sections

Outside of the challenges directly linked to the tower’s design, Aurecon and its partners also had to contend with some more practical difficulties related to the construction work. Specifically, how to get the large steel sections needed for the tower’s construction to the job site and, once there, how to assemble them.



© Sands China Ltd

The Macau Eiffel Tower is half the size of the original and retains many decorative features of its Paris cousin, including cornice scrolls, balustrades, gussets plates, lattices, staircases and mesh screens around the observation decks.

“The port of Macau is neither large enough nor deep enough for the vessels that would normally deliver the oversized steel sections needed,” said Dr Chong. “As a result, the job had to request shallow-hulled vessels, but this limited delivery capacity. This, in turn, meant we had to plan the size of the delivery racks, to maximise delivery capacity and minimise delivery costs, which were estimated as being anything up to a quarter of the overall material cost.”

And on the job site itself, there was a challenge presented by the selection of the tower crane needed to place the steel and other building materials, added Dr Chong. “On a traditional concrete building the tower crane is attached to the construction as it climbs, offering lateral rigidity so the crane can be raised higher and higher.

“But because the replica Eiffel Tower is

such a slender structure, the support for a regular tower crane is not there. The tower crane selection was therefore a complicated process that required full collaboration between the construction manager, the design engineer and the tower crane manufacturer because we had to select a crane and configuration that would avoid large lateral loads being transferred to the tower.”

The solution came in the form of a luffing jib crane, which can articulate its jib between the horizontal and near vertical angles. Using such a crane, and fitting it with a shorter jib, meant less of the lifting force was distributed laterally and more was directed down the crane’s mast. With a maximum hoisting capacity of 28 t, the crane facilitated the modular construction method on site, overseeing the fast and safe installation of building elements.

AMONG THE BIGGEST CHALLENGES FOR THE DESIGN TEAM WAS ADDRESSING THE ISSUE OF TYPHOONS, WHICH OCCUR SEASONALLY IN MACAU. IN PARTICULAR, THE DESIGN TEAM HAD TO ENSURE IT MADE THE CORRECT CRITICAL WIND LOADING CALCULATIONS FOR THE TOWER IN THE EVENT OF A DIRECT HIT FROM A TYPHOON.

“Recreating the Eiffel Tower using modern steel construction technology is vastly different from working with the wrought-iron that features on the original,” explained Dr Chong. “Extensive consideration had to be paid to disguising the modern steel construction while at the same time, achieving a cast-iron lattice appearance. It’s been immensely satisfying to see this truly inspired structure come to fruition. And it’s been rewarding to see how the extensive use of advanced techniques such as finite element analysis, 3D drafting and shop drawing preparation have delivered successful solutions for the design, fabrication and erection of the complex lattice geometry on this project.”

Standing next to another distinguishable Sands development, the Venetian Macao, the replica Eiffel Tower at the Parisian Macao is set to become both a landmark feature and a popular outlook, offering guests and visitors alike spectacular views of Macau’s bustling Cotai Strip. The tower is half the size of the original and retains many decorative features of its Paris cousin, including cornice scrolls, balustrades, gussets plates, lattices, staircases and mesh screens around the observation decks. ■

“ BECAUSE THE REPLICA EIFFEL TOWER IS SUCH A SLENDER STRUCTURE, THE SUPPORT FOR A REGULAR TOWER CRANE IS NOT THERE. THE TOWER CRANE SELECTION WAS THEREFORE A COMPLICATED PROCESS THAT REQUIRED FULL COLLABORATION BETWEEN THE CONSTRUCTION MANAGER, THE DESIGN ENGINEER AND THE TOWER CRANE MANUFACTURER. ”



A luffing jib crane was used on the project, which can articulate its jib between the horizontal and near vertical angles. Using such a crane, and fitting it with a shorter jib, meant less of the lifting force was distributed laterally and more was directed down the crane’s mast.



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The construction site of Contract 823B, which is being carried out by the Maeda-China State JV.

GUANGZHOU - SHENZHEN - HONG KONG EXPRESS RAIL LINK

The Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) has been in construction since 2010 and will be opened in phases between 2011 and 2017. The project aims to connect Hong Kong with some major cities in mainland China including Guangzhou and Shenzhen. The XRL Hong Kong section is under the management of Mass Transit Railway Corporation (MTRC), which features 26 km long and comprises several tunnels. The project costs US\$8 billion and is split into nine contract packages.

Drill-and-blast, mixed ground TBM and cut-and-cover tunnelling methods are applied in the excavation of XRL. Apart from construction of the railway network, establishment of related facilities is also essential in providing an efficient, safe and convenient transportation system to the public. Among them are emergency facilities designed for emergency evacuation and maintenance units, which are critical for every rail track. There are eight emergency access points along the XRL and an emergency rescue siding (ERS) located approximately in the middle of the XRL route. The 1.24-km-long stabling sidings and ERS are located in Shek Kong.

