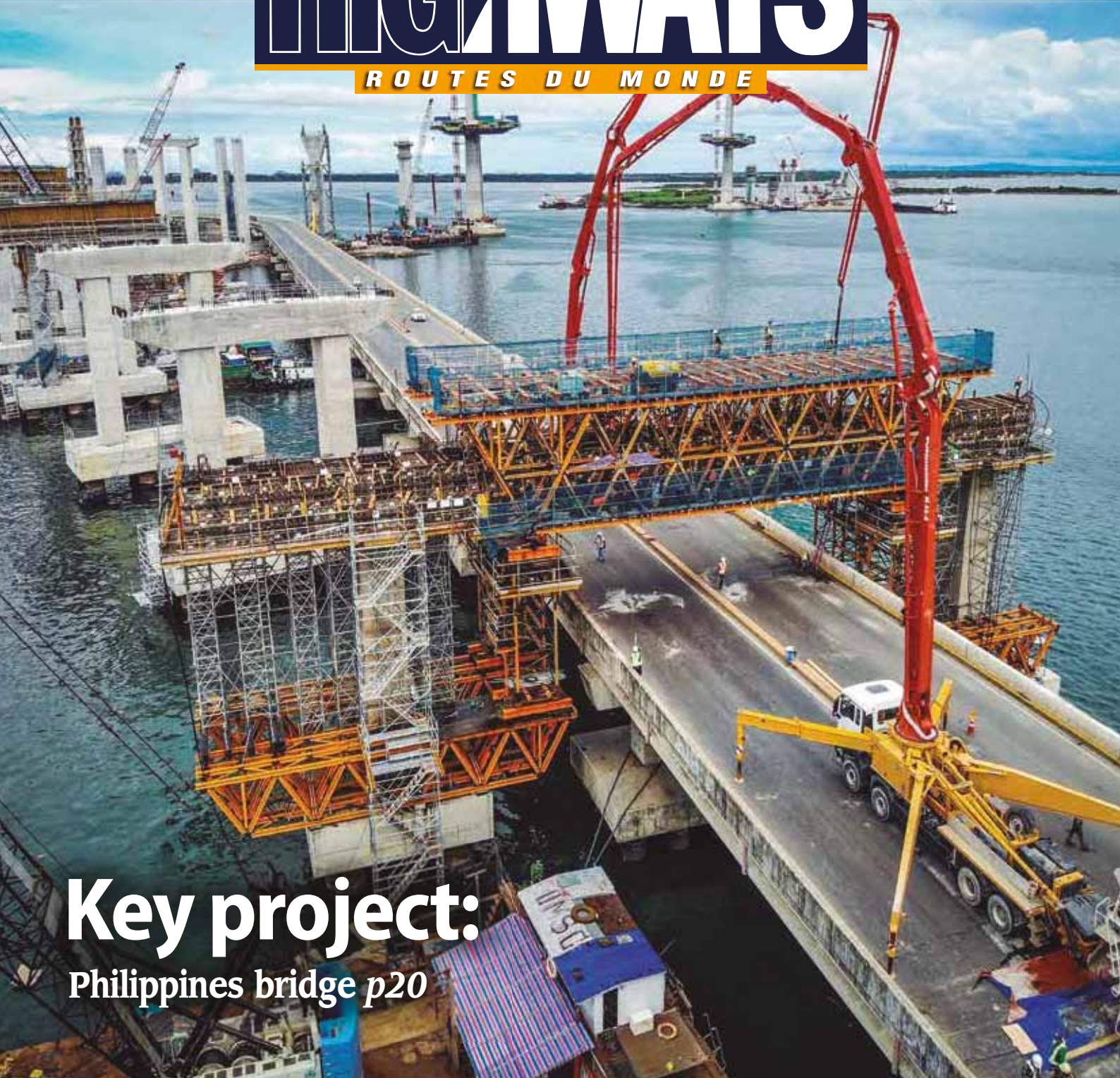




WORLD HIGHWAYS

ROUTES DU MONDE



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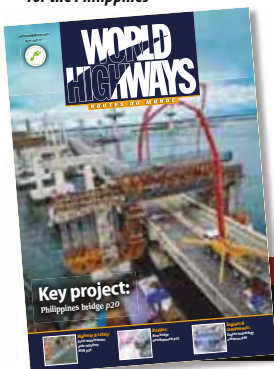
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Road user charging

The news that the Utah Department of Transportation (UDoT) is now seriously considering implementing road user charging in coming years is of note. A recent report from UdoT has detailed its plans to introduce road user charging in the state by the 31st December 2031. The plan would apply to all vehicles registered in the state, while measures would also be in place so that drivers from out of state would also pay suitable fees to access the road network.

A lot can change in a few years and it remains to be seen whether the programme set out by UdoT will come into force. However, the fact that the report has been published and taken seriously at high level in a car-dependent state highlights the wider appreciation that change has to come to the funding of road maintenance and construction.

The basis of this programme started in January 2020 to provide an alternative to the more conventional use of fuel taxes by the state to generate the necessary funding for transportation. The new programme is intended to deliver a more sustainable funding solution with a new system in which users pay, so that drivers are charged for the distance they have driven.

According to UdoT, this change is needed as Utah's transportation infrastructure has suffered because fuel taxation has not kept pace with funding needs. A further boost for road user charging comes in the shape of more fuel efficient vehicles such as hybrids as well as EVs. With fuel usage dropping over the long term, it is abundantly clear that a new funding method for Utah's transportation system is essential.

The report details the steps that will be needed for road user charging to be implemented in the state, as well as showing the options available to policymakers for implementation of the scheme.

One version suggests using a simple method of measuring distance travelled by monitoring the odometer readings on each vehicle. The other uses a more sophisticated system based on the use of technology and tracking systems. While the former would be quick to implement it would also feature a number of challenges, not the least of which could be claims by vehicle owners that they had travelled significant distances outside of the state.

The more sophisticated system would deliver a more dependable structure for transportation funding and could be rolled out in phases over a number of years.

For drivers in Utah, it looks as if UdoT has already made up its mind. Presenting this to the general public as the way ahead may prove a challenge however. But if Utah is now considering this programme, it can only be a matter of time before other US states follow. Road user charging is coming, like it or not.

And if the US, arguably the most car-dependent of all developed nations, can countenance road user charging on a state by state basis, it begs the question as to how long it will be before other developed countries can initiate similar programmes for road user charging.

Mike Woof, EDITOR
mwoof@ropl.com

“ Road user charging is coming, like it or not ”

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Editor: **Mike Woof**
 Deputy Editor: **David Arminas**
 Sub-Editor: **Kevin O'Shea**
 Contributing Editor: **Guy Woodford**
 Editorial Contributors:
 • **Shem Oirere, Kristina Smith, Mauro Nogarin,**
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 Designers: **Simon Ward, Andy Taylder**
 Production Manager: **Nick Bond**
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 Internet, IT and Data Services Director: **James Howard**
 Web Administrator: **Sarah Biswell**
 Managing Director: **Andrew Barriball**
 Chairman: **Roger Adshred**
 Publishing Director: **Geoff Hadwick**

ADDRESS: *Route One Publishing Ltd, Waterbridge Court, 50 Spital Street, Dartford, Kent, DA1 2DT, UK*
 Tel: +44 1322 612055 Fax: +44 1322 788063
 Email: [initialsurname]@ropl.com
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 JAPAN: **Ted Asoshina**
 Tel: +81 3 3263 5065 Fax: +81 3 3234 2064
 Email: aso@echo-japan.co.jp
 ASIA / AUSTRALASIA: **Roger Adshred**
 Tel: +44 7768 178163 Email: radshead@ropl.com

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A major stake in Doosan will be bought by Hyundai



Hyundai deal for Doosan

Approval by the regulator has cleared the way for the purchase of a major stake in Doosan Infracore by Hyundai Construction Equipment's parent, Hyundai Genuine. The move has been approved by the Fair Trade Commission (FTC) and will see Hyundai Genuine buying a 34.4% stake in Doosan Infracore in a deal worth US\$760 million.

The official regulator has stated that this move will not restrict competition in the market. While the two brands have strong positions in the South Korean market combining to have 51.2% of the excavator segment and 66% of the wheeled loader segment, the FTC says that supply currently exceeds demand. The Volvo CE brand also holds a strong share of the South Korean market as the firm makes its excavators in the country, having previously acquired this range from

Samsung some years ago. As a result of the market conditions, Doosan and Hyundai will not be able to dictate machine prices to South Korean customers. There is also a high level of competition for the global market provided by other construction machinery manufacturers (from China, Europe, Japan and the US).

Hyundai Genuine was established earlier this year by Hyundai Heavy Industries Holdings with the view to acquiring a major stake in Doosan Infracore. With this development, Hyundai Genuine will now be able to become one of the world's top five construction equipment manufacturers.

At present, the two brands combined would rank a joint firm ninth in the global market for construction machines, with Caterpillar in first place and Komatsu in second.

Funding for West Africa road link

A major portion of the funding required to improve a key West African road link is being supplied by the World Bank (WB). The US\$470 million package will pay for maintenance and improvement work to the road linking Niger, Burkina Faso and Togo.

The road runs through the capitals of the three nations, Niamey in Niger, Ouagadougou in Burkina Faso and Lomé in Togo. The package is being provided through the International Development Association (IDA).

The improvement works to the 1,065km road connection are of vital importance to landlocked Niger and Burkina Faso, two of the world's poorest nations. Upgrading the road connection will allow better transport of goods along the route, delivering an economic lifeline to Niger and Burkina Faso.

Access to Togo's port at Lomé will help reduce the costs of exports and imports for Niger and Burkina Faso.



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A new expressway will connect Laos with neighbouring China



Laos-China expressway project

Planning work is being carried out for the new expressway that will provide an improved transport link between Laos and China. The road will stretch 440km from the capital of Laos, Vientiane, to Boten, which lies on the border with China's Luang Namtha Province.

Building the three key stretches for the project is expected to cost US\$7.1 billion and the work is likely to take up to 10 years to complete. The expressway is to be operated by China-China Joint Expressway Development, which has been awarded a 50-year concession

package for the link. A financing package is being secured for the project while the supply of the necessary construction equipment to carry out the work is also being finalised. The new expressway will provide a much-needed economic boost for landlocked Laos.

India's road development

India's Uttar Pradesh State has set out major plans for road development works. The programme will improve rural road connections across the state, delivering better transport links to those areas that currently suffer poor infrastructure.

India's Government has yet to provide its approval for the programme. Should the work get the official go-ahead, it will see the construction of around 10,000km of new roads in rural areas in the state.

There are 6,500km of roads being built in Uttar Pradesh State at present, as well as 800 new roads and five bridges. A budget for the rural road development programme has not been revealed at present.



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Oslo University research

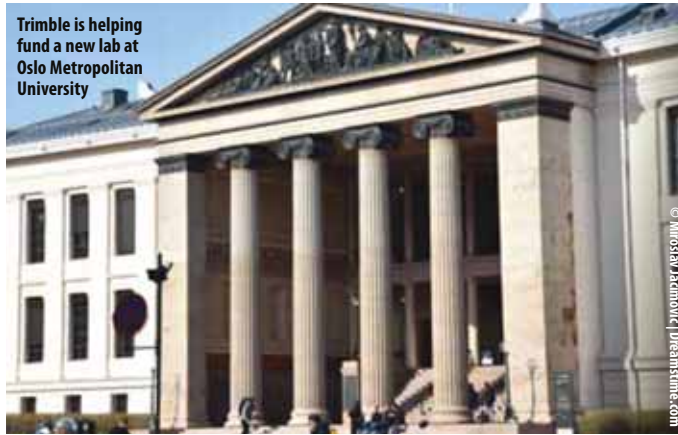
Norway's Oslo Metropolitan University (OsloMet) is benefiting from funding provided by Trimble.

This will be used to establish a state-of-the-art Technology Lab for civil engineering and energy technology. The lab will expand the university's leadership in digital applications for civil and structural engineering, building technology and sustainable building design.

The Trimble Technology Lab will provide students enrolled in OsloMet's Department of Civil Engineering and Energy Technology hands-on experience with Trimble solutions. Applications of these solutions range from building information modeling and mixed reality to infrastructure planning and construction. Partnering with Trimble allows OsloMet to integrate across its curricula technological tools that are transforming how the built environment is designed and constructed.

"Today, digital competence is of great importance for our students. By establishing the Trimble Lab, our students will have access to cutting-edge technology and products in engineering and construction. We believe this will accelerate the adoption and integration of digital tools in our study programs," said Jian Dai, associate professor and head of Civil Engineering Studies. "The lab will not only benefit our students in achieving an enhanced learning outcome but also equip them with the competence to lead the change and renewal in the industry in

Trimble is helping fund a new lab at Oslo Metropolitan University



their future careers. In addition, the lab is also a valuable asset to support the development of our new smart mobility and urban analytics program and the infrastructure engineering specialisation."

"Norway's OsloMet is an outstanding new addition to our network of labs around the world and we're eager to play a significant role by enabling students and educators to enhance their engineering, building technology and design education with Trimble's advanced industry technologies," said Allyson McDuffie, director of Education & Outreach at Trimble. "Our mission in transforming the way the world works requires that we invest in the next-generation workforce, who will become the influencers and leaders of tomorrow."

Carl Christian Thodesen, dean at the Faculty of Technology, Art, and Design said, "Oslo Metropolitan University is thrilled about the new lab for digital competence in engineering and

construction, which has been developed through remarkable relationship and collaboration with Trimble. This lab will provide our students access to state-of-the-art equipment and software, which will make them attractive and competitive in the modern engineering and construction industry. Working with Trimble in developing this facility is a testament to how industry and academia can work together to develop skills and competence for a competitive and sustainable engineering industry where top notch abilities and attitudes are a prerequisite."

The lab will include a broad range of Trimble's industry-leading solutions such as Trimble SiteVision, Robotic Total Stations and Rugged Tablets. Advanced software solutions Quadri, Novapoint, Quantm, Tilos, Tekla Structures, Tekla Structural Designer, Tekla Tedds, Trimble Connect and the company's popular 3D modeling software, SketchUp Pro and SketchUp Studio.

New road works are planned for Colombia

The primary, regional and tertiary roads in Colombia's Cauca Department, Cauca Department and Huila Department will receive funding for maintenance and improvement works. Financing is also being provided for improvement works for the road network in Putumayo Department.

The US\$1.05 billion budget for road upgrades in Cauca Department, Cauca Department and Huila Department has been sourced by Colombia's national road institute (Invias). Around 25% of the funding will be for the construction of new road links. One of the jobs planned is for surfacing works on the road connecting Popayan, Paletara, Isnos and Sombrierillos.

Meanwhile, the \$471.5 million budget Invias has sourced for work in Putumayo Department will see improvements to 456km of both national and rural roads. Surfacing work will be carried out on the Corredor del Sur road as well as a 5.3km stretch of the road between Puerto Caicedo and Arizona. Work will also be carried out on the road linking San Francisco and Mocoa.



Russia's major new highway project

The cost of one of Russia's most important highway projects has now been revealed. The new highway connecting Kazan in the Volga Region with Yekaterinburg in the Urals Region comes with a pricetag of US\$6.66 billion. The highway will feature a tolled stretch as well as a stretch that is free for use by drivers.

The tolled stretch will cost \$3.51 billion to build while the section that is free to use will cost \$3.15 billion to construct. Further details about the project will be revealed once the plans are complete in 2022.

A major new highway project is being planned in Russia





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Puerto Rico road repair problem

Puerto Rico faces a key problem with regard to repairing transport infrastructure. Numerous roads, bridges, pedestrian facilities and traffic light systems were damaged during the ferocious Hurricane Maria that struck the island in 2017. But the Puerto Rico Highways and Transportation Authority (PRHTA, ACT in Spanish) has insufficient funds to pay for the necessary repair and maintenance work.

The US Federal Emergency Management Agency (FEMA) is to provide US\$1.17 billion for road and bridge repair work. But this is thought to be insufficient to pay for all the work that has to be carried out to repair all the transport infrastructure that was damaged by the hurricane.

Puerto Rico faces problems with regard to repairing its infrastructure

Safety concern on DUI in specific US states

Road crash data from those US states where marijuana is legalised for recreational purposes shows a cause for concern.

A study has been carried out by the Insurance Institute for Highway Safety (IIHS), revealing that California, Colorado, Nevada, Oregon and Washington have a higher rate of road crashes than previously. This has been backed up by another study carried out by the Highway Loss Data Institute (HLDI).

The two studies reveal that there has been a 6% increase in road crashes involving injuries in California, Colorado, Nevada, Oregon and Washington states, compared to other states in the Western US. Of greater concern is that road crashes have increased by 4% in California, Colorado, Nevada, Oregon and Washington



High crash rates are a concern in US states where marijuana use is legalised

© courtesy of Mike Wood

states compared to other states in the Western US.

Research by the IIHS using simulators shows that people under the influence of marijuana show delayed reaction times and have greater difficulty concentrating. They also have problems maintaining a lane and

are more likely to make mistakes in emergency situations.

However, drivers under the influence of marijuana also tend to drive more slowly, overtake infrequently and maintain their distance from vehicles in front.

There are a number of inconsistencies in the data collated so far. But they do highlight the particular risk of drivers combining alcohol with marijuana, which poses greater problems.

While other US states, not to mention other nations, may look to liberalising laws on marijuana use. The data from California, Colorado, Nevada, Oregon and Washington makes it clear that there are issues over road safety at stake. Very clear laws need to be in place on DUI, while driver education and enforcement measures also need to be used.

Papua New Guinea road development

Papua New Guinea (PNG) is developing its national road network strategy, which will see a programme of road works being carried out across the country.

A budget of US\$5.7 billion has been set by the PNG Government for the programme of works. The plans cover maintenance and improvement works to 15 roads. Four of the roads to be upgraded connect Madang with Baiyer and Kompam, Madang to Lae and Finschhafen, Vanimo with Wewak and Madang and Ramu to Gembolg, Kundiawa, Karamui and Purari. Improving these four roads will boost transport connections between Madang, Morobi and East Sepik.

The programme will help improve transport in key areas of the country, assisting in economic development.



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New Zealand road safety issue

Road crashes caused by driving under the influence (DUI) of alcohol are a serious problem in New Zealand according to official data. A report compiled by New Zealand's Accident Compensation Corporation (ACC) shows that road crashes caused by DUI have cost an average of US\$445,203/day (NZ\$636,000/day) over the past five years.

The data shows that the problem is particularly acute in New Zealand's largest city, Auckland. Over the past five years, DUI has cost the city around US\$154.7 million (NZ\$221 million). Driving under the influence of drugs is also a major issue in New Zealand. Overall, New Zealand's record on road safety is comparatively poor for a developed nation.

Key projects planned for the Philippines

A number of key infrastructure projects are being planned in the Philippines.

There are 13 of these major projects, with a total estimated value of US\$10.78 billion. The projects are being planned by the National Economic and Development Authority (NEDA) in

the Philippines, on behalf of the country's government.

One of the major works planned is for the Laguna Lakeshore Road Network Project, which has an estimated cost of \$3.7 billion. Another project is for the construction of the Bataan-Cavite Interlink Bridge

at an estimated cost of \$3.62 billion. Of note is the fact that the latter project had previously been shelved and is now being revived.

Other projects include works to improve ports and to reduce the impact of flooding and earthquakes in areas of the country that are vulnerable.

Volvo CE has seen a strong resurgence in sales

© courtesy of Mike Woof



Europe and Americas drive strong Volvo CE sales

Volvo Construction Equipment increased year-on-year net sales by 13% in Q2, driven by higher volumes in Europe, North America and South America.

The Swedish manufacturer says it has continued its strong rebound from the challenges of last year with all markets except China seeing an uptick in sales from the same period 2020. China saw a slight slowdown despite its initial surge of sales in the first three months of the year.

With improved construction activity, high customer confidence and increased investment in infrastructure, Volvo CE says its order intake has also increased by 35%. Total net sales in the second quarter increased by 13% amounting to SEK25,839m (€2522.35m), compared with SEK22,876m (€2233.06m) in Q2 2020. This was supported by a 17% rise in the sales of services. Adjusted for currency movements, however, net sales increased by 21%.

Sales in Asia, including China, the world's largest construction equipment market, remained the highest but still accounted for a 12% drop, due to a decline in infrastructure investment. Asia (excluding China) continued to solidify its growth with improvements in all key markets including India, Korea and South East Asia. Adjusted operating income amounted to SEK3,374m (€329.36m), up slightly from SEK3,108m (€303.39m) last year, corresponding to an adjusted operating margin of 13.1% (13.6%).

Volvo CE says that a more confident customer outlook and increased investment across most markets saw order intake increase by 35%. It adds that there was a significant rise in orders for Volvo-branded products and a more modest yet

stable order intake in SDLG branded products, affected as they were by the slowdown in the Chinese market.

Demand for large and medium-sized machines remained strong and higher than for compact machines. The manufacturer says this was due in large part to higher sales in Europe and North and South America, the latter of which saw a 120% increase in deliveries from the same period last year, overall deliveries increased by 5% in Q2.

Volvo CE says the year up to May has benefited from high customer activity across industry segments, more than positively impacted by increasing volumes in the European, North American and South American markets.

In Europe, the majority of countries continued their recovery to see a 30% increase measured in units from the same period last year, while North America saw a 35% rise thanks to high infrastructure and housing construction activity. The South American market enjoyed the biggest surge (71%) due to an increased demand in commodities. Despite its strong start to the year, China began to decline in Q2 in line with decreasing government investment in infrastructure.

Melker Jernberg, president of Volvo CE, said: "Thanks to our commitment to innovation and customer success, we have offset a slowdown in China with a solid increase in demand across our other key regions of Europe and North America. While maintaining a steady recovery from the challenges of last year remains our top priority, we have also continued our journey of innovation with a number of exciting launches this quarter, including our entry into the 50tonne excavator segment and the launch of our first dedicated Fuel Cell Test Lab."

