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APRIL-MAY 2022
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A BLUEPRINT FOR THE FOOTPRINT

FROM THE EDITOR

Construction was a complex sector to work in, long before recent events made life in Europe so much more challenging.

Construction businesses have learned to adapt to Covid and are learning to live with higher prices and reduced availability of materials and components.

As an industry, we are also readying ourselves to deal with the growing skills shortage.

Even as we look at the conflict in Ukraine, there are positives, as we discover new ways to come together in solidarity with the oppressed and with unprecedented sanctions against aggression.

As an industry, we can be incredibly positive, dynamic and adaptable, so why are we struggling to adapt to the greatest of all challenges: global warming?

Regulations and initiatives are being rolled out by the European Commission (see page 28), but the industry must take the lead on this issue.

And why not? There are strong business arguments for transitioning to 'greener' construction. For one thing, the EU has pledged billions of euros, to be invested in transformational projects.

Moreover, among the 30 largest investors in the world, there is a commitment to achieve net zero investment portfolios by 2050.

When organisations such as the insurers Zurich and Allianz, as well as the giant US pension fund CalPERS, commit to such a target, it amounts to a powerful expectation of change within the businesses they invest in.

These financial giants will ask for transparency and accountability, to fully understand the risks they are taking with their investments and how best to mitigate them.

Within this transparency, for the construction industry, there will doubtless be a call to disclose carbon footprints.

This is the future and diving in will be preferable to being dragged in feet first.

Mike Hayes,
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ON THE COVER
For Sweden's new West Link railway tunnel in Gothenberg, the Epiroc BoomerXE3 drill rig - which has three drilling arms plus a further telescopic arm - was used to drill 800 holes for each rock blast
PHOTO: EPIROC

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FOUNDATIONS | FALSEWORK AND FORMWORK

EVENTS DIARY

2022

GIC-Concrete Days
April 28-30, 2022
Piacenza
Italy
www.gic-expo.it

UK Construction Week
May 3-5, 2022
London
UK
ukconstructionweek.com

Hillhead
June 21-23, 2022
Buxton
UK
www.hillhead.com

Bauma
October 24-30, 2022
Munich, Germany
www.bauma.de

UK

UK eyes up to seven new nuclear plants

Government looks to significantly scale up its nuclear energy programme

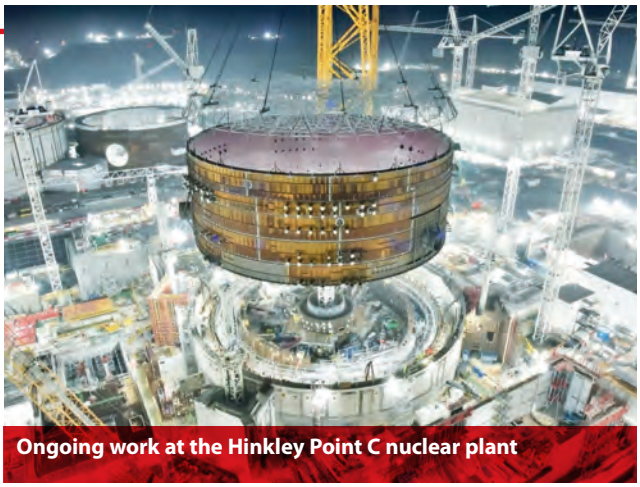


PHOTO: HINKLEY POINT C

Ongoing work at the Hinkley Point C nuclear plant

The UK is planning a significant expansion of its nuclear energy capacity, with seven new nuclear plants potentially being commissioned by 2050.

In an interview with The Telegraph, the UK's business secretary, Kwasi Kwarteng, described the increasing need for the country to increase its energy self-reliance, saying, "there is a world where we have six or seven sites in the UK [by 2050]".

The government agreement is set to to establish a body (Great British Nuclear) to identify sites and offer contracts to build and run plants.

With all but one of the UK's current nuclear plants set to be decommissioned by 2030, the country's Prime Minister, Boris Johnson, is expected to announce his support for the construction of at least two large-scale nuclear plants by 2030, along with plans for the construction of a number of small modular reactors.

The wider plan that Kwarteng has outlined would see the UK's nuclear energy output increase to more than three times the current 24GW by 2050. This would see up to a quarter of the country's energy mix being provided by nuclear plants. ce

ALBANIA

Albanian dam could supplant Russian gas

Albania is making preparations for the construction of a large dam on the Drin River in the north of the country, with the intention of boosting its energy security.

At an estimated cost of around €500 million, the proposed 210MW Skavica hydroelectric plant is expected to produce approximately 20% of Albania's domestic energy production, following a five-year construction period.

Skavica will also optimise energy production at other dams, which currently supply 1,350MW of electricity. Currently, all of the energy produced in Albania comes from renewable sources, primarily hydroelectric.

Following three years of dry weather, however, the average cost per MW of electricity has risen in the country from around €52.20 to over €550.

Accelerated by a clear intention of reducing Russian gas imports, the dam project will be the largest undertaken in the country since the fall of communism in 1991.

US-based construction firm Bechtel has been contracted by the Albanian government to carry out initial feasibility studies for the dam.

Albania's minister for energy and infrastructure, Belinda Balluku, said, "Skavica is the most challenging and most wonderful project that we have to create independence from imports.

"We aim to create energy security and less dependency on Russian gas or other sources. The aim is to turn Albania from an importer into an exporter." ce

PHOTO: ADOBE IMAGES

The Fierza hydroelectric power station on the Drin River in Albania

FRANCE

Eiffage JV signs €7bn Armed Forces deal

A joint venture partnership of Eiffage and Arcade Vyv has signed a €7 billion agreement with the French government to manage the country's Armed Forces housing stock for 35 years.

The companies will work together under the consortium name Nové, on the Ambition Logement (Housing Ambition) programme, which will ultimately include the construction of some 15,000 new housing units.

Initially, Nové will be responsible for improving the housing stock's energy performance with the renovation of almost 8,000 housing units, and for expanding it, through the construction of around 3,000 new-build houses across 55 sites. These projects will be realised during the first years of the contract.

Eiffage said financing will partly come from Nové shareholders' equity capital and a €1.3 billion loan.

Australian crane company Marr Contracting has completed its heavy lift crane solution for the world's longest mid-span and highest tower suspension bridge in Turkey.

Marr's scope of works on the construction of the 318m-high bridge towers included engineering the crane solution, its integration into the temporary and permanent works, the supply of two 330 tonne capacity M2480D cranes (including installation, climbing, dismantle and maintenance), and the actual crane operations.

PHOTO: MARR CONTRACTING

GERMANY

Hydrogen 'key' to replacing Russian gas

Climate minister signs agreement with Norway to accelerate hydrogen delivery

In a move aimed at reducing Germany's reliance on Russian natural gas, the country's economy and climate minister, Robert Habeck, has announced plans to work with Norway on the development of a hydrogen gas pipeline project.

The agreement comes as the threat of Russia shuttering its main Nord Stream gas pipeline to the country continues to grow.

Following a meeting between Habeck and Norway's prime minister, Jonas Gahr Støre, the two countries have agreed to undertake a feasibility study on the proposed project, while looking to ramp up Norway's current supply of hydrogen to Germany.

PHOTO: REUTERS

Germany's climate minister, Robert Habeck

The question that remains unanswered is whether the German government will consider a U-turn on its rejection of low-carbon 'blue' hydrogen.

Norway is keen to sell 'blue' hydrogen into the EU, which is produced from natural gas, but with its carbon captured and stored below ground.

This could now be seen by Germany as an expedient short-term option, as the renewable energy sources (wind, solar, etc) required to produce 'green' hydrogen, are ramped up. ce

HUNGARY

Rosatom 'pulling out' of Hungarian nuclear project

Rosatom has reportedly told the Russian government that it plans to withdraw from the Paks nuclear expansion project in Hungary.

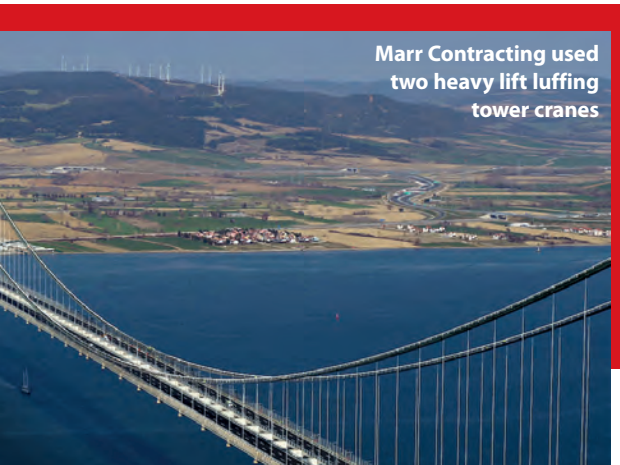
The Russian state-owned nuclear energy company has a €12.5 billion contract to deliver two new reactors to the plant. It is reportedly citing force majeure as its grounds for withdrawing from the project, due to the sanctions placed on Russia, following the country's invasion of Ukraine.

PHOTO: REUTERS

Reactor unit turbine hall at the Paks nuclear plant

In 2014, the Russian government agreed to provide a €10 billion loan to finance 80% of the project's costs, through the state-owned Vneshekonombank (VEB). In the current situation, it would not be possible for the loan to be directly paid to fund the already years-behind-schedule project.

According to Newsbase Daily News, however, Rosatom Central Europe's Hungarian CEO Zalan Bacs has denied the report, insisting the implementation of the Paks project will continue according to schedule and Rosatom is fulfilling its contractual obligations under the Russian-Hungarian intergovernmental loan agreement, including securing the financing of the project. ce



Marr Contracting used two heavy lift luffing tower cranes

NIBS

PHOTO: LIEBHERR

GERMANY LIEBHERR CONSTRUCTION SALES UP
The Liebherr group has announced that revenues in the earthmoving, material handling technology, deep foundation machines, mobile and crawler cranes, tower cranes, concrete technology and mining product segments were an impressive 17% higher than in the previous year, at a little over €8 billion (US$8.8 billion).

SWITZERLAND HOLCIM ANNOUNCES IT WILL REMOVE ITSELF FROM RUSSIAN MARKET
The Swiss-based building materials manufacturer has announced that it is to initiate the process to exit the Russian market. The company said this was in line with the company's values to operate in the most responsible manner. Holcim had previously announced that it was suspending all capital investments in the market.

PHOTO: ENKA

SERBIA MAJOR INFRASTRUCTURE PROJECTS FOR CHINESE CONSTRUCTION GIANT CRBC
Construction is underway on a major new road project, to be built by the Chinese state-owned contractor China Road and Bridge Corp (CRBC). Stretching for approximately 75km, of which 51km will be bridges and tunnels, the Požega-Duga Poljana expressway is said to be the largest infrastructure project in central southern Serbia, although the total value of the contract has not as yet been disclosed.

TURKEY UK PLEDGES €2.1BN IN FINANCING
Turkey is set to recieve €2.1 billion in green financing from the UK Government for a new high-speed electric railway project. UK Export Finance (UKEF), through its Buyer Credit Scheme, will provide the funding for the new 503km electric-powered railway line between Turkey's capital Ankara and the portside city Izmir, intended to facilitate rapid transport between the cities.

The Sustainable Reconstruction and Recovery Framework is a toolkit for disaster-hit areas

PHOTO: ADOBE IMAGES

GLOBAL

Post-disaster toolkit for construction

Construction framework for countries that have suffered natural disasters and conflict

The World Green Building Council (WorldGBC) has launched a framework that it says will help communities build with a holistic, inclusive and resilient approach to reconstruction in regions experiencing natural disasters and conflict.

The 'Sustainable Reconstruction & Recovery Framework' is structured around six themes which emphasise that disaster risk reduction, and the sustainable urban reconstruction of the physical environment, can restore the wellbeing of communities, revitalise livelihoods, and support social and cultural life.

The six themes of the report are:

1. Efficient resource utilisation – A physical environment that ensures the proper utilisation of resources, continued growth and environmental resilience.
2. Environmental and climate resilience – Promote long-term integrative planning to decrease the communities' vulnerability and increase its adaptability to the harmful effects of climate change.
3. Sustainable mobility – Ensure freedom of access to all members of society in an environmentally sensitive and healthy manner.
4. Integrative social and economic resilience – Ensure social networks are given equal importance to physical networks, and are rebuilt and supported in the physical environment in ways that facilitate opportunities for economic growth and community resilience.
5. Health and wellbeing – Address both the objective and subjective aspects of community wellbeing, especially post crisis.
6. Heritage – Maintain a strong link to the heritage of an area, representing the historic and cultural richness of the region, which is crucial in ensuring belonging and in turn, wellbeing.

ce

SPAIN

Ferrovial wins €171m high-speed rail build

Spanish contractor will partner with Acciona on proposed high-speed line in Murcia and Almería

Contractor Ferrovial has been awarded a €171 million contract to build the trackbed for a high-speed rail line in southern Spain.

With its project partner Acciona, Ferrovial will construct the double-track high-speed trackbed between Pulpí in Almeria and Lorca in the neighbouring municipality of Murcia.

The scope of the project covers a 31.3km section of the Murcia-Almería line, including the remodelling of the Pulpí and Puerto Lumbreras stations, plus the construction of a new station at Almendricos.

Additional construction work includes the building of a tunnel and ten viaducts and bridges of several types, with a total length of 1,250m.

A further 28 structures will also be built, with all construction expected to be completed in approximately 34 months.

As part of the construction of the main trackbed, Ferrovial says it will re-use more than 18km of the existing non-electrified single-track line between Lorca and Águilas, while dismantling 20km of existing line.

The company has already played a key role in the development of Spain's high-speed rail network, and is currently working on projects including the new rail access to Murcia and the Pulpí-Vera trackbed on the Mediterranean Corridor, the trackbed of a section of the Madrid-Extremadura high-speed line.

Spain has Europe's largest high-speed rail network

US

Call for US to end its tariffs on construction materials

Construction employment and spending on construction projects increased again in the US, but association officials warn that growth may stall unless tariffs on key materials are lifted.

According to analysis of government data by the Associated General Contractors of America (AGC) construction employment climbed by 19,000 jobs between February and March, while spending on construction projects rose for the 12th month in a row in February.

However, the AGC called for the US government to end tariffs on key materials, as well as broaden training and education opportunities for construction careers. Association officials said the industry will need to obtain materials on a more timely basis and hire hundreds of thousands of additional workers in order to execute projects that will soon be funded by the US$1.2 trillion Bipartisan Infrastructure law, on top of the continuing demand for homebuilding and private non-residential structures.

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Tariffs are in place for many construction-related materials

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BIM for Manitou

French material handling equipment manufacturer has taken a step forward in its digital transition, by launching freely-accessible 3D digital models of its construction equipment for use with BIM.

The creation of the virtual models, which was carried out by BIM specialist BIM&CO, can be found in the BIM library on Manitou's website and BIM&CO's website. It means that BIM architects, modellers and designers can now easily download and introduce Manitou's machines into their own digital work environments.

CNH to develop technology with new US facility

CNH Industrial will open a new engineering centre in Scottsdale, Arizona, US. The new facility, says the company, will accelerate its Raven business developments in AI, autonomy, machine learning, and data science.

Kevin Barr, chief human resources officer at CNH Industrial, said, "Our industries are undergoing a significant tech transformation and CNH Industrial wants to attract a growing talent pool of engineers and digitally focused professionals that will shape this future.

"Our new Scottsdale hub will be an attractive, dynamic and innovative workplace where we will accelerate progress in the digital, automation and autonomous spaces."

The multi-national corporation is also intending to invest in the expansion of the Innovation Campus in Baltic, South Dakota, US. The facility upgrades will give additional space and resources for engineering, testing, and research.