Waterproofing on Contract 823B

The Contract 823B project was designed by AECOM and awarded to the Maeda-China State Joint Venture. It includes the formation of a 27-ha jobsite covering maintenance and plant buildings, the ERS, drainage system, water course diversions, roadwork, noise barriers, landscaping and linked habitat compensation works in Shek Kong.

Mapei played a role in this project by supplying its pure and hybrid polyurea waterproofing membranes for use at the building rooftops and sections of the tunnels respectively. At the rooftops of maintenance and plant buildings, Mapei's Primer SN two-component epoxy primer and Purtop 1000 two-component, solvent-free, pure polyurea membranes were used to waterproof a total area of about 28,000 sq m. Mapei's Mapeflex PU45 was used to repair pinholes and for defect fixing purposes.

For sections of the tunnels, Mapei's Primer SN and Purtop 400M two-component, solvent-free, spray applied, hybrid polyurea membranes were used to waterproof an approximately 18,000 sq m area. The waterproofing membranes were chosen due to their chemical resistance, flexibility and tear strength characteristics to fulfill the specific requirements for each location.



The rooftop of a maintenance and plant building.



Above, left and right: Applying Mapei Purtop 1000 pure polyurea membrane at different areas of the rooftop.



Above, left and right: Applying Mapei Purtop 400M hybrid polyurea membrane at a tunnel section.

The article on pages 78-79 courtesy of *Reada Mapei International* no. 51



Excavation on Contract 810A

One of the stations along the Guangzhou-Shenzhen-Hong Kong XRL is the West Kowloon Terminus (WKT), which is situated in the Hong Kong section. This underground station features a four-level structure built to a depth of 30 m, with a footprint of 11 ha, 15 platforms, customs and immigration facilities, departure lounges and retail outlets.

A particular challenging area of the WKT works is the north top-down section where the 15 tracks merge towards the two running tunnels. It requires completion of a slab at first basement level to act as a solid strut between the completed diaphragm walls that surround the site. Excavation then continues below the slab.

Two contractors are undertaking this part of the works under two separate contracts for the MTRC, with the largest contract being 810A, awarded to the Leighton-Gammon Joint Venture. The JV is excavating 1.7 mil cu m of earth, and placing 600,000 cu m of concrete and 150,000 t of steel reinforcement. The technique used by the JV is to combine the mechanical breaking of the rock with a drill and blast operation, which could lead to timesaving on the excavation. The decision to use explosives was made in the middle of 2014, with the first blast taking place on 22 September 2014. Projections are that the final excavations will be completed by the first quarter of 2016.

The JV had already chosen to use Sandvik Ranger DX700 top-hammer drill rigs for the drill-and-split operation. It now decided on adding DQ500 units, plus one Dino DC400Ri unit, which have the capacity to match the demands of drill-and-blast along with the manoeuvrability to work between the support columns and under the restricted head height.

According to Kenny Chen, sales manager of Sandvik Hong Kong,



Top: Inside the excavation.
Above and below: Sandvik DQ500 rigs drilling holes for the drill and blast operation.



the peak deployment of the drill rigs will see a total of 22 units working underground. “These will comprise nine DQ500 units, one remote-controlled Dino DC400Ri, and a total of 12 Ranger DX700 or 800 models. Leighton already owned two DQ500 units, and we are supplying 14 other rigs on a rental agreement. Local sub-contractors are supplying the other units. All the 14 rental units are new, and are being delivered from the factory in Finland.”

Sandvik is supplying its own drill bits as well, regrinding them at its depot in the New Territories. The entire manpower for the rigs, operators and service personnel are also Sandvik employees. The Sandvik staff total 14, including four maintenance engineers who are resident on the site. In addition, Sandvik has a regular data analysis that details the performance of each machine. “From that, we can see how effective is the drilling, how the wear on the drill bits is progressing, and how we can extract the maximum in performance,” said Sean Warren, plant manager of the JV.

The granite that has to be broken and removed from the WKT excavation is “extremely tough, very competent, has a very high UCS, minimal jointing and is very coarse grained,” said Francis Haden, blasting manager of the JV. “Once you get through the softer upper layers and into the bedrock, it is massive, flawless. On the western side of the excavation the joint sets are 17 m apart. We are working on top of the rock, and the circumstances make this unlike any other blasting project that has been undertaken in Hong Kong.”

Mr Haden also explained the importance of drilling flexibility. “When you are blasting a tunnel, you have a generally standard cross section on the tunnel face, and you drill to a set pattern. When you



The Contract 810A is awarded to the Leighton-Gammon Joint Venture. The JV is excavating 1.7 mil cu m of earth, and placing 600,000 cu m of concrete and 150,000 t of steel reinforcement.

are quarry blasting, you are marking out your set volume. But here, we are essentially scalping the top of the rock heads to create flat, level benches. In order to get that level surface we have to drill holes of different lengths. So we might be drilling 1.2 m deep, we might be going to 2.4 m or 3.3 m, and the holes can be fanned, or vertical, or horizontal. Drilling flexibility and the ability of the rigs to work their way into confined areas are therefore extremely important.”