Thailand's impressive transport plan

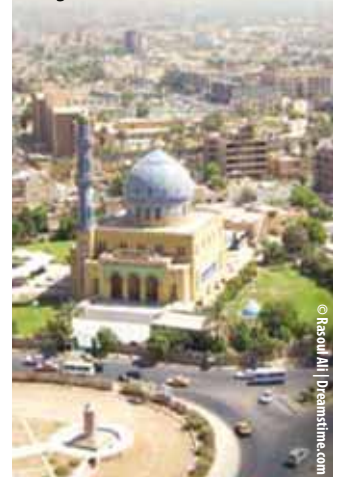
Thailand has an impressive plan that will improve transport and logistics across the country. The aim is that Thailand will become a hub for logistics for South East Asia. At the heart of the plan is the construction of the Southern Land Bridge, which will connect Thailand's coast with the Andaman Sea in the west and the Gulf of Thailand in the east.

The project includes improvement to port facilities in Thailand, in addition to the construction of the new highway link.

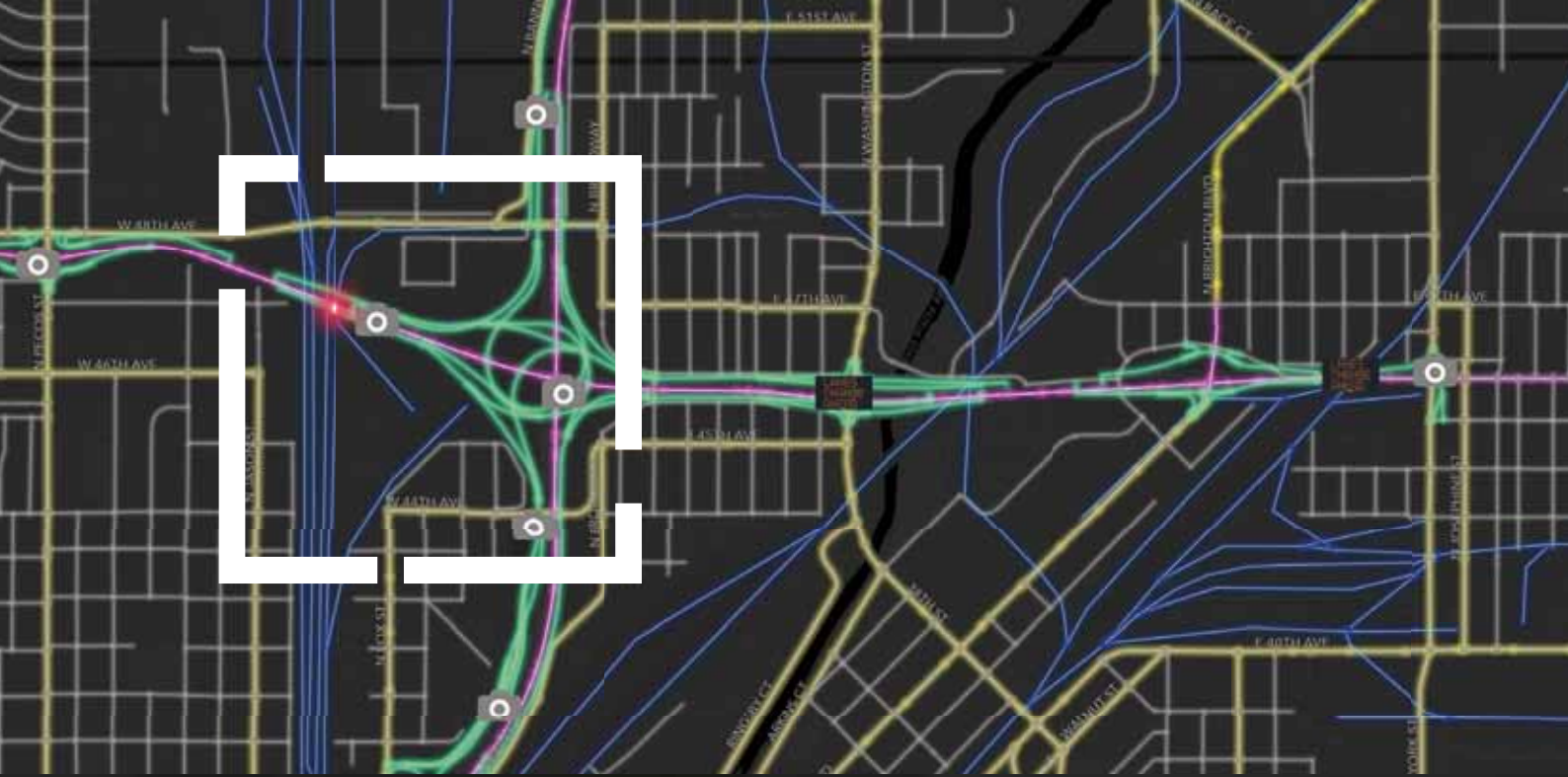
Baghdad's road upgrade plan

A series of road improvement works are being planned for Iraq's capital, Baghdad. A budget of US\$162 million has been set for the work by the Iraqi Government.

The tender process for the work is due to open shortly. Road maintenance and widening work will be carried to existing road links out as well as other general road improvements. Three new bridges will be constructed will three of the city's important road links will be upgraded. The client for the works will be the Baghdad Municipality. Iraq's capital city desperately needs road improvements following years of neglect and the work is intended to help improve transport and commercial activity in Baghdad.



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Beyond business as usual: The energy and carbon performance of our road infrastructure

Following recent policy-setting decisions by authorities in Europe and North America to achieve net zero emissions economy-wide no later than 2050, IRF has invited contributions from notable industry innovators in preparation for the 18th IRF World Meeting & Exhibition. Jonathan Davis, co-founder and CCO at Uberbinder, shares his thoughts on the historic responsibility and opportunity for the road industry to enhance its energy and carbon performance.

In the quest to provide infrastructure solutions that predict and provide for our growing economy and population, we as an industry continue to develop incremental solutions to maximise efficiency and profitability. This is the factory model of the first and second industrial revolutions, which includes a tendency to externalise the steep costs of social and environmental harm to our communities and regulators. By design, we are not responsible.

The highly extractive take-make-dispose approach is so ingrained in our ways of working that the cumulative effect of a historic fixation on energy and carbon intensive building materials has brought our mutual responsibility into sharp focus.

For the road building industry, true innovation will mean root-level changes that challenge and disrupt business as usual for the greater good. There is a growing pressure to introduce society-wide benefits that take into account living responsibly within planetary boundaries, and in better balance with our natural world.

Everyone is comfortable with the system of road building and with the companies that deliver the best possible performance using conventional bitumen and OPC binders. There have been advances that cleverly add elements, emulsions, and extenders, all to enhance the final result using all sorts of developmental chemistry, but one big question has been overlooked in this process: the energy and carbon performance of our road infrastructure.

While demand for concrete and asphalt continues to grow, energy and carbon performance is the defining challenge for our generation of policymakers, regulators, and road builders. These essential building materials are highly energy intensive and responsible for more than 10% of greenhouse gas emissions worldwide. Construction, manufacturing and transportation infrastructure produce well in



Jonathan Davis

“For the road building industry, true innovation will mean root-level changes”

excess of one-third of global emissions.

Governments spend billions of dollars every year for the maintenance and extension of road networks. For its 4.3 million km of paved roads, the US alone spends US\$150 billion every year on road construction, using more than 400 million tonnes of energy and carbon-intensive road building materials. European governments forecast spending a similar \$120 billion/year until 2030. The energy and carbon performance of our road infrastructure will thus play a decisive role in shaping the success or failure of how to mitigate the issue of energy and carbon efficiency.

Is it possible to improve from incremental changes within the existing system to find a new path that reframes the problems with new opportunity? To do this, the road building industry must continue to encourage a funnel

of innovators to work to complement, improve and sometimes challenge the existing system.

Organic polymer binders represent a decisive advance in material innovation by bringing natural balance and improved performance to the heart of road building. It is widely known that severe fluctuations in surface temperatures accelerate rutting and cracking, with heat and water damage from extreme weather causing premature end-of-life events to our road infrastructure, capital investments, and social stability.

Using naturally abundant resources for polymer development, along with local waste resources including plastics and recyclables as aggregate, it is possible to address these issues by allowing more extensive use of local minimally processed, repurposed and recyclable materials. A new organic polymer binder has been developed that allows storage, transport and application at ambient temperature while removing heat from the existing process which will potentially save billions of dollars in fuel cost alone.

The road construction sector wants to make things better and is in the business of delivering on performance. What industry must prepare for is sustainability becoming a demanded and expected key performance indicator. ■

A focus on sustainability at the 18th IRF World Meeting & Exhibition

Global commitments to reduce carbon emissions have placed greater societal expectations on road builders to design sustainable transportation networks and mobility services. Join leading advocates, researchers and practitioners at the 18th IRF World Meeting to identify successful strategies and cost-effective solutions:

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- Towards Energy Efficient Pavements
- Deploying ITS for Climate Impact Mitigation
- Infrastructure Pathways to Electric Mobility

Additional information:
www.irf2021.global



Paul Ajegba
Director, Michigan Department of Transportation



Binyam Reja
Global Practice Manager, The World Bank



Kamil Kaloush
Professor, Arizona State University



Maitha bin Adai
CEO, Dubai Traffic & Roads Agency



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November 7-10, 2021

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ONLINE TRAINING

Planning for Autonomous Mobility

START DATE: 4 NOV 2021

FACTUAL



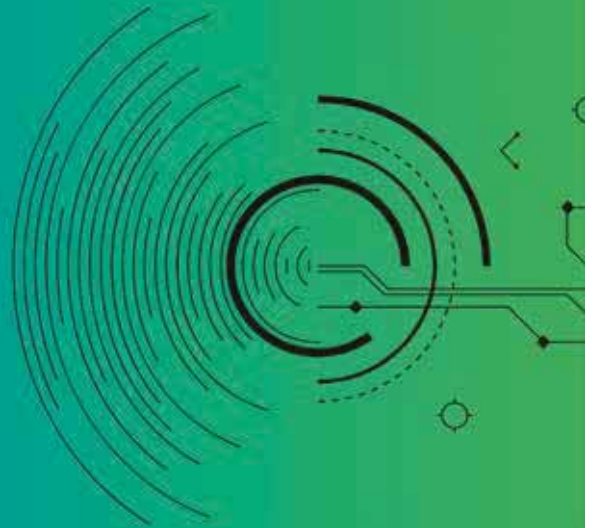
International Road Federation
Fédération Routière Internationale
Federación Internacional de Carreteras



Urban Mobility



Co-funded by the
European Union



Planning for Autonomous Mobility: new training kicks off in November

Organised as a joint partnership between the International Road Federation, EIT Urban Mobility, and FACTUAL, the training Planning for Autonomous

Mobility training is designed to tackle key aspects of autonomous mobility as a means to respond to new transport demands and to deliver value to society and businesses.

More specifically, the training will

equip the participants with knowledge on relevant features of the autonomous mobility ecosystem, including urban landscape impact, long-distance travel, logistics and economic aspects. The training will provide the tools that will help participants solve future challenges that autonomous vehicles will convey.

This tailored training targets mobility professionals interested in deepening their knowledge, skills, and abilities to enhance their technical, business, and professional competencies in autonomous vehicles while

furthering their careers.

The planned training consists of four modules and nine different sessions organised in a complete online and interactive format. Each session is intended to last approximately two hours. The training will last for a bit more than one month, with the first session taking place on 4th November and the last one on 2nd December. ■

• More information and registration available on: www.irfnet.ch

Innovation: charting pathways to sustainable mobility

On 21-22 October, IRF will be hosting its annual autumn conference virtually, under the theme "Innovation: Charting Pathways to Sustainable Mobility".

With fast-growing populations leading to significant urbanisation, the demand for new transport infrastructure is predicted to see massive growth in coming decades. The new challenges: the increasing expectations of

businesses, service users and the public and the need to reduce carbon emissions and waste.

For the road sector this means finding innovative ways to fulfil the need of building new roads, maintaining, upgrading and operating the existing road network. At the same time it means aligning these actions with the provisions of the Paris Agreement - targeting lower greenhouse gases - and those

of the SDGs looking at an equitable, safe and sustainable mobility for all.

The collective task: create a truly safe, sustainable and efficient multimodal transportation system. For this to happen, there is a need to learn to think and do things differently.

The arrival of new digital technologies is enabling efficiency improvements in existing

transport systems, as well as making them more user-friendly and sustainable. Integration across transport networks and modes is driven by the growing ability to make real-time system data and information available to operators and users.

None of the extraordinary mobility changes being witnessed at present would be possible without proper infrastructure. Yet transforming mobility requires more than just technology and infrastructure. Transforming mobility requires innovation on all fronts: in the way the industry professionals think, plan, design and deliver and manage transport systems. ■

• Registration to the conference is free and can be made on IRF website: www.irfnet.ch



SuM4All Course: mobility requires a new policy approach today

IRF is proud to support the Sustainable Mobility for All (SuM4All) partnership on its first four-module course to be held on 14, 21, 28 September, and 5 October 2021. Under the theme "Sustainable Mobility Requires a New Policy Approach Today" the course will serve as a knowledge exchange space for decision-makers and stakeholders in the transport sector.

The world economy is changing rapidly; with an abundance of new opportunities, come new risks and vulnerabilities. As countries around the world undergo a

fundamental reconfiguration to adapt, making the right policy decisions has become more challenging than ever. Transportation and mobility define the very well-being of our daily lives and livelihoods and therefore, rethinking and adapting transport policy must be prioritised.

The four-module virtual knowledge exchange will cover:

- Key dynamics that are shaping the future of mobility and necessitating a new policy approach, including the SDGs,

data and technology, open government and citizen engagement, equity and inclusion;

- Measurement and tracking of country progress toward sustainable mobility;
- Generation of customised country roadmaps of action toward sustainable mobility; and
- Sharing of knowledge and experience with peer countries on the implementation of action plans.

This course is designed for participants who are interested in a new approach to decision-making in transport that is aligned with the SDGs and Paris Climate ambition. It does not require transportation sector expertise.

- Transport policymakers, regional and country-specific transport specialists, and all stakeholders with a vested interest in a more holistic and collaborative approach to transport policy.
- Officials within ministries and banks responsible for transport, gender, governance, finance, and urban and rural development.
- Industry stakeholders, including private sector partners and staff from multilateral development banks who wish to gain additional tools and understand opportunities for making policy and investment decisions that will advance collective aims and progress toward SDGs. ■

• For more information and inscriptions, visit the SuM4All website: www.sum4all.org

A banner for the 'Sustainable Mobility Requires a New Policy Approach Today Knowledge Exchange Course'. The top half features a blue background with white icons representing various transport modes: a bicycle, a person walking, a car, a train, a bus, a truck, a ship, and a wind turbine. Below the icons, the text reads 'Sustainable Mobility Requires a New Policy Approach Today' in white, followed by 'Knowledge Exchange Course' in yellow. The dates 'September 14, 21, 28, and October 5, 2021' and the time '8:30 to 9:30 AM ET' are shown in white. At the bottom, the 'Sustainable mobility FOR ALL' logo is on the left and the website 'www.sum4all.org' is on the right.

2021

AUGUST

**31 August – 2 September:
Parking China 2021
Shanghai, China**

Organiser: Messe Frankfurt
Tel: +86 21 6160 8433
parking@china.messefrankfurt.com
<https://parking-china.hk.messefrankfurt.com/shanghai/en.html>

SEPTEMBER

**6-9: 6th Roads, Bridges &
Highways Summit 2021
ONLINE**

Organiser: Equip Global
enquiry@equip-global.com
<https://www.equip-global.com/6th-roads-bridges-highways-summit>

**14-16: Hypermotion
Frankfurt, Germany**

Organiser: Messe Frankfurt
Tel: +49 6975 755272
daniло.kirschner@messefrankfurt.com
<https://hypermotion-frankfurt.messefrankfurt.com/frankfurt/en.html>

**15-18: Construction Indonesia
2021, Jakarta, Indonesia**

Organiser: PT. Pamerindo Indonesia
Tel: +49 3999 9050
contact@merebo.com
<https://ci.merebo.com>

**15-18: Geofluid 2021
Piacenza, Italy**

Organiser: Piacenza Expo
Tel: +39 0523 602711
alessandra.bottani@piacenzaexpo.it
www.geofluid.it

OCTOBER

**20-21: IRF Annual Conference
2021 – Innovation: Charting
Pathways to Sustainable Mobility**

Organiser: IRF Geneva
Tel: +41 22 306 0260
info@irfnet.ch
<https://irfnet.ch/event/irf-annual-conference-2021/>

**21-23: IFAT Eurasia
Istanbul, Turkey**

Organiser: Messe Munchen
Tel: +90 2122 418171
genc@mimi-eurasia.com
<https://ifat-eurasia.com/en/>

NOVEMBER

**2-4: Hypermotion Dubai
Dubai, UAE**

Organiser: Messe Frankfurt
Tel: +971 4389 4500
<https://hypermotion-dubai.ae.messefrankfurt.com/dubai/en.html>

**2-4: TRAFIC 2021
Madrid, Spain**

Organiser: IFEMA
Tel: +34 9022 21515
www.ifema.es/trafic

**3-4: 4th Construction
Equipment Forum Berlin 2021,
Estrel Convention Center, Berlin**

Organiser: IPM AG
Tel: +49 5114 7314790
www.constructionforum.eu

**7-10: 18th IRF World Meeting
& Exhibition, Dubai, UAE**

Organiser: Washington-based
IRF Global
Tel: +1 7035 351001
wm2021@IRF.global
<https://worldmeeting.irf.global/>

**09-11: Intertraffic Mexico
Centro Citibanamex, Mexico City**

Organiser: RAI Amsterdam
(in partnership with Tarsus Mexico)
Tel: +31 (0)20 5491212
intertraffic@rai.nl
<https://www.intertraffic.com/mexico/>

**10: ASECAP Days 2021
ONLINE**

Organiser: ASECAP
Tel: +32 (0)2 289 26 20
asecapdays@asecap.com
<http://www.asecapdays.com/>

**24-26: Asphaltica 2021
Verona, Italy**

Organiser: Veronafiere S.p.A.
Tel: +39 045 8298 338
trentini@veronafiere.it
<https://www.asphaltica.it/en>

DECEMBER

**7-11: EXCON 2021
Bengaluru, India**

Organiser: CII
Tel: +91 44 42444564
excon@cii.in
<https://www.excon.in/>

2022

MARCH

**29-31: World of Asphalt
Nashville, Tennessee**
Organiser: NAPA, AEM & NSSGA
Tel: +1 (414) 2740644
www.worldofasphalt.com

**29 March-1 April:
Intertraffic Amsterdam
Amsterdam, Netherlands**
Organiser: Rai Amsterdam
Tel: +31 (0)205 491212
intertraffic@rai.nl
www.intertraffic.com/en/amsterdam

MAY

**5-7: RecyclingAKTIV &
TiefbauLIVE 2021
Karlsruhe, Germany**

Organiser: Messe Karlsruhe
Tel: +49 (0) 721 3720 2300
verena.schneider@messe-karlsruhe.de
<https://www.recycling-aktiv.com/en/>

JUNE

**21-23: Hillhead 2022
Hillhead Quarry, Buxton,
Derbyshire, England**

Organiser: The QMJ Group
Tel: +44 (0)1159 454377
Harvey.sugden@qmj.co.uk
<https://www.hillhead.com/welcome>

AUGUST

**30 August-2 September:
M&T Expo 2022
São Paulo, Brazil**

Organiser: Messe Munchen
Tel: +55 11 3868-6340
info@mtexpo.com.br
<https://www.mtexpo.com.br/en/>

SEPTEMBER

**28-30: Intertraffic Istanbul
Istanbul Expo Center - CNR
Istanbul, Turkey**

Organiser: RAI Amsterdam
(in partnership with Informa)
Tel: +31 (0)20 5491212
intertraffic@rai.nl
<https://www.intertraffic.com/istanbul/>



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Volvo P6820D ABG and P7820D ABG tracked pavers optimize operator control – allowing focused concentration on the job in hand. The new Electronic Paver Management system places all essential operating information within clear view of the operator, while the jog wheel allows rapid selection and fine adjustment. Machine adjustments are customizable to the operator's preferences – with saved parameters allowing swift setting for similar paving jobs. ECO mode adapts engine output to the needs of the job, automatically setting engine speed and reducing noise and vibration to a minimum. The view from the operator's seat is superb – auger channel, screed, and hopper fill can all be seen at a glance, making Volvo pavers the operator's choice.

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Metso:Outotec

Fast and accurate control

Topcon's sophisticated GT Series ultrasonic robotic total stations are said to be fast, accurate and versatile.

The system is said to provide precise and productive workflows for demanding survey and construction applications. The units can lay out or survey more points precisely and in less time than previous generation tools. Meanwhile, the units also improve quality and consistency.

These digital tools are said to be easy to use and offer accurate and repeatable results, for less rework and better quality control. The units are compact and are said to be easy to transport onsite, while their versatility means that they can be used for layout, survey and machine guidance duties.

Key features include precise positioning and single-person operation, high-speed advanced ultrasonic motors and easy to use MAGNET or Pocket3D software, as well as seamless integration into BIM workflows. The units are available in GT-1200 and GT-600 models with multiple accuracy levels and are offered with a three-year instrument and five-year motor warranty. Designed for use in tough construction site duties, the units are rugged and offer IP65 dust and water resistance. The UltraTrac prism tracking technology offers reliable performance and the units are said to maintain work pace with the total station locked onto the prism, even in challenging environments.