The investments in Scottsdale and Baltic will aim to bolster the company's engineering talent base, says CNH Industrial. This will support the demand for innovative aftermarket solutions, in addition to furthering Raven's technology integration and advancements for the Case IH and New Holland Agriculture brand platforms.

"Our integration with Raven is rapidly accelerating technology delivery to customers. It allows our Engineering teams to efficiently go from 'code to cab' to develop and deploy new technologies. These sites combined with our existing activities will reinforce our commitment to have engineers work closely with our customers," said Parag Garg, chief digital officer at CNH Industrial.

The Phoenix metro area is a nationwide hub for high-performance companies and individuals, says CNH Industrial

PHOTO: CNH INDUSTRIAL

PHOTO: XCMG

XCMG's mammoth XDE440 electric dump truck

Chinese OEM produces the 'world's largest' electric dump truck

XCMG has unveiled its 440 tonne rigid mining truck with AC electric drive

XCMG has produced what it says is the world's largest tonnage alternating current (AC) electric drive dump truck.

The 440-tonne mining truck – which is said to have more than 60 invention patents – is customised for high-end mining markets such as Europe, South America, North America, and Australia.

The XDE440 has a load capacity of 400 tons, and is close to the height of a three-storey building, setting a record for the highest load capacity of a rear-drive rigid mining truck in the world.

In order to meet the load requirements of 400 tons, XCMG says that it has independently developed the world's largest output torque wheel reducer and the world's strongest wet disc brake, which can effectively alleviate the problem of tight mining capacity.

The company says it has carried out more than 80 special designs and professional service plans according to the field conditions, and successfully completed the R&D and production tasks.

XCMG has a full range of mining equipment industries including 70-700 tonne mining excavators, 30-440 tonne dump trucks, 100-6000t/h crushing and screening machinery, and 350-550hp motor graders. The company also says it is cooperating with the world's top mining companies such as Rio Tinto, BHP Billiton and Vale as a major player in the sustainable, green development of the global mining industry.

"In the future, XCMG will go all out to provide service guarantees throughout the product lifecycle, help our customers to maximize their value, and jointly contribute to the intelligent, safe and green development of the mining industry," said Wang Min, chairman and CEO of XCMG. ce

PHOTO: BEAMUP

Stephane Levy, Founder and CEO of BeamUp

US$15m investment into AI platform

BeamUp Ltd, an artificial intelligence (AI) design and management platform company, has been launched with a US$15 million round of seed investment led by StageOne Ventures and Ibex Investors.

BeamUp generates digital models of facilities and is said to reduce system and infrastructure design time from months to days – in addition to improving management efficiency by up to 70%.

Stephane Levy, CEO and founder of BeamUp, said, "Buildings and the systems within them are as complex as cities, but the tools to design and manage them have not kept up. By introducing intelligence and historic and macro level data into this industry, BeamUP automates manual processes to prevent dangerous compliance breaches and skyrocketing costs for enterprises who manage hundreds, if not thousands, of facilities."

"BeamUP," he told TechCrunch, "[is the] first platform that is using AI to execute on facility design and management at scale to [meet] the unique requirements of Fortune 500 organisations."

Nate Meir, partner at StageOne Ventures, commented that, "Beyond initial design and install, facilities must be managed, maintained and updated over time. Early on, we identified BeamUP as uniquely positioned to tackle both of these problems and it has been great to work with the team as they upgrade a desperately outdated ecosystem."

Meir added that the company – which was founded in Israel in 2019 – was working with customers around the world, helping them to automate their processes to improve operations.

BeamUp said that the seed financing would be used to invest in its sales, marketing, and operational departments.

Komatsu's new telematics solution

Data can be used across mixed fleets to streamline machine management systems

Komatsu has released a new digital hub, My Komatsu, which the company says allows contractors to interpret visual analyses of data collected from numerous sources, such as from different OEMs equipment.

In a press release, Komatsu said that the My Komatsu application can pull data from Komtrax, Komtrax Plus, ISO API 15143-3 (AEMP 2.0) data from other OEMs, or other direct data sources.

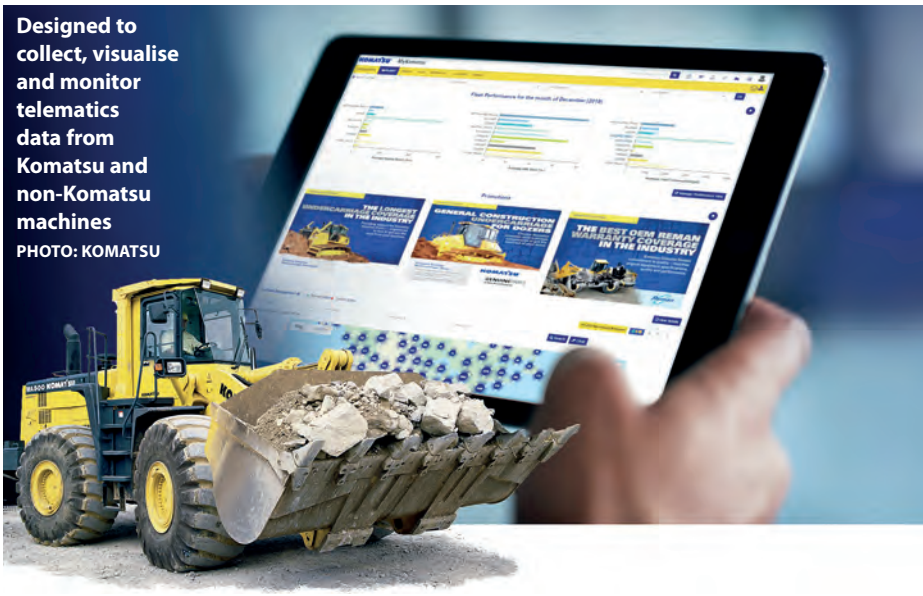
The data is then used to produce analytics that can better streamline fleet management processes as well as reduce multiple IDs and passwords.

The My Komatsu application, with the ISO-15143-3 (AEMP 2.0) telematic API (application programming interface), connects telematic data from all equipment or is able to access it through monitoring and analysis services.

The system can be used on Komatsu and non-Komatsu machines – enabling fleet managers to view their entire fleet – to benchmark machine performance, track fuel consumption and manage data on one dashboard.

Matthew Beinlich, director of digital support solutions for Komatsu, said, "Starting today, our customers can get the most important telematics data, such as location, hours, fuel consumption, idle ratio and production, from My Komatsu for many of the other brands of equipment they may operate.

"Enter the ISO 15143-3 API credentials for those brands into My Komatsu once, and you'll no longer need to log into each OEM's system separately each day." ce



Designed to collect, visualise and monitor telematics data from Komatsu and non-Komatsu machines
PHOTO: KOMATSU

Latest construction tech speaker announced

The fifth speaker for KHL's Construction Technology Summit, taking place on April 21 this year, has been announced, Martin Ward, director of Mi Project Solutions.

The company – a digital business created by contractor Willmott Dixon – provides the built environment with a suite of digital governance tools that can be used by contractors.

Ward will talk about how contractors can use data to save time, reduce risk, and seamlessly track enrolment, performance and societal KPIs – ultimately, how data can be used to make better decisions.

Originally trained as an architectural technician, Ward spent many years working on site and in drawing offices, before taking on a number of CAD Management positions.

During the early 2000's he established iSite as a Digital Estate Solution and worked with blue-chip organisations advising on strategy and working with clients to drive demonstrable value through adoption of digital strategy, data analytics and integrated property lifecycle management. He joined Mi Project Solutions as Business Director in 2021.

Martin Ward, director of Mi Project solutions

The free to attend event, taking place at 4pm Brussels time (12pm Washington DC time) on April 21, will examine digital construction in the real world and how contractors can practically digitise their workflows.

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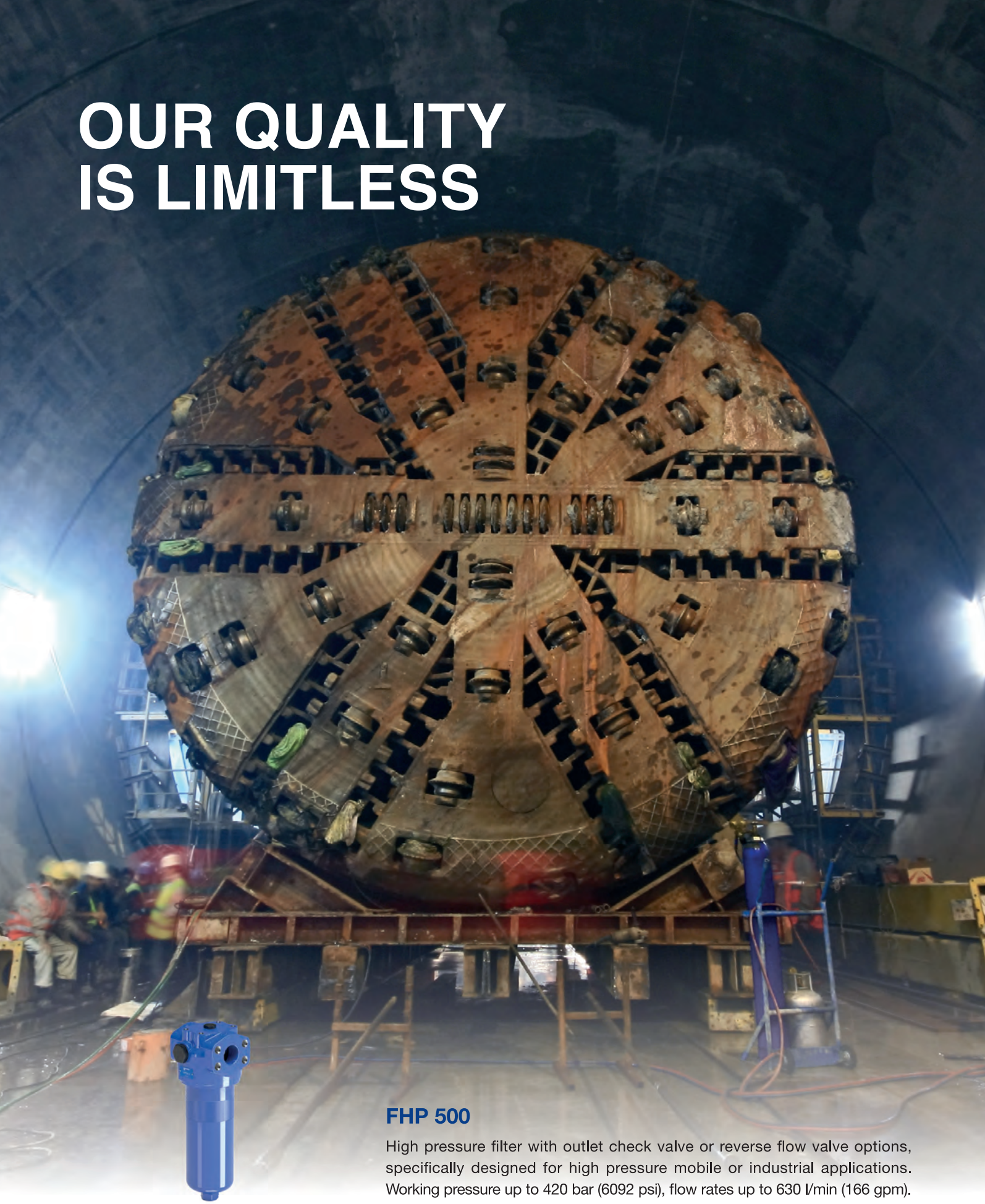

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OUTLOOK FOR SPANISH CONSTRUCTION

Spain is set for a challenging year, with the conflict in Ukraine putting further pressure on the supply chain, as IHS Markit's Scott Hazelton **explains**

The Spanish economy proved resilient in the second half of 2021, but the spillover from the Ukrainian conflict, historically high inflation and continued global supply disruptions will negatively impact growth in 2022.

Fixed investment grew by 4.3% in 2021 after a 9.5% decline in 2020. However, the strength came from machinery and equipment, not structures.

The dissipating impact of Covid-19 helped deliver improved confidence in February. The IHS Markit Spain Purchasing Managers' Index® (PMI®) survey shows that both manufacturing and service industries expanded at strong rates.

The seasonally adjusted Composite Output Index improved to 56.5 from 47.9 in January, with a score above 50 signifying expansion.

The survey also confirmed that price pressures were a problem during February, and firms expressed "a strong appetite to pass on these increased costs to clients by raising charges at an unprecedented rate."

However, this is likely be a temporary pick-up, with the Ukrainian conflict exacerbating supply chain disruptions and stoking stronger input price inflation. Higher energy and food prices will raise the 12-month consumer inflation rate to over 11.0% in May and June before falling to 8.7% by year-end.

Households faced with increased costs may curtail their demand for consumer durables, home improvement spending and travel/tourism spending, which is critical to Spain's economy.

We expect that investment will benefit from Spain's use of the EU Recovery and Resilience Faculty to finance major public projects. However, business investment will be under pressure amid rising cost pressures and retreating corporate confidence.

IHS Markit's March forecast calls for the economy to expand by 3.5% in 2022 (down from 5.4% in February). Growth is likely to slow to 2.2% (down from 3.3%) in 2023 with higher-than-anticipated inflation rates spilling into next year.

SLOW GROWTH ONLY

The outlook for Spanish construction is for improving, but it's tepid growth. Total real construction spending fell 3.9% in 2021 after a 9.9% drop in 2020. IHS Markit expects real growth to return, but only to a 1.7% rate in 2022, with continued weakness at 1.1% growth in 2023.

Strong real growth of 6.9% should return for 2023.

ABOUT THE AUTHOR

Scott Hazelton is a director with the Global Construction team at the market analyst IHS Markit.

Scott has over 30 years' experience in construction, heavy equipment, building materials and industrial manufacturing markets.

CE BAROMETER Construction's challenges now go beyond Covid

IN ASSOCIATION WITH Liberty Mutual SURETY

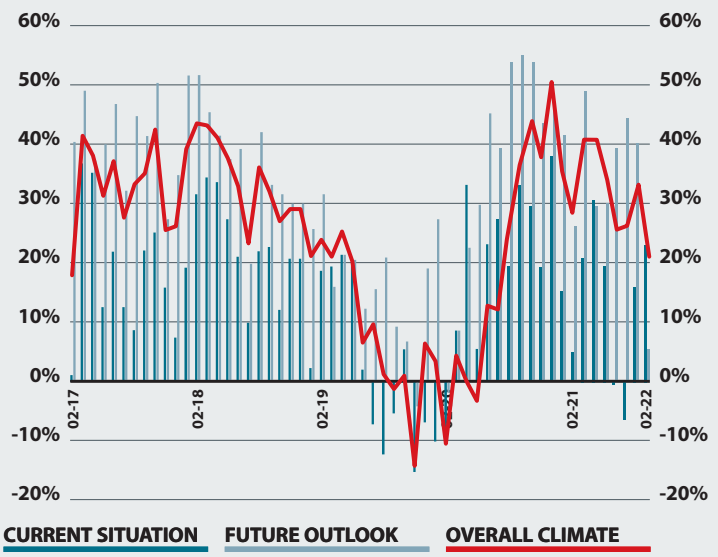
The February barometer survey was carried out during the first three weeks of March.

While the shocking events currently taking place in Ukraine have had a clear effect on this month's barometer, it is testament to the strength of the market that the figures remain largely positive.

Comparing current levels of business with the previous month, there is even an uplift, with 40% of respondents seeing an improvement, against 37.1% in the previous barometer.

The percentage of respondents reporting a slowing of business stands at 16.9%, a fall of over 4% from the 21% of last month.