Continued overleaf...



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This is where the DQ500 rigs come into their own, equipped with 48 mm A330 button bits proving themselves drilling the blasting holes. “In places where the DQ500 could not go, the Dino can be sent in on remote control. We have found this to be a very workable solution, because this is essentially for small-scale work and we can deploy the Dino quickly and with ease around what is a very congested site. In some places the steel structural support is spaced at only 6 m and so you have to have something that has a high degree of rotation,” explained Mr Warren.

DQ500 operator Tang Kin Hung said that the rigs are drilling a rectangular pattern with 0.5 m spacing, and that an average of 500 holes is needed per shift. “We have no difficulty in meeting this target, despite the toughness of the granite. Our only real problem is space and accessibility.”

The Dino DC400Ri has proved to be perfect for such tricky work. “The Dino works where the DQ500 cannot access,” said Wong Ka Po, one of the operators assigned to the Dino DC400Ri. “This unit is fully remote controlled and is equipped with a 48 mm bit. We can send it close up against the structural elements and the retaining wall.” The blast holes are packed with 32 mm by 200 mm cartridges, with up to three being used in one hole in a method known as triple-deck blasting. The usual delivery to the site is 200 kg of explosive per day.

The Ranger DX700 and DX800 rigs are equipped with either 102 mm RT300 button bits or 127 mm RT330 button bits to drill the holes for the mechanical splitting operations. The drill bits are sent to the Sandvik depot after 60 m of drilling, where the buttons are reground. An electrolysis steel depletion machine is used to remove worn steel from around the carbide on the button bits before regrounding the buttons.

“We need only place the bits into the machine’s salt solution and then run a low DC voltage through the solution,” said service representative Chiang Kwong Chuen. “There is no need to use any handheld grinding wheel on the bit, so that means there is no noise or dust, and it is also faster. We can also reclaim spent carbide from bits that we could no longer regrind. In this way we are sharpening each bit up to eight times, which is very cost-effective when you consider the toughness of the granite.”

Mr Haden said that the quota for the drilling and blasting operation is to break on average 200 cu m per day, and that the figure more usually achieved is 250 cu m. So the advantages of drill and blast are becoming very apparent. “Mechanical splitting works but it is very plant intensive. The drill and



Sandvik Dino DC400Ri drill rig is used in areas where the DQ500 cannot access.



Above: Sandvik Hong Kong depot. Left: The drill bits being used on the project.



From left: Sean Warren, plant manager of Leighton-Gammon JV; Francis Haden, blasting manager of Leighton-Gammon JV; and Kenny Chen, sales manager of Sandvik Hong Kong.

split team has the advantage in that they can begin work at 7 am in the morning and because they have a construction noise permit they can work as late 11 o’clock at night.

“Time-wise, compared with drill and blast, they have double the time that we have. We don’t receive our explosives until about

mid-day, and we generally fire at 7 pm. We have a much smaller team than they have, and fewer drill rigs, and we have to drill more holes, although of smaller diameter.

“But even with the various constraints, the blasting team is still breaking comparable volumes of rock.” ■

Information on Mapei waterproofing products on Contract 823B (pages 78-79): www.mapei.com.hk
 Information on Sandvik drilling rigs on Contract 810A (pages 80-82): www.construction.sandvik.com



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TURKEY DAY



The Regnum Carya Golf & Spa Resort in Antalya, Turkey, was opened in mid 2014 in preparation for the Expo Botanik 2016. The 500 m approach road to the hotel was completed in April 2014. The roadworks, carried out by road construction specialist Antmos Asfalt, comprised a 15 cm crushed-stone base and a 10 cm asphalt base. The company's contracts involved access roads, connecting roads and highways with varying requirements – encompassing everything from pure pavement rehabilitation jobs to the construction of new roads.

The Antmos Asfalt paving crew started by laying a 15 cm crushed-stone base followed by a 10 cm asphalt base. The company used its Vögele Super 1900-3 paver, which came with a Vögele AB 600 TV extending screed equipped with tamper and vibrators. This screed has a basic width of 3 m and extends hydraulically up to 6 m. As on this job the total pave width ranged between 10 and 12 m, the Super 1900-3 laid two strips of



Top and above: Antmos Asfalt works on the 500 m approach road to the Regnum Carya Golf & Spa Resort in Antalya.

4.5 to 6 m each. Due to this, the machine had to be repositioned several times.

The AutoSet Plus repositioning and transport function helped to ensure a consistent paving quality. It works as follows: the paver is put into transport mode automatically with a single push of a button before repositioning – the hopper front, auger, screed and deflectors in front of the crawler tracks are raised, conveyors are reversed, the screed is locked in position and all the settings are saved. After repositioning, another push of the button is all it takes to reset the systems to the previous working positions.