These tools can help in kerb and gutter jobs by maintaining productivity and accuracy



Topcon has developed a new robot total station offering precision control

when facing GPS coverage issues. Using either the GT-1200 series robotic total station or the LN-150 robotic layout navigator, customers can augment their existing Millimeter GPS concrete paving solution, and remedy issues such as foliage canopies, large buildings, tunnels and overpasses.

Both instruments offer support for a prism solution that can switch quickly between Millimeter GPS and local positioning systems (LPS). Both use Topcon LongLink communication for connectivity. The self-levelling LN-150 is an easy-to-use, cost-effective robotic solution while

the GT-1200 series instruments can perform a full range of functions as a standalone surveying total station.

The tools allow precise 3D layout and have an easy to use, self-levelling setup as well as Wi-Fi and long-range Bluetooth options. The units offer cloud-connected workflows with Autodesk, Bentley, and MAGNET software, including the MAGNET Construct mobile app for phone or tablet.

Topcon Positioning
www.topconpositioning.com

Non-contact sensing

A novel non-contact radar sensing technology from SICK offers accurate and reliable real-time monitoring of bulk solid levels for the storage and handling of mineral products.

The SICK SicWave uses high-frequency 80 GHz free-space radar to overcome the limitations of low-frequency radar sensors or mechanical devices to achieve precision continuous level measurement.

The microwave pulses of the SICK SicWave sensors are claimed to penetrate through dust and material build-up to output accurate results. The SICK LBR SicWave is a bulk solids level sensor with a range of up to 120m. This can be used for continuous level measurement in production of products such as cement, concrete and gypsum for crushers and belt transfer, as well as for silos for storing products.

The firm claims that this technology can be used to manage the supply of bulk

solids in storage vessels. It offers accurate level measurement using non-contact technology and is not disrupted by the presence of dust or build-up of residue, or by other obstructions in the vessel.

Positioned at the top of a silo, or over a heap or bunker, the SICK SicWave sensor sends a narrow beam of microwave radar pulses and uses the time-of-flight principle to return a high-quality signal even at long ranges or extreme temperatures and pressures. The SICK SicWave 80 GHz free-space radar sensors are a thousand times more sensitive than previous generation 26 GHz radar technologies ensuring high availability in challenging environments with minimal maintenance. The narrow field of view avoids the potential for false signals caused by deposits on walls or by obstructions inside the vessel.

SICK
www.sick.co.uk

Accurate silo measurement technology is now offered by SICK

Getting set for main span construction

NEW TOLLED CROSSING

CEBU LINK

-CORDOVA EXPRESSWAY

The 8.5km CCLEx, as it is known, will include the longest and tallest bridge in the Philippines when the structure is finished next year, reports *David Arminas*

The Cebu-Cordova Link Expressway (CCLEx), also known as the Cebu-Cordova Bridge, is a combined toll bridge and causeway that stretches 8.5km across the Mactan Channel (also known as the Opon Channel). It will link Cebu City, with a population of around 1 million and on Cebu Island – nearly 4,700km² in size – with the town of Cordova on the much smaller island of Mactan – 65km² in area.

The greater Cebu City region, however, has as population closer to 3 million. As such, the goal is to relieve traffic congestion on two existing bridges across the Mactan Channel and help improve the economic fortunes of the surrounding Visayas Region.

The north-west coast of Mactan island is much closer to Cebu Island than its southern region, which is where the new bridge and causeway is being constructed. To the north of the new bridge where the Mactan Channel narrows, lie the much

shorter Mactan-Mandaue Bridge and the Marcelo Fernan Bridge (see box).

The new Cebu-Cordova Link Expressway is a four-lane, 27m-wide cable-stayed two-pylon bridge that allows a 51m navigational clearance. It has a design vehicle speed of 80-90kph and is expected to handle at least 50,000 vehicles daily, according to the website of CCLEx. It will also cut 40 minutes off the drive to Mactan Cebu International Airport on Mactan Island – the second busiest international airport in the Philippines.

At 8.5km long, the Cebu-Cordova Link Expressway will be the longest and tallest bridge in the Philippines. It will surpass the San Juanico Bridge Expressway (2.1km) that opened in 1973 and the 5km Candaba Viaduct that opened in 1977 and which is part of the North Luzon Expressway – an 84km, four-to-eight lane expressway connecting Metro Manila to the provinces of the Central Luzon region.

The complete CCLEx structure will consist of the main bridge, plus on and off ramps connecting the main bridge

to the Cebu South Coastal Road as well as a viaduct that levels down to the causeway in Cordova's Pilipog Barangay. A Barangay is the smallest political unit in the Philippines, essentially a tiny municipality.

The expressway was scheduled to open this year but this has been pushed back to next year. Just over 70% of construction has been completed, according to CCLEx.

In April, the public witnessed for the first time the illumination of the 40m-high Christian crosses sitting atop the bridge's two 145m-high pylons.

The crosses, which on the night were blessed by priests, are there to celebrate the 500th anniversary of Christianity coming to the Philippines, notes the CCLEx website. "These crosses will illuminate the skyline of Metro Cebu – beacons of hope and progress, symbols of achievement and everything Cebuanos are proud of," said Manuel Pangilinan, chairman of Metro Pacific Tollways on the night of illumination. >>

» Milestone

Trevi Foundations Philippines, a division of Trevi, based in Cesena, Italy, has been responsible for deep foundation work. Of the 477 piles, 216 are offshore and 261 are onshore. A recent construction milestone was completion of the casting of all 446 NU (Nebraska University) girders required for the entire stretch of CCLEEx. These girders – the first such girders to be produced in the Philippines – serve as the main structural support for the road.

NU I-girders can be combined to form an economical precast, prestressed concrete system for longer girder spans. The girders' large span-to-depth ratio allows their use as alternatives to steel plate girders without the need to increase the superstructure depth. This allows for a simplified design and reduced embankment cost. The girders are being installed using the mobile launching gantry at the Cebu South Coastal Road on-ramp and off-ramp sections of CCLEEx, as well as on the Cebu viaduct, the Cordova viaduct and low-lying bridges on the causeway itself.

Construction of the main bridge deck and installation of stay cables continues apace. By May, around 152m of deck remained to be completed before the main span can be connected. Also, 36 out of 56 cables had been installed.

At the causeway, backfilling and placement of riprap, also known as shot rock and rock armour, continues. Riprap consists of various types of rubble, placed such as to protect shoreline structures against scour, wave and ice erosion. Riprap is also used to armour streambeds, bridge abutments, foundational infrastructure supports and other shoreline structures. Common rock types used include granite and modular concrete blocks, as well as rubble from building and paving demolition.

Also, still ongoing in May was the laying of the 20 vent pipes, which are intended to equalise the flow of seawater in the Cordova Channel. Four low-lying bridges that serve as access for fishermen in the town of Cordova on Mactan Island to their fishing grounds in the channel had been completed by May.

Sidewalks will be provided along the entire stretch of CCLEEx.

Other key features are of the expressway, when finished, will be:

- a cashless RFID system for tolling to maintain fast driver throughput;
- weigh-in-motion sensors for detecting overloaded vehicles;
- IP-based speed detection cameras and HD CCTV that will cover the entire expressway for traffic monitoring and incident detection;
- service facilities such as fuel stations, retail outlets, convenience stores and restaurants, along with security, medical and maintenance centres accessible for motorists after passing the through the eight-lane toll plaza.

Who's who

Architect: Dissing+Weitling (for conceptual design)

Engineering design: ENER Ingenieria y Sistemas & Carlos Fernandez Casado, a joint venture

Technical consultant/project management services: DCCD Engineering

Contractor: CLJV, the Cebu Link Joint Venture of Acciona, First Balfour and DM Consunji

Cost: Around US\$630 million

Opening: First half 2022

A feasibility study of the project was conducted by Parsons Brinckerhoff in 2015. In January 2016, Metro Pacific Tollways Development Corporation (MPTDC) announced that construction of the bridge would start in 2017 as a design and build contract. The company said that it would be responsible for the construction and financing of the bridge, as well as its operation once it is completed – all through its subsidiary, the Cebu-Cordova Link Expressway Corporation.

A ground-breaking ceremony for construction was held in March 2017. The bridge is the first venture for the MPTDC outside of Luzon, the

largest and most populous island in the Philippines.

COWI, an international engineering and environmental consulting group headquartered in Lyngby, Denmark, worked with local Philippine counterpart DCCD Engineering as the CCLXe technical advisor. The project is being carried out by the Cebu Cordova Link Expressway Corporation under a public-private partnership arrangement with the local governments of Cebu City and Cordova Municipality.

Meanwhile, Norconsult is the project's independent engineering consultant. Norconsult is based in Sandvika, just outside Oslo, and

is Norway's largest multidisciplinary consultancy firm. The company has worked on international projects in more than 150 countries over the past 50 years. Apart from transport projects, the company is involved in the oil and gas, energy, rock engineering and engineering geology sectors. According to the company, it focuses "especially on selected markets in South America, southern Africa and South East Asia", where it has established local offices. The contractor is CLJV, a consortium composed of Spanish company Acciona Construcción and Filipino companies First Balfour and DM Consunji.

“We faceted both the pylons and piers to keep them as slender as possible while allowing the expression of the deck to stay light and elegant”

Jesper Henriksen

Dissing+Weitling: design parameters

Jesper Henriksen, a partner at Dissing+Weitling, based in Denmark, explains that a single-span design would have been risky because of typhoons that are common to the region. Also, aesthetics were important to the client.

“Our overall approach in the initial concept phase was to establish not only a cable-stayed bridge which would be a record span for the Philippines, but to create a landmark for the City of Cebu. Religion - and especially Magellan's Cross - plays a

major part in how the city sees itself, so the expression of the pylons was very important to the client at the early stages,” says Henriksen.

“We faceted both the pylons and piers to keep them as slender as possible while allowing the expression of the deck to stay light and elegant. We have been quite successful in keeping and integrating the faceted structure and the giant crosses into the design. We also did sketches for the toll stations, with references to the Philippines flag, but

this was unfortunately dropped at a later stage,” he says.

“Our involvement in the project, after we had established the overall design and expression, was to uphold the ideas and concept throughout the development stage. It is, of course, always difficult working from a distance, but we feel that... the client has been firm on meeting our demands and keeping the original thoughts and ideas throughout the project.”



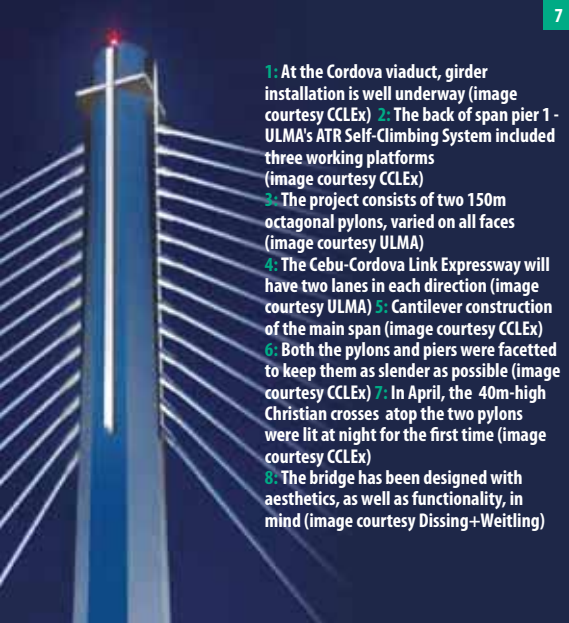
1 2



3 4



5 6



7 8

- 1 At the Cordova viaduct, girder installation is well underway (image courtesy CCEEx)
- 2 The back of span pier 1 - ULMA's ATR Self-Climbing System included three working platforms (image courtesy CCEEx)
- 3 The project consists of two 150m octagonal pylons, varied on all faces (image courtesy ULMA)
- 4 The Cebu-Cordova Link Expressway will have two lanes in each direction (image courtesy ULMA)
- 5 Cantilever construction of the main span (image courtesy CCEEx)
- 6 Both the pylons and piers were faceted to keep them as slender as possible (image courtesy CCEEx)
- 7 In April, the 40m-high Christian crosses atop the two pylons were lit at night for the first time (image courtesy CCEEx)
- 8 The bridge has been designed with aesthetics, as well as functionality, in mind (image courtesy Dissing+Weitling)

» ULMA formwork¹

ULMA, headquartered in Spain's Basque region, undertook the most technically challenging structures in the project: the pylons; the working platforms for the installation of the cable-stayed structure; as well as the piers, pier caps and pier segments. The company is also responsible for a pier cap beam whose size and technical requirements - combined with the constant interference of traffic below - made it the most challenging aspect of the project, according to the company.

The bridge consists of two 150m octagonal pylons, varied on all faces, which required 42 piles in total. ULMA's ATR Self-Climbing System not only adapted to the height and geometry of the pylons, but also to the presence of a 50m-high ornamental metal cross embedded in the concrete, a tribute to Magellan's arrival in Cebu².

Likewise, the system proved sufficiently flexible during pouring to adjust to the presence of the cable anchors embedded in the wall. This presented a significant challenge in the interior of the piles during Phase 3, though it was foreseen in the initial design of the solution.

The comprehensiveness of the ATR System allowed the crane to be used for other auxiliary works, such as rebar placement. All systems were designed to ensure the ease and safety of

work, as well as the productivity of the entire construction process. In fact, fully enclosed work platforms were designed so that it was possible to carry out the work even in extreme wind conditions that are typical of the area.

The configuration of the ATR Self-Climbing System was designed specifically to meet the requirements of these two pylons, using three working platforms. The main platform was used for bearing loads, reinforcement work and offsetting the formwork. Meanwhile, the intermediate platform housed the hydraulic system and the third platform was used for cone recovery. In addition, the formwork itself was equipped with working platforms to guarantee worker safety at all times.

The final formwork solution was divided and designed in three phases:

- Phase 1: from foundation to slab deck (44.27m)
- Phase 2: from slab deck to start of the cross-section (50.18m)
- Phase 3: from the beginning of the cross-section to the top (41m)

Work processes were planned so as to improve the pace of execution, which was 5m pours in weekly cycles. The following phase consisted in installing the stay cables

that connect the two pylons to the bridge deck. For this purpose, ULMA supplied BMK platforms to facilitate the work of placing and tensioning the cables during Phase 3 of the pylon construction.

In order to connect the Cebu South Coastal Road to the main bridge, a pier cap support beam with demanding technical specifications was required. ULMA's engineering team proposed a solution based on the MK System to implement a 45m-long square section beam supported on two piers and with cantilevers up to 8.3m.

ULMA noted that its personnel were present continually throughout the project, accompanying the client on a daily basis from the very beginning, providing solutions in real time to any technical questions that arose. ■

¹ Editorial copy supplied by ULMA

² Magellan's Cross is a Christian cross planted by explorers of the first circumnavigation of the world, led by Spain's Ferdinand Magellan, upon arriving in Cebu in 1521. The original cross is housed in a chapel next to the Basilica del Santo Niño in Cebu city centre. It is encased inside another wooden cross, reportedly to protect it from people chipping away at it for souvenirs.

Marcelo Fernan Bridge



© Mjizik | Dreamstime.com

Existing bridges

The Mactan-Mandaue Bridge is an 854m-long, 9m-wide truss bridge carrying two lanes of traffic across the northern Mactan Channel to connect the cities of Mandaue on the main Cebu Island with Lapu-Lapu on Mactan Island. Its longest span is 145m. Construction began in 1970 and the bridge was opened in 1973. In 2013, the bridge was officially renamed the Sergio

Osmeña Bridge in honour of the fourth president of the Philippines (1944-46) who was also a former governor of Cebu, his birthplace.

The structure is owned and operated by Philippines federal Department of Public Works and Highways. The bridge's importance is its location as a gateway to nearby Cebu International Port where about 80% of domestic and

international shipping operators and shipbuilders are located.

Around 1.6km north of the Mactan-Mandaue Bridge is the 1.2km-long Marcelo Fernan Bridge. Construction started in 1996 and was finished in 1999.

The bridge, built to alleviate traffic on the older bridge, is owned and operated also by the Philippines federal Department of

Public Works and Highways. The extradosed cable-stayed bridge has a 185m centre span, four traffic lanes and two pedestrian walkways - making it one of the widest and longest bridge spans in the Philippines. It was constructed with help from the Japanese government and named after federal Senator Marcelo Fernan who hailed from Cebu City.

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Vivacity Labs will use sensors to monitor cycle lane use

Vivacity to capture cycling data

Vivacity Labs has partnered with the London boroughs of Sutton and Kingston to review and monitor the use of cycle routes.

The councils will use Vivacity's artificial intelligence and Internet of Things (IoT) technology to provide anonymous data on different transport modes and movement patterns.

Sensors will be deployed to gather more information about each borough's cycle infrastructure, including the number of cyclists using the cycle lanes and main roads as well as the number of unauthorised vehicles illegally using the spaces.

Vivacity says this will help the councils to consider the areas to be included within expansion of cycle route networks and the type of infrastructure needed to aid the users.

In Sutton, 13 sites will have sensors and 17 sites have been identified in Kingston, with both councils including town centre locations.

The councils are carrying out the project as part of the South London Partnership, an initiative that seeks to deliver an IoT platform that will connect various sensors across borough boundaries.

Vivacity
<https://vivacitylabs.com>

Swarco and Lime in data project

SWARCO and Lime will cooperate in a pilot project to reduce the crash risk of micro-mobility users at traffic light controlled intersections.

SWARCO is an Austrian traffic technology specialist and Lime is a San Francisco-based shared electric vehicle provider. The joint pilot project - Intersection Risk Mitigation - aims to optimise SWARCO's adaptive traffic light management algorithms to improve the safety of vulnerable road users and enhance traffic efficiency for drivers as well, explained Christoph Stögerer, head of innovation and technology at SWARCO.

Meanwhile, SWARCO will leverage Lime's anonymised ridership data to develop insights and countermeasures, such as adjusted pedestrian crossing timing algorithms, to support safer road conditions, especially for vulnerable users of micro-mobility.

"We know that intersections are key areas where conflict between cars and micro-mobility users are more likely to occur," said Annie Chang, director of safety programmes at Lime. "We're encouraged by SWARCO's leadership in providing traffic management solutions throughout Europe and believe that with Lime's unparalleled expertise



The timing is right for SWARCO and Lime to develop intersection timing solutions to improve safety (image courtesy of Lime)

in micro-mobility data, we can make a real impact in improving safety for all road users, including pedestrians, cyclists and scooter riders." ■

Swarco
www.swarco.com

Lime
www.li.me

PlasticRoad, Orbia cyclepath in Mexico

Dutch firm PlasticRoad has helped create a climate-adaptive bicycle path made from around 1 tonne of plastic waste in part of Mexico City's Chapultepec Forest.

PlasticRoad said that the path is the first pilot project for its road system that allows ingress and storage of rain and runoff water. The companies said that this will help alleviate some flooding, a major issue for the Mexican capital of around 22 million people. With extremely high annual rainfall, water runoff from roads and other city areas can infiltrate drinking water systems.

According to PlasticRoad, the modular design of Mexico City's cycle path offers temporary water storage and drainage which is monitored via embedded sensors. By gradually releasing rainwater back into the ground, dry periods will also have less impact on

the area around the cycle path. In addition, its durability and low-maintenance construction mean a reduced carbon footprint of up to 72% over its service life as compared to traditional road structures.

"Our third pilot in Mexico is an opportunity to test our product under a different set of climate conditions, which will provide us with significant data in order to explore international markets outside our country of origin - the Netherlands - in the future," said Eric Kievit, managing director at PlasticRoad.

Chapultepec Forest - Bosque de Chapultepec - is one of the largest city parks in the Western Hemisphere, measuring more than 686 hectares. Marina Robles García, secretary of Sedema, Mexico City's environment ministry, says the initiative is part of the capital's environment

and climate change programme, unveiled two years ago.

"An initiative like this combines the idea of seeking sustainable mobility in the city with the idea of giving new life to plastic waste as reusable material to build new infrastructure," said Robles García.

PlasticRoad worked with Orbia, a global company based in Mexico City and which develops sustainable solutions in the agriculture, building and infrastructure sectors. Orbia brands include Netafim, Wavin, Koura, Dura-Line, Vestolit, Alphagary, Amanco, PAVCO, Plastigama, Klea and Zephex.

PlasticRoad
<https://plasticroad.com/en>

Wavin
www.wavin.com/en-en

Orbia
www.orbia.com

Amanco Wavin supervised installation of the PlasticRoad bicycle path in Mexico City's Chapultepec Forest - Bosque de Chapultepec



The ScandEliVry project is to help in the transition to electrification of heavy and light goods vehicles

© Scharfsm86 Dreamstime.com

Sweden to need 1,200 EV stations

Sweden will require 1,200 EV charging stations by 2030 to accommodate an increasing number of heavy electrified trucks, according to a report by Power Circle.

Many of the charging stations are likely to be located at logistics centres, sea ports and alongside major Swedish roads used by long-distance vehicles.

Power Circle, a Swedish non-profit organisation focused on electrification and power system transition, estimates that Sweden will have 12,500 EV trucks on the

road by 2030, equivalent to 15% of the country's total fleet. Some of the heavy electric trucks will be modified from their original internal combustion systems.

Power Circle, along with Dansk Elbil Alliance and IUC SYD, has set up the ScandEliVry project to help in the transition to the electrification of heavy and light goods vehicles.

The project is part-financed by the EU program Interreg-ÖKS and has been operating in Sweden's southern Öresund-Kattegatt-Skagerrak region since last year

and will run until next year. Network meetings are published regularly on the project's website (see link below).

The aims are to examine the best ways to set up a EV system, which also includes how to encourage vehicle manufacturers to develop and transport companies to purchase EVs. A final report will be delivered that deals with opportunities for electrifying goods and freight transport, alternatives for charging as well as mapping of electricity networks and transport nodes.