Unfortunately, this is where the positive movement ends. As we look at confidence about next year's business, we see a huge drop in the balance figure – from 40.3% in the previous barometer, to just 4.6% this time round. (The balance figure, by the way, is the result of those



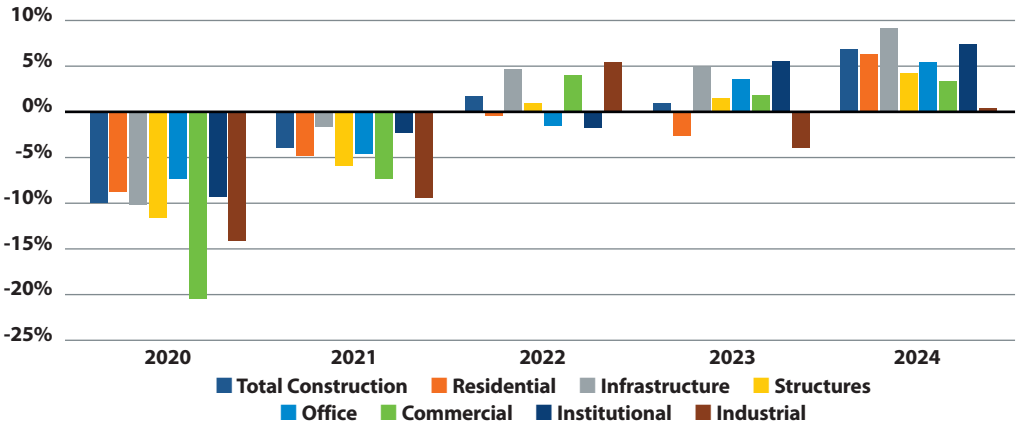
Between economic headwinds and uncertainty over Russian developments, construction growth will remain challenged and Spanish construction spending will not re-attain 2019 levels in real terms until 2025.

However, given inflation, 2019 nominal levels will be achieved in 2023. Nominal growth is an indicator of the increase in construction business revenue, while real growth would closely approximate the outlook for square metres of construction.

All construction segments struggled in 2021, and 2022, and even 2023, feature a decided mixed bag. Residential experienced the smallest decline among structural investment in 2021.

Inflation's toll on households will restrict activity in 2022.

OUTLOOK FOR KEY CONSTRUCTION TYPES
(PERCENT CHANGE, REAL 2015 UK €)



Building material and wage price escalation was a problem even before the war in Ukraine, and housing permits have been trending downward since last September.

There are reports of new construction closing until prices moderate as developers cannot preserve margins in the current environment. When inflation outpaces wage gains and interest rates are rising, housing affordability falls, reducing demand.

Economic issues suggest that it will be 2024 before Spain sees a 'normal' residential construction market.

ENERGY SECTOR BOOST

Non-residential structures will eke out real growth of one to two percent over 2022-23. Industrial structures offer a strong recovery in 2022, but a corresponding retreat in 2023. This is largely due to the energy sector, which will modify plants to improve flexibility given supply uncertainty.

Most other industries will see modest growth in 2022 with a modest decline in 2023. As supply chain issues are resolved in 2023 and beyond, construction of industrial structures will progressively improve.

Commercial offers 4% real growth in 2022 and 2% in 2023, largely due to recovery in Spain's hospitality sector as COVID retreats. Retail will be a hindrance to growth as e-commerce consumes an ever-larger share of spending and conventional stores suffer. Warehousing and logistics will see strong growth. Commercial construction does not recover to its 2019 real value over the forecast.

Office waits until 2023 to recover as companies sort out space given the proven ability of some professions to work from home. It will take several years to rationalize the current office stock with projected employee in-office hours; real office construction re-attains its 2019 level in 2026.

Infrastructure has the strongest outlook given countercyclical spending by the EU. However, there is downside risk here too. It is uncertain what funds European nations will commit to deal to refugees fleeing Ukraine, as well as the intentions of NATO members to increase defence spending.

Given fiscal realities, funding such unexpected needs could come at some expense to infrastructure.

National average growth can mask key regional differences. IHS Markit's Regional Explorer product provides outlooks by region – in the case of Spain, by its 59 provinces. The table below displays the top 12 provinces by nominal value added.

Value added is approximately the labour component of construction, removing the more volatile building materials spending. The table also includes the performance over the past five years, as well as the coming five years.

Forecast growth is stronger than historical due to higher inflation and recovery from the Covid-19 recession. However, both are largely national influences, so the relative growth over the forecast indicates the areas of greatest potential.

While the variation is not large, provinces in southern Spain generally outperform the rest of the country, due to the recovery of commercial properties in this tourist sensitive region as well as the desire, and now ability, of Spaniards to telework from the attractive climate with high quality of life. ce

PERFORMANCE AND OUTLOOK BY TOP SPANISH PROVINCES
BILLIONS US$, COMPOUND ANNUAL GROWTH (%)

	2021	COMPOUND GROWTH 2016-2021	COMPOUND GROWTH 2021-2026
MADRID	11.26	2.5%	5.9%
BARCELONA	8.54	2.5%	6.3%
VALENCIA	3.80	3.1%	6.6%
MÁLAGA	2.96	4.9%	6.9%
ALICANTE	3.05	2.5%	6.9%
BIZKAIA	3.10	2.2%	7.6%
SEVILLA	2.30	3.1%	7.3%
MURCIA	2.04	3.2%	7.4%
MALLORCA	1.96	2.8%	7.2%
A CORUÑA	2.05	3.0%	6.9%
ZARAGOZA	1.64	3.9%	7.1%
CÁDIZ	1.51	5.6%	6.2%

CE FEBRUARY 2022 SURVEY RESULTS

reporting better business against those reporting worse, with 0% representing parity).

Some might say the fact that the balance figure, looking a year ahead, has not moved into negative numbers is a cause for cautious optimism.

As we compare business levels now to those of a year ago, we see very little movement. Just over half (52.3%) of respondents say business has improved; this is down 2.5% on last month's figure.

That percentage is basically added to the column of those reporting a drop in business, which is up 2.4% on last month's figure, at 16.9%.

The overall climate figure has now fallen to 21%, down from 32.3% last month and well down on the optimistic 40+% seen towards the end of last year.

TAKE PART

The survey, which takes just one minute to complete, is open to all construction professionals currently working in Europe.

■ See **www.construction-europe.com/ce-barometer** for more info.

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THE FUTURE OF DIESEL

As the construction industry moves towards sustainable infrastructure and hybrid alternatives, Catrin Jones looks at what this means for diesel's future

Diesel has powered our machines since the 1890s and since then has remained one of the most common engines used in power generation. While diesel still dominates the construction sector and continues to power the largest machines – equipment manufacturers are facing new challenges.

Alternative fuels, advanced technology and near-zero emission products are steadily emerging as companies opt for sustainable processes. Yet diesel is finding new ways to evolve and stay relevant in an industry that is on the road to net-zero emissions.

The European Commission's emissions standards for non-road machinery have progressively tightened the restrictions on construction engines and equipment since being adopted in 1997. The most recent directive, Stage V, came into effect in 2019.

Engine technology has been adapted to reduce the harmful substances from exhaust gases that enter the air. The diesel particulate filter (DPF), a major player in Stage V, is engineered to reduce the number of particles, or pollution, emitted by engines.

Government legislation is an influential driver behind the evolution of cleaner >

"Clean diesel machines are likely to deliver on the majority of projects"

TIM BURNHOPE, JCB's chief innovation and growth officer

JCB 4.8 litre Stage V emissions standard engine
PHOTO: JCB

diesel engines and lower emissions. For example, in the UK, the use of 'red diesel' has been banned, as of 1 April, as a method of powering non-road mobile machinery.

According to the UK government's statistics, red diesel used in the construction and infrastructure building sectors was estimated to have caused 7% of nitrogen oxide emissions and 8% of PM10 emissions in London back in 2018.

ADVANCING TECHNOLOGY

As stricter legislation drives innovation and that innovation drives technological revolution. JCB Power Systems has used a combination of particulate control technology incorporating a diesel oxidation catalyst (DOC), integrated DPF and selective catalytic reduction (SCR) to meet European Stage V emissions regulations.

Tim Burnhope, JCB's chief innovation and growth officer says that he sees a balanced future for diesel and alternative power. "Where the optimum machine and power source should be selected for each application. Right now, that sees clean diesel machines likely to deliver on the majority of projects. But in sensitive environments – demanding quiet operation or zero emissions at point of use – electric equipment can be appropriate."

The push for sustainability is gaining momentum in the construction sector, but advances in 'cleaner' diesel mean that it may be some time before it relinquishes top spot. "NOx is down 97% and soot particulates are down by 98%," says Burnhope.

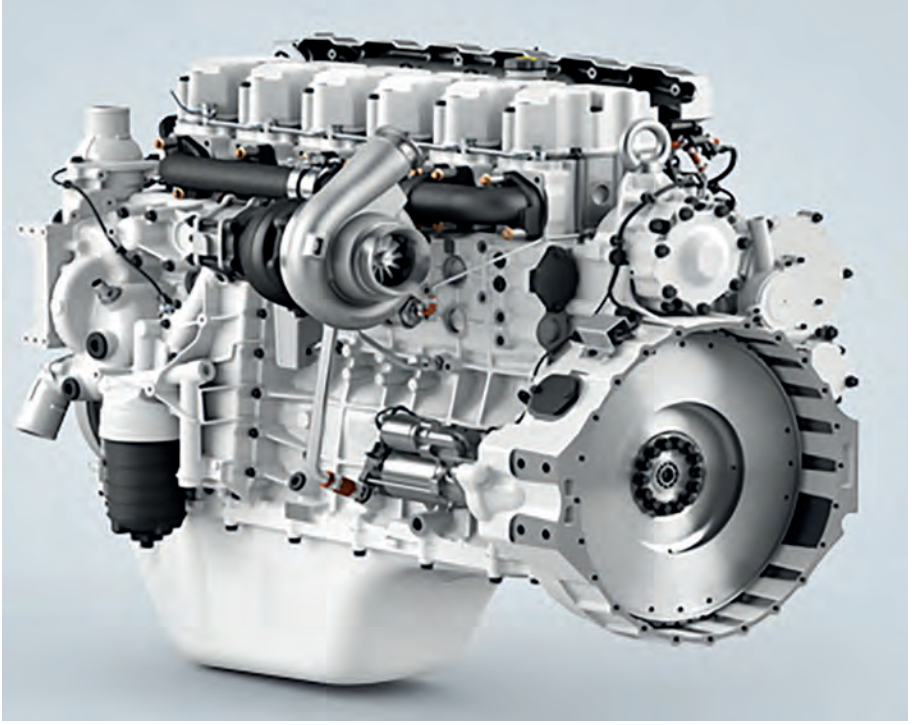
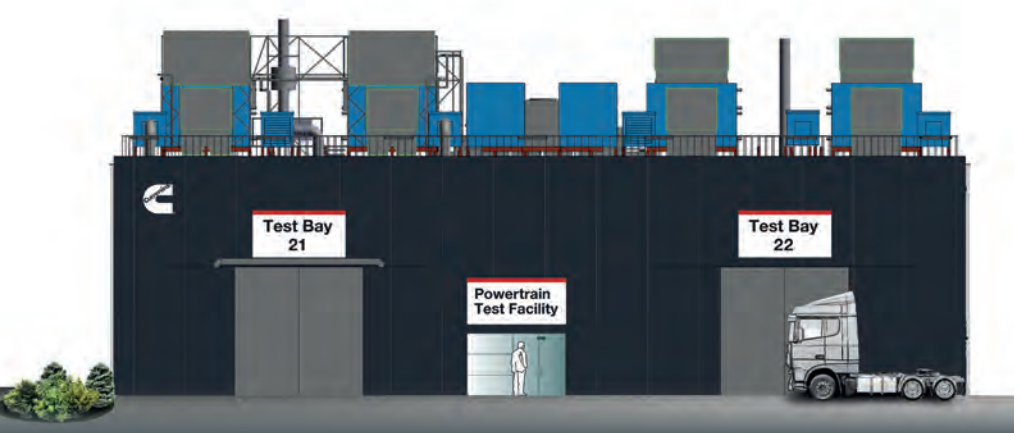


PHOTO: LIEBHERR

Liebherr D966 inline engine is tested with Tula's diesel Dynamic Skip Fire software



Graphic of Cummins's new powertrain facility at Darlington, UK

IMAGE: CUMMINS

CUMMINS INVESTS €17 MILLION IN POWERTRAIN TEST FACILITY

Cummins has announced it will open a new powertrain test facility in Darlington, UK, to help accelerate the move towards cleaner power technologies – with a particular focus on reducing greenhouse gas emissions and improving air quality.

Ground preparation work for the new facility is now underway and is expected to be fully operational by May 2023.

Cummins said that the facility, designed to be fuel-agnostic, will allow them to develop and test a wider range of power technologies. The installation and testing capability will also extend to hydrogen fuel cells and battery-electric powertrains.

The America-based company added that the highly advanced dynamometers will also be able to test chassis-installed powertrains and vehicles – from compact SUVs, heavy trucks over 44 tons or a double-deck bus.

Jonathan Atkinson, executive director of Cummins on-highway business in Europe, said, "We are very excited to announce this significant investment in the new Powertrain Test Facility at Darlington, which will be an important element in Cummins Destination Zero strategy to deliver a broad portfolio of power solutions to meet the world's sustainability challenges.

"The new facility will further enhance the ability of Cummins European Technical Operations to introduce low-to-zero carbon power solutions and meet the forthcoming Euro VII very low emission regulations, likely to take effect around 2025."

"The promising low or zero-carbon solutions such as electric or hydrogen are not yet able to offer the flexibility and cost-effectiveness needed for the tough duty cycles of construction"

STEVE NENDICK, marketing communications director for Cummins Off-Highway

PHOTO: CUMMINS

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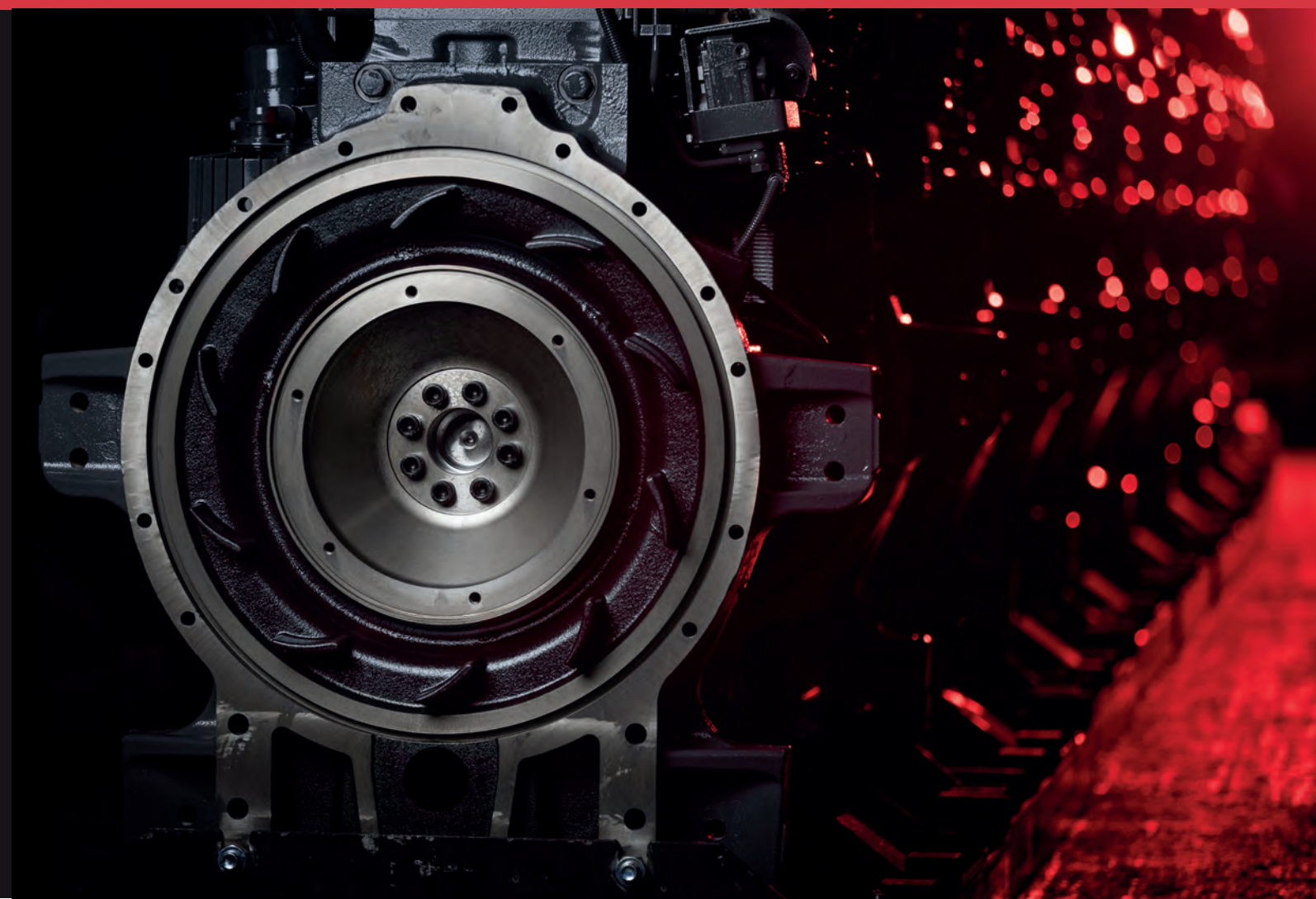

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"Beyond that, JCB's clean diesel technology has helped deliver a 43% reduction in CO_2 emissions from JCB machines by improving fuel efficiency, saving 2.5 billion litres of diesel."