As mentioned, the pave width of each strip varied between 4.5 and 6 m. The Vögele AB 600 TV extending screed allowed changes to be made in the pave width without the need for any conversion on the paver. The work was made easier by the Dash 3 function. The ErgoPlus 3 screed operator's console comes with the SmartWheel system for infinitely variable screed width control.

“With the SmartWheel, I can infinitely extend and retract the screed with one finger. And I can do this at two speeds: slow if I want to go along an edge or fast if I want to extend or retract the screed quickly,” said screed operator Hüseyin Arkoc.

In addition, the PaveDock Assistant simplified the process of transferring the mix from the lorry to the paver through the use of clear light signals, e.g. for reverse, stop, dumping the mix, etc. ■

Website: www.wirtgen.com.sg



The Vögele Super 1900-3 paver helps Antmos Asphalt to perform efficient roadworks.



Right: The paver's AutoSet Plus repositioning function ensures a consistent paving quality.

Below: The Vögele AB 600 TV extending screed with tamper and vibrators is seen here with new walkway and footstep.





IN THE ICY NORTH

The Muskrat Falls Hydroelectric Generating Facility is located on the Lower Churchill River in the province of Labrador, Canada. It consists of a generating plant, four turbines, a central dam and adjoining north and south dams. In the power house there are four power plant units, each of which has a 206 MW Kaplan turbine, an inlet, a half spiral and an intake manifold. A total of five spillways are being built to prevent flooding.

The hydroelectric power station has been designed to meet strict environmental requirements and its sustainable structure has been certified by LEED (Leadership in Energy and Environmental Design).

With an output of 824 MW, it will supply homes and businesses across the provinces of Labrador and Newfoundland with renewable energy, using about 40 percent of the power generated. A further 20 percent will be used to supply Nova Scotia, and the remaining 40 percent will be exported to Atlantic Canada or New England.

Developed by Nalcor Energy, the project is being constructed by Astaldi Canada. Work started in 2014 and is scheduled for completion in 2017.

The commissioning of the hydroelectric power station in Muskrat Falls will allow for the closing of a coal-fired power plant in the



The Muskrat Falls Hydroelectric Generating Facility consists of a generating plant, four turbines, a central dam and adjoining north and south dams.

province. This represents a major step toward sustainable environmental protection.

Formwork solution

Doka formwork solution has been selected for use in the project. It requires customised solutions and an immediate response to rapidly changing weather conditions. The housings and formwork systems must be largely heated. Storage and assembly is



Above and below: Construction work is also carried out during the night.



not possible on site due to extremely low temperatures. For this reason, the individual components weighing many tons were pre-assembled and transported 2,400 km by truck from Toronto to Muskrat Falls. Accurate work and precision planning were thus critical in the preparations for the project.

Another challenge is the formwork for the turbine's outer walls. The walls have to be shaped into a precise hydrodynamic form, which requires the utmost perfection in the interplay between the concrete surfaces and steel. The formwork is constructed so that steel mounting parts can be easily attached. In some areas, special formwork was adapted precisely to the steel liners. Short-term modifications, for example, due to changes in the weather, were managed successfully with just-in-time delivery of formwork materials.

The Doka Top 50 large-area formwork is combined with the high-performance D22 dam formwork to build the asymmetrically-shaped concrete structure. The slabs for the powerhouse, which are up to 4 m thick, will also be formed using the Top 50 large-area formwork, with the support of Staxo 100 load-bearing tower. The Staxo 100 system has been especially designed for very high loads and is therefore suitable for the construction of this type of structure.

In addition, the Framax Xlife framed formwork is being deployed, as well as various tie rod systems and support trestles. The preassembly in Toronto was carried out primarily for the Top 50 large-area formwork, the working platforms and for specific special formwork for the turbine outer walls. At the time of project completion, Doka said it will have about 5,000 working and protection



platforms and over 16,200 sq m of Top 50 large-area formwork on site.

“I have 35 years of experience in this field, but the site at Muskrat Falls is clearly the most complex and challenging project that I’ve ever been involved in,” said Peter Friesenegger, head of the engineering department at Doka’s Amstetten headquarters.

Indispensable support is also being provided in these special weather conditions by the Doka Concremote. This technology enables real-time online measurement of both concrete strength and temperature development. The concrete strength development, for example, allows users to calculate striking times, treatment times and prestress points. Measurement of thermal changes is important in order to monitor the stress caused by temperature differences in a component. This helps to prevent cracks and subsequent damage to the building. Doka Concremote concrete monitoring enables users to take the right steps on the basis of concrete strength measurements, and thus securing and accelerating the building process.

In such complex and challenging project, safety is a top priority. All D22 climbing platforms have integrated ladder systems and stair towers to ensure that



Top: Five spillways, central dam and the power house.