Importantly, there will be "concrete examples" of good solutions to prevent the electricity supply network's capacity from slowing down the switch to electrified transport.

Power Circle brings together experts and stakeholders from trade, research and development, the academic and legal world as well as government energy to stimulate investment for research and development into electrification of vehicles.

The Dansk Elbil Alliance consists of member companies from the entire value chain for electric cars, including energy companies, component suppliers, charging infrastructure operators, electric car manufacturers, knowledge institutions and companies that use electric cars.

IUC Syd is a cluster operation for manufacturing companies that is supported by Sweden's Skåne Region council that includes the city of Malmö. IUC Syd has been backing e-mobility projects since 2005. ■

Power Circle

<https://powercircle.org/scandelivery>

Gothenburg in winter data project

The Swedish city of Gothenburg will start a two-year digital road condition data collection project in order to improve the efficiency of winter road maintenance.

The municipality is working with ViaPM, NIRA Dynamics and the Luleå University of Technology to use fixed sensors and mobile sensors on vehicles for gathering information, according to Håkan Johansson, head of planning at the city of Gothenburg. Among data to be collected is that from vehicle-mounted sensors which continuously note road friction.

The goal of the project is to develop road condition forecasting models so Gothenburg's maintenance machinery can react more quickly to poor driving conditions. Also, not as much de-icing material would be needed. Maintenance vehicles, such as snow ploughs, would spend time only where they can be most effective and so cut down on time on the road, thereby reducing vehicle emissions.

An added benefit is that cycle lanes and bus lanes would be cleared more efficiently and so improve public transport times for commuters.

ViaPM is a construction management and inspection consultancy based in Gothenburg. NIRA Dynamics, headquartered in Linköping,



Fixed sensors and mobile sensors on vehicles will gather information Dynamics

Image © NIRA

Sweden, is a specialist road condition data company within the Volkswagen Group.

NIRA recently signed an agreement with Global Weather Corporation for use of its RoadWX data service that forecasts weather and road surface conditions that vehicles will encounter within minutes or hours, worldwide. Global Weather says that its RoadWX data integrates with connected vehicle data to enable road weather safety alerts, route optimisation, autonomous system engagement

and disengagement, rideshare fleet deployment and transportation decision systems.

RoadWX's proprietary RoadWeather technology models the thermal physics of the road to estimate these complex road conditions and forecast their evolution.

Global Weather Corporation, based in Boulder, in the US state of Colorado, is a weather data services company formed by the University Corporation for Atmospheric Research Foundation. UCAR is a non-profit consortium of more than 115 North American colleges and universities focused on research and training in the earth system sciences. The corporation also manages the US National Center for Atmospheric Research on behalf of the National Science Foundation. ■

ViaPM

www.viapm.se/tjanster.html

NIRA Dynamics

<https://niradynamics.se/>

Luleå University of Technology

www.ltu.se

Global Weather Corporation

<https://globalweathercorp.com/>

Vaisala, Yotta in maintenance deal

Yotta has partnered with Vaisala, a weather, environmental and industrial measurements company, to provide a solution to help UK councils accelerate road maintenance programmes.

The solution features Vaisala's RoadAI product and Yotta's asset management software solutions Horizons and Alloy. Vaisala's RoadAI uses high-quality video data and computer vision to assess highway conditions quickly and accurately, explained Ben Brown, head of road asset management at Vaisala.

Yotta's Horizons and Alloy then interpret the data and use it to provide rapid insight into future planning and maintenance needs.

Using Vaisala RoadAI, engineers can collect geospatial video data every time they go out on the network, either responding to an ad hoc call out or as part of a routine network or safety inspection. Further to this, clients can automatically process video data to produce condition surveys.

This replaces today's scenario where clients book and commission a survey with an external agency - when that agency has the resources available and then plan it, six to 12 months in advance. It also gives councils the opportunity to undertake condition surveys on a risk-based approach following the inspection regime. This means roads may have much more regular condition assessments.

With the early intervention asset management that the partnership between Yotta and Vaisala supports, councils can pick up defects on the network as soon as they start to occur.

Vaisala
www.vaisala.com

Yotta
www.weareyotta.com

REBLOC for Scotland M8

A major bridge upgrade project on Scotland's busiest motorway has been completed using REBLOC RB140 and Maxibloc barriers to ensure maximum protection for road users.

The permanent concrete road safety barriers have been installed on the M8 at Junction 3, in Livingston, to replace an old system which no longer met safety standards. The M8 connects the country's two largest cities, Glasgow and Edinburgh.

Hardstaff Barriers, a manufacturer and supplier of vehicle restraint systems, worked alongside Transport Scotland, BEAR Scotland and Highway Barrier Solutions, to install the high containment barriers.

REBLOC RB140 and Maxibloc barriers were installed during an eight-week programme along the verges and on the central reserve to protect the bridges in the event of a collision. ■

REBLOC
www.rebloc.com

Hardstaff Barriers
www.hardstaffbarriers.com



REBLOC RB140 and Maxibloc barriers were installed along Scotland's M8 motorway

Fix your street with FixMyStreet



Better phone this one in and let FixMyStreetPro that uses Yotta's Alloy software take over

The FixMyStreetPro smartphone app allows UK residents to report public street issues, from potholes and unsafe highways to broken street lights and loose drain covers.

Information gathered from FixMyStreetPro - created by SocietyWorks, a local UK authority services provider - is sent to Yotta's Alloy software. This automatically alerts authority maintenance or inspection teams to take appropriate action. The app also notifies the person who had sent in the notification as to what actions have been taken.

The new integrated solution will initially be used primarily for highways and street works applications. Both companies said the app has potential for other services, such as reporting missing waste bins, processing payments for garden waste and grounds maintenance problems.

"Both residents and local authorities

want to see resources put to the best possible use in order to make public funds go as far as possible," said Sam Orton, head of transformation accounts with Yotta, the global asset management software and services provider.

"Citizens benefit from getting a better delivery outcome from any queries or requests they may have which, in turn, helps strengthen the reputation of the council in the community," said David Eaton, sales director at SocietyWorks.

SocietyWorks is the wholly-owned subsidiary of mySociety, a UK charity that has been working to improved services delivery and outputs for local authority residents. ■

SocietyWorks
www.societyworks.org

Yotta
www.weareyotta.com

Drainage planning with QuAD

The QuAD software resilience tool from ACO Water Management allows users to test a proposed maintenance regime for a water channel design

ACO Water Management UK says its free-to-use QuAD software can help road authorities and contractors design more efficient drainage channels and allow easier maintenance afterwards.

Users of the QuAD Hydraulic Design 2.0 software can test a proposed maintenance regime for a channel design based on the anticipated sediment and silt build-up. Combining the latest water management systems with carefully planned maintenance is the most cost-effective way to eliminate potholes and ensure road safety, according to the company.

QuAD supports designers in the creation of catchment areas. Supplementary catchment areas can easily be added upstream and downstream of any previously designed channel run. Optimising the specific channel runs can be done with the optimiser feature selecting the smallest product suitable. Excavation and concrete requirements are also provided.

Attenuation required for the project can be calculated and compared with the storage available in the channel design. Attenuation volume is presented along with suitable options for storage. Output can be generated for all or parts of the project and can be generated in PDF or CSV formats.

"It's difficult to overstate the damage that standing water can cause, with potholes appearing in a matter of weeks in some circumstances," said Terry Wilkinson, highways application engineer at ACO Water Management in the UK, which is part of the global ACO Severin Ahlmann Group based near Kiel in Germany. "This is where it is critical to tackle the issue at source, by minimising surface water rather than simply treating the symptom. As we have seen, the long-term costs associated with filling in potholes is far greater than the investment required to introduce effective water management solutions."

It is a two-stage process, he explained. "On the one hand,



you have to make sure the right solutions are put in place. Collection systems, such as ACO's RoadDrain, are there to remove water from the road surface and should form a central part of planning. Equally important is the ongoing maintenance of drainage solutions, as this is integral to their long-term efficacy."

Best practice for water drainage involves the concept of a sustainable drainage system (often abbreviated as SuDS). The aim is to regulate surface rainfall run-off by controlling the rate and volume of run-off from site. This relieves pressure on sewerage systems and simulates natural drainage as closely as possible. Used effectively, SuDS can help local authorities, planners, architects and developers deliver greener infrastructure. ACO believes that the best SuDS will be cost-effective to operate and provide efficient drainage throughout their life.

The SuDS philosophy is based upon four key pillars: water quality; water quantity; amenity; and biodiversity.

Water quality is about controlling the quantity of run-off to support the management of flood risk, and maintain and protect the natural water cycle. Water quantity is about managing the quantity of the run-off to prevent pollution. Amenity refers to creating and sustaining better

places for people. Biodiversity is about creating and sustaining better places for wildlife. ACO has a wildlife range of products that help protect wildlife habitats around developments.

ACO has developed a model to reflect adoption of SuDS thinking – collect, clean, hold and release. This framework embraces the entire surface water management cycle, from the point where rain lands, right through to where it re-enters the natural water environment.

Collect

Ensuring surface water run-off is managed at source is an important part of SuDS, and ACO has a wide range of channels designed to collect and convey water close to the surface efficiently. Consideration of ground conditions, catchment design, rainfall intensity, downstream hydraulic conditions, loading and visual setting are key to correct product selection.

Clean

Protecting the environment from surface water run-off contaminated with hydrocarbons and particulates is a critical process within modern integrated surface water management. Stormwater surges that dislodge and carry high concentrations of pollutants from exposed areas

such as car parks must be treated prior to its release.

Hold

The provision of sufficient attenuation volume within the surface water management system ensure it retains its designed collection and release performance under maximum rainfall conditions. High-capacity drainage channels and attenuation tanks, such as ACO StormBrixx's flexible geo-cellular range, ensure it can be used to achieve the required safe storage capacity.

Release

Flood risk management requires the accurate control of surface water run-off volumes entering either the mains drainage network or the local natural groundwater or surface water courses. Individually, sized flow control devices or infiltration systems can be used to meet any specified discharge rate.

To help those in the highways industry get to grips with the latest water management solutions, ACO Water Management has a free CPD webinar on Managing Highway Surface Water, available on its website. ■

ACO Water Management

www.aco.co.uk

ACO Group

www.aco.com

NTEP cert for Intercomp's TS30

Intercomp reports that its TS30 CPU with a touchscreen indicator is now NTEP Class III/IIIL certified for use in static wheel-load weighing.

The TS30 CPU is an advanced touchscreen indicator for self-contained operation of portable scales.

NTEP stands for National Type Evaluation Programme, an approval system created by the US Department of Commerce's National Institute of Standard and Technology and the National Conference on Weights and Measures. Any scale or balance used for sales in the US must be NTEP-approved, making it legal for buying and selling goods by weight.

The TS30 CPU's touchscreen display and graphic user interface is housed in a rugged, standalone wireless indicator. Intercomp says that this allows operators to set up scales, weigh vehicles and create weighing records with greater speed, flexibility and operator safety.

Vehicle weight data is displayed on a single screen. Weights from wheels, axles, axle groups and gross vehicle weight – GVW – is displayed in real time. Vehicle records are printed on an integrated ticket printer or exported and downloaded.

The NTEP certification enables cable-free use of the indicator with Intercomp's portfolio of wireless or cabled NTEP certified scales, explained Jon Arnold, market specialist at Intercomp. "Communicating via our RFX wireless technology, the CPU and scales enable safe scale operations without walking around vehicles to view and record the scales."

Intercomp's RFX wireless remote communication capabilities provides line-of-sight connectivity up to 90m and the ability to connect with up to 12 scales. The CPU offers onboard storage capacity for over two million separate weight records and data can be exported via multiple USB or Ethernet ports.

The CPU has the intuitive touchscreen interface, rechargeable battery, and thermal



ABOVE: NTEP certification for Intercomp's portable wireless touchscreen indicator for static scale operation

printer integrated and self-contained in a rugged all-weather case, built to withstand the demands of portable weighing operations. ■

Intercomp

www.intercompcompany.com



LEFT: Because of the slim shape of Kistler's Linesas quartz WIM sensors no massive cuts in the road are necessary for installation (image courtesy Kistler Group)

Ukraine opts for Kistler

Ukraine is working to set up 250 weigh-in-motion stations by 2025 in an effort to tackle rapidly increasing road damage by overweight vehicles.

Already, 45 WIM stations – around half of them using Kistler's Linesas quartz WIM sensors – have been set up on crucial transport routes across Ukraine.

The WIM stations allow Ukrainian authorities to automatically fine overloaded trucks. In addition, authorities will be able to analyse the data to help predict when a given road surface will need replacement or where further infrastructure development might be beneficial.

In Ukraine, the rapid decay of road surfaces

has long been a major issue for Ukravtodor, the state agency responsible for maintaining the country's major roads. Almost immediately after a road has been constructed or repaired, damage starts to appear. In the capital Kiev, the problem is most acute. About 40% of all trucks on the road in and around the city are either overweight or violate size restrictions.

On the agency's website, Oleksandr Kubrakov, chairman of Ukravtodor comments that if everything is left as it is, a newly constructed road's lifespan is a mere two years. To prevent this scenario, the national government launched a campaign to combat weight violations on Ukrainian roads that includes large-scale introduction of weigh-in-

motion stations to back up the government's resolve.

They weigh all passing vehicles without disrupting traffic and transmit the data to a control cabinet by the road for analysis. If the vehicle is too heavy, a camera automatically takes a picture of the license plate and sends the collected information to the local authorities, who will then fine the offending driver or logistics company.

Kistler says that Ukraine is not the first eastern European country to install its WIM technology on a large scale to reduce the number of overloaded vehicles. "We have been providing WIM systems for direct enforcement in countries like the Czech Republic, Russia and Hungary for several years now," says Tomas Pospisek, regional manager for Eastern Europe within the Traffic Solutions business at Kistler Group.

Kistler specialises in piezoelectric sensors, a measurement technology that stands out for its longevity and accuracy even in tough conditions such as high temperatures or fast traffic. "Over the past 20 years, we have continuously made our products more and more accurate to enable direct enforcement. Now we can offer an accuracy around 2% with our KiTraffic Digital System," says Pospisek. ■

Kistler

www.kistler.com/wim

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www.roplreg.com



Smooth milling was carried out for airport works in Malaysia with Wirtgen

Smooth runway milling

A fleet of machines from the Wirtgen Group has been used for an airport runway upgrade in Malaysia

The contractor used high-performance Wirtgen cold milling machines as well as pavers from Vögele and rollers from Hamm for the rehabilitation of runway 1 at Kuala Lumpur International Airport (KUL).

The first part of the job for the contractor was the rehabilitation of runway 3 as part of the KUL Runway Sustainability Master Plan. The firm was then given the go-ahead to begin work on the first complete rehabilitation of runway 1, including the adjacent taxiways. The first step in this process was removing 44,000m³ of asphalt.

The large-scale asphalt removal operation was carried out by a fleet of Wirtgen milling machines designed for high performance. The planer fleet comprised several large milling machines with a milling width of 2m: two W 195s; one W 205; two W 1900s. In addition, the contractor also used a W 1000 compact milling machine with a milling width of 1m.

The planers were used to mill an area of around 4km in length and 60m in width. All the different models involved can be used in a variety of ways. Equipped with a 2m standard milling drum, the W 195 and W 205 large milling machines, for example, can each mill to a depth of 33cm.

Due to the much higher load in the central area of the runway caused by the weight of the landing aircraft, the milling experts from contracting firm Nippon Road defined two areas, each with a different milling depth. The first area encompassed the central corridor measuring 18m-wide, and the contractor decided on a milling depth of 250mm for this section, which was continuously milled in two passes – first at a

depth of 100mm, then at a depth of 150mm. The two outer strips of the runway, each 21m-wide, formed the second area where the company removed a 75mm-thick asphalt layer in a single pass.

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

The LEVEL PRO PLUS levelling system delivered a uniformly milled, even surface. Integrated into the control system, this continuously compares the current milling depth with the preset target value.

Front-loading the milled material optimised truck logistics throughout the milling operation. Continuously filling the waiting trucks kept the milling process flowing smoothly as the trucks rotated on the fly. The milled asphalt material was then reused at a nearby road construction project.

Once the milling work had been completed, pavers from Vögele and rollers from Hamm were then employed to pave and compact the new asphalt surface. Using this Wirtgen fleet the contractor was able to complete the complete rehabilitation of runway 1, including the adjacent taxiways, at Kuala Lumpur International Airport. ■

Wirtgen Group
www.wirtgen-group.com



Up to six of the Wirtgen mills were employed at one time on the airport job

Mallorca Airport upgrade

Palma de Mallorca Airport (PMI) reopened its northern runway (06L-24R) at the end of 2020, after completing the surface refurbishment work.

The construction project was carried out with the help of MAB Obras Públicas SL and Sampol Ingeniería y Obras, with consulting services from AERTEC. The runway is 3.27km-long by 45m-wide and now also has almost 6,000 linear metres of the new ACO Qmax Neo high-capacity drainage channel for the collection and evacuation of rainwater and wastewater.

Spanish Airports and Air Navigation (AENA) required the northern runway of Palma de Mallorca Airport to meet the highest standards for safety and reliability.

As a result, AENA looked for the replacement of all beacons and existing light signals with LED technology, as well as the renovation of the runway's surface. The switch to LEDs was



The new drainage also forms curves where necessary

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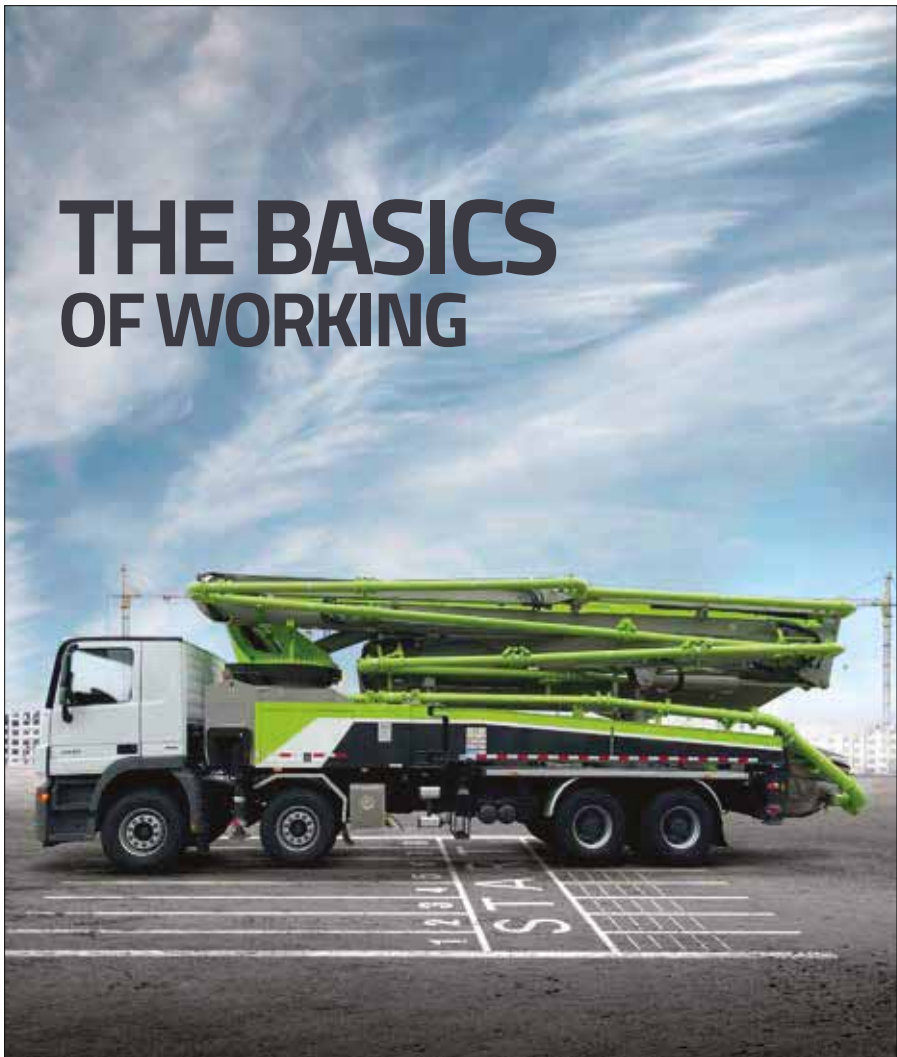


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Drainage has now been improved using the ACO systems



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www.zoomlion-europe.com



» intended to improve energy efficiency while AENA wanted to improve the runways and build two rapid exit taxiways for aircraft. To increase safety on the runways, the rainwater drainage system was also refurbished to prevent flooding. This new water evacuation system was designed with 8,000 linear metres of maximum-capacity drainage channels, most of which are the new ACO Qmax NEO 300 model.

This system has a circular channel with a diameter of 300mm. This allows the collection of rain and wastewater up to 550litres/second without a gradient. The channels also offer an F900 load rating allowing the units to withstand the passage of aircraft or heavy-duty vehicles.

In addition to collecting water, Qmax allows water to build up within the channel capacity, regulating the volume of water that enters the sewer system and allowing for the effective control of peak flows during a storm. The chosen grate was the cast iron Q-FLOW model. The easy assembly and modularity of the ACO Qmax Neo 300 was also important. Supplied in 2m-long pre-molded pieces that are stackable and transportable, the technicians were able to handle and position the components within the tight timeframe for the refurbishment of the airport.

In addition to the Qmax drainage channels, 11 high-strength Combipoint PP grates have also been installed on the sides of the runways and 46 circular Multitop cast iron manhole covers.