INCREASED EFFICIENCY

Liebherr Machines Bulle SA provided its D966 engine for a study with US-based Tula Technology. It was said, based on simulations, that Tula's diesel Dynamic Skip Fire (dDSF) software allows the reduction of NOX tailpipe emissions by 41% and carbon dioxide (CO_2) by 9.5%.

Ulrich Weiss, managing director for research and development of combustion engines at Liebherr Machines Bulle SA, says, "The reduction of greenhouse gases and nitrogen oxide emissions is the goal that we strive to achieve, while continuously improving our engine's performance."

According to Liebherr, research indicates dDSF can play a pivotal role in addressing zero-emission challenges. The research could be influential on the further development or manufacturing of off-highway equipment.

Hydrogen and electric offerings are becoming readily available among smaller off-highway machines but they're still yet to pack the punch to power larger vessels.

"The promising low or zero-carbon solutions such as electric or hydrogen are not yet able to offer the flexibility and cost-effectiveness needed for the tough duty cycles of construction," says Steve Nendick, marketing communications director for Cummins Off-Highway.

"There are still many tasks within the sector that require the operation of clean diesel power. For example, many large machines such as loaders and excavators operate over long periods of time with intense duty cycles, often in remote locations that don't currently have access to charging infrastructure.

"So, they need to have dependable and robust solutions in place that reduce the potential for downtime. In this way, it's likely that diesel will continue to play a vital role for many years to come."

Cummins says that they continue to push the evolution of diesel technology, with the latest generation Stage V performance series engines exemplifying this. "These engines have high power density across a 55-503 Kw (74-675hp) range, reaching a maximum high peak torque curve of 2,508Nm," adds Nendick.

Cummins latest generation also offers downsizing potential without compromising >

TADANO CRANES TO FEATURE ROLLS-ROYCE MTU ENGINES

German subsidiaries of Tadano, Tadano Faun and Tadano Demag, will be powered by Rolls-Royce mtu engines.

The company says that the move signifies a deepening of the already long-standing cooperation between the two companies.

Most of Tadano's 26 crane models with two to nine axes and payloads from 45 to 700 tons are already powered by the in-line mtu series 1000, 1100, 1300 and 1500 engines.

The delivery power outputs from 129 to 480 kW and compliance with EU Stage III to V emissions standards were qualities that drew Tadano towards the engines. Additionally, the low running costs, high reliability and power-to-weight ratio were desired benefits.

Expanding the partnership will see the sale of around 3000 mtu engines and Daimler transmissions by the end of 2025, says Rolls-Royce.

Jens Ennen, president and CEO of Tadano, said, "This cooperation agreement marks a milestone in the re-orientation of our mobile crane business. We're delighted to have strong, reliable partners like Rolls-Royce and Daimler Truck at our side as we grow. Even in the midst of the pandemic with its supply chain uncertainties, Rolls-Royce has continued to deliver reliable drive solutions of the highest quality."

PHOTO: ROLLS ROYCE

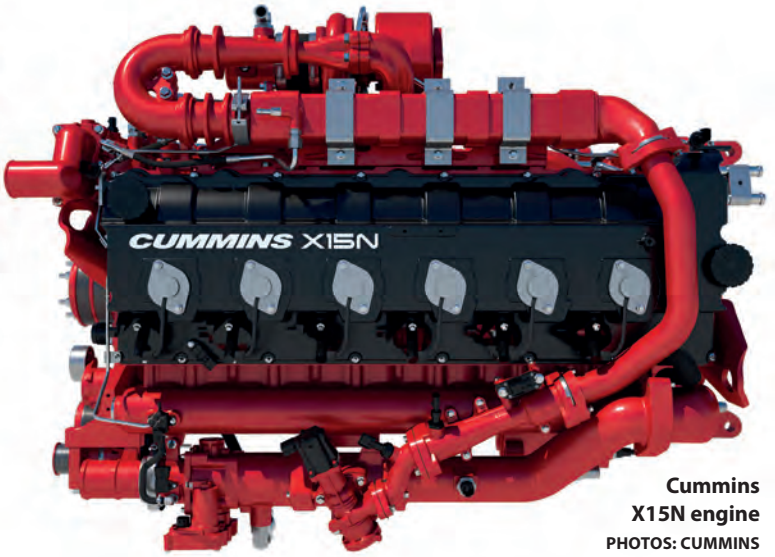
Rolls Royce engines used in Tadano cranes

Deutz TCD engine can now use alternative fuels

PHOTO: DEUTZ

"The reduction of GHGs and nitrogen oxide emissions is the goal"

ULRICH WEISS, MD of combustion engines R&D at Liebherr Machines Bulle



Cummins X15N engine
PHOTOS: CUMMINS

"It's likely that diesel will continue to play a vital role for many years to come."

STEVE NENDICK, marketing communications director for Cummins Off-Highway

the productivity, while enabling reductions in fuel usage, running costs and emissions. Compared to many alternative fuel power solutions, diesel has flexibility across a wide range of machine types and its uses are a real benefit.

Nendick says, "Many applications are likely to transition to alternative power solutions in the future, however the adoption of alternative off-highway power solutions is expected to take some time yet."

FIT FOR ALL FUEL

Renewable fuels and 'clean diesel' are growing in both choice and demand on the market. Germany-based Deutz AG have recognised this and made changes to their engines to enable them to work on more than one fuel source – their entire TCD engine portfolio is now fit for use with paraffinic diesel fuels.

PHOTO: YANMAR

Carlo Giudici, sales and marketing director at Yanmar Europe

Alternative fuels can now be used in EU Stage V emissions standard compliant engines, specifically in the sub-4 litre and above-8 litre range, for biodiesel blends up to B30.

Alternative fuels are known for their reduced carbon footprint and lesser impact on the environment. Combustion engine manufacturers that have adapted their technologies to accommodate carbon-neutral resources demonstrate positive steps for the future of running engines on alternative fuels.

Cummins has already conducted rigorous R&D to develop biodiesel and hydrotreated vegetable oil (HVO) capabilities across its engine range. The company said that this has been done in recognition of market demands to create decarbonised solutions that maintain engine uptime and performance.

FUEL CONSUMPTION IMPROVEMENT

In addition to accommodating the ever-growing fuels on the market, improving fuel efficiency is an evolving characteristic of the diesel engine – less diesel means fewer emissions. Volvo Penta has factored this in when upgrading the D13 genset engine.

D13 500 kVA
PHOTO: VOLVO PENTA

"The addition of the 500 kVA power node to our D13 genset engine is another step in this Volvo Penta journey," says Kristian Vekas, product manager for generator engines at Volvo Penta.

The D13 500 kVA has a fuel-saving of 4-5% when compared with previous models, says Volvo Penta. This is partly due to the quality and viscosity of the lubrication oil, which influences the internal friction in the engine and plays a vital role in fuel consumption.

Also adapting their technologies to keep up with changing demands, Japan-based company Yanmar has upgraded its YDG Series of portable generators – which are now available in the European construction equipment market for the first time.

The Stage V-compliant diesel engines, which incorporate a micro-sized fuel injection system, are said to ensure low fuel consumption. Yanmar's air-cooled L-type engines provide power outputs ranging between 3.3 and 5.8kVA, depending on the specific model.

Carlo Giudici, sales and marketing director at Yanmar Europe, says, "These upgraded and precision engineered models are brand new entrants into the European market and are established yet meticulously advanced generators which meet all global emissions standards and incorporate cutting edge components."

The European market also benefits from shorter lead times, adds Giudici, "As the generators are now made in Italy this also means that the many loyal customers of the YDG Series can look forward to a much shorter ordering process for new units."

Diesel combustion engines using alternate or low-emission fuels will continue to be present in the industry and with diesel still evolving, there is likely to be even lower fuel consumption coupled with greater efficiency. ce

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MANITOU
HANDLING YOUR WORLD

Leila Steed **reports on how the latest equipment and technologies are being put to use on tunnelling projects across Europe**

TUNNELLING INNOVATIONS

There is little need to explain how fundamentally impressive tunnelling projects are. Now, as we move to creating less environmentally impactful structures, the number of projects requiring underground tunnelling looks set to increase, particularly when it comes to infrastructure.

With their construction demanding the highest levels of engineering, architectural design and construction knowledge and skills the sector has to offer, this article will look at the unique machines, new technologies and innovative methods that are driving the sector forward.

TUNNEL FOUNDATION WORKS

Before any underground structure can be built, significant tests and preparation must be carried out to ensure the stability of the ground and any structures or roadways above.

A case in point is that of the new Brescia East-Verona High-Speed/High-Capacity railway line in Northern Italy.

Currently under construction and part of a 165km-long infrastructure project that aims to connect Milan and Verona, the Brescia East-Verona line measures 48km long and crosses two regions and 11 municipalities.

While it will mostly run alongside the A4 motorway, which connects Turin and Trieste via Milan and Venice, it also includes a 7.9km rail tunnel – known as the Lonato Tunnel - that will run under the motorway.

Before a tunnel boring machine (TBM) could be launched to excavate the tunnel, which also runs beneath the industrial area of the city of Lake Garda, significant consolidation works had to be carried out to stabilize the ground and minimize any subsidence caused by the passage of the TBM.

Foundations specialist Trevi was contracted to carry out preparation works for the excavation of the Lonato Tunnel, described as the "most complex and articulated" part of the Brescia East-Verona line.

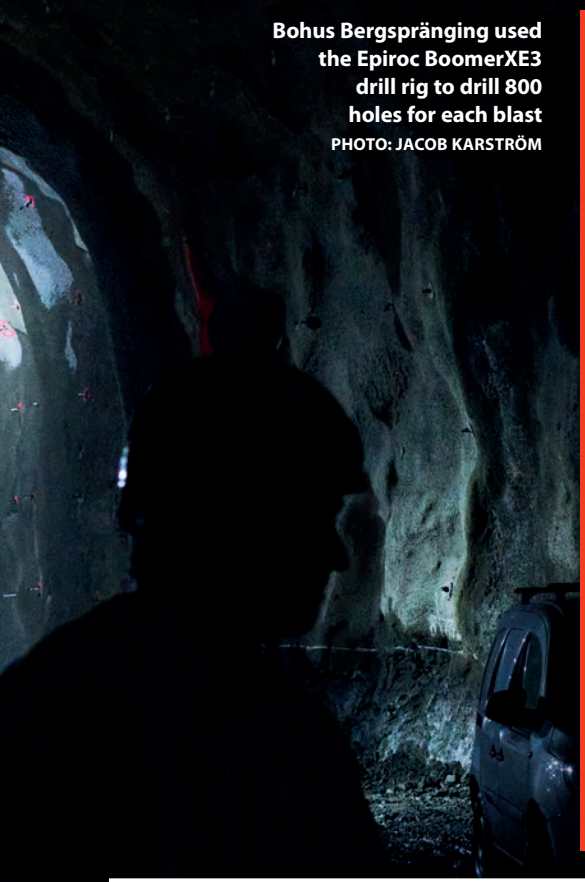
"The purpose of the consolidations is to improve the physical-mechanical characteristics of the soil behind the excavation section - behind the piers and the cap - for a thickness of about 3m," says Trevi.

While initial plans for the Lonato Tunnel specified that the soil consolidation works should be carried out from ground level via three types of drilling – sub-vertical, sub-horizontal with a perpendicular direction and sub-horizontal with a longitudinal direction, "the poor capacity of the soil" and the "complex drilling geometry" led the company to look for a better approach.

"Thanks to the tests carried out in the test field that...we were able to reshape the project mesh and develop more performing mixtures suitable for the soil," says Trevi,

Trevi's tunnelling site adjacent to the A4 motorway in Italy

PHOTO: TREVI



Bohus Bergspränging used the Epiroc BoomerXE3 drill rig to drill 800 holes for each blast
PHOTO: JACOB KARSTRÖM

DRILL RIGS

The latest tunnelling rig from Italian manufacturer Casagrande, the PG 185, is specifically designed for forepoling – the supporting of a weak roof of a tunnel or mine, quickly and economically.

The machine features "a highly maneuverable hydraulic base carrier and a horizontal mast supported by two telescopic columns that enable the angle of inclination to be aligned with that of the tunnel.

The PG 185 has a maximum operating weight of 50 tonnes and is fitted with 186kW diesel engine, and a 132kW electric motor.

Casagrande says, "The PG 185 is suited with the CDR (Casagrande Data Recording) system that helps in monitoring and recording of all jetting parameters for each jet column, like lifting speed of rod, rotation of rod, graph pressure."

"In this way, the operator monitors the progress of the process on the screen and the work parameters are recorded for subsequent analysis or for site reports."

The PG 185 rig model has recently been used on several tunnelling projects in Italy, and to construct a horizontal jet column tunnel for India's new 125km-long railway line from Rishikesh to Karnaprayag, which is being built by state-owned Rail Vikas Nigam Limited (RVNL).

As well as the PG 185, Casagrande also provided a complete technological package for RVNL. This included a horizontal SILO, a high-pressure pump, mixing plant and other instrumentation.

Trevi used mixtures with low cement content to stabilise the soil on the Lonato Tunnel project
PHOTO: TREVI

Based on its field tests, Trevi chose to use a combination of cement and silicate-based chemical mixtures to stabilize the soil, and cement mixtures with low cement content to provide a better balance in the soil.

The foundations specialist also opted to adapt the project mesh by increasing the number of valves per linear meter.

This meant that only sub-vertical drilling from above needed to be carried out and that it could be done "entirely occupying the emergency lane in both directions without interrupting the freeway traffic," says Trevi.

When the works to the Lonato Tunnel are completed around 89,500 linear metres of drilling and grouting will have been carried out, "using about 10 million litres of mixture".

TUNNELLING DRILL RIGS

Just as Trevi's work on the railway project aims to ensure the stability of the A4 motorway, as well as the Lonato Tunnel itself, other European contractors are also seeking to protect above ground structures.

Take Bohus Bergspränging (BB) for example. The blasting specialist recently completed works to a section of Sweden's new West Link railway tunnel in Gothenberg which, while only 60 metres long, lies just 10 metres beneath one of the city's oldest buildings.