Above: Detailed view of the one-sided starter formwork for the spillway separating wall. The formwork works without special slots.

personnel can work safely on the platforms. The Staxo 100 load-bearing tower ensures safe ascents and descents by way of ladders featuring non-slip rungs and continuous railings integrated into the frames. Personal safety is assured by attachment points for

personal protective equipment. Flexible handrail clamps in the transition areas, as well as pre-mounted platform linings provide maximum safety on the construction site. ■

Website: www.doka.com



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RUNWAY SUCCESS



The new southern runway at the Fort Lauderdale-Hollywood International Airport was built on an 18.3 m high man-made embankment that crosses over an existing highway and railroad line.

The Fort Lauderdale-Hollywood International Airport in Broward County, Florida, USA, was previously dealing with departure delays on every single flight. The length of an existing runway, 9R-27L, was not long enough anymore at 1,615 m. The Broward County Board of County Commissioners created a plan to extend the southern runway to 2,438 m to accommodate the larger commercial aircraft in operation today.

To create enough area for the longer runway, a new 18.3 m high man-made embankment had to be built. And to the west of the new embankment, concrete bridge structures had to be built to support the runway extension and adjacent taxiway as it crossed over US Highway 1 and the Florida East Coast Railroad line.

Archer Western Construction LLC, based in Tampa, Florida, won the bid for the grade work, subbase preparation and concrete slipforming of the airport's new runway and taxiway. Due to delays on the project, the company had to carry out its portion of the work while the other major contractors finished the embankment and bridge structures.

Paving challenge

Archer Western's paver for the project was a Gomaco four-track

GHP-2800 with Leica Geosystems 3D machine guidance. "For our subbase, we used the 9500 placer. On the concrete paving we used a PS-2600 placer/spreader with a GHP-2800 paver setup at 5.7 m wide, followed by a T/C-600 texture/cure machine. We ran stringless with a Leica Geosystems setup. Then, for our hand pours, we used the 9500 and RTP-500 placers," explained Justin Cooper, project manager of Archer Western Construction.

Paving work on the new runway began in February 2014. As grade work was completed, subbase could be placed. Archer Western used its Gomaco 9500 to place the 152 mm thick cement-treated base (CTB). Originally, the plan was to pave the new 2,438 m long concrete runway in 610 m sections. Project phasing would not allow for that and paving runs were shortened to 457 m in 10 hour shifts.

The concrete for the project was mixed on site in the company's portable batch plant. Requirements called for a standard P-501 concrete, 650 flex airfield mix. The concrete had fly ash added and used manufactured sand instead of natural sand. Slump averaged 19 mm. The plant batched 7.6 cu m loads and eight to 10 trucks worked to supply the concrete to the paving site. The end-dump trucks unloaded onto the large conveyor belt mounted on the left side of the Gomaco PS-2600 placer/spreader.

“This was a basket job with dowel baskets every 6.1 m. The dowels were 38 mm and placed on 457 mm centres,” explained Mr Cooper. “With the slump of the concrete being as low as it was, you get that initial set and the PS-2600 placer gives you a better tolerance for running that GHP-2800 behind it and achieve a smooth finish.”

The Gomaco GHP-2800 slipformed the new runway in 5.7 m wide, 419 mm thick paving passes with a standard crown down the middle. At that width and thickness, each 305 mm of new runway lane required nearly 0.8 cu m of concrete.

The paver is equipped with a Leica Geosystems 3D guidance system, eliminating stringline from the site. Since most of Archer Western’s paving was done at night to accommodate the subtropical heat of southern Florida, the 3D system offered a distinct advantage.

“There’s nothing to trip over,” said Mr Cooper. “At night we used to have to make sure we had lighting all the way up and down the project so the guys didn’t run into the stringline. Now, we don’t have to set up the whole lane at once. We can move the light plants along with the paving equipment. That’s nice.

“It’s worked out well for us. We also used our Leica Geosystems setup on the CTB placement, so we went stringless all the way from subgrade up. We had some initial setup with 3D getting things warmed up and getting the system down. We’ve learned to do a dry run at the beginning of each shift. We’ll back the paver up 18.3 m prior to the actual concrete coming into place to make sure the paver is coming in at the right elevation and not making any adjustments when it gets to the start of the paving.”

The weather proved challenging as well on the project. Rain showers would hit every night, sometimes twice each night, and Archer Western had to be ready to cover its fresh concrete at a moment’s notice. “This is a first for me to come pave this far south and when we were in the heat of paving, it would rain just about every day,” said Mr Cooper. “At first we wondered how in the world are we going to pave this with all of the rain? The guys became good meteorologists out in the field at night and we did a lot of covering with plastic.”

Slipforming the runway was divided into eight paving lanes. Smoothness specifications using the two-tenths blanking band and edge slump requirements had to be met on all areas of the new concrete pavement. “Our quality is very good on the pavement and we took no deductions for PWL (percent within limits) specifications,”



Above: Archer Western Construction slipformed the new 2,438 m southern runway with its Gomaco PS-2600 placer/spreader, GHP-2800 paver and T/C-600 texture/cure machine.