The ACO DRAIN Qmax Neo is a new member of the ACO Qmax family, which now includes the range of sizes from 150mm, 225mm, 300mm, 350mm up to egg-shaped 550mm, 700mm and 900mm. Integrated gaskets make the channel watertight and all sizes can be combined in a project by tailor-made inlet shafts and inspection elements to meet a project's hydraulic needs. In case of areas without a terrain gradient, special height adapters can be used to achieve a slope.

A pavement beam provides reinforcement and positioning during installation, while concrete flows through the top part of the product. Installation is simplified with the use of a special jig that keeps the product in place during the process.

ACO

www.aco.com

Kontent Structures has it covered

Renovation on a bridge over the Rhine River in Karlsruhe, Germany, has been completed using a weather-resistant tent covering the entire length of the structure

By installing an 18.5m-wide by 335m-long tent, work continued regardless of weather conditions and in a dry and frost-free environment. Work was completed without delays. Kontent Structures supplies temporary and permanent accommodation for events and business solutions, mostly across Europe. All its tent structures are designed and produced in-house with its 5,000m² facility in Alphen-on-the-Rhine, between Leiden and Utrecht in the Netherlands.

The tent for the Karlsruhe bridge project was made mostly of extruded aluminium profiles with steel connector parts. Kontent Structures sets up and dismantles its structures and the length of its tent systems is unlimited. The maximum free span is 40m. But this length depends on the location, period and weather conditions of the site to be covered.

All the tents, which are reusable, are water and weatherproof. The company said that before deciding on a tent system and design, it does a structural analysis according to the European EN Eurocode 1991-1: Actions on Structures. This includes wind and snow loads according to location-specific values. EN 1991-1-1 gives design guidance and actions for the structural design of buildings and civil engineering works, including densities of construction materials and stored materials, the self-weight of construction elements and imposed loads for buildings.



TOP & ABOVE: Kontent Structures installed an 18.5m-wide by 335m-long tent along the entire length of a bridge over the Rhine River in Karlsruhe, Germany, for work to continue regardless of weather (image courtesy Kontent Structures)
BELOW: In the case of extremely cold weather, sandwich panels and air-filled double-layered roof covers can be used to provide insulation (image courtesy Kontent Structures)



The company said that in the case of extremely cold weather, sandwich panels and air-filled double-layered roof covers can be used to provide insulation. A sandwich panel is any structure made of three layers - a low-density core and a thin skin-layer bonded to each side. Sandwich panels are used where a combination of high structural rigidity and low weight is required. To enhance the insulation of a tent, heating systems can be integrated into the structure to create a better working environment.

The company said that it is currently working on another site in Guntersdorf, a market town in Lower Austria.

Kontent Structure's client was Strukton, a specialist construction company. Earlier this year, Strukton announced that it will build a 1.8km immersed tunnel underneath the Scheldt River as part of a ring road around Antwerp, Belgium. Strukton Immersion Projects, part of the Dutch engineering firm Strukton Civil, focuses on the floatation, transport and immersion of tunnel elements and caissons.

The company will develop eight tunnel elements for the Oosterweel connection that will connect the Expressweg (E34) near Bloklersdijk via a toll tunnel (the Oosterweeltunnel) underneath the Scheldt, connecting the Antwerp Ring Road at Merksem and Deurne. ■

Kontent Structures

www.kontent-structures.com

Strukton Immersion Projects

<https://strukton.com/en>

ULMA on the Gadiana Bridge

Heavy onsite winds and the simultaneous renovation of both pylons were challenges for ULMA when it supplied scaffolding for work on the Gadiana International Bridge.

The cable-stayed structure crosses the Gadiana River to connect the Spanish town of Ayamonte and Portugal's Vila Real de Santo António, both popular tourist destinations.

The 666m, 5-span heavily trafficked composite bridge was designed by the architects José Luis Cancio Martins and Teixeira Duarte and opened in 1991. The bridge – with a 334m central span – connects Portugal's Via do Infante de Sagres A22 Motorway to Spain's Autopista del Quinto Centenario A-49 Motorway and is part of the European Route E1.

Renovation work includes a major repair of suspension cables and large-scale structural and mechanical maintenance, as well as repaving of the road deck.

ULMA provisioned 460tonnes of formwork and scaffolding for the work.

The 100m-high pylons were covered with BRIO Modular Scaffolding and access stairways to creating many distinct access points to facilitate the repair of suspension cables. The scaffolding design had to accommodate the pylon geometry and the presence of the suspension cables, while providing safe working spaces. ULMA's design was further complicated by the presence of strong winds onsite.

ULMA was required to provide an efficient and timely response to the project's various demands, not least enough scaffolding to renovate pylons simultaneously.

Two protective gantries – one for each pylon – were installed in an extremely limited space so renovation could be undertaken without interrupting traffic flow. In order to adapt to the limited



The 100m-high pylons of the Gadiana International Bridge were covered with ULMA's BRIO Modular Scaffolding to facilitate the repair of suspension cables (image courtesy ULMA)

space available and withstand the load of the scaffolding structures, the gantries were made from heavy-duty T-500 Shoring Towers combined with intermediate metal beams and ENKOFORM.

See the Key project report on

page 20 of this issue of *World Highways* for ULMA's work on the Cebu–Cordova Link Expressway in the Philippines.

ULMA

www.ulmaconstruction.com/en

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CIFA's five arms

CIFA's new five-arm truck-mounted concrete pump K36L, with a 36m boom, is designed for easy use, especially in tight spaces.

CIFA says that K36L-5 is being launched with the slogan "five arms like never before" to underline the special characteristics of the pump.

"K36L-5 was designed to be the perfect concrete pump for every jobsite, especially the tightest ones, and for every operator, even the least experienced ones," said Marco Polastri, CIFA's marketing director. "This new product is part of a CIFA strategy that aims at streamlining the product offerings as a result of the new needs of the construction site."

Having a boom in five sections and a new continuous rotation joint on the last section allows for greater flexibility in small spaces and for pumping in the most complex placements.

The major difference when using a rotor is simplicity of use and time savings. It is easier to unfold and move to indoor construction sites because the rotor enables any boom positioning and rotation in both directions.

CIFA says that the base frame of K36L-5 has been designed for compactness and light weight. The key improvement is the linear stabilisation on the rear. This layout makes any placement possible, even the most complex ones. Compared to the rear swing-out outriggers, it takes up much less space on the ground.

In addition, the K36L-5 can be mounted on 3-axle chassis with short wheelbases from 4-4.5m. In this way the machine is always manageable, even in city centres or in mountainous areas.

Thanks to the automatic functions included in Smartronic – the management system made by CIFA – the stabilisation of the K36L-5 is easy and safe, according to the manufacturer. Having K36L-5 with Smartronic means maximising the efficiency of the machine and its safety of use with ASC (advanced stability control) and MBE (maximum boom extension).

ASC maximises the work area based on the effective opening of the stabilisers. When approaching a limit situation, it works by first slowing down the boom and eventually

CIFA's advanced stability control will slow down the boom extension and eventually stop it before the boom length reaches a critical stability situation



stopping it before reaching a critical stability configuration.

Meanwhile, the MBE function determines the maximum distance that can be reached with the boom with a partial opening of the stabilisation, before opening the boom.

For ease of recognition, CIFA said the "K" in K36L-5 stands for pump, "36" for the boom length in metres, "L" for Steeltech – the most customisable and highest-quality line in the

CIFA product range – and, finally, "5" for the number of boom sections.

CIFA, a manufacturer of concrete-working machinery and equipment with a consolidated presence in the Italian and global markets, has been part of the Chinese industrial group Zoomlion since 2008. ■

CIFA

www.cifa.com



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LEFT: Automatic, digital and flexible: Doka's new powder-coating plant selects the right powder application method, such as the robot hand, to suit a client's needs (image courtesy Doka)
BELOW: Doka's new chief executive, Robert Hauser: more digitalisation (image courtesy Doka)



New powder coating plant for Doka

Doka, an Austrian formwork solutions company, has commissioned a new powder-coating plant in St. Martin, close to the company's corporate headquarters in Amstetten.

The highly-automated plant "forms part of a multistage expansion of production facilities in St. Martin with a total investment volume of €40 million".

Doka said the new powder-coating plant consumes 80% less water than the previous plant and uses environmentally friendly chemicals. The use of sophisticated technologies also permits the plant to save energy in the operation of the furnaces.

"The plant design was inspired by the notion of maximum flexibility," said Christian Mayr, Doka's vice president of production.

A major new feature is that even the larger components of the Doka Framax product range can be powder-coated in the near future. This also means that small series, in addition to large-scale series, can now be produced quickly and economically. The new powder-coating plant adds a real touch of colour, with frame elements able to be painted according to client wishes, such as in corporate colours.

Due to the high level of automation and digitisation in the production process, the range can even be produced in Austria at competitive prices. The plant is currently being ramped up to run as a single-shift operation. The company also plans to make the plant available for contract manufacturing in the future.

The commissioning coincides with Robert Hauser taking over as chairman of

the company. Hauser joined the company in 2018 and has been a board member for the Middle East & Africa and East Asia & Pacific regions since last year. He moved from Dubai for the new position and takes over from Harald Ziebulka who is retiring from Doka after 21 years. He intends to accelerate Doka's digitalisation in the sense of intelligent methods and efficient processes.

Prior to joining Doka, Hauser was employed by the industrial services provider Bilfinger SE where his responsibilities included the Scaffolding division. Before Belfinger, he worked at scaffolding provider Peri for 12 years. ■

DOKA
www.doka.com

BESIX to build Kangaroo Bridge

The Connect Brisbane team, led by BESIX Watpac, has been awarded the design and construction of the pedestrian Kangaroo Point Green Bridge, in Brisbane, Australia.

The contract, worth US\$103 million includes the construction of a 460m-long cable-stayed pedestrian bridge, one of the longest of its kind in the world, according to BESIX. The structure is expected to be a landmark for Brisbane, noted Pierre Sironval, deputy chief executive of BESIX Group. The bridge will directly connect Kangaroo Point to Brisbane's central business district. The walkways will be shaded by solar panels along the length of



Brisbane's 460m pedestrian Kangaroo Point Green Bridge will be one of the longest of its kind in the world (image courtesy BESIX Watpac)

the bridge. The infrastructure will also include public amenities, including a restaurant over the water and viewing platforms.

Drew Brockhurst, general manager of BESIX Watpac in Australia's Queensland state, noted that the company will maximise

involvement of local partners, subcontractors and suppliers. Around 40% of suppliers will be from the Brisbane local government area and over 90% from south-east Queensland. "In terms of employment, the company has also committed to ensuring a minimum of 5% indigenous participation," he said.

Work will begin later this year, with delivery planned for the second half of 2023.

BESIX Watpac
<https://besixwatpac.com.au>

BESIX Group
www.besix.com



RSK's work includes multidisciplinary engineering and environmental support services for the UK's Mersey Gateway bridge (image World Highways/David Arminas)

RSK acquires TechnikGS

RSK Group, a global UK environmental, engineering and technical services provider, has acquired specialist geotechnical contractor TechnikGS, based in the UK.

TechnikGS provides mini piling, micro piling and quality geotechnical solutions for foundation and ground engineering problems. The company was set up in 2011 and has offices in Runcorn and London in England, and Glasgow in Scotland. Clients include construction companies, developers, structural engineers, multidisciplinary consulting engineers and architects.

RSK says that the deal is its tenth acquisition during 2021/2022, completed in an effort to provide a "comprehensive end-to-end offering for its clients".

TechnikGS's existing management team will become part of RSK's geosciences and engineering division, Alan Ryder, RSK's chief executive and founder. "We already have a good relationship with [TechnikGS] through existing RSK group companies and we know the high-quality and innovative solutions that it can provide."

Ryder noted that RSK is on course for delivering an annual turnover of £1 billion (US\$1.4 billion) and will employ 10,000 people around the world by 2025.

Other acquisitions since 2016 include Dynamic Sampling and JB Site Investigations, Non Destructive Testing Services, PB Drilling, Biocensus, Cognica, Boden +

Wasser, Amphos 21, Black & Veatch Hong Kong and Black & Veatch in Singapore.

Apart from TechnikGS, in the current financial year, RSK has acquired Scan Station, RSK Orbital, SkyVision International, Smith + Kennedy Architects, Stephenson Halliday, QSI, Althoff & Lang GbR and Minerex.

RSK was established in 1989 and now consists of more than 100 companies. Its head

office is in Helby, England. The company is certified to the ISO 9001, ISO 14001 and ISO 45001 international standards for quality, environmental management and health and safety management.

Among the projects that RSK has worked on is the new Mersey Gateway, a £1.86 billion (US\$2.6 billion) crossing of the River Mersey near Liverpool, England. The 2.3km, six-lane toll bridge is made of reinforced concrete supported by steel cable stays attached to pylons rising 80–125m above the riverbed.

From the project's inception, RSK provided multidisciplinary engineering and environmental support services, and wide-ranging tender, build, finance and operate contract support for the contractor Merseylink. Also, before construction began, RSK prepared and maintained a detailed discharging programme and obtained all the necessary consents for the work.

The project - whose structural and design team was COWI & Fhecor - won the Outstanding Structure Award 2019 from the International Association for Bridge and Structural Engineering, a scientific and technical association based in Zurich, Switzerland. ■

RSK Group

<https://rskgroup.com>

TechnikGS

<https://minipilingservices.com>



Powering up

John Deere Power Systems is offering advanced new power solutions for its customers - ***Nick Block** reports

The most cutting-edge solutions are often cultivated for the most long-standing trades, such as construction and quarrying. Advances in engine technology have delivered new and more efficient power units that deliver higher power densities, while using less fuel and producing lower levels of emissions.

The recently introduced John Deere JD14 diesel engine provides OEMs with more power/litre than previous 13.5L configurations. John Deere designed this engine specifically to meet customer needs of increased power and torque. With outputs up to 510kW, it has 14% higher power and 11% increased peak torque, making it a reliable and durable power solution.

The John Deere JD14 engines are proven and have been working more than 47,000 hours at high load in a variety of applications. Many of the operating challenges were even more extreme than typically confronted in the field; repeating high to low loads to confirm thermal durability, block loading to show strength, and ultra-low idling to demonstrate oil pressure capabilities.

Continuing with an analysis-led process first used with the JD14 engine, the firm's recently introduced JD18 is now the largest engine in the range, offering rated power up to 676kW.

This engine is the second unit from John Deere to be engineered to address the latest customer and market needs for industries such as construction. The JD18 engine has been designed for extreme durability and is ideal for heavy-duty applications around the world.

As the JD18 engine builds on advancements made during the JD14 development programme, there are multiple technological and design similarities. These include John Deere model-based controls, a rear gear train and streamlined service and repair capabilities.

The John Deere model-based controls offer advanced prognostics capabilities and reduce the overall number of sensors needed, which improves transient response. Switching the location of the gear train from the front to the rear of the engine reduces noise and torsional vibration. In addition, its streamlined design factored in the top 20 service and repair jobs normally completed on an engine as part of the development process, resulting in reduced repair. Both engines also feature a three-piece integrated harness with a protective channel,



The JD18 engine is now the largest in the JDPS range

further boosting overall reliability.

To meet customer needs for fewer and shorter planned maintenance intervals, John Deere utilised hydraulic lash adjusters (HLAs) in the JD18 engine design. The HLAs are hydraulically operated and self-adjusting, eliminating the need to manually reset the valve lash, a lengthy service process. The JD18 also features a three-piece integrated harness with a protective channel for additional reliability.

In addition, locating the gear train in the rear of the engine improves durability while boosting operational flexibility, as it enables more gear drive auxiliary power take-off capabilities.

The firm says that it continues its commitment to helping OEMs implement electrified system architectures. The company offers a range of engine, drivetrain, and electronic solutions with hybrid architectures that have been proven in the field with more than 2 million operating hours.

Implementing alternative power systems such as drivetrain and electric solutions in off-highway equipment can depend on being able to optimise an overall power solution. These balance mechanical, hydraulic and electric power systems, and cost. John Deere offers a broad range of expertise in mechanical and electronic solutions, which contribute toward robust, reliable alternative power architectures.

John Deere recently introduced its Smart Industrial

strategy, which is designed to help customers become more profitable and sustainable. As a part of this strategy, the firm uses the Internet of Things (IoT) and machine performance data to develop new solutions through John Deere Connected Support. An increased focus on implementing connectivity solutions has empowered a shift from reacting to problems after they occur in the field to a proactive approach of anticipating and preventing machine downtime, increasing productivity by boosting uptime.

Because the John Deere solution includes power generation and traction drive components that are designed to work together, JDPS says it can also work with a vehicle system integrator to provide a solution that generates the right amount of energy for the tractive power. The company says it can provide OEM customers with integrated electric drive generation, traction drive and power electronic components that are designed for specific applications and can interface effectively with each machine. ■

*Nick Block, Director, Global Marketing & Sales, John Deere Power Systems

John Deere Power Systems

www.deere.com

Clean power

Cummins is now commencing testing of hydrogen-fuelled internal combustion engines, while also entering into a partnership with oil firm Chevron for the supply of hydrogen.

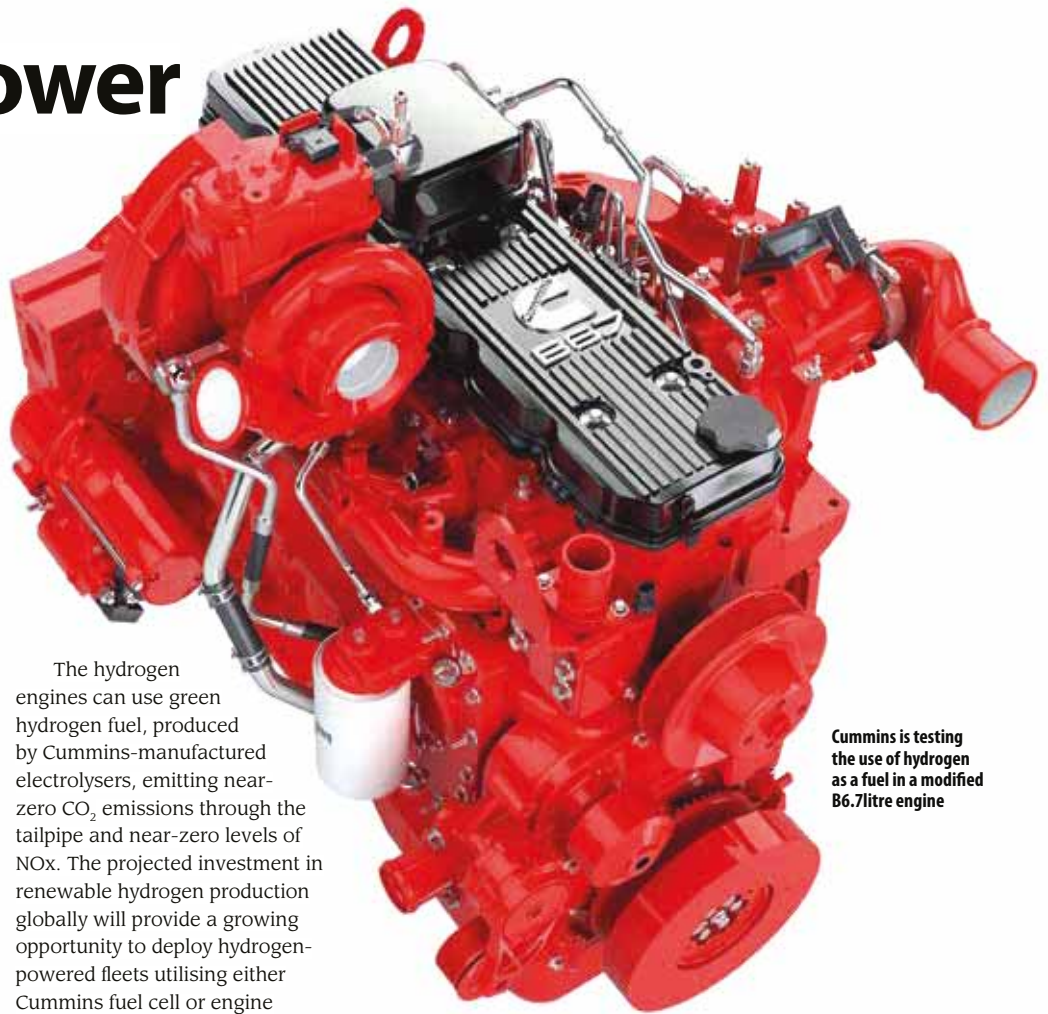
The engine firm is carrying out proof-of-concept tests using a modified B6.7litre diesel. The tests are said to build on its existing technology leadership in gaseous-fuel applications and powertrains. The aim is to deliver new power solutions that will help meet the energy and environmental needs of the future.

"Cummins is thrilled about the potential of the hydrogen engine to reduce emissions and provide power and performance for customers," said Srikanth Padmanabhan, president of the engine segment. "We are using all-new engine platforms equipped with the latest technologies to improve power density, reduce friction and improve thermal efficiency, allowing us to avoid the typical performance limitations and efficiency compromises associated with converting diesel or natural gas engines over to hydrogen fuel. We have made significant technological advancements and we are optimistic about bringing this solution to market."

Following the proof-of-concept testing, the company plans to evaluate the engine in various on- and off-highway applications, supporting the company's efforts to accelerate the decarbonisation of commercial vehicles.

"The hydrogen engine programme can potentially expand the technology options available to achieve a more sustainable transport sector, complementing our capabilities in hydrogen fuel cell, battery electric and renewable natural gas powertrains," said Jonathon White, vice-president of engine business engineering.

Hydrogen engines offer users the benefit of adaptability by using familiar mechanical drivelines, with vehicle and equipment integration mirroring that of current powertrains while continuing to provide the power and capability for application needs.



Cummins is testing the use of hydrogen as a fuel in a modified B6.7litre engine

The hydrogen engines can use green hydrogen fuel, produced by Cummins-manufactured electrolyzers, emitting near-zero CO₂ emissions through the tailpipe and near-zero levels of NOx. The projected investment in renewable hydrogen production globally will provide a growing opportunity to deploy hydrogen-powered fleets utilising either Cummins fuel cell or engine power.