Located at 1 Södra Hamngatan in Gothenburg and built in 1648 for Count Lennart Torstensson, the 370-year-old house was bought by the Swedish monarchy in 1657.

Over the years the great house has been expanded and rebuilt, and it is now the official residence for the Governor of Västra Götaland County.

Despite the building's historical importance, BB "didn't hesitate" when it was contracted by AGN Haga AB to create the 60-metre long tunnel section directly beneath the structure.

But as one of the most sensitively-located parts of the new West Link railway line, it took the team almost seven months to complete the task.

The tunnel, which measured 11 metres high and 15 metres wide, was blast excavated using a BoomerXE3 drilling rig manufactured by Epiroc.

Affectionately named 'Madeliene', BB's Epiroc drill is equipped with three drilling arms and a telescopic arm with a service basket for utility applications.

On the technology side of things, it features Epiroc's RCS 5 control system, self-diagnostic capabilities and the BUT 45 boom system.

>

Inge Jan Thorsen CEO of Vassbakk & Stol and Dina Lefdal county director for infrastructure and roads in Vestland county municipality

SKANSKA BUILDS AVALANCHE PROTECTION TUNNEL

Vassbakk & Stol, a subsidiary of Skanska Norway, has begun construction on a landslide protection tunnel project in Norway.

Works on the FV 500 Folgefonn tunnel started after the company signed a NOK 335 million (€34.8 million) contract with Vestland County Council for its construction back in October 2021.

The FV 500 Folgefonn tunnel project, which is located in Årsnes in Kvinnherad Municipality, comprises the widening of a 22km stretch of roadway and the construction of 1400-metre avalanche protection tunnel.

The project, which is due to be completed in February of 2024, is being carried out through what is described as an "interaction contract".

According to Skanska, for over a year prior to the start of works, "the builder and contractor have carried out an interaction phase where the project has been optimized".

Inge Jan Thorsen, CEO of Vasbakk &stol, says, "It has been very instructive to be allowed to participate in the first road project in Western Norway where competitive dialogue and interaction have been used in the procurement phase.

"This is an important project for the local community and we are now looking forward to embarking on the actual work to secure this landslide-prone stretch."

The Epiroc drill is equipped with three drilling arms and a telescopic arm with a service basket for utility application

This enables operators to easily position the drill arms and keeps them steady while carrying out high-impact drilling, increasing productivity.

"There's a lot that's different from a surface rig," says Roger Johansson, founder of Bohus Bergsprängning.

"Obviously, you're drilling straight ahead and not straight down. But it's also powered by electricity, as you can't have diesel exhaust gases down in the tunnel.

"In this project, which is so much about precision and caution, we benefit greatly from the XE3's screens and electronics being so much better than in our old rig. It's even possible to set up automatic drilling if you want," he says.

During its phase of works BB used 'Madeliene' to drill 800 holes measuring 180 centimetres long for each blast.

"Normally, the holes would have been five, six metres long and much fewer, perhaps a hundred," says Johansson.

"Now we need to be careful. We also measure vibrations all the time and adjust the drill plan if there are doubts."

BB completed its section of works in December of 2021, with the West Link project scheduled to be finished in 2026.

TBM Cecilia inside HS2's northbound Chiltern tunnel

PHOTO: HS2 LTD

HIGH-SPEED 2 UPDATE: CHILTERN TUNNEL

While projects like the West Link have required specialist blasting work, work on the UK's High Speed 2 railway project has required the use of multiple, highly engineered TBMs.

Measuring 170 metres in length and weighing 2,000 tonnes each, two of the giant machines recently completed the first stage of a 10-km excavation for HS2's 'twin-bore' Chiltern Tunnel – the project's longest tunnel.

'Florence' and 'Cecilia', which were specifically designed to work with the chalk and flint geology beneath the Chiltern Hills in England, have now reached the site of the Chalfont St Peter ventilation shaft, after being launched separately from the Chiltern

WATER WORKS

Netherlands-based hydrodemolition specialist Hompert-Renes has used hydrodemolition to remove decayed concrete from a railway bridge tunnel in Belgium.

Located in Zemst to the northeast of Brussels, the railway bridge tunnel was becoming unsafe, with parts of its concrete ceiling and walls falling onto the road beneath.

To protect the historic building above, each blast was carried out with extreme precision PHOTOS: JACOB KARSTRÖM

Tunnel's south portal in May and June of 2021, respectively.

The TBMs, which are being operated by main contractor Align – a joint venture formed by Bouygues Travaux Publics, Sir Robert McAlpine, and VolkerFitzpatrick, have been in continuous 24-hour operation since their launch and have now dug through a combined distance of 3.6 miles.

As well as eating through 15 metres of earth a day to create the tunnels, the TBMs have also lined and grouted their respective bores with over 20,000 concrete wall segments – each weighing around 8.5 tonnes - while on the move.

The company, which completed the works last year on behalf of Belgian renovation specialist Renotec, used the Aqua Cutter 710 Evo from Aquajet and a Hammelmann HDP 487 high-pressure pump to remove 42m^3 of concrete - more than 80% of the tunnel walls and ceiling in just two weeks.

According to manufacturer Aquajet, the design of the Aqua Cutter 710 Evo allowed Hompert-Renes' team to reach horizonal, vertical and overhead areas up to 7m high without support.

Align Project Director, Daniel Altier, says, "Florence and Cecilia reaching our first shaft at Chalfont St Peter is a great achievement for not only the tunnelling team but also construction team involved in excavating and preparing the shaft."

The 78 metre deep shaft at Chalfont St Peter is the first of five that will provide ventilation and emergency access to the ten-mile-long twin tunnels.

While there will be a total of ten TBMs on the HS2 project - working to create 64 miles of tunnel between London and the West Midlands, only three machines have been launched for the HS2 project so far. ce

For more information about other tunnelling projects in Europe; visit www.construction-europe.com

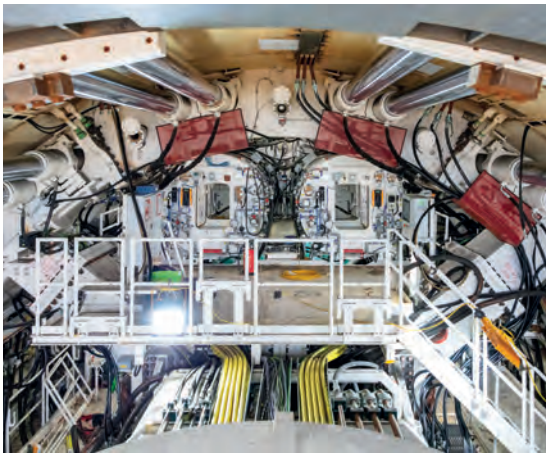


PHOTO: HS2 LTD

Inside HS2's Florence TBM, looking towards the cutter >

Patrick Lane-Nott, **director of engineering at HyperTunnel, tells *CE* how the company's radically different approach to tunnelling - using miniature robots to dig multiple mini tunnels - could one day transform the industry**

IS THIS THE FUTURE OF TUNNELLING?

HyperTunnel is a UK-based tunnelling technology company that is bringing together proven technologies from across multiple industries, with the aim of 3D-printing a tunnel inside the ground.

"Normally you dig a hole and then build the tunnel in the hole, but we're actually building the tunnel and then we'll dig the hole," says Patrick Lane-Nott, Director of Engineering at HyperTunnel.

The new method was created by an engineering team sourced from "innovation-rich sectors such as Formula 1, aerospace, oil and gas, and geoscience".

They focused on a key question to guide them; what do we know from a different application that can solve this problem?

This has resulted in the development of a radically different tunnelling technique.

PHASE 1 – PREPARATION AND SURVEYING

It starts with taking core samples of the ground via test bores. A proprietary 3D ground-penetrating radar (GPR) system is run through the bores and its data, along with seismic, tomographic and thermal imagery, helps create a detailed picture of the geology.

This is developed into a 3D, digital twin of the tunnel and the geology immediately surrounding it, which is supported by BIM, virtual reality (VR) and augmented reality (AR) technology.

Lane-Nott says, "What we're putting together is a flexible solution that will allow tunnellers of the future to customise their tunnel according to the geology.

"So you could have different thicknesses of tunnel lining for example, you could have different materials, all depending on what's going on in the geology and what the use of the tunnel is."

A series of bores are drilled around the tunnel periphery and used as a skeleton or scaffold during the construction phase, into which multiple semi-autonomous robots, called hyperBots, are deployed.

PHASE 2 – TUNNEL CONSTRUCTION

The reusable hyperBots deploy an additive manufacturing process into the ground using the same principle as 3D printing, to create tunnel's shell.

Managed by swarm technology, they operate simultaneously at different locations within the tunnel's scaffolding to form a shell structure, according to a construction plan which provides key construction data, such as material strength, chemical volume, and location.

"Because we can work down the whole length of the tunnel, we can then just put more bots in the system to be able to do the construction," says Lane-Nott.

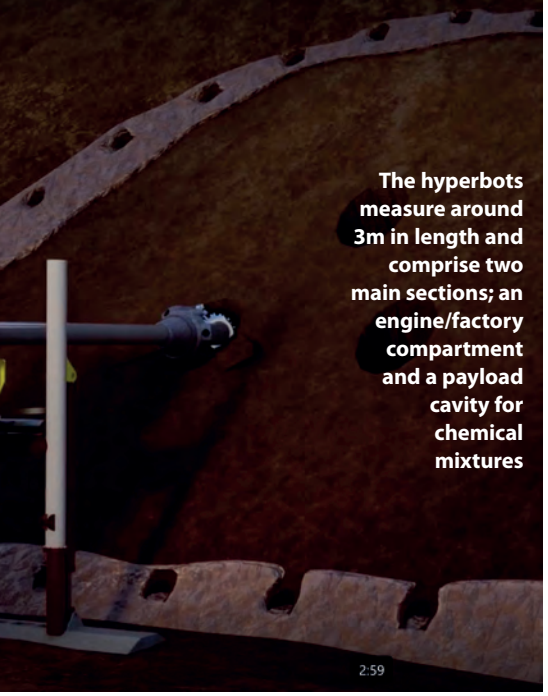
"It actually would take no longer to build a 1km tunnel than it would to build a 5km tunnel, because you just put more bots in and they operate in parallel."

When the tunnel's structural shell is complete, the untreated geology within it is disrupted to make excavation of the spoil easier.

PHASE 3 – EXCAVATION

For excavation, HyperTunnel has taken

> "It would take no longer to build a 1km tunnel than a 5km tunnel... you just put more bots in and they operate in parallel"
>
> **Patrick Lane-Nott, Director of Engineering at HyperTunnel**



The hyperbots measure around 3m in length and comprise two main sections; an engine/factory compartment and a payload cavity for chemical mixtures

IMAGES: HYPERTUNNEL

inspiration from open-cast mining and is developing its own 'dragline shield' technology for large tunnels.

Known as the hyperShield, the machine gets pulled through the geology and its leading edge cuts the interior shape of the tunnel, explains Lane-Nott.

"It's remote controlled – or semi autonomous, there's no one that needs to be onboard, and because of the disruption we've done already within the ground, it scoops up and pushes it [the spoil] out the back either onto conveyors or a convoy of autonomous trucks".

Of course, the standout advantage of the method is to do with site worker safety.

"The one thing we can say with absolute certainty is that safety is significantly better because we don't have to put anyone in harm's way until you've got a competent structure," says Lane-Nott.

The hyperShield design is based on dragline technology used in open-cast mining

PHASE 4 – TUNNEL LINING AND ASSET HANDOVER

The tunnel is then lined and the digital twin and all the data gathered throughout the planning and construction stages can then be used for assurance.

In addition, with the scaffolding and sensors remaining in place after construction, these can then be used for future maintenance and management of the tunnel, which effectively turns it into a 'smart asset'.

The new tunnelling method will Initially lend itself to repairs and general inspection repairs of underground or buried structures.

"We can see that happening relatively quickly, and I think that will be the first commercial work we do, in and around that, and that may even be around relatively simple structures – there's a lot of opportunities," says Lane-Nott.

The possibilities offered by the method have already been recognized by UK transport authority National Rail, which last year awarded the company with a research and development contract.

This will be completed within the next six weeks and while the HyperTunnel method is not due to be trialled on a larger scale for another year, its potential and current level of development has left many wondering; could this be the future of tunnelling? ce

WHAT THE GREEN DEAL MEANS FOR CONSTRUCTION

The European Commission's plans to make Europe climate neutral by 2050 cannot hope to succeed without support from and huge changes in all segments of the construction industry, as Mike Hayes **reports**

In July 2019, Ursula von der Leyen became President of the European Commission (EC).

She may have thought twice about taking the job had she foreseen the challenges awaiting her, including a worldwide pandemic and the shocking invasion of Ukraine by Russia.

She already knew of one great challenge, however, which she was determined to tackle as President; that of climate change.

With global construction set to grow by over 40% by 2030, the potential for increased pollution and waste is clear, especially given that, on a global scale, the built environment is responsible for 40% of all greenhouse gas emissions, with concrete alone responsible for 8%.

It is now imperative that the Green Deal campaign that saw von der Leyen into office shapes a new, cleaner, greener, more circular and sustainable Europe.

The overarching aim is for Europe to be carbon neutral by 2050 – vital if the climate change effects of global warming are to be limited.

Since the Green Deal was first announced, a number of offshoot initiatives have been launched and many of them affect the construction industry, including the *Renovation Wave* and *Fit for 55*.

The aims of the *Renovation Wave* include at least doubling the rate at which existing buildings are renovated, which could see the energy performance of

When Vinci acquired the energy business of ACS, it also acquired its ongoing renewable energy projects
PHOTO: ADOBE IMAGES

some 35 million buildings significantly improved by 2030.

The *Fit for 55* package aims to reduce the EU's carbon emissions by 55% by 2030. This is leading to numerous legislative changes that could impact construction, including a revision of both the Renewable Energy and Alternative Fuels directives.

CONTROVERSIAL LEGISLATION

Fit for 55 also includes a contentious proposal for a Carbon Border Adjustment Mechanism, or CBAM, through which EU importers would have to pay a 'carbon tax' on entry.

Riccardo Viaggi, secretary general of CECE, the Committee for European Construction Equipment has concerns about this controversial piece of legislation.

He says, "This is a way to stop carbon leakage – a way to stop offsetting carbon by importing carbon-intensive components or raw materials.

"The idea is that you put a levy on steel, on cement, etc, if it comes from a third country where there are no carbon emission mechanisms.

"That, of course, is going to make these imports more expensive and that, we believe could make some manufacturing at European level less competitive.

"This is where we get to the detailed discussions of certain policies. For example, we know that Russia and Ukraine provide almost a quarter of the steel that is used in Europe, so right now there is virtually no Russian steel. If, on top of that, we start putting levies on steel that we import from outside of Europe, we really are shooting ourselves in the foot."

European Commission President Ursula von der Leyen introduced the European Green Deal PHOTO: REUTERS

Viaggi insists that his organisation has embraced the green transition and says member companies are on their own trajectory to meeting environmental goals, to innovate, invent and change the way they make machines and deliver machines.

He says, "Regulation has a part to play in changing industries, but it's only one of the factors.

"For us, efficiency improvements are a no-brainer. We know that there is a direct relationship between fuel efficiency and emissions.

"As long as economic, social and environmental sustainability come together, it's a win win win. It really is positive for everybody.

"When it comes to the different legislation that the EU is putting on the table, in order to make the Green Deal a legislative reality – and not only a political declaration – this of course is where we get the proverbial 'devil in the detail'.

Viaggi says the EU generally states that the pandemic shouldn't change anything, in terms of the pace of Europe's path to decarbonisation. In fact, he believes recent events, including the Russian invasion of Ukraine are likely to, if anything, accelerate the move to sustainable energy, with EU member states keen to develop energy security, primarily through the rapid upscaling of renewables projects.