Below: The GHP-2800, using a Leica Geosystems 3D guidance system, comes off the evening’s header and paves down ramps off the new 419 mm thick section of runway.



said Mr Cooper. “We were allowed a 4.9 m straightedge and had to use a two-tenths blanking band with a profilograph. The cutoff for payment was 110 mm/km and we typically ran in the 32 mm/km range.

“When we ran our straightedge behind the machine, we had to ensure there was not excessive edge slump as part of our quality checks. That was the biggest challenge because that manufactured sand is a little harder to finish, but the paver handled it and built a good edge.”

A Gomaco T/C-600 texture/cure followed

the paver applying a burlap drag finish and a white spray cure. Transverse joints were saw cut into the new runway every 6.1 m.

With the project complete, the new runway’s designation changed from 9R-27L to 10R-28L. “We did a lot of concrete work in a small amount of time, basically completing the runway portion of the project in five months,” said Mr Cooper. “We’ve had a lot of good feedback about the new runway and the tower is very happy to have a second runway operational.” ■

Website: www.gomaco.com



An aerial view of Lima Convention Centre during construction.

LIMA RISING

The newly opened Lima Convention Centre in Peru recently hosted the Annual Meetings of the Board of Governors of the World Bank (WB) and International Monetary Fund (IMF). The facility spans an area of 85,441 sq m in a predominantly residential district. Rising 10 floors above ground level, it also features four underground parking levels that can accommodate more than 900 vehicles. Eight floors of conference rooms offer 14,925 sq m of meeting space with a total capacity of 9,950 people. The top floor features an exhibition room covering 5,250 sq m.

Precision lifting

Construction of the Lima Convention Centre had a scheduled time frame of only 15 months. To help speed up the project, Lima-based heavy lifting contractor Grúas y Maniobras used the Terex Superlift 3800 lattice boom crawler crane. “It’s versatile and mobile, features cutting-edge technology and is designed to handle lifts quickly and with utmost precision, which is exactly what we needed for a demanding and complex project like this,” said José Arturo Sánchez Torres, general manager of Grúas y Maniobras.

In November 2014, Grúas y Maniobras prepared its 650 t

Superlift 3800 crawler crane for the 25 km journey from the company’s headquarters in the San Juan de Lurigancho District to the east side of Lima, where the convention centre is located. Transporting the enormous crane, as well as its boom sections, counterweights and fixed jib took a total of 35 transportation vehicles.

“The way the Superlift 3800 is designed makes it possible for users all over the world to get it ready to go quickly and efficiently, all thanks to how its smaller boom sections can be nested inside larger ones and to the fact that none of its components has a width of more than 3 m,” said Carlos Ojeda of Ferreyros, Terex crane distributor that supplied the Superlift 3800 to Grúas y Maniobras. “Once at a work site, features such as its quick-connection system make it possible to install and remove the superstructure in less than 15 minutes, speeding up the unit’s setup.”

The components’ relatively narrow transportation width proved to be an enormous advantage for the project. “We set up the crane in a residential area right in the middle of the city, which meant there was very little space to manoeuvre in when getting the machine to the site,” explained Mr Sánchez. “However, the crane’s design made getting to the site and setting up the machine there extremely

easy.” Once the crane components made it to the convention centre construction site, Grúas y Maniobras’ crew of 12 had the Superlift 3800 crane assembled and ready for work in only four days.

For the heavy lifting, the crane was equipped with 96 m of main boom, a 12-m light fixed fly jib and Superlift structure to help boost lift capacities when working at maximum radius. Full counterweight of 165 t was positioned on the variable-position Superlift tray and another 50 t was placed on the super structure.

Grúas y Maniobras used the crawler crane to lift and install the building’s preassembled beams and girders. “The segments weighed up to 40 t each, and we worked the crane at a maximum radius of 90 m and a height reaching 38 to 40 m,” said Mr Sánchez. This was well within the Superlift 3800 crane’s capacity of 58 t when working at this radius.

Operating a crane of this size in a residential area can be challenging, but the crew and Superlift 3800 crawler crane were up to the task. The obstacles in the way of the lifts included banks, a government building, and heavy vehicle and pedestrian traffic. “However, the crane features extremely precise controls and is easy to operate and manoeuvre, so performing the actual lifts ended up being quite easy,” added Mr Sánchez.

Depending on the phase of construction, crews performed an average of 12 heavy hoists every day with the crawler crane. Working on a large structure spanning more than 8.5 ha made it necessary to move the crane a number of times, but, according to Mr Sánchez, the fact that they were able to use the crane with a very large radius made a significant contribution to the lifting operations’ efficiency.



Having a tight deadline, Grúas y Maniobras used the Terex Superlift 3800 lattice boom crawler crane to help build the new convention centre.