Cummins is investing across a range of technologies to support hydrogen-based transportation, including hydrogen engines, fuel cells, electrolyzers and storage tanks.

The firm has a joint venture partnership with hydrogen storage specialist NPROXX that adds the ability to integrate the fuel cell or hydrogen engine with the high-pressure gas cylinder tanks and supply lines on the vehicle. The high energy density of hydrogen enables easily integrated onboard gas storage without compromising vehicle payload or operating range. NPROXX is also a leading supplier of containerised storage vessels, enabling fast hydrogen refuelling for users.

The firm's role in expanding the use of hydrogen goes beyond fuel cells and storage solutions to the manufacture of decarbonised renewable hydrogen. The modular scalability of its electrolyzers are suited to a range of applications, from the localised supply of on-highway fleets to utility-scale electrolysis. Cummins has hydrogen capabilities

extending from fuel production to storage and vehicle power.

In a further step, Cummins and Chevron have announced a strategic collaboration for the hydrogen sector. The firms have agreed on a memorandum of understanding (MOU) to develop commercially viable business opportunities in hydrogen and other alternative energy sources.

The MOU provides the framework for Chevron USA (Chevron) and Cummins to initially collaborate on four main objectives. The first is to advance public policy that promotes hydrogen as a decarbonising solution for transportation and industry. The second is to build market demand for commercial vehicles and industrial applications powered by hydrogen. The third is to develop infrastructure to support the use of hydrogen for industry and fuel cell vehicles. And the fourth is to explore opportunities to leverage electrolyser and fuel cell technologies from Cummins at Chevron's refineries.

"Chevron is committed to developing and delivering

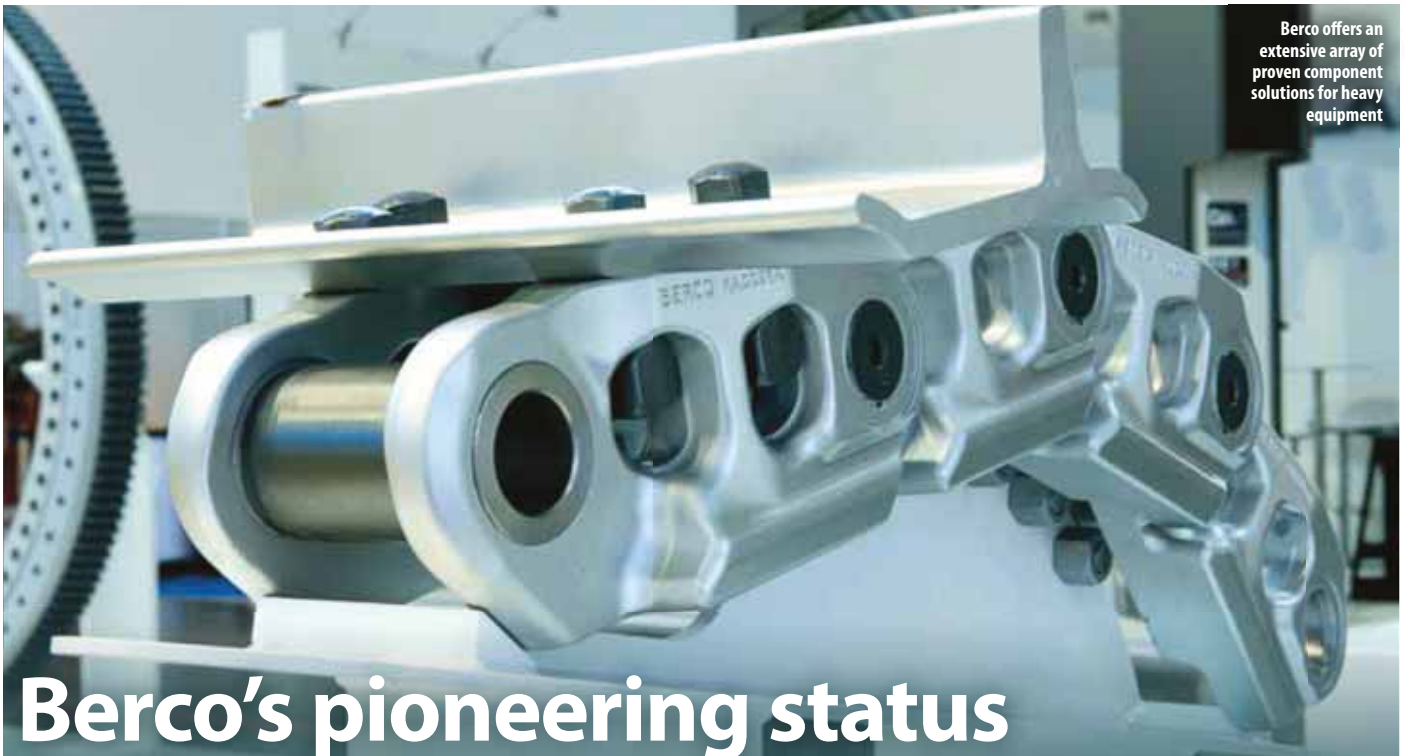
affordable, reliable, ever-cleaner energy, and collaborating with Cummins is a positive step toward our goal of building a large-scale business in a lower-carbon area that is complementary to our current offerings," said Andy Walz, president of Chevron Americas Fuels & Lubricants.

"Working with Chevron to advance hydrogen technology and accelerate ecosystem development helps us continue our goal in enabling a carbon-neutral world," said Amy Davis, vice president and president of New Power at Cummins.

"The energy transition is happening, and we recognise the critical role hydrogen will play in our energy mix. We've deployed more than 2,000 fuel cells and 600 electrolyzers around the world and are exploring other hydrogen alternatives, including a hydrogen-fuelled internal combustion engine, as we continue to accelerate and harness hydrogen's powerful potential." ■

Cummins
www.cummins.com

Berco offers an extensive array of proven component solutions for heavy equipment



Berco's pioneering status

Components specialist Berco has been a key industry pioneer of innovative undercarriage solutions. The company has introduced several recent innovations that operate in demanding surroundings.

Two of the most innovative are said to be the Robustus (ROtating BUShing Undercarriage System) and BPR2 (Berco Positive Pin Retention2 System). Robustus is a specially engineered system that is used for D5 and D6 class dozers. The Rotating Bushing system, in conjunction with BPR2 is said to increase the life of the lubricated track group assemblies in applications operating in abrasive terrain, reducing ownership and undercarriage costs. This is of particular importance, given that the undercarriage accounts for 50% or more of the total lifetime cost of a machine.

In a machine fitted with a conventional undercarriage, bushings (outer diameter) are constantly subjected to wear because bushings-sprocket bushings slide onto the sprocket tooth roots during engagement. With Robustus, bushings rotate when engaged by a sprocket, reducing the wear rate of the bushings. This is claimed to deliver up to a 35% increase in track life, allowing a maximum of 6,000 hours of operation without maintenance, reducing operating

costs by up to 30%. Now in its third generation, Robustus is compatible with existing frames and standard components of D6 and D6 classes. In addition, the conversion to these units can be performed easily.

The performance of Robustus is further strengthened by another Berco innovation: BPR2. The Robustus system features four sealing points instead of two as in a conventional design. However, the BPR2 system provides more reinforcement on the sealing points. This system uses a metal ring plastically deformed as a mechanical locking element. This ring is pressed in between pin and link, locking the joint to specific predetermined end-play levels. BPR2 prevents end-play generation and increases the sealing of the joint by at least 25%, boosting track life.

The use of the BPR2 system on conventional track group assemblies is usually recommended for heavy-duty applications such as extraction, heavy construction or demolition. These conditions generate large loads and impacts, twisting the chain and generating axial movements. Even machines equipped with wide shoe arrangements can mount BPR2 in order to ensure the reduction of torsional effects on the joint.

Another recent challenge for Berco has been to extend wear life

of undercarriage components used in heavy excavators for extraction applications. The travel rate of an undercarriage can vary significantly between different operations. When blasting is being carried out for example, the heavy machinery will have to be withdrawn from the working area for safety. In situations such as this, it is recommended to use carburised bushings, as they are suitable bushings for reducing the rate of wear.

For applications with lower travel needs however, undercarriage parts are still subjected to wear. Continuous hammering of the front shovel for example may not wear out the bushings quickly, but the forces generated can cause cracks on bushings instead. Berco's solution has been to use both quenched and tempered, and induction hardening and tempering (IHT) bushings. The quenched and tempered steel with added boron increases hardenability. These specially produced bushings provide greater value when fitted on reinforced chains.

This solution is designed for heavy application such as for track chains used on 200-400tonne machines, as it provides high resistance to wear as well as resistance to impact. Being capable of achieving up to 20,000 hours of use in the field it ultimately

reduces ownership and undercarriage costs.

Another pioneering development is the use of rotoforged steel for rollers used in demanding applications. This innovative process is expected to deliver significant benefits to machines that have a huge load transfer in their working times, such as large excavators used in the extraction markets that weigh above 200tonnes. For applications of this size, the rollers are under particular pressure as they carry the inertia of the machine.

Steel that has undergone this novel heat treatment process acquires a high microstructure and compactness, to such an extent that it is able to achieve toughness values double those of conventional steel. Continuous casting steel is usually rolled. Rolled steel that undergoes the new rotoforging process has its microstructure transformed down to the core, resulting in a much stronger and tougher structure.

For this reason, rollers made from rotoforged steel are said to be suitable for machines that operate in the most demanding working environments. These components are said to offer a very high level of reliability and a wear life of 15,000-20,000 hours.

Berco

www.thyssenkrupp-berco.com

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Rolls Royce continues to expand its MTU engine business offering



Rolls-Royce develops

Rolls-Royce Power Systems is developing its operations with a series of key moves. The firm says it is taking the next step towards a climate-neutral future. By 2030, the Rolls-Royce business unit is to cut greenhouse gas emissions by 35% compared to its 2019 level through the use of new net zero and zero carbon technologies.

This near-term target plays a significant role in Rolls-Royce Group's ambition to achieve net zero by 2050 at the latest. To accomplish that mission, the role of pioneer goes to Power Systems: "With 'Net Zero at Power Systems', we're not just taking action to protect the environment. We're realigning our strategy towards eco-friendly energy and propulsion systems. We already see these explicitly as growth opportunities for our business in the coming years," said Andreas Schell, CEO of Rolls-Royce Power Systems.

A key element in achieving these goals is the certification of the most important mtu engine products, which will run on sustainable fuels from as early as 2023 and then be successively brought into use. "The certification means that the new generation of Series 2000 and 4000 engines, that currently account for 85% of our sales revenues, will be qualified to run on second-generation bio-fuels and on E-fuels," explained Dr Otto Preiss, Chief Technology Officer and COO of Rolls-Royce Power Systems

One of these developments is the firm's new partnership with MAN Energy Solutions to cooperate on turbochargers, while another is the expansion of its MTU Aiken facility.

The agreement with MAN Energy Solutions will see MAN's PBST brand distribute the advanced mtu turbochargers. "With this cooperation, we are combining our

competencies - on the one hand, PBST's global sales structure for turbochargers and, on the other hand, Rolls-Royce's latest high-efficiency mtu turbocharger technology for high-speed diesel and gas engines," explained Andreas Schell, CEO of Rolls-Royce Power Systems.

The turbochargers developed and produced in-house by Rolls-Royce Power Systems will be made available in additional markets. For Rolls-Royce, this creates a new channel for sales in addition to Woodward L'Orange. PBST will include the latest generation of the mtu turbocharger family ZR1 to ZR5 in its product portfolio and will distribute them under the series name HIRO in the future.

"We are now able to offer our customers the right turbocharger for their high-, medium- and low-speed applications under one roof via the PBST brand," said Dr Uwe Lauber, CEO of MAN Energy Solutions.

The mtu turbochargers are offered on the basis of a modular system for engines in the 400-2,500kW power ranges in single- and two-stage versions. Rolls-Royce designs them to meet the specific requirements of various applications.

"Advanced turbocharging helps engines achieve low fuel consumption and high power over a wide speed range. It is an important building block for meeting increasingly stringent emissions requirements in the future - without compromising engine performance or efficiency," explained Dr Preiss. "With the aim of offering new propulsion and energy solutions for a climate-neutral future, we are also currently working on electrically assisted turbochargers for greater agility and lower fuel consumption, as well as on turbocharger concepts for fuel cells."

Meanwhile, Rolls-Royce is to expand its mtu Aiken Plant to add remanufacturing and

overhaul capabilities. The new regional center will leverage existing infrastructure at the plant to offer expanded services to meet growing demand from customers in the Americas. The Aiken campus will also remanufacture mtu Series 2000 and 4000 engines.

This \$17.4 million investment at its mtu Aiken manufacturing facility will be built next to the mtu Aiken plant's existing engine manufacturing operations. The new centre will bring currently outsourced workshop and warehouse operations in-house and expand them to provide remanufacturing of mtu Series 2000 and 4000 engines and components, the overhaul of mtu brand and customer owned engines, plus internal and external rework services to help customers and distributors fine-tune maintenance and performance.

"Investing in a remanufacturing and overhaul centre in the United States is the next milestone in implementing our global strategy to optimise the value of our installed base, with regional centers and supporting workshops offering the best support for our customers," said Dr Preiss.

The facility at Aiken will feature distinct work areas to carry out the remanufacturing and overhaul process: core management; cleaning and disassembly; measuring and inspection; rework; reassembly; test; painting and packaging. Upon start-up, the centre will remanufacture all applications of mtu Series 2000, Series 4000, and legacy Detroit Diesel two stroke-Cycle engines. The future aim is to add capabilities to support the company's sustainable solutions such as battery containers, along with natural gas engines and systems. ■

Rolls Royce
www.rolls-royce.com

Improved Volvo Penta engine

Volvo Penta has improved its powerful D16 engine, introducing a version featuring five key upgrades.

The new Stage V/Tier 4F certified D16 off-road engine is said to be the company's most powerful and versatile diesel from the company so far. This 16litre engine is designed to meet the needs of customers working across demanding environments such as construction and quarrying.

It has increased power as the Volvo Penta D16's dual-stage turbo system delivers high performance across the operational range, providing high torque at both low and high engine speeds. This enables the engine to meet the requirements of multiple applications, without operators having to compromise between performance and torque. For example, customers can benefit from both high power and high torque, leading to increased productivity. In applications where the requirement is often for high torque at low rpm, the Volvo Penta D16 is optimised for low fuel consumption.

The engine offers a 10% reduction in fuel consumption. Based on proven technologies within the Volvo Group that have undergone millions of hours of testing and real-world use. Its versatile performance delivery, response, and highly efficient combustion have been proven in use to help customers reduce fuel consumption by up to 10% when compared with the previous Volvo Penta D16 model.

The Volvo Penta D16's reliable exhaust aftertreatment system (EATS) has been designed to use selective catalytic reduction (SCR) technology only, removing the need for exhaust gas recirculation (EGR) and a diesel particulate filter (DPF). The optimised EATS



Volvo Penta has upgraded its D16 engine

design ensures high uptime and low total cost of ownership. The dual turbo technology and efficient combustion system also help the engine to achieve industry-leading performance at high altitude. At an altitude of 2,500m, Volvo Penta's D16 delivers the same performance as it does at sea level.

Built on the dependable in-line six-cylinder design, the Volvo Penta D16 has been developed to produce smooth operation with low noise levels. A durable, compact base engine that is said to be easy to install, the Volvo Penta D16 is built to run. With easily

accessible service points, the industrial engine is simple to maintain and now has an extended oil service interval.

Volvo Penta's 16litre D16 (TWD1683VE) diesel engine delivers 585kW of power and 3650Nm peak torque at 1900rpm. As well as meeting the Stage V and Tier 4 Final emissions regulations, the new engine also complies with MSHA, CANMET, Reg 120, Reg 96, and RoHS2 requirements. ■

Volvo Penta
www.volvopenta.com

Volvo Group developing battery options

A new business division for the Volvo Group, Volvo Energy, plans to focus on battery life cycle solutions. These technologies will be used in products across the Volvo Group.

Volvo CE, the construction machinery arm of the Volvo Group has already introduced electric machines, such as its L25 compact wheeled loader. This new development will allow Volvo CE access to more electric technology.

This new move will provide batteries and charging solutions to

the Volvo Group's divisions and outside clients. The new business area will provide battery life cycle options including disposal and repurposing, as well as develop charging infrastructure.

"Volvo Energy will be a business area with full profit and loss responsibility," according to a Volvo statement. "It will have both an internal role, providing batteries and charging solutions to the Volvo Group's other business areas and an external role, offering used,

remanufactured and refurbished batteries to customers for use across different applications."

Volvo Energy will also carry the group's responsibility for hydrogen infrastructure solutions for fuel cell electric vehicles and be working on collaborations with other companies to do so.

"There is a great and growing interest for electric vehicles and machines among our customers," said Martin Lundstedt, chief executive of Volvo Group, the

parent company of Volvo Construction Equipment.

"Our ambition is to offer our customers the most competitive solutions when it comes to electrification, including batteries and charging infrastructure. With Volvo Energy, we are taking a holistic view of the entire life cycle, which benefits both our customers' business and society as a whole."

Volvo CE
www.volvoce.com

Power management

Power management specialist Eaton now offers its X3 medium-duty pump and motor portfolio, including a new two-speed cartridge motor paired with single or back-to-back pump configurations.

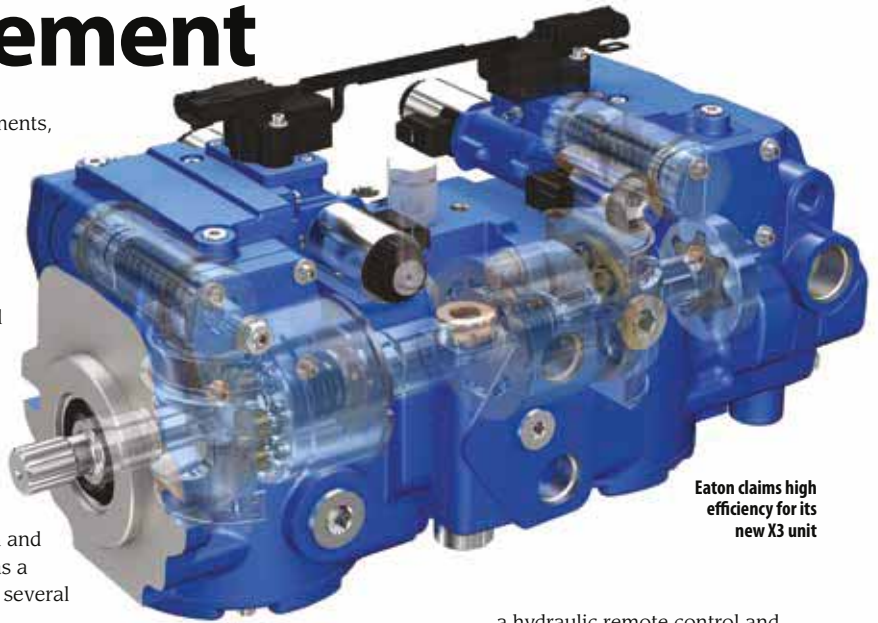
Combining compact package size, precision and efficiency, Eaton's latest plug-in variable piston motor solutions are said to help OEMs improve machine control, productivity and system life.

"Eaton's X3 pump and motor portfolio offers a compact package for mobile applications where space is at a premium," said Florin Radoi, product manager, Mobile Pumps and Motors, Hydraulics Group EMEA. "Providing more flexibility and customisation in designing mobile machines, OEMs can combine improved control and accuracy as part of an advanced propel solution."

Eaton's X3 two-speed cartridge motor is available in

41cc and 49cc displacements, providing more top-end horsepower at the wheel while ensuring most mid-frame mobile propelling needs are covered. The motor also has a built-in speed sensor port, making it easy to add a sensor to measure speed and direction. Using a standard SAE B 2-bolt mount, the motor will fit into virtually any existing machine design and can also be positioned as a drop-in replacement for several motor configurations.

Built for durability in the toughest mobile environments, the X3 motor pairs with back-to-back or single pump options, which offer a 36% increase in the side load capacity over previous generations of Eaton pumps. The compact size makes it easier for designers to fit the pump into



Eaton claims high efficiency for its new X3 unit

smaller machines. The pump also has improved packaging that better protects the control solenoids against damage.

The X3 portfolio is a Pro-FX Ready integrated solution that is available with a variety of controls, including a non-feedback electrohydraulic control,

a hydraulic remote control and a manual servo control. When combined with an Eaton HFX programmable controller, the solution can actively sense and dynamically adjust parameters such as position and flow. ■

Eaton
www.eaton.com

A LONG WAY TOGETHER

EARTHMAX SR 41

No matter how challenging your needs, EARTHMAX SR 41 is your best ally when it comes to operations that require extraordinary traction. Thanks to its All Steel radial structure and the special block pattern, EARTHMAX SR 41 provides excellent resistance against punctures and an extended service life. In addition to long working hours without downtime, the tyre ensures extraordinary comfort.

EARTHMAX SR 41 is BKT's response to withstand the toughest operating conditions in haulage, loading and dozing applications.



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For info:
europe@bkt-tires.com

Improved valve

Parker Hannifin has launched a mobile directional control valve that can be used in a Steer-by-Wire system for earthmoving equipment and other types of mobile machinery.

This high-performance single fault tolerant valve is aimed to meet the trend for the electrification of machines.