"I know that the European Commission is staying the course, and I know that our industry is staying the course as well," he says.

INDUSTRY MOVERS

As we look around at some of the biggest construction businesses in Europe, the direction is clear; it's transitioning to 'green'. One might say, yes, but how long will the transition take? If it's anything like the so-called digital transformation, it will not happen overnight.

Riccardo Viaggi, secretary general of CECE PHOTO: CECE

At the same time, we see companies like Vinci, the giant of European construction, prepared to spend €4.9 billion to take over the energy business of Spain's ACS.

Within the acquisition – along with ACS' ongoing renewables projects – Vinci will take over Cobra IS, ACS' renewable energy division. Vinci's chairman and CEO Xavier Huillard said this element of the deal would "accelerate our development in renewable energies, which will help us make a greater contribution to the environmental transition."

Also looking to the future, Swedish construction giant Skanska has pushed ahead of even the EU's ambitious targets with its own goal of being carbon neutral across its entire value chain by 2045.

The company says it has already reduced carbon emissions from its own operations by 40% and has set a goal of 70% reduction by 2030.

Anders Danielsson, Skanska Group's president and CEO, says the company "has a strong will to raise our ambitions and that includes working towards a more sustainable transition for the entire industry."

THE CASE FOR 'GOING GREEN'

On 8 March, the European Construction Industry Federation (FIEC) organised its second in its webinar series entitled *Making the business case for green construction*.

>

Dealing with the greening of public works, the webinar brought together legislators, public buyers and construction companies to exchange ideas about how public infrastructure and buildings can make the green transition.

Following the presentations of public buyers, FIEC said it appeared likely that the contract award criteria for projects will increasingly include scrutiny of the environmental and CO_2 performance of companies.

Such approaches have been welcomed by company representatives arguing that investments in green construction techniques must be a business case and be rewarded accordingly in public tenders.

Operators working at Oslo's first zero emissions construction site

BIG BUYERS POWERING CHANGE

Big Buyers for Climate and Environment is an initiative established by the EC, which promotes collaboration between large public buyers in terms of implementing public procurement in a way that can achieve sustainable goals.

These buyer groups regularly meet with public entities to discuss specific procurement needs intended to help drive sustainability in the market.

In return, the buyers exchange ideas on best practices with peers from across the European Union and share market intelligence about, for example, the latest technological developments.

The EC says the Big Buyers for Climate and Environment group has already helped push the market position in key areas, with working groups established to look at circular construction materials, zero-emission construction sites and heavy-duty electric vehicles.

The Big Buyers initiative was actually established by the EC in 2018, but has moved into a new phase of activity, within the structure of the Green Deal.

The initiative is managed by the NGO ICLEI and Eurocities, a network of more than 200 European cities.

Simon Clement of ICLEI says, "Hopefully, there will be a big advantage in carrying out joint market engagement and sharing market intelligence. Markets listen more when there's more demand behind it – so when there's collaboration between different purchasing entities, that makes the market listen to us more."

PHOTO: VOLVO CE

The Skanska/Volvo 'electric site' project reduced emissions, energy use and the need for workers on site

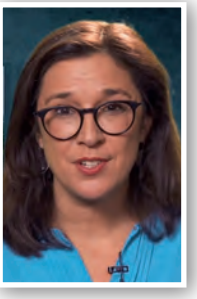
Describing the current situation in Europe, ICLEI's Kaitlyn Dietz, says, "Thanks to energy efficiency gains, operational carbon continues to sink; this puts the focus more and more on the embodied carbon of our built environment.

"Emissions from material extraction and manufacturing, as well as construction works themselves, are increasingly in focus.

Dietz headed up one of the recent Big Buyers working groups where she says the group found "an unfortunate lack of availability, especially of large [greater than 2.5 tonnes] emission-free construction machinery or NRMM [non-road mobile machinery]."

Dietz says, "Whichever machine manufacturer rises to this occasion to fulfil the unmet need, stands to benefit from public contracts requiring fossil-free or emission-free works.

Rather than being a utopian vision, Dietz believes this will be the minimum requirement to do business going forward and cites the example of Oslo's public work sites, where it already is.



Lena Hök, VP of sustainability at Skanska IMAGE: SKANSKA

THE PROBLEM AND THE SOLUTION

Skanska appears to have grasped the business case for the green transformation and has a strong advocate in its VP for sustainability, Lena Hök. She says, "What we can do to be part of the transformation is really important. We need to drive innovation and find new solutions."

Hök describes some of the work Skanska is doing to reduce emissions. She says, "On concrete, we have developed a greener concrete that is actually reducing the carbon footprint by 50%."

Hök also highlights Skanska's recent collaboration with Volvo, launching the world's first electric site.

"We managed to automate and electrify a quarry, with heavy machinery run by green energy and also being run remotely," she says.

"What we achieved in that project was to decrease carbon emissions by 98%, as well as decreasing the cost for energy by 70%.

"These kinds of green business cases need to be scaled up and need to become part of common business going forward." ce

PHOTO: VOLVO CE

An autonomous electric dumper, brought onto the 'electric site' project by Volvo CE

THE VOLVO LX03 IS STILL A PROTOTYPE BUT HAS ELEMENTS THAT WILL COME TO FRUITION IN THE AUTONOMOUS FUTURE – NO CAB, ELECTRIC DRIVE, EMISSIONS-FREE AND OPERATOR PROGRAMMABLE
PHOTO: VOLVO CE

Robotics and autonomy are changing the face of construction, as TOM JACKSON **reports**

THE NEW REVOLUTION

In today's construction industry robotics and autonomous technology are emerging in everything from portable power tools to giant mining trucks.

While remote control is an established technology, the addition of artificial intelligence (AI), Lidar (light detection and radar), new software and massive increases in computing power promise big changes – as big, if not bigger, than the introduction of GPS machine control 20 years or so ago.

From what the equipment OEMs say, autonomous and semi-autonomous construction machines are going to radically change the industry by creating new levels of productivity, quality, and safety – and usher in a new, digitally savvy generation of construction workers.

As with GPS machine control, what's driving this revolution is economics. "You dig more, spend less," says Erol Ahmed, director of communications for Built Robotics, which makes aftermarket robotic upgrades for excavators. Add in the safety benefits, the ability for one worker to do more high value work and operation in hazardous environments and you've got a winning combination, he says.

FROM MACHINE CONTROL TO AUTONOMY

Autonomy evolved from the technology developed for GPS machine control two decades ago, but it's taking things further. With machine control, the operator still makes dozens of decisions every day. Autonomy is evolving to enable the machine to make more of these decisions.

"The next step is to develop advanced software with higher levels of perception and intelligence integrated into the product," says Scott Crozier, general manager at Trimble. "The way we get there is by continually advancing the levels of assistance."

What's required for 'assistance' depends on the machine and the job. A compactor performs a relatively simple operation, and a mining truck can follow a pre-programmed path from the loading area to the dump site easily. "But more complex machines and tasks will require significant levels of software to deliver the intelligence and the perception systems that make these useful," Crozier says.

Finlay Wood, business area director for autonomous solutions at Trimble, adds that, "We're taking on more of the things that operators have to think about and automating

> OUR GOAL IS TO MAKE AN INEXPERIENCED OPERATOR PERFORM LIKE A GOOD OPERATOR

HILTI'S JAIBOT TAKES ON SOME OF CONSTRUCTION'S MOST TEDIOUS TASKS AND CAN COMPILE AS-BUILT DATA WHILE IT WORKS
PHOTO: HILTI

those, all the things that take an experienced operator years to get good at."

"Our goal is to make an inexperienced operator perform like a good operator by helping them make those decisions – on the machine but also at the site level."

REPETITIVE PERFECTION

With machine control, you dig precisely to grade. With autonomous or semi-autonomous operation, you'll not only dig to the grade detailed on the digital site plan, but dig with perfect efficiency – every bucketful, every time, every day; without fail, fatigue, interruptions, or flagging attention.

"A talented operator might be fast for a few hours," says Crozier. "But if you're doing it over the course of a longer period of time, you're going to find the automated process will likely perform better."

In construction, cycle times impact everything from productivity to fuel consumption and machine depreciation. An optimised, autonomous, or semi-autonomous digging cycle will outperform manual control by instantly analysing and then optimising every variable from the geometry of the bucket penetrating the ground to the capacity of your hydraulic pump to where your engine is in the torque band.

With position sensors surrounding the machine with a digital safety grid, it can dig and dump at top speed 24/7 without any concern about accidently hitting the truck or structures close by.

Many operational challenges faced on construction sites today can be solved without complex and costly AI-based solutions. "Instead, our focus is placed on building products that solve real word problems in the simplest way practicable – whether that is by creating workflows enabled by cloud technologies or using LIDAR point clouds and digital cameras to differentiate between a building and a stockpile," says Trimble's Wood.

Crozier adds that optimised performance will become even more important as more battery powered machines come into play as the industry looks to lower its emissions and increase sustainability. "You want to be as efficient as

AUTONOMY EVOLVED OUT OF THE TECHNOLOGY THAT ESTABLISHED GPS MACHINE CONTROL AND IS OFFERING EXPONENTIALLY LARGER BENEFITS WITH THE ADDITION OF NEW SOFTWARE AND PROCESSING POWER TO ASSIST OPERATORS IN DECISION MAKING
PHOTO: TRIMBLE

BUILT ROBOTICS MAKES AFTERMARKET ROBOTIC UPGRADES
PHOTO: BUILT ROBOTICS

you can be with the use of that power," he says. "We're going to see intelligent automation come into play that enables maximum work output from a battery charge."

The ideal with robotics is to take a task that's tedious, repetitive, or has high health and safety risks and add a level of automation that lets the robot take over the arduous and repetitive tasks, says Aidan Maguire, business unit manager for measuring and robotics at Hilti.

Overhead drilling in concrete is one such task, but any task that puts the worker in an awkward position ergonomically or in a hard-to-reach area has the potential to be automated. Hilti's semi-autonomous Jaibot is designed to do that and can be programmed to follow a digital plan detailing where the drilling or work needs to be done. "We have automated the steps in the application where we can achieve the greatest productivity gains, such as location drilling and marking the anchor point," says Maguire. "We're also learning how to make construction projects more robot friendly."

Hilti is continuing to add more field intelligence to the Jaibot, enabling it to analyse situations and determine when a drilling point may run into interference or where drilling many not be possible such as the angled section of a metal deck or in the case of rebar hits. "At that point the operator can use their construction knowledge to say, 'Yes, I'm happy with all these moves, go ahead and drill,'" says Maguire.

Mining is an early adopter of this technology. "The mining industry has used autonomous technology for more than twenty years, but we've gone as far as we can go with the first iteration of this technology," confirms Bibhrajit Halder, founder and CEO of SafeAI.

He adds that this second generation is AI-powered, versatile, and scalable, and will bring meaningful, widespread change to the mining industry.

In March this year, SafeAI announced that is working with Australian company Position Partners to retrofit a mixed fleet of 100 vehicles for MACA, a diversified mining and contracting group, to create one of the largest autonomous heavy equipment fleets in Australia. SafeAI has created a machine-agnostic package that can be added to any machine, from a skid steer to a mining truck.

"This technology is a game changer for our business, our customers and our industry," says Shane Clark, MACA's general manager of estimating and technical Services. "SafeAI's solution has profound implications for site safety, efficiency and cost-effectiveness."

THE NEW INDUSTRIAL REVOLUTION

"The first Industrial Revolution was more than 100 years ago, and we are absolutely in the beginning of a new industrial revolution centred around robotics and artificial intelligence," says Jeremy Searock, who co-founded Advanced Construction Robotics with Stephen Muck five years ago.

Their company's first creation was TyBot, an automated rebar tying machine for large horizontal applications such as bridge decks and concrete flatwork. In the development is another robot that will be able to tie rebar in horizontal applications and the IronBot that will pick up long lengths of rebar and space them out on a grid.

> THE FIRST INDUSTRIAL REVOLUTION WAS MORE THAN 100 YEARS AGO, AND WE ARE ABSOLUTELY IN THE BEGINNING OF A NEW INDUSTRIAL REVOLUTION CENTRED AROUND ROBOTICS AND ARTIFICIAL INTELLIGENCE

"With labour in short supply, the only option is to make a single person more productive, and that's what robots do," says Searock. "By working with a robot, one person can do the work of an entire crew. The goal is not to reduce headcount, but to give each person on the job the opportunity to perform higher value tasks," he says.

Automation is going to change the construction world to be more closely aligned with the skill sets that young people have today, says Wood. "Your experienced operators are never going to go away. But robotics and autonomy are going to make the jobs more accessible to young people."

There's going to be a transition, says Crozier, but not fewer people. Instead of machine operators there might be grid operators managing multiple machines. Cybersecurity skills will become more important as will the ability to diagnose and work through digital issues. These workers will likely be paid more and highly

AFTER A SUCCESSFUL PROOF OF CONCEPT AT THE KARLAWINDA GOLD MINE, SAFEAI AND POSITION PARTNERS IS NOW OUTFITTING A FLEET OF 100 VEHICLES WITH AUTONOMOUS, SELF-DRIVING TECHNOLOGY FOR AUSTRALIAN MINING COMPANY MACA
PHOTO: SAFE AI

recruited because they're delivering more value than a single operator working with just one machine.

"Digital literacy has to come up," says Hilti's Maguire. "We'll see it naturally with this new generation. But the new generation can't throw away the knowledge and best practices of the past because those core skills are required to use any technology effectively. So, we have to figure out the best way for contractors to marry those two worlds together."

There is no doubt that robotic equipment operators are one of the jobs of the future for construction and that – even if it takes longer than initially thought – the influence of robotics and automation on construction will only continue to grow. CT

INDUSTRY ROUNDUP

OUR PICK OF THE LATEST ROBOTIC AND AUTOMATED EQUIPMENT

VOLVO
WHEELED LOADER OF THE FUTURE?

Volvo CE's prototype LX03 is a five-ton machine that was built by engineers, programmers and technicians from Volvo CE sites in Sweden and Germany. The LX03 incorporates the company's L25 Electric driveline, making it a zero-emissions loader with a runtime of up to eight hours. It has no cab and no operator and gets its daily marching orders from a programme. The LX03's brain has the capacity to adapt to different scenarios, make decisions in real-time and collaborate with humans.

HUSQVARNA
NEW DEMOLITION ROBOTS OFFER RANGE OF ABILITIES

Husqvarna has four new remote-control demolition DXR robots that are electrically powered with shore power connections and lithium-ion batteries. The DRX 275 offers light weight and low ground pressure for operation on floors with limited load bearing capacity. The DRX 315 has a telescopic arm that reaches up 216 inches and forward 204.72 inches. At 4,303 pounds, the DRX 305 optimizes its power to weight ratio and the compact DXR 145 offers a 360-degree rotating arm.

CATERPILLAR
ADVANCED REMOTE CONTROL FOR COMPACT EQUIPMENT

In January Caterpillar announced the expansion of Cat Command for Loading to its D3-series skid steer and compact track loader line. This technology provides joystick-controlled remote operation of the machines in two configurations: line-of-sight with a shoulder-carried console and non-line-of-sight via a remote Command station. Retrofits are available for any Cat D3 skid steer or compact track loader.

BROKK
NEW WAYS TO DEMO AT A DISTANCE

Swedish manufacturer Brokk has been building remote control demolition robots for decades now and recently expanded its line-up with two new products. The Brokk 900 is the company's newest and biggest model suitable for heavy duty tunnelling and demolition applications. The Brokk Pedestal Boom, unlike the undercarriage driven models, is a compact, stationary breaker boom system. It pairs Brokk's three-part arm system with 360-degree slewing.