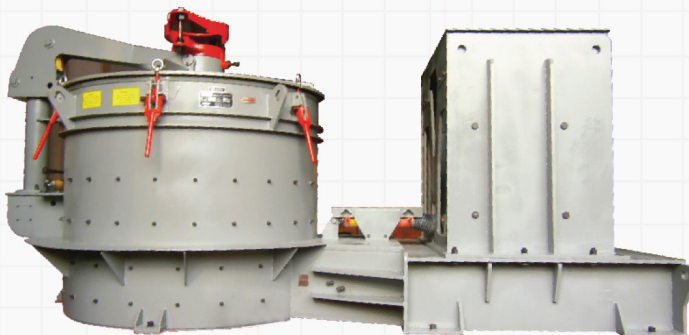
“Thanks to the Superlift 3800’s capacity, we needed to move it fewer times, and the time saved as a result meant we were able to cut down on man-hours and other costs.” ■

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9 & 11 Empress Place (Victoria Theatre and Concert Hall)

The Victoria Theatre and Victoria Concert Hall, built in 1862 and 1905 respectively, have undergone rejuvenation. The team did well to balance the goals of restoring the past and meeting the demands of two modern art venues. Good effort is evident in retracing their history and evolution. As a result, hidden and lost gems from the 1950s renovation were reclaimed from obscurity. These include the original central courtyard and adjacent passageway, the internal facade flanking Victoria Theatre and the ground floor space of Victoria Concert Hall.

Throughout the restoration, the venerable structures were well protected with extensive shoring. The team engaged conservation specialists for consultation on materials usage, and skilled craftsmen from India for the intricate plaster works. This further secures the quality and authenticity of the restoration.

The team also introduced many interventions. The recovery of the old open courtyard made way for a voluminous covered atrium with a skylight that visually connects the clock tower to the buildings. The lost internal facade was reinterpreted with such elegant restraint that the new wall stands with great confidence in contrast with the old.

While the new Victoria Theatre has a modernised interior, the past remains everywhere. Timber seat backings have been repurposed as sculptural pieces, and metal chair components redirected to serve as a support for the timber wall claddings.

Noteworthy interventions at the Victoria Concert Hall include the refurbished balcony and mezzanine. Rebuilding them smarter and lighter allowed for the removal of intrusive support beams that had



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Project Team:

Owner: National Arts Council & Singapore Symphonia Company Limited

Architect: W Architects Pte Ltd

Engineer: T.Y. Lin International Pte Ltd

Contractor: Sato Kogyo (Singapore) Pte Ltd

distorted the grand staircases below. New glazing for both porticos have given the facades a much lighter appearance. The extra effort to reinterpret the dome's missing crown, restore the clock mechanism and reinstate the original 'City Crest' is laudable. ■

1 St Andrew's Road (National Gallery Singapore)

A complex restoration, involving a diversity of historic elements, the project has set new standards with its sensitive and scientific approach. Great effort has been placed in understanding the history and memory of the buildings, evident in pivotal spaces such as the main lobby and the Rotunda Library of the former Supreme Court and the City Hall chambers.

Extensive research and consultation with conservation specialists informed the entire process - from the robust structural shoring that secured the buildings during work, to the extensive retention of original materials such as the Shanghai plaster, copper domes, teak ceilings, terrazzo finishes and the historic floor patterns on the second floor of the Supreme Court, as well as the marble flooring on the grand staircase of City Hall. A high quality outcome is also evident on the majestic facades, fenestrations and roofs. The two historical lobbies and four main courtrooms were entirely retained, as was the original profile of the memorable courtyards of City Hall. The team was judicious in observing the 3R principals to ensure the accuracy and longevity of the final product.

From above, the new roofline is a subtle yet powerful touch that instantly defines the envelope of the new development. As it connects old spaces, it creates exciting new possibilities such as the monumental new central atrium with its pair of link-bridges, and an extensive roof garden with views of the skyline and main dome. The well-thought-through design complements the monuments, celebrating the memorable courtyards of City Hall and opening up hidden spaces like its roof deck and the internal courtyards of



© URA

Project Team:

Owner: National Gallery Singapore

Architect: CPG Consultants Pte Ltd & Studio Milou Singapore Pte Ltd

Engineer: CPG Consultants Pte Ltd

Contractor: Takenaka Singapore Piling Joint Venture

Supreme Court for public enjoyment. The decision to convert the old Rotunda Library into an Art Reference Library cleverly preserves its usage history. The project team is also lauded for their care in discretely introducing mechanical and electrical services required to meet the stringent standards of a modern-day gallery. ■

12, 13 & 17 Rochester Park

Originally built as residences for British military officers, this set of three colonial black and white buildings, circa 1950s, has been renovated as a modern corporate training retreat.

The success of this comprehensive design approach was founded on careful research to understand the origin of the site, the houses and their construction, as well as their relationship with their historic terrain. Adhering to the 3R principles, the team did well to retain the original fabric of the building, especially the original roof structure with its concrete beams and timber rafters. Damaged elements were repaired; rafters were reinforced and given anti-termite treatment.