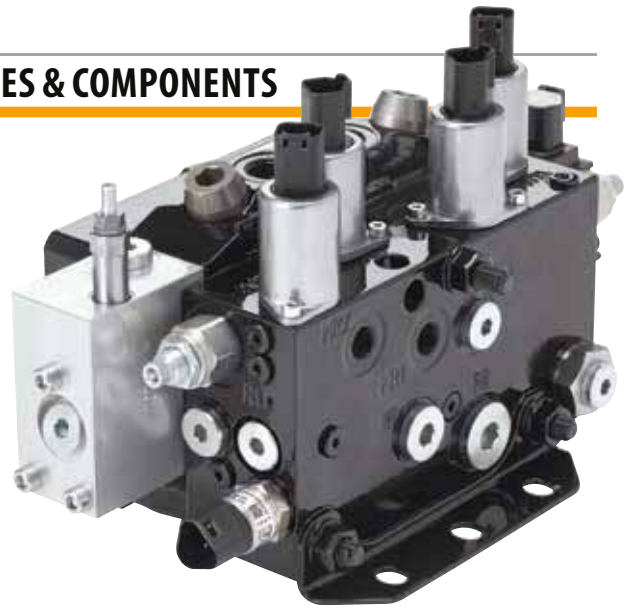
A Steer-by-Wire system where the hydro-mechanical connection between the steering wheel and the steering cylinders is substituted with electronics enables a hydraulic-free cabin, easier installation than earlier orbitrol systems, and increased comfort for the operator. Steer-by-Wire systems are compatible with other automotive trends such as vehicle automation (autonomous driving), remote connectivity and artificial intelligence. These advantages also deliver high energy efficiency.

The Parker SBW110 mobile directional control valve is a state-of-the-art closed centre load sensing (LS) valve. The valve is

controlled by two individual pilot circuits. The pilot circuits consist of fail-safe pilot valves. With a proportional control pressure rating up to 350bar and pressure compensated flow up to 110litres/min, it is well-suited for mobile machinery applications. ■

Parker Hannifin

www.parker.com



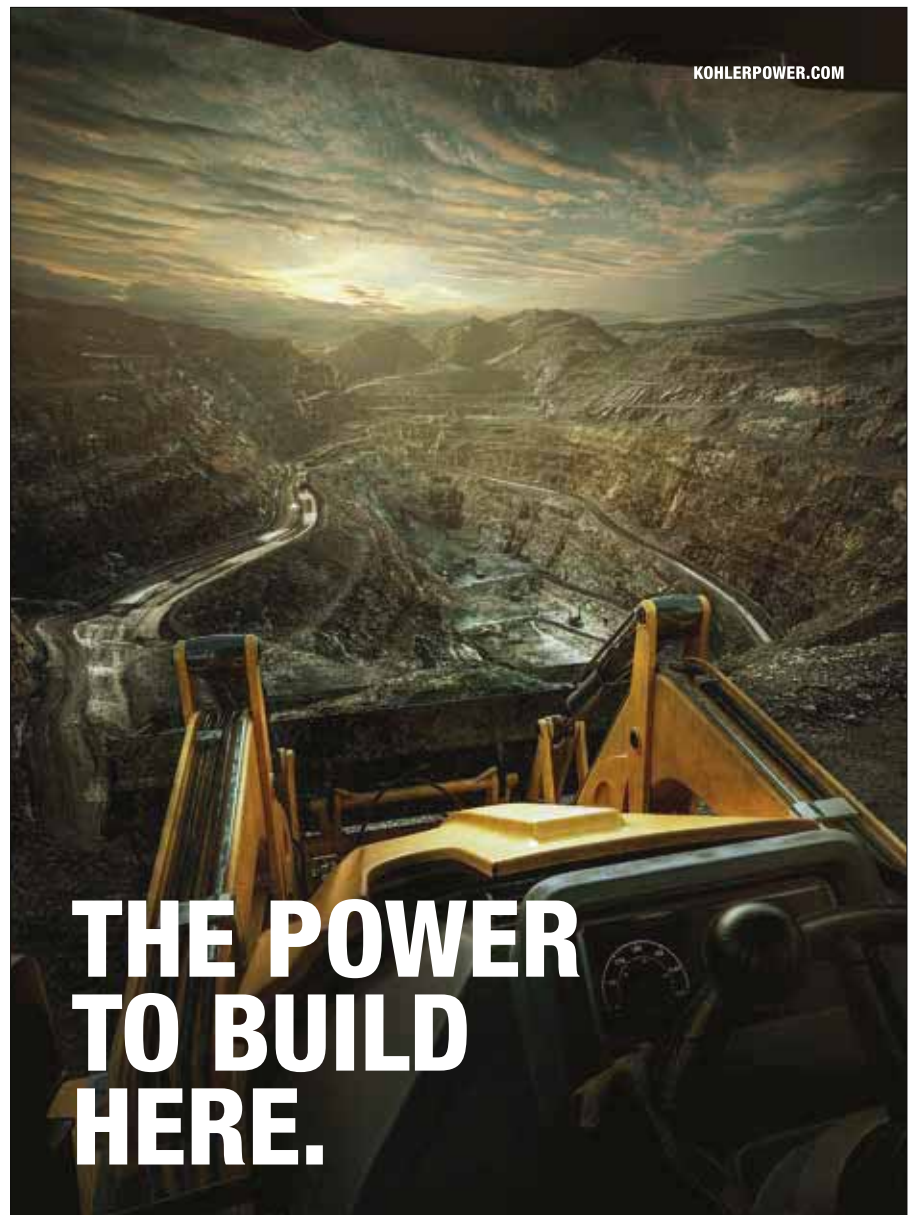
Heavy duty

BKT is now offering new tyres that deliver a combination of flotation and traction, as well as the ability to cope with high travel speeds. These tyres also offer high resistance to wear, ensuring long life.

BKT says that its MULTIMAX MP 569 tyre can be used in site development applications on soft ground where high flotation is required, as well as for on-road use. The company says that the tyres are designed for use at high speeds with heavy loads.

BKT

www.bkt.com



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Multiple mixes for Polish plant

An Ammann asphalt plant is being used in Poland to deliver multiple mix specifications for a range of clients

The ABA 210 UniBatch asphalt mixing plant was bought by TRAKT Co and is being used to supply a wide array of asphalt mixes for a range of road building projects as well as road repair works.

The plant is said to be proving highly versatile, delivering various mix types as well as those including recycled asphalt (RAP). TRAKT is providing materials for use on municipal roads, delivering between three and five different types of mixes/day. However, Jerzy Szklaruk, president of TRAKT says that the design of the plant makes it easy to switch quickly to the production of different recipes.

A key driver behind purchasing this new plant was its capacity of 210tonnes/hour. The previous plants produced mix at a maximum rate of 80tonnes/hour, which was typically enough for TRAKT projects.

However, Szklaruk said that increased demand for materials means that the firm now needs a greater capacity, which was why the company opted to buy a plant able to deliver 210tonnes/hour. He said that for large contracts, the performance of the plant delivers a healthy margin for the entire project.

The new plant also provides high production while ensuring high quality, which is watched more closely than ever. Szklaruk explained that quality control

from road project managers is now more demanding than in previous years.

TRAKT specified its ABA 210 UniBatch with a cold recycling system and a BKS coal dust burner. The firm plans to add an asphalt foaming capability as well.

Szklaruk said that the firm equipped the plant with recycling components to meet expected future demand. He explained that while relatively little RAP is used in the region at present, he expects this to increase and already sees signs of a growth in this segment. And whenever there is a project using RAP, the firm is now more competitive.

As the company is located close to forests, green areas and pastures, the low emissions performance of the plant was a key benefit. Szklaruk said that the efficient Ammann filter system was another important factor in the company opting for this model. The plant also features sound suppression equipment, another important factor in the selection of this unit. Ribbed sheets in the discharge channels reduce sound and improve wear

resistance. Szklaruk said, "There are other small production facilities around us, but also residential buildings. The inverters and insulation installed in the plant reduce noise."

TRAKT had positive experiences with other Ammann plants, so the company again turned to Ammann when looking for improved productivity. Szklaruk said that the firm's previous Ammann plants offered advantages over competitors.

Szklaruk said that particular advantages of the plant lie in the aggregate sorting, filter system and control system. He added that the Ammann plant runs smoothly, is easy to use, economical, popular with operators and allows the production of bituminous mixes of high quality at low cost.

Meanwhile, the modular design of the plant allows it to be upgraded in the future. He said that the construction of the ABA UniBatch allows frequent adjustments, featuring proven components and systems from Ammann's ABP Universal plants.

Other features of the ABA 210 UniBatch that offer precision and efficiency include the double-stroke actuators for dosing aggregate and inverters on the main fan, according to Szklaruk. He said the plant delivers precise dosing of material with the mixer screw and the latest control system. Szklaruk said that the proprietary as1 Control System is very extensive and gives practically unlimited possibilities, while also being intuitive and modern. As Ammann provides the control, this helps with servicing. Features the firm find

A new Ammann plant is proving versatile for Polish producer TRAKT



useful include the ability to transfer data to the manager on a memory stick, so that the operator does not have to manually rewrite or print it. The Ammann service team can connect remotely, while the plant operator can see what the team is doing on the computer screen, another benefit.

The plant is economical due to the brown coal dust burner as well as its electrically heated asphalt tanks. The comfort of the operator cabin has been praised by the firm, as has access to components for maintenance. ■

Ammann
www.ammann.com

The Ammann plant bought by TRAKT is able to deliver a wide range of mix specifications to high-quality requirements



Chinese plant order for Lintec



The Lintec plant has proven highly productive for a major Chinese contractor

Lintec-Linnhoff has supplied a major Chinese contractor with an asphalt batching plant to meet high output requirements. The contractor required a plant able to deliver over 3000tonnes of asphalt/day to keep pace with strong demand in the area.

Because the plant is designed on a modular basis with sections inside standard shipping containers, this allowed faster commissioning as well as a number of other cost savings for the client.

With an output of up to

320tonnes/hour, the Lintec CSM4000HS20-SE asphalt batching plant has helped the contractor to meet pressing demands for material supplies to several prestigious projects over the past 18 months.

Based in China's eastern Zhejiang province, Ningbo Heng-Shun Traffic Engineering Co took delivery of the containerised plant, the second-largest in the Lintec line at the end of May 2019. The modular construction meant that by the middle of June 2019 the plant was ready according to schedule, typically mixing over

3000tonnes of asphalt during a standard 10-hour shift.

Materials from the plant have been delivered to a host of the contractor's regional projects. This has included the phase four expansion project of Ningbo Lishe International Airport as well as for numerous surrounding highways.

Ningbo Heng-Shun selected the Lintec plant in 2019 after travelling to the construction site of the Hong Kong-Zuhai-Macau bridge, where another CSM4000 had just completed the job. Seeing the faultless performance of the plant on this high-profile, heavy-

duty project sealed the deal for Ningbo Heng-Shun's leadership.

The company noted there were several design features that appealed to its needs. The operating system provided precise weighing of the aggregate and bitumen ratio, which has saved a significant quantity of bitumen. The firm also opted for corrosion-resistant paint as an option, which has given effective environmental protection against the humid and often harsh climate of the East China Sea coast.

Environmentally friendly performance was also crucial as the plant is based close to city centre areas. To meet these needs, Lintec's standard pollution control unit, which recycles dirt particles into reclaimed filler rather than emitting them into the air, has proved essential.

The shipping container structural design provided a further benefit through its simple, low-cost transportation and assembly.

Once a plant has begun operation, a Lintec engineer offers onsite technical support to ensure optimum production, with full operator training also provided as was the case for Ningbo Heng-Shun.

Lintec engineers are also able to log-in to the operating system of any unit, to provide 24/7 remote technical support. This allows them to make rapid diagnoses of any issues to ensure the plant operates at maximum efficiency. ■

Lintec & Linnhoff Holdings
www.lintec-linnhoff.com

New burners

Astec has launched a new burner that has been designed to offer several advantages for retrofit applications. When developing the new Astec Versa Jet burner, the firm's engineers designed a new system that is said to take a significant step forward over earlier generation units.

The firm says that its Versa Jet burner offers several advantages for retrofit applications such as a versatile platform that is able to fire at a range of different rates. This means that the burner can be configured to meet the specific production needs of an application. At the same time, the customer has the option to reuse an existing fuel train while the burner is said to offer compatibility with virtually all drum designs and without the need for complicated drum modifications. In addition, the Versa Jet burner has the ability to work with existing controls, while its novel platform permits quick setup.

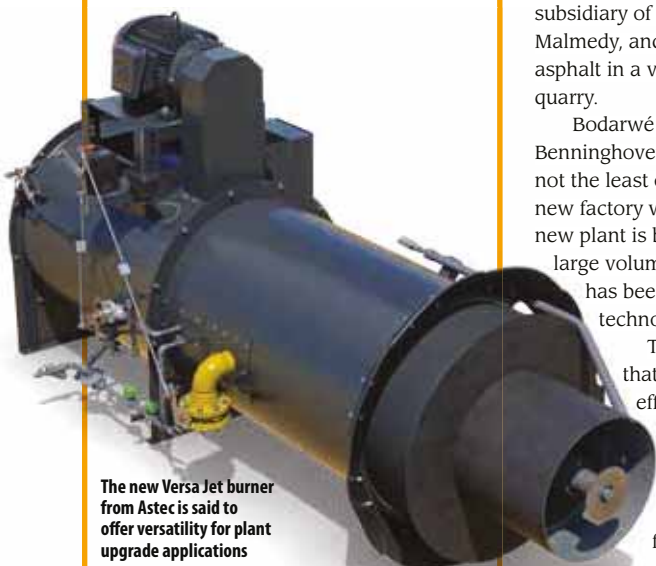
The versatility of the Versa Jet burner means it can be easily relocated to a different plant if the need arises. Another advantage of the design is that the Versa Jet burner uses less energy than other comparable burners.

Astec can integrate new burner systems and equipment into existing operations or with equipment from any manufacturer. In addition, Astec provides its retrofit customers with the same service available to complete new plants.

The firm claims that its burners offer the latest in reliable burner technology. With retrofit capabilities, Astec is able to offer everything from a simple burner replacement to a complete installed system.

Astec Industries

www.astecindustries.com



The new Versa Jet burner from Astec is said to offer versatility for plant upgrade applications

NIGHT: A sophisticated plant from Benninghoven has been installed at a site in Belgium
BELOW: The client, Bodarwé, specified certain features for the plant to meet its needs



New asphalt plant



A customer in Belgium is now using a brand new TBA 4000 mixing plant from Benninghoven, boosting output and product quality.

This has also been the first mixing plant produced at Benninghoven's new factory in Wittlich, Germany. The company's new headquarters, which are close to the German section of the Moselle, not far from the plant's location, represent the biggest single investment in the history of the Wirtgen Group.

The new plant is being run by Boreta, a subsidiary of Bodarwé, from Baugnez near Malmedy, and is being used to produce quality asphalt in a variety of recipes, directly from the quarry.

Bodarwé opted to purchase the Benninghoven plant for a number of reasons, not the least of which was the confidence in the new factory with its advanced technologies. The new plant is being used to produce and ship out large volumes of up to 320tonnes/hour and has been equipped with a range of optional technologies.

Two key technologies help ensure that Benninghoven plants offer efficiency and a low environmental profile. The multivariable feed system and parallel drum fitted to the new Bodarwé plant allow it to handle up to 70% of RAP in the feed.

Benninghoven classifies its

recycling technologies into two types: cold feed and hot feed systems. Multivariable input is a cold feed system technology, which feeds up to 40% of old asphalt directly into the mixer. The hot parallel drum feed system heats this stripped-out and reclaimed asphalt, and passes it into the mixer as hot asphalt. This procedure allows a high feed rate for the TBA. The technology for the high recycling rate of 90 + x% also comes from Benninghoven. Thanks to this recycling technology, the reclaimed asphalt becomes a valuable resource that remains in the cycle, rather than problematic waste that needs to be disposed of at great expense. This technology means that should the RAP input rates required by law should increase, the TBA 4000 in Baugnez will still offer potential.

Another important technology is the new foam bitumen module, which is also integrated into the TBA 4000. The feature was specified as use of this binder receives subsidies from the state in Belgium. This innovative technology can be used to produce low-temperature asphalts at a temperature of 110°C, which is around 40°C lower than the 160°C required for conventional asphalt. This cuts the energy consumption for asphalt production by about 9kWh/tonne, which is equivalent to 0.9litre heating oil/tonne of finished asphalt. CO₂ and other emissions are also reduced.

For durability, the Benninghoven asphalt plants are coated with a solvent-free powder coating, which is scratch-resistant and impact-resistant as well as providing corrosion protection. The plant features a 20m-high weighing and mixing section, while the mixing tower is 42m high. The mixed material loading silo has a capacity of 341tonnes.

Some of the mixes produced are being sold to outside customers, while others will be used by the company's contracting arm. Bodarwé runs a fleet that includes Vögele pavers and Hamm rollers, also from the Wirtgen Group.

Support is provided by Bennighoven and includes everything from winter maintenance to the supply of spare parts or answering day-to-day questions about plant operations. ■

Wirtgen Group

www.wirtgen-group.com

Vroom! Vroom! Anti-ageing technologies go head-to-head

Both Shell Bitumen and TotalEnergies are concentrating on the message that longer lasting roads are the secret to lower carbon roads - **Kristina Smith** reports

Silverstone in the UK is best known as the home of British motor racing. But on the A43, a dual carriageway which runs past the racing circuit, a different sort of competition is underway: two new technologies aimed to slow down the ageing process in bitumen are both under trial on the Highways England operated road.

One is Shell Bitumen's Cariphalte AgeSafe, the other is Styrelf Long Life from TotalEnergies. Both products claim to go beyond the performance of polymer modified bitumen (PMB), extending the time between resurfacing interventions, saving money and carbon and reducing disruption to motorists.

A 10% improvement in ageing durability would remove one intervention in the life of a road such as the A43, which might have a 50-year design life with resurfacing planned for every 10 or 12 years. However, both Shell and TotalEnergies hope that their technologies can do even better than that.

"We have got a lot of data from the lab so we are feeling confident," said Richard Taylor, global product technology manager at Shell. "But now we need to see how it performs in the field."

Shell Bitumen started work on its anti-ageing technology three years ago, using the Western Research Institute (WRI) in Lamramie, Wyoming which is renowned in its work on longer-lasting roads, to verify its lab research and results. Shell researchers looked at several additive combinations which were then assessed and the best one taken forward.

The plan, said Taylor, was to find a combination which tackled all the different forms of ageing, looking at changes in chemistry, performance and what happens to the asphaltenes in bitumen, which Taylor explained attract most of the ageing process.

The result is something totally new, said Taylor: "We are dealing with new chemicals and a new supply chain." Shell Bitumen applied for a patent in August last year.

For the Shell Bitumen product, the Silverstone trial, carried out with CRH, was its

first trial worldwide, although another section was laid on a road in Thailand soon afterwards with a further test section laid in Cumbria in the North of England in June and two more to follow. "We want to test it out in different geographies," said Taylor.

TotalEnergies' Styrelf Long Life Bitumen has already been laid on roads in the Netherlands and in Germany. The stretch on the A43 is its first trial in the UK, and the first time it will be subjected to such high traffic levels.

On the A43, Long Life will be compared against stretches laid using standard grade bitumen and Styrelf eXtreme 100 which is a PMB bitumen. "This trial paves the way for enhanced highways asset management and predictive deterioration modelling for Highways England," said Rick Ashton, market development manager for Total UK, part of TotalEnergies.

TotalEnergies' Bitumen UK technical manager Gary Schofield explained how Styrelf Long Life works: "We are effectively blocking the pathways for oxidation to occur within the molecular structure of the bitumen where we have lots of double bonds. Oxygen is attracted to those areas and forms oxidised groups that makes the bitumen stiffer and stops it from relaxing when strain or movement is applied to it."

In performance terms, this means that the ability of the asphalt mix to resist fatigue, fretting and cracking should be retained for longer.

In the laboratory, researchers assess the performance of different asphalt mixes over time by artificially ageing specimens using a pressure ageing vessel (PAV), typically at temperatures between 80°C and 100°C. As well as doing multiple PAV cycles, TotalEnergies performed other tests too, said Schofield.

"We developed a test to look at how well the bitumen could keep up with strain or movement, with multiple cycles, since the ability to relax any movement is the real benefit that bitumen brings." »

ABOVE: Shell Bitumen has applied for patents for its technology **BELOW:** Shell Bitumen has been working on its anti-ageing system for three years



» Longer lives save carbon

Both Shell and TotalEnergies are keen to emphasise that creating roads that last longer is one of the best ways to save carbon, once energy spent at the plant has been reduced as far as possible – by improving the efficiency of the burners, perhaps using biomass or switching to warm mix (or all three).

“Over the last few years, we have dedicated more and more R&D effort to the circular economy. We are not just thinking about recycling, we are looking at how to extend the life of the materials, slowing down the loop,” said Taylor. “There’s a lot of focus on RAP and recycling but a big part is how long roads stay in service. Extending the life of products is a really important part of the circular economy.”

According to TotalEnergies, resurfacing 1.6km of single-lane carriageway produces around 26.5tonnes of carbon, excluding what is used for transport. If two resurfacing interventions were saved over a road’s life that would equate to the carbon emissions produced by the average car driving 432,000km.

TotalEnergies has been working with

Eurobitume and the Mineral Products Association (MPA) to look at new designs that improve durability. “The argument is sustainability through durability,” said Schofield. “I think that approach is by far the most effective and efficient route to sustainability. Do a job once, do it properly and make it last.”

Shell Bitumen is working on a pavement life model that can calculate the impact of different mix and road designs on longevity. “Tools where we can assess estimated service life are absolutely vital,” said Taylor. “I firmly believe the focus will swing to how we keep roads in service for as long as possible.”