TYBOT
AUTOMATING DIFFICULT TASKS

The TyBot robotic rebar tying system from Advanced Construction Robotics can tie together up to 1,100 rebar intersections an hour, increasing the productivity of installations by as much as 400%. It is used in highway and bridge installations, light rail infrastructure, and any large concrete slab installation such as warehouses and data centres. TyBot uses cameras and sensors that run on a rail across the rebar grid to identify the intersections using AI and automatically twist each crossing point together with a length of wire.

HONDA
BIG PAYLOAD, NO DRIVER

Honda has been testing an off-road construction 'mule' that uses a GPS guided, battery powered all-terrain vehicle to haul construction materials over large jobsites. In a month-long field test the second-generation prototype of the Honda AWV performed towing activities and transportation of construction materials, water, and other supplies to pre-selected points on the jobsite. The vehicle can carry payloads of nearly 900 pounds and tow a trailer hauling more than 1,600 pounds.

Zero carbon steel may not be commercially available yet – but that hasn't stopped some of the world's biggest construction companies from demanding it. Lucy Barnard **finds out more**

THE QUEST FOR NET ZERO STEEL

PHOTO: ADOBE STOCK

Workers in protective clothing tend to the furnace at a steel mill

PHOTO: ADOBE STOCK

PHOTO: STEELZERO

Mike Peirce, director of corporate partnerships at The Climate Group, leads SteelZero

Mike Peirce, the head of SteelZero, the group campaigning for zero-carbon steel, runs down a list of construction and property big hitters among his membership; Eiffage, LandSec, Mace, Multiplex, WSP…

"We've brought these companies together because construction and property really matter for steel procurement," he says, still running his pencil down the list.

Accounting for about 7% of global emissions, the steel industry is one of the world's biggest emitters of carbon dioxide and is already under intense pressure to reduce carbon emissions. And the construction sector is one of the largest users of steel.

"If you're looking for one of the biggest producers of carbon dioxide in the world, it's the steel industry," says Peirce, who is corporate partnership director UK-based non-government organisation, The Climate Group. "And then you say ok, let's look at the biggest sector producing demand for that, it's building and construction. 51% of steel used globally is used for construction and infrastructure. That is why we've got to get movement on this."

Together Peirce estimates that SteelZero's 18 members procure and specify a total of almost 2 mega tonnes of crude steel annually – roughly the same as the entire annual output of an industrial sized steel mill.

Although most of the members comprise of contractors, property developers and engineers, the group also includes steel suppliers, renewable energy companies and architects.

The thing they all have in common is that each and every one of them has made a public commitment to buy, specify or stock only zero-carbon steel from the year 2050 and, in the meantime to purchase, specify or stock "lower carbon" steel to make up half of the steel they use by 2030.

PUBLIC COMMITMENTS

"This is a group of companies who have already looked at operations emissions and renewables. They have got advanced sustainability commitments and are therefore looking for the next big issue to tackle. And we know this is also where the steel production is moving," he says.

"It's a very simple point – here we are. We would like to buy this. We're showing forward >

Grosvenor is looking to find ways to procure low carbon steel at its South Molton Triangle project in London's Mayfair

PHOTO: GROSVENOR

PHOTO: SSAB

Swedish steelmaker SSAB has produced fossil-free steel for the Volvo Group

commitment of demand so that suppliers can say ok, this is another bit of evidence to inform their investment decision making."

The only problem is that, as Peirce readily admits, at the moment, it is impossible for firms to get hold of zero-carbon steel at any meaningful scale because of the long investment cycles in the steel industry. And that, in short is the point of the group.

"Currently there is no net-zero steel available to buy, certainly not on the scale needed by any of the large construction companies which make up a large part of the group's membership," Peirce says.

"A lot of significant investment is needed to be able to decarbonise the steel making process before any of the companies that have joined us are able to buy net zero steel at a competitive price. What we've done is to create that forward signal to the suppliers to say, this is what people want. How can you move forward on some of the big investment cycles that you need to, to be able to supply that?"

Last year Swedish steelmaker SSAB announced it had produced fossil-free steel for Volvo Group as part of a pilot project set up through its Hydrogen Breakthrough Ironmaking Technology (HYBRIT) partnership with state iron-ore producer LKAB and state power company Vattenfall.

Instead of using a blast furnace to add carbon to iron ore in the first part of the steelmaking process, SSAB's HYBRIT technique entails using green hydrogen to produce sponge iron, before converting it to steel using an electric arc furnace (see box). SSAB said it plans to scale up its operations to produce 1.35 million tonnes of sponge iron a year by 2026.

And SSAB is not alone. Most of the major steel producers in the Western world have announced plans to cut carbon emissions.

In July 2021, steel manufacturer ArcelorMittal announced that it had signed an agreement with the Spanish government to turn its plant in Sestao, Spain into the world's first full scale zero-emissions plant. BlueScope, Tata Steel, Midrex and US Steel have also announced plans to cut carbon from their steel making processes.

Whatever way it is made, it seems pretty clear that initially low-carbon steel will be more expensive than its alternative. SSAB has said that its fossil fuel-free steel would be 20-30% more expensive to manufacture. ArcelorMittal estimates that using hydrogen at a plant in Germany would raise production costs by 60%.

Yet Peirce points out that companies must start buying the stuff in bulk for steel companies to ramp up production and for prices to then come down. He compares the group to another of The Climate Group's campaign groups, RE100, which was set up in 2014 focusing on the demand for 100% renewable power among corporate customers and now includes more than 300 members.

DEMAND DRIVES PRICES DOWN

"We started RE100 nearly a decade ago now and during that time, the prices of renewables have come down 90-95%. We had companies joining the group earlier on who were making a very significant commitment. But that price has moved and the companies have been able to move faster towards their commitment," he says.

Peirce believes that 'low embodied carbon' steel should be readily available on the market at a "competitive price" by 2030, halving the carbon emissions associated with the steel production process.

"There is no legal or contractual standing that says our members must buy steel from any individual company. Those sorts of campaigns work by being able to use the voice of corporate buyers to solve the problem as its emerging. With RE100, we didn't say you should be thinking about wind or solar. That's your business as a supplier to be able to work out how that happens."

Instead, SteelZero has set out three broad ways in which its members can reach their interim targets. The first of these is to buy some of their requirement from mills certified by steel industry organisation Responsible Steel which audits mills according to a wide variety of strict environmental and employment standards. A second route is by acquiring steel from steel mills where the owner regularly publishes emissions data and has published a science-based target for reducing emissions. And a third route includes measuring the greenhouse gas intensity of the steel produced.

"In terms of delivery, it's very early on," says Peirce. "The first Responsible Steel sites are just coming on board now. The important thing is the framing of the commitment because it helps steel companies to think about how to implement these plans and what that would mean for their cycle investment."

Ultimately, the group says it wants to get to a position where the steel its members are buying produces as close as possible to zero greenhouse gas emissions and any remaining emissions have been offset.

And, over the next two years, alongside technical partners, it plans to start tracking and reporting how much of each type of steel each company has bought as a proportion of its total procurement.

TRACKING AND REPORTING

"I think there is more complexity to come over how that is analysed so that we can do that in a way that isn't burdensome, but at the simplest level it will be stating progress towards those 2030 and 2050 goals," says Peirce. "We need to be able to track what they are buying because I think that will build confidence over exactly where the steel has >

PHOTO: SSAB

SSAB's HYBRIT project's first steel deliveries are a major step on the road to a completely fossil-free value chain for iron and steel production

come from and the nature of the net-zero-ness of it."

The group is also attempting to work alongside the Clean Energy ministerial Industrial Deep Carbonisation Initiative (IDDI), an affiliation of public sector procurement bodies which have formed their own separate initiative to stimulate demand for low carbon industrial materials.

Peirce agrees that the group has a long way to go before it can even begin to make a difference. SteelZero's current membership is heavily biased in favour of the UK and Europe, while the lion's share of steel manufacture takes place elsewhere in China, the USA, India and South Korea. The group has recently been given funding to support an Indian chapter and is keen to start to expand further.

"The bigger next step is to say how do we involve the US and in China? We know that's going to be an evolution. We'll know this has succeeded…when we have brought on a much more internationally diverse membership to SteelZero."

However, the point of the group is not necessarily to be representative of all steelmakers around the world – at least not yet – but to provide an example.

"As a model of change, we know it is important is to be able to get a first group that is willing to be vocal and take a leadership position. Then it becomes much more possible to engage in other markets," says Peirce. "I don't want to make it sound as though we will only have achieved success when every single company has joined the initiative because this sort of initiative aims to shift wider behaviour. If more people start doing it who are not members of SteelZero and more steel companies start changing faster than would have happened otherwise then we will still have been successful."

A MODEL OF CHANGE

In October, British Steel specifically mentioned SteelZero's influence when it announced that it would be adopting science-based targets to reduce its direct emissions by 89%, reduce emissions from its purchased electricity by 3% and all other indirect emissions by 8%.

"Many of our customers require us to have climate change targets and be working to reduce our CO_2 intensity," said British Steel Chairman Huiming Li in a press release. "Internal analysis shows that the best path for British Steel to meet one of these [SteelZero] requirements is by adopting a science-based target."

In fact, SteelZero members are already looking at ways of sourcing and incorporating low carbon steel into projects.

Property developer Grosvenor has been working with engineering firms Bourne Group and steel fabrication company William Hare as well as steel maker ArcelorMittal to work out ways in which it can source low embodied carbon steel to use in its South Moulton Triangle project in Mayfair, London which is due to start construction later this year.

"While there is a waiting time for net zero steel to become available, our members are not just pledging to cut carbon emissions in future, they are already engaging very actively in how they can bring in lower carbon steel to their projects, "says Peirce. "For Grosvenor, early engagement with suppliers allows them to manage risk and opportunity, as incorporating change at the construction stage would prove costly and cause disruption. With our guidance, they're working across the supply chain to address barriers to using net zero and low carbon steel."

Moreover, by bringing buyers together Peirce says that members will also be able to act together as a lobby group attempting to make more low carbon and zero carbon steel available. Although the group has yet to meet to discuss this area in detail, SteelZero members are likely to have views about steel tariffs and other adjustment mechanisms.

But, says Peirce, the group's first challenge is simply to stimulate supply.

"At the moment there isn't the supply, so the first step is to get that moving," he says. "There will be challenges in the next five or ten years about how you do that, where that works, which technologies are working that will really inform how the companies who have become members of SteelZero want to exercise their influence and their voice. In some ways that's the exciting part. They can work together to say yes we do need to act together on policy either internationally or in a particular geography to be able to get the steel we want at a sensible price." ce

ArcelorMittal says it will turn its plant in Sestao, Spain into the world's first full scale zero-emissions steel plant
PHOTO: REUTERS

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WHY 2022 WILL BE A 'GOLDEN YEAR' FOR MMC

Des Duddy, managing director of construction products specialist Protrade on Modern Methods of Construction and the benefits of using offsite manufacturing

Modern construction site in Dubai.
PHOTO: ADOBE -KASTO

Back in 2011, a quite astonishing feat happened.

In China, a prefabrication business, which proclaimed itself as the world's fastest builder, erected the 30-story T30 Tower Hotel in a little over two weeks. That same company went on to build a 57-storey building in just 19 days in 2015, doing so by completing three floors of the structure every day.

More recently, the Huoshenshan hospital was built in Wuhan in 10 days in 2020, to treat patients suffering with Covid-19.

All three of the above examples were extraordinary feats of construction, with the latter drawing fascination from across the world as millions visited sites like YouTube to watch time-lapse videos of how it was achieved.

As remarkable as they were, they are the latest in a clear line of indicators of the route our industry is inevitably heading in.

MMC (Modern Methods of Construction) and off-site manufacturing are nothing new. However, its adoption as the primary method of working across the industry has been accelerated by the need for construction to be far more efficient.

Prior to 2022, the off-site construction of buildings, building elements and structures accounted for around 2% of the total construction market. Thanks to a perfect storm, however, we're going to see MMC and off-site manufacturing boom and the above examples of construction feats will become the norm in the years to come.

I believe MMC and off-site manufacturing will become invaluable to the construction sector as it enters a crucial point in its journey to return to pre-pandemic levels by 2023.

The three main benefits of MMC and off-site manufacturing beyond efficiency

Focusing purely on the economics of MMC, there are three obvious benefits:

- the commercial gain
- its ability to give companies a genuine competitive edge
- improvement in the sector's capability to meet demand after the pandemic

Off-site manufacturing techniques have progressed significantly over the last few years, moving it on significantly from a time when it held a tarred reputation and was used mainly as temporary accommodation, such as portacabins.

Instead, what we now have are buildings and structures that are produced to incredibly high and repeatable standards, as we saw with the hospital that was built in Wuhan in just ten days.

SUPPLY SHORTAGES, PRICE INFLATION ON RAW MATERIALS AND EXTREMELY HIGH DEMAND

The supply shortages and lead times construction has faced in recent months have caused issues with a huge number of projects, with stakeholders grappling with limited supplies and soaring prices.

To combat these ongoing problems, the onus is on construction professionals to shift to a more viable option.

The obvious alternative is off-site manufacturing. There's no faster construction method, as it strips away the myriad of factors, like weather, site access, permissible working hours, and noise pollution, that can impact a project.

If you could purchase a plot of land and know that the house would be finished and ready to move into within four weeks, the financial savings would be significant.

Concerns over build quality are no longer relevant, with many off-site homes now offering a mortgageable 60-year warranty. Even hospitals, schools and commercial properties are looking towards modern methods of construction. ce

FAST-FOOD BRANDS UNDERSTAND IMPORTANCE OF USING MMC

In many ways, the fast food sector has been ahead of the game on MMC and offsite manufacturing.

The approach was actually made popular by brands like McDonald's and KFC, both of which calculated the huge sums of lost revenue caused by not having a fully finished restaurant as each day passed during the construction process.

McDonald's, in particular, uses prefabrication technology for its units and it is that method that allows the business to complete new outlets on pre-existing groundworks in as little as 13 hours.

Once planning permission has been granted, the time to store opening is dramatically cut, all while it is creating savings in equipment, labour, fees and other expenses associated with a large-scale build. The benefits are two-fold and this rise in interest in MMC and off-site manufacturing is generating jobs and bringing new skills and diversity to the workforce.

EARTHMOVING

New A-Series excavators are announced by Hyundai

Hyundai Construction Equipment is launching two new Stage V-compliant excavators

Hyundai CE's new HX160A L and HX180A L midweight excavators

PHOTO: HYUNDAI CE

The new HX160A L and HX180A L are powered by Cummins engines, with a 5% reduction in fuel consumption, and a 60% reduction in particulate matter emissions without exhaust gas recirculation.

Hyundai says the 16 and 18 tonne machines will deliver a 13% increase in power, plus 27% more torque than their predecessors.

The company highlights the addition of its electric pump independent control (EPIC) system, which allows both new machines to harness the extra power of the Cummins engine. Both machines promise a 115kW gross power output, with 712Nm peak torque at 1200rpm.

A new Lifting Mode feature is standard with the new models, which improves both fine control and lift capability, while Fine Swing Control is an option, making the movement of the boom smoother.

The A-Series cab has 13% more internal space. Upgraded tech also features, with a 200mm screen, controlled through a jog/dial module.

Both models also feature a Miracast feature, which allows operators to smartphone functions through the cab's screen.

Hyundai says drivers can operate their phones hands-free, listen to music directly from their smartphone and use a number of internet-based applications through the Miracast system.

The new models also promise reduced service costs, with engine oil and oil filter intervals extended to 800 hours, and fuel filter intervals doubled to 1,000 hours. ce

CRANES

Liebherr unveils its new 2,500 tonne crawler crane

A 2,500 tonne capacity lattice boom crawler crane is new from Liebherr-werk Ehingen in Germany.

The LR 12500-1.0 fits in the upper end of the product range between the 1,350 tonne capacity LR 11350 and the 3,000 tonne capacity LR 13000. It has several design differences from other Liebherr models.