Key period features such as the chimney, cast iron access door of one of the bungalows, ventilation panels and original ceiling designs at the verandas and eaves were repaired and reinstated. Missing elements such as windows, doors and ventilation screens, which could not be salvaged were fastidiously refabricated to their original design.

New elements such as brass window and door fittings, and period tiles were well selected and strengthen the development's sense of history. The bungalows were fitted to be functional with natural ventilation; all verandas were kept open. In the interiors of the bungalows, materials chosen for the surfaces are representative of those used in the same period as the houses' construction.

In form and choice of palette, new additions, pavilions and linkways have been designed to be unobtrusive, quietly exalting the developments' vintage assets. Great effort has also been placed in reviving the property's tropical landscaping to reinstate and capitalise



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Project Team:

Owner: BASF South East Asia Pte Ltd

Architect: Forum Architects Pte Ltd

Engineer: Ronnie and Koh Consultants Pte Ltd

Contractor: Towner Construction Pte Ltd

on views to and from the gardens, which had been blocked due to overgrowth over the years. The team is commended for saving the historic trees that came with the property, even though it was not mandatory to do so. Retaining and reusing the bungalows' outhouses is also an admirable decision. ■

66 Pheng Geck Avenue (Alkaff Upper Serangoon Mosque)

Working on a modest budget, the restoration has secured a living heritage site for the mosque's growing congregation and its neighbouring community, for now and for generations to come. Sensitive to the layers of change over time, and respectful of the original fabric of the building, the restoration proceeded according to the 3R principles, informed by careful research on the site's history and architecture.

Much of the mosque's original architectural form, its masonry and period detailing have been reinstated. The original roof profile, lost in a previous renovation, has been reintroduced along with the authentic ceiling design. The team is commended for making the concerted effort to bring back these important elements of old that add to sustaining the building's historic aura.

All useable materials, including the original timber doors and the cast iron balustrades, and useable parts of the roof timbers, were retained with great care and effort. Surfaces, columns, capitals, plaster mouldings and the historic flooring, among others, have been thoroughly cleaned and given a new lease on life.

Long-missing elements such as the mild steel windows have been reintroduced. The sense of airiness of the building has also been recaptured, while the distinctive minaret remains a beacon for the mosque community and a landmark for the wider neighbourhood.

Modern materials have been used for the new extensions to avoid visual competition with the historic building. Many meaningful extra touches add to the appeal of the project, such as the incorporation



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Project Team:

Owner: Majlis Ugama Islam Singapura & Alkaff Upper Serangoon Mosque

Architect: Shing Design Atelier Pte Ltd

Engineer: Keon Consult Pte Ltd

Contractor: Tangs Engineering Pte Ltd

of the mosque's name in the patterns of the new carpeting at the prayer hall. ■

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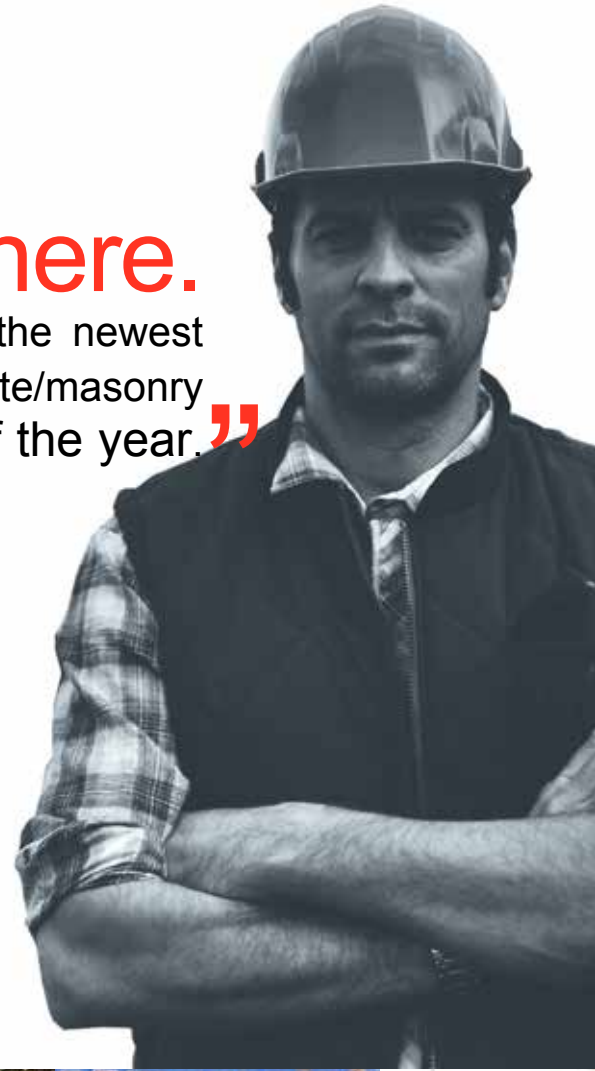
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