Of course, one of the challenges in proving long life in service is that you have to wait a long time for the results. As well as keeping a close eye on the A43, core samples that have been installed on a nearby service road will be taken and tested at regular intervals. ■

Shell Bitumen

www.shell.com/business-customers/bitumen

Total Energies

www.bitumen.totalenergies.com

Sripath’s ‘growing’ rejuvenator market

The Illinois Tollway, the agency which maintains and operates toll roads in the state of Illinois, is currently trialling rejuvenators in a bid to increase the percentage of RAP that can be used in its roads while maintaining their performance.

One of these rejuvenators is ReLIXIR, a product based on bio-oils which has been created by Sripath Technologies, based in Franklin, New Jersey and headed up by president Krishna Srinivasan. According to Sripath, it is on the approved list for 60% of US states and has also been used in India, Australia and New Zealand. Now Sripath is looking to widen ReLIXIR’s global footprint, with laboratory tests underway in Europe and the hope of live trials later this year.

Srinivasan, who describes himself as “a veteran of the industry”, worked as vice president of technology for roofing company GAF Materials Corporation before he set up Sripath Technologies in 2006 to supply polymers, oils and antistripping agents. “Our philosophy was that we wanted to find technical solutions to various issues and problems by looking at things from a different viewpoint, trying to see if they could be simpler, easier,” he said. “We also wanted to be environmentally and socially responsible.”

Although ‘green’ products often have “performance limitations” said Srinivasan, this is not the case for ReLIXIR. “In the beginning, while we wanted to be environmentally responsible, there was no bias in that direction. The principal bias was performance. We looked at petrochemical oils, organic oils, RREOB (rerefined engine oil bottom) and it turned out that bio-oils possessed the best level of properties.”

Sripath began developing ReLIXIR in 2011, with trials beginning in 2014 and a commercial launch in North America in 2015. The first sales of the rejuvenator in Asia came three years later, said Sripath, with trials in Russia and South America from 2019.

One of ReLIXIR’s longest users is Ashoka Buildcon, based in Nashik in India which has been using the rejuvenator since 2018, when its first project was a road in Chandigarh. According to quality control manager Devendra Marode, the company uses between 25% and 40% RAP in both the base course and wearing course, depending on the job.

“We performed our own internal



ABOVE: A stretch of road in Cumbria is one of three trial sites for the Shell Bitumen system in the UK
BELOW: The technology developed by TotalEnergies helps to stop oxidation



evaluations, comparing ReLIXER to other rejuvenators, and came to the same conclusion that it was the best rejuvenator available. The dosage efficiency, cost savings, sustainability, and ease of use were key," said Marode. "But beyond that, the technical service we received as we evaluated the product, and actually on site at several jobs, was outstanding."

ReLIXER is a blend of bio-oils or vegetative oils, combined with a proprietary additives package which Sripath said have been designed to aid the speed of diffusion into the RAP as well as reactivating the aged bitumen and aiding long-term stability.

Srinivasan will not reveal what vegetative oils make up ReLIXER, only that they are not oils that can be used for food. "We don't want to enter the food versus fuel debate," he said.

Other rejuvenators made from vegetative oils are often based on coniferous tree woods, from which crude tall oil (CTO) is extracted. For example, Ingevity's Evoflex – which is also under trial by Illinois Tollway – and Kraton's SylvaRoad PR 1000, which was developed by Arizona Chemicals which was acquired by Kraton in 2015.

There are bio-based rejuvenators based on food oils. Oil from sunflowers, soybeans, palm, castor, cashew nuts, cotton seed and linseed are all potential ingredients. Cargill's Anova and Biorestor from BioBased Spray Systems are examples of these.

ReLIXER, which is also marketed as



With some success in India and the US, Sripath Technologies is looking to new markets for its bio-oil-based rejuvenator

ReJUVEN8 in some countries, can work with any type of asphalt mix process, says Sripath; at a batch plant, pug mill or continuous mill where it can be sprayed onto the RAP on the conveyor, added to the bitumen tank or

fed into the bitumen line. It is also suitable for different environments, said Srinivasan. "It can work for a wide range of roads and temperatures, as well as with different mixing plants. We think it's a robust technology that >>

Polymer Modified Bitumen Plants

MASSENZA

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» can be deployed worldwide.”

The problem with RAP

The reason why owners like Illinois Tollway want to investigate rejuvenators is that some roads containing higher proportions of RAP have not performed well. Higher proportions of RAP can make the road stiffer and hence more resistant to rutting but that's no good if they fail prematurely due to cracking.

Some rejuvenators have proved better than others. RREOB has been banned in several states, for instance, according to Srinivasan.

The problem was that the tests being used were not appropriate for aged bitumen. “We devised certain tests, some of which have been adopted,” said Srinivasan. Back in 2010, Sripath was working with Professor Hussain Bahia from the Department of Civil and Environmental Engineering at the University of Wisconsin, who developed tests that would better predict performance of pavements containing RAP.

“Hussain set about devising lab tests methodology for ageing virgin bitumen and producing RAP bitumen. Some of that has morphed into the Delta TC argument,” said Srinivasan.

Delta Tc (ΔT_c) is an asphalt binder parameter aimed to predict the long-term durability performance of asphalt pavements. It is calculated by using the results (S and m)



ReLIXER comprises bio-oils or vegetative oils and a proprietary additives package

from the standard Bending Beam Rheometer test and can be used on binder that has been aged, or binder recovered from RAP.

The proportion of RAP used obviously varies from state to state and country to country. Generally speaking, the more landlocked the area, the more likely it is to allow high RAP content. So New York City, where truck movements in any direction are a problem, has looked at 100% RAP, as have parts of London in the UK.

Local specifications also govern which layer of the road that material containing RAP can be used in. For instance, Switzerland does not allow it in the surfacing layer, while France does, said Srinivasan.

However, the drive towards circular economies is strong in Europe, says Srinivasan, which should be good news for

Sripath and ReLIXER. RAP with rejuvenators is good news environmentally and economically. “Historically when you look at green technology, the price was five times higher. It's very rare that you are saying the price is less,” he said. “We show the contractor that in a properly designed mix, you will not only get properties that are similar to a no-RAP mix, here's how you do it to save you money.” Savings can be between 5% and 15%, he explained.

Now that movement is a little easier, after the restrictions of the pandemic, Srinivasan hopes that his case will be compelling enough for European road owners and contractors to want to trial ReLIXER. ■

Sripath
sripath.com

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Upgraded midi excavator

Komatsu says that its PC88MR-11 midi excavator offers better performance than the earlier PC88MR-10.

New features are said to boost productivity, reduce fuel consumption and allow faster work equipment speed. Versatility is increased due to the factory-fitted Lehnhoff Powertilt option.

Low fuel consumption and a new 2.4litre Stage V compliant Komatsu engine delivering 50.7kW are said to increase output allowing reduced running costs. The engine offers increased output over the previous model and has a proven Komatsu aftertreatment system with DPF and no SCR that reduces emissions as well as maintenance needs. The tight tail swing allows the operator to use the machine in confined areas and the machine is said to offer good ergonomics, performance and controllability and ease of servicing.

The engine fan clutch system reduces

both noise and fuel consumption, while productivity has been increased 7% over the PC88MR-10. Fuel consumption is, on average, 6% lower than for the PC88MR-10, while there has been a 14% increase in levelling speed and a 12% increase in attachment oil flow rate.

The new blade shape is said to improve dozing work, while the travel switch on the blade lever boosts productivity. Other improvements include high-visibility LED work lamps, Bluetooth radio, easier attachment flow settings, easy radiator cleaning, new large access doors and engine access on one side, accessible from ground level.

Komatsu

www.komatsu.com



Komatsu's new midi excavator is said to deliver high productivity



Mecalac's versatile loader can handle a range of duties

Telescopic loading

Mecalac is now offering its highly adaptable AS900tele loader. The machine combines the compactness and mobility of Mecalac's AS Swing Loader Series with a system for extra versatility on the jobsite.

The 84litre/min auxiliary hydraulics allow use with a range of attachments including, road sweepers and earth augers. Functioning as a loader or telehandler, the AS900tele reduces the need for

additional equipment onsite. The 7.25tonne AS900tele features Mecalac's innovative swing design. Operators can swivel the loaded bucket 90° on either side for duties such as filling trenches or carrying pipes in minimum operating space. On a road project, this rotation limits necessary space, requiring only a single lane closure rather than the two-lane closure needed for conventional loaders. The unit's telescoping capabilities allow

a lifting height of 4.72m and outreach of 3.5m.

The AS900tele has a carrying capacity of 2.27tonnes at full extension while it can be used with attachments such as pallet forks, buckets, brushes, snowplows and hedge trimmers, allowing it to be used instead of backhoe loaders, wheeled loaders and telehandlers.

Mecalac

www.mecalac.com

Low emission loading

Yanmar has launched a Stage V-compliant V120 wheeled loader that is said to be powerful, efficient and versatile. The V120 suits use in space-restricted urban job sites or for highway construction.

Powered by a 3.6litre diesel engine and fitted with a DPF as standard, the V120 is Stage V-compliant and fuel-efficient. The engine delivers 75kW at 2,000rpm and 410Nm of torque at 1,600rpm, while allowing the V120 to reach travel speeds of up to 36km/h.

Parallel kinematics allow operators to raise loads to a maximum lifting height of 3.365m and a maximum dumping height of 2.68m, with static tipping load capacities of 5tonnes when straight and 4.4tonnes on full turn, as well as a maximum digging force of 55kN.

The independent hydraulics use a variable displacement pump to build a working pressure of 250bar and a capacity of 81litres/min. The circuit is thermostatically controlled, maintaining

optimum oil temperature and reducing the risk of overheating.

The V120 is offered with three attachments: a general purpose bucket, forklift and multi-purpose bucket. Fast changing between attachments is achieved using Yanmar's hydraulic quick hitch, which is operated from the cab.

On uneven terrain, Yanmar's rear axle oscillation offers stability, keeping all four wheels on the ground with slewing angles of up to 8°. The V120 is manoeuvrable, due to 40° of articulated steering and a turning radius of just 2.155m. Hydrostatic transmission, all-wheel drive and automatic self-locking differentials help to boost traction on challenging terrain.

Yanmar's Smart Control system is included as standard, improving control and monitoring capability. The display provides real-time machine data, alongside customisable settings to suit the operator.

Yanmar

www.yanmar.com



Yanmar's new compact wheeled loader offers high productivity

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Improved output

Hitachi claims versatility and performance are key features for its new ZX130-7 and ZX135US-7 excavators aimed at the 13tonne class. The ZX130-7 and ZX135US-7 models are Stage V compliant and are said to offer a combination of comfort and safety as well as productivity.

Good fuel economy means that the ZX130-7 and ZX135US-7 excavators use 9% less fuel than the firm's previous models, due in part to the sophisticated HIOS V hydraulic system. Life cycle costs are said to be reduced as the new engine does not require an SCR system, eliminating the need for urea, filter replacements and associated maintenance. And a new ECO gauge allows operators to control fuel efficiency and reduce costs.

Attachments can be changed quickly using the improved attachment support system on the monitor, extending versatility. The Zaxis-7

excavators feature an Aerial Angle camera system that provides a 270° view around the machine. New LED work lights and a windscreen wiper with an increased sweeping area are also fitted.

Remote monitoring systems Owner's Site and ConSite send operational data daily via GPRS or satellite from the excavator to Global e-Service. In addition, ConSite summarises the information in a monthly email and the ConSite Pocket app shows real-time alerts for any potential issues. The system continuously monitors the quality of engine and hydraulic oil. Data is transmitted daily via two oil sensors to Global e-Service and they detect if the oil quality has deteriorated, so that both maintenance and unscheduled downtime are reduced.

Hitachi Construction Machinery (Europe)
www.hcme.com



The compact ZX135US-7 excavator from Hitachi can be operated in restricted space applications

New backhoe loader range

Caterpillar is now offering four new backhoe loader models that are said to build on the success of the previous F2 series.

The new line consists of the Cat 428, 432, 434 and the 444 models, replacing the 428F2, 432F2, 434F2 and the 444F2 machines respectively. The new Cat backhoe loaders benefit from similar features throughout the range, offering component commonality and operating similarities.

The redesigned operator control system has a colour LCD information display. Informational icon pop-ups offer navigation between operating modes, while diagnostics simplify

troubleshooting and maintenance. The security system disables the engine, transmission and hydraulic system until a valid passcode is entered on the LCD control screen.

Pilot controls are available on the 428 and 434 as an option and new seat-mounted controls that provide the operator with more comfort and control are standard on the 432 and the 444.

The Cat C3.6 engine meets Stage V emissions standards and is rated at 68kW or 76kW depending on the model. The aftertreatment package consists of a service-free SCR system with DEF and DPF. The 428 is available with a 55kW engine, replacing the 427F2, and requires only a DPF to meet the Stage V emissions standards. The DPF is designed to deliver reliable operation throughout the machine's service life.

The new diesel reduces fuel consumption by up to 10% compared to the F2 Series engine.

All models in the new backhoe loader line feature standard four-wheel drive with rear differential lock for improved traction in poor conditions.

Selectable power management modes offer Economy Mode and Standard Mode for good engine performance and increased fuel savings or Standard Plus Mode to maximise backhoe implement speeds. A new powershift transmission is available as an option on the 428 and 434 and fitted as standard on the 432. The 444 is fitted with a fully automatic transmission as standard.

All new models feature adjustable auxiliary hydraulic flow to the backhoe, so machine hydraulics can be fine-tuned for each attachment. To increase utilisation, the machines can be equipped with optional Integrated Tool carrier loader couplers (IT) for fast work-tool changes. These new backhoe loaders are compatible with F2 series attachments, eliminating the need to purchase new attachments.

Remote data monitoring is offered through the VisionLink system and the machines have the latest Cat Product Link package as standard to maximise uptime. Customers can modify machine operating data to meet specific needs for improved fleet management.

Caterpillar
www.cat.com



Caterpillar is introducing a new backhoe loader range



Spanish quarry firm Canteras de Santullán has increased productivity since it started using its new Doosan machine fleet

New Doosan fleet

A new fleet of construction machines is helping to improve output for the Spanish quarrying business, Canteras de Santullán. The firm is based in Bilbao (Bizkaia) in Spain and recently upgraded its construction machinery fleet in a bid to boost efficiency. The new Doosan machines include two DL550-5 wheeled loaders, two Doosan DA30-7 ADTs and a DX420LC-5 excavator.

Canteras de Santullán produces limestone products for use in the construction and industrial sectors, with an output of over two million tonnes/year of crushed ore. The firm selected the Doosan equipment after a competitive bid process involving machines from five different manufacturers. All the new Doosan machines are used in the production of the limestone products and work 24 hours/day to meet demand. Since the fleet was commissioned, the firm has been able to

increase its output efficiency. According to the client, Doosan was able to offer machines configured to meet the requirements of its production process.

Another important factor was the operational control provided by the DoosanCONNECT telematics system, available as standard on the Doosan machines. This allows the firm to monitor the location of the machines, as well as their status, hours, fuel consumption and maintenance schedules, all from the office. The system collates the necessary data and provides an effective fleet control solution.

The firm uses its Doosan DL550-5 wheeled loaders to load aggregates, sand and other products into on/off-highway trucks belonging to the firm's own fleet as well as trucks from other companies that are used to transport materials direct to customers. The limestone

is produced by blasting at the quarry face and the Doosan DX420LC-5 excavator is fitted with a hydraulic breaker to reduce any oversized material.

The excavator is also used to load rock into trucks taking the material to the primary crusher. The DA30-7 ADTs are used for general material handling applications to supply the stockpiling operations.

The client also finds it useful that all the machines are from the same manufacturer as this simplifies servicing and spare parts supply. The after-sales technical service is provided by Adal Exclusivas Generales, the official Doosan distributor in the area, with the support of Centrocar, the exclusive Doosan importer for Spain, Portugal, Angola and Mozambique.

Doosan Construction Equipment

www.eu.doosanequipment.com

Cutters for tunnelling

Drum cutter attachments from Erkat, now part of Epiroc, have been used successfully on a tunnelling project in New Zealand.

The five transverse drum cutters have been used on the project in Auckland. Supplied by Erkat distributor Digga NZ, the Erkat attachments are being used for a 3.45km tunnel that features twin tubes, now under construction up to 42m below the city centre. The two larger Erkat drum cutters are currently in operation excavating the tunnel opening. The smaller attachments will be used for wall profiling, excavating service tunnels and other tasks.

The builder of the tunnels, CRL Link Alliance, considered the Erkat transverse drum cutters for use on 8tonne, 14tonne, 34tonne and 45tonne excavators. Erkat discussed the project application with the client and determined that the



Erkat drum cutters are now being used for excavation and scaling purposes on a major tunnelling project in New Zealand's largest city

attachments would be suitable for use in the geological formations underneath the city of Auckland.

The transverse drum cutter attachments supplied by Digga to the client were an Erkat ER1500 and ER250, two Erkat ER600's and an Erkat ER2000-2TU. With the assistance of Digga NZ, the machines were mounted on a Yanmar Vio80 excavator, two Doosan DX140LCR excavators, and Liebherr R924 and R950 tunnel excavators, respectively.

The Erkat ER1500-1X and ER2000-2TU are now being used to excavate the opening/starting point for the journey of the 7.15m diameter TBMs. Meanwhile, the smaller ER250 and ER600s are now being used for wall profiling, excavating service tunnels and a range of other tasks.

Epiroc

www.epiroc.com



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Photo of the month

Using poop for fuel

FRESHLY GRILLED

One Lamborghini owner decided it would be rather entertaining to use the flames shooting from the exhaust of his car to flame grill some sausages. The powerful Aventador model features a V12 engine and one person sat in the driver's seat revving the engine hard as another man held the sausages against the flames. The car was not designed for such treatment however and burst a coolant pipe, spilling coolant onto the garage floor and bringing the cooking experiment to a rapid halt. Exactly what the sausages tasted like remains unclear.

NO DUMPING

Police in the UK caught some motorists who had used an emergency parking area on the M6 motorway to dump rubbish. The motorists had been seen on CCTV stopping to dump their rubbish, tipping out cartons and other waste from black plastic bags and then driving away, presumably thinking that they were in the clear. However, they had been spotted and the license plates of their vehicles identified and after travelling around 30km, they were intercepted by traffic officers in a patrol car and made to return to the emergency parking area to pick up their rubbish again. The motorists were also given a warning.

YOU CAN'T PARK HERE

A car owner in Mumbai had a shock upon returning to where the vehicle had been parked. In its place was a hole in the ground filled with water but of the compact car there was no sign.

The incident was caught on CCTV however; It happened following a period of heavy rain in Mumbai. It is thought that the sinkhole appeared when floodwater undermined the base of the parking area. It is not clear if the owner was able to retrieve the car later on.

NOT GARAGED

A study shows that 53% of garages in the UK are not used by their owners to store cars. The report was carried out for motoring body, the RAC. The research says that for up to 68% of garage owners, this is because the garages are filled with other belongings, meaning that there is no space to park a vehicle inside. Tools for DIY are the most common items stored in garages at 90% of cases, with furniture at 74% and bicycles at 55%. Meanwhile in 30% of cases, owners say that their garages are now too small for their vehicle to fit inside, as modern cars are typically rather larger than those of previous decades when the garages were first constructed.

DIRECTIONLESS

A woman driver in Milwaukee crashed off an overpass in her car when she lost control. The vehicle smashed through a guardrail and fell 21m. Despite the height that the vehicle plunged, the woman escaped with only minor injuries. Instead of immediately calling for assistance, the woman waited inside the crashed car for 90 minutes before calling her partner. Only then were the emergency services called to

rescue her. Police were less than impressed when emergency workers managed to help her from the wrecked vehicle however, as the officers realised the woman was intoxicated. Despite the evidence, she claimed she was not guilty of drink-driving and explained that the crash had been caused by her poor ability at following directions.

UNSAFE AT ANY SPEED?

UK drivers can be banned from driving if they accrue 12 or more penalty points for driving offences on their licences. However, there is a loophole in that drivers can claim in court that not having a licence would significantly affect their livelihood. Some people exploit this loophole and there are 46 UK drivers who have been legally allowed to continue driving on UK roads, despite having more than 30 points on their licences. The worst offender has accrued 68 points, while there are six other licence holders with 51 points or more and a further 39 with anything from 30-50 points. In UK capital London there are 1,194 people with 12 or more points while there are 556 in West Yorkshire, 491 in the West Midlands, 730 in Merseyside and 348 in Greater Manchester. Of note also is that there are 8,237 drivers in England with 12 or more points, of whom 6,837 are male and 1,400 are female. In Wales there are 512 drivers with 12 or more points, of whom 413 are male and 99 are female, while in Scotland there are 225 drivers with more than 12 points, 192 male and 33 female.

PUFFED CYCLIST

Officers in the Canadian Province Ontario have been searching for a cyclist who crashed his bicycle, then immediately fled the scene of the incident. When police examined the trailer the bicycle had been towing, they realised why the cyclist had run away, as it contained 14kg of the drug cannabis.

ALL EGGS IN ONE BASKET

A woman in the UK was involved in a crash while riding her cargo bike and was unable to ride for a number of months while she recovered from her injuries. When she did recover, she was keen to start riding again but when she went to retrieve her cycle helmet from where it had been stored, she discovered that birds had nested in it and it now contained a clutch of eggs. She subsequently bought a new helmet and left the eggs to hatch.

POOPED

In the UK, Wessex Water is now using two trucks in its fleet that run on methane instead of diesel. The methane is derived from a combination of food waste and sewage that is allowed to decay, with the gas being captured and stored. As the trucks are used to collect sewage sludge for treatment, they have a ready source of the raw materials required to produce the methane. Wessex Water says that it will be purchasing more trucks capable of running on biogas in the future as using this fuel deals with waste material effectively, as well as reducing (unpleasant) emissions. This development follows the use of gas from similar sources being to fuel a bus in the city of Bristol.

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