The boom is wider and gives the same stability as using the double lattice PowerBoom or the SX boom, the manufacturer said. It is called HighPerformanceBoom. Its maximum length is 100 metres but it can be extended using sections from the luffing jib. A short version of the luffing jib makes a WV type jib for vessel lifting, typically tall columns in petrochemical industry applications.

Erection of larger wind turbines will be another common application for this new giant.

The crane's maximum tip height of around 200 metres is achieved with 100 metre main boom and 108 metre luffing jib.

DESIGN DIFFERENCES

The crane's superstructure is much narrower than existing models and the two main hoist winches sit on top of it instead of in between. The back mast is mounted at the front of the superstructure immediately behind the boom foot.

Easy transport is a key element of the new design. Largest is the 4 metre wide superstructure front section which can be transported on a low bed trailer. Other components come in at 3.5 metres wide or less.

Crawler units can have the tracks removed to reduce the 150 tonne overall weight of each one. Without tracks the crawler frames each weigh 97 tonnes and they can be split further, into two pieces.

Counterweight slabs are the same 25 tonne concrete ones as used on the LR 13000. They have twistlocks on each corner and can be transported like a 20 foot container.

TWO ENGINES

The narrow rear section of the superstructure houses a pair of engines. The Liebherr straight six diesels offer a combined output of 800 kW. Redundancy in the design means should one engine fail the crane can be operated, at reduced speed, to bring it to a safe position.

The first unit is on the test pad at the Ehingen factory in Germany and the first customer is international heavy lift and transport specialist Sarens based in Belgium. Delivery of that first unit is scheduled for the first quarter of 2023. ce

EARTHMOVING

New Zaxis-7 goes big

Hitachi Construction Machinery (UK) has revealed the largest wheeled excavator model in its new Zaxis-7 equipment range.

Described as highly versatile, the ZX220W-7 has an operating weight of 22 tonnes and is powered by a Stage V engine.

Wilbert Blom, Hitachi Construction Machinery (Europe) NV excavator product manager, said, "We're delighted to introduce the largest Zaxis-7 wheeled excavator model."

"We've had a hugely positive response from customers to the new range so far, and we hope the ZX220W-7 will be equally well received.

"It offers outstanding versatility for a wide range of applications when used with Hitachi attachments, and delivers an exceptional performance."

According to Hitachi, the excavator's HIOS III hydraulic system offers greater productivity and better fuel consumption than previous models, reducing costs.

Liebherr LR 12500-1.0 on the test pad in Ehingen with just the back mast and no main boom
PHOTO: LIEBHERR

GENSETS

Yanmar launches YDG generators in Europe

Stage V-compliant YDG3700 and YDG5500 series models feature Yanmar L-type diesel engines

PHOTO: YANMAR

One of Yanmar's new Stage V-compliant YDG5500 series generators for the European market

Yanmar has upgraded its YDG Series of portable generators to meet the EU Stage-V emissions standards, making the machines available of the European construction equipment market for the first time.

The new YDG generator line, which is manufactured entirely in Europe, comprises two YDG3700 and two YDG5500 series models that incorporate a recoil start-up method.

Each of the models is also available in an electric starter version and is equipped with Yanmar's air-cooled L-type engines, which provide power outputs ranging between 3.3 and 5.8kVA depending on the specific model.

The Stage-V compliant diesel engines, which incorporate a micro-sized fuel injection system, are said to ensure low fuel consumption.

Carlo Giudici, sales and marketing director at Yanmar Europe, said, "These upgraded and precision engineered models are brand new entrants into the European market and are established yet meticulously advanced generators which meet all global emissions standards and incorporate cutting edge components.

"As the generators are now made in Italy this also means that the many loyal customers of the YDG Series can look forward to a much shorter ordering process for new units."

Described by Yanmar as robust and reliable, other key features of the Stage V generators include a low-noise output measured at 81dB, pollution and waterproof control panel sockets, stainless steel top covers and automatic low oil shutdown protection.

The generators are also compactly sized, with the units measuring just 720mm long, 578mm high and 480mm wide.

"The upgraded YDG Series of generators is especially quiet and come in a versatile power range to meet many required outputs. Also, due to their very low fuel consumption, the generators can be used at full capacity for up to 10.5 hours.

"Furthermore, Yanmar Europe, based in The Netherlands, has taken over the sales of YDG products for Europe, Russia, Middle-East and Africa and as we also have a comprehensive parts center near Amsterdam customers will be assured that Yanmar will provide reliable and fast back-up service and parts. We are also sourcing more European components." ce

MATERIAL HANDLING

Kubota expands tracked dumper range with electric and diesel models

Kubota has expanded its range of tracked dumpers with the launch of both a new electric KC70VSL-4 e model and the new KC110SL-4 diesel model.

Based on the design of the manufacturer's KC70H-4e machine, the stand-on electric KC70VSL-4 tracked dumper is described as a "perfect fit for customers working in city centres due to its quiet operation".

The electric dumper is powered by a 47V lithium battery pack of 48V and features a variable track that gives the machine a retracted width of 758mm wide, which enables users to carry out tasks in confined spaces.

While the model, which has a payload capacity of 700kg, can be fully charged and ready for a full day's work in three hours via a Universal Battery Charger (UBS), it can also be charged up to 80% in half that time.

In addition to the electric model, the manufacturer's new diesel-powered KC110SL-4 tracked dumper is equipped with a Stage V-compliant Kubota D722 engine.

Kubota KC70VSL-4e electric tracked dumper
PHOTO: KUBOTA

The stand-on machine, which is described as the ideal workmate for a mini excavator and is suitable for use on projects in urban areas, weighs 940kg and has a maximum width of 990mm.

The front-tip skip of the KC110SL-4 dumper has a payload capacity of 1200kg with a heaped volume of 0.59m^3 and can be used on up to 20° slopes. ce

CECE **on the EU's new InfraROB project, investing in new research on robotised building processes**

The road to robotics

InfraROB is a European Union's Horizon 2020 funded project, running 42 months from September 2021 until February 2025. The innovation it wants to develop aims to reduce workers' exposure to live traffic and construction machines, to increase the availability of the transport network, to reduce the cost of repetitive tasks, and to increase the safety of road users. It plans to do that by promoting significant advances in automating, robotising, and modularising the construction, upgrade, and maintenance of the road infrastructure.

Notably, the project aims to achieve a 50% reduction of fatal accidents and 20% reduction of traffic disruption due to maintenance work as well as reduction of routine maintenance costs and improvement of network capacities.

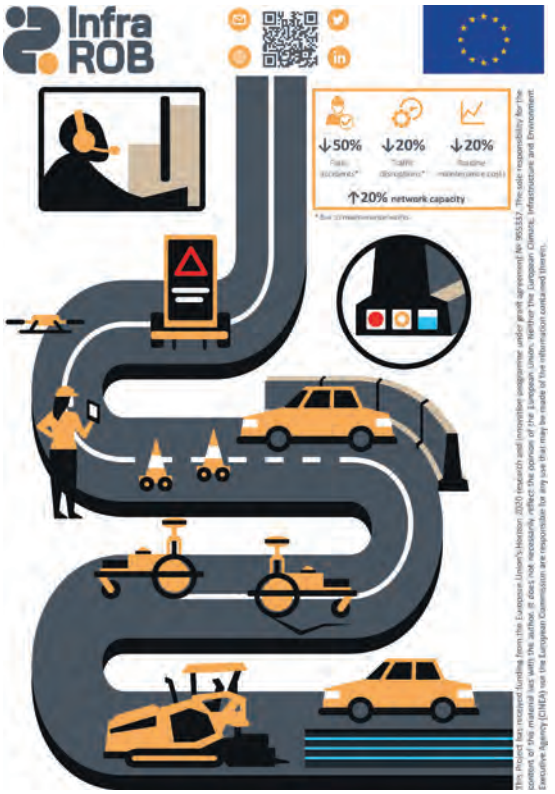
InfraROB is driven by a European consortium of 18 partners, including companies, tech-centres, and consulting companies of eight countries – Spain, Portugal, Italy, Belgium, Germany, Austria, Swiss and Denmark – with GeoTECH Group, a member of CINTECX at the Spanish University of Vigo as project coordinator. CECE is one of the partners involved in the project's communication and dissemination activities. Moreover, CECE is responsible for creating and managing the project's social media.

The InfraROB project is structured in two phases. The first one focusses on research and technical development, the second on demonstration, validation, and outcomes in a fully operational environment in Austria, at 'Graz Living Lab', a pilot test site on the Austrian motorway network A2 in the south of Vienna that is managed by ASFINAG. The project has been granted with EU funding of 5 million euros.

WHAT IS IT ABOUT?

Road transport is the most widely used mode of inland passenger transport in most European countries today, strongly contributing to ensuring the mobility of people but also of goods across the EU. Thus, proper road infrastructure management is essential for both economic growth and the achievement of the Sustainable Development Goals.

The main value of road infrastructure lies in the network capacity, which needs to be ensured through assets' maintenance, and, upon necessity, expanded through new construction and upgrading. Road infrastructure maintenance is therefore essential, and, alongside maintenance works, special emphasis must be put on work zone safety.



How InfraROB aims to use robotics to reduce human exposure to hazards on road construction projects

The need to improve safety of both construction workers and road users in relation to work zone areas remains a priority, as 4% of accidents take place in work zones. Workers engaged in roadworks are exposed to high risk, whereas many repetitive construction or maintenance tasks could be replaced by robotised systems.

Yet, even if robotics has reached significant technological maturity and thus implementation levels in many industrial sectors, it has not reached the same implementation levels in road infrastructure management. A coordinated effort at the European level is therefore needed to boost the introduction of automation, robotics, and greater modularization in this field.

Pavement is probably the most representative and critical element of roads. Even if other engineering structures like bridges or tunnels are also important, pavement is the fundamental 'continuous' engineering structure with the duty to carry road traffic throughout kilometres of road infrastructure.

By focussing on roadbed and pavement, and particularly on roads paved with asphalt – the most widely applied type of pavement in Europe with 90% of all paved roads and highways – the project will develop autonomous robotised systems and machinery for paving and repaving, repairing cracks and potholes in the road surface, and line marking.

It will also develop collaborative robotised safety systems to ensure safety of workers and road users. It will then also develop an all-in-one multi-functional precast concrete element applicable as roadside safety barrier and as road construction element at the same time, serving a major degree of modularization in road design, construction, and upgrade.

To cope with safer operations and maintenance, the project will furthermore upgrade existing traffic management systems as well as maintenance management systems to provide for the safe and coordinated deployment of automated road maintenance robots.

HOW DOES IT WORK?

The project partners meet every month to stay updated on the evolution of the different activities.

A stakeholders' group will be set-up by February 2023 to provide non-binding advice to the project as well as engage in the dissemination-oriented activities.

Parties interested in supporting the project should visit www.infrarobproject.com or contact CECE in Brussels. ce

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FIND US ON

Revised TEN-T guidelines

The revision of the TEN-T guidelines is an opportunity for building and upgrading the network's infrastructure to the highest quality standards

While recognising the necessity of modernising the EU's transport system, the European Commission adopted four transport-related legislative proposals last December, among which the revision of the Union guidelines for the trans-European transport network (TEN-T), with the aim of supporting the transition to cleaner, greener, and smarter mobility. Despite the EU having one of the densest transport infrastructure networks in the world, a large part of it is now ageing and coming under increasing pressure due to a rise in traffic. As such, FIEC welcomes the Commission's proposal and calls for it to be as ambitious as possible, especially regarding the maintenance of the TEN-T infrastructure.

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A MODERN TEN-T

The TEN-T is an EU-wide network of rail, inland waterways, short-sea shipping routes, and roads, connecting over 400 major cities with transport hubs. When complete, it will cut travel times between these cities. To modernise the entire network, the Commission's proposal comes with several changes. It introduces more ambitious requirements for each transport mode. To ensure infrastructure planning meets real operational needs, the new TEN-T creates nine 'European Transport Corridors' that integrate various transport modes such as rail, road, and waterways. Also, with the introduction of an intermediary deadline of 2040, the network will now be gradually completed in three steps instead of two. This should ensure the completion of major parts of the network ahead of the 2050 deadline. Also noteworthy, the new TEN-T required cities along the network to develop Sustainable Urban Mobility Plans (SUMP) with the objective of promoting zero-emission mobility.

WHAT IS THE NEW TEN-T AIMING FOR?

The TEN-T revision is closely linked to the European Union's climate agenda. The new TEN-T has several major aims. First, the reduction of congestion and transport emissions. Second, acknowledging that the TEN-T network is far from complete, the removal of bottlenecks and gaps on the network is listed as a major objective of the proposal itself. In this respect, the new TEN-T also aims at connecting EU cities and regions, including rural and remote regions. Lastly, the proposal is aimed at bringing more benefits to the users of the TEN-T network with one major objective of providing better transport services to freight customers.

MORE FOCUS ON MAINTENANCE

Over the past decade, a lack of proper maintenance has led to the deterioration of Europe's transport infrastructure thus exposing its users to a greater risk. This vulnerability is no more evident than with the collapse or closure of bridges in recent years. In addition, the maintenance deficit has significant environmental impacts, particularly, in terms of CO_2 emissions and raw material consumption.

The current Regulation contains limited obligations on Member States in terms of maintenance. This changes with the Commission's proposal as Member States would now be obliged to maintain the network's infrastructure in a way that it can provide the same level of service and safety during its lifetime. The addition of these obligations is a step in the right direction as regular maintenance is vital, not only to guarantee the safety of users across the entire transport network, but it represents also a key activity in the circular economy.

INNOVATIVE INFRASTRUCTURE

For FIEC, the TEN-T can also be a precursor for high-quality and future-oriented infrastructure. The promotion of innovative infrastructure is necessary to progressively shift to new mobility patterns such as electrical vehicles. In this respect, the new TEN-T requires the roll-out of alternative fuel infrastructure for various modes of transport, particularly when it comes to recharging and refuelling points for electric and hydrogen vehicles in the cities included in the network. This last point is also a key element of the new urban mobility framework. FIEC welcomes the uptake of this type of infrastructure as it is essential to meet the decarbonisation goals of the EU and securing an effective shift to green mobility.

THE ROLE OF THE EC IN TACKLING DELAYS

While a higher level of ambition is certainly necessary to address missing links in the network, problems of delays for several projects need to be tackled. Indeed, one of the major concerns related to infrastructure projects, especially in the current economic climate, is the lack of speed in terms of implementation. Often, administrative issues play a major role in delays. In Italy, for example, large infrastructure projects take - on average - over 16 years to complete due to administrative obstacles. While the EU has limited competences in addressing these issues, the new TEN-T does strengthen the Commission's oversight of the implementation of parts of the network. This is a positive step towards ensuring the infrastructure projects in the network are implemented swiftly and FIEC considers the European Commission's role crucial to avoid delays.

WHO WILL PAY?

Another major factor behind delays in infrastructure projects is the lack of funding. The estimated investment for the completion of the TEN-T will amount to € 244.2 billion until 2050. Nevertheless, the new proposal does not specify how infrastructure projects are going to be paid. While there are instruments - at the EU level - to co-finance these projects, it is expected that national budgets will take the biggest share of the cost. FIEC argues that the cost could also be shifted to infrastructure users. The 'user-and-polluter pays' principle has proven successful to guarantee funding resources in several EU Member States and should also be applied when implementing TEN-T projects. ce

Devastation in Borodyanka Ukraine
PHOTO: REUTERS

Tom Stocker **of construction law firm Pinsent Masons outlines the legal impact of the conflict in Ukraine on construction businesses**

The cost of war

In response to Russia's invasion of Ukraine, the UK, EU, US, Canada and other countries have imposed unprecedented sanctions against Russia.

Currently, new sanctions are being imposed on a daily basis.

Those sanctions impact on Russian business and people but also overseas companies with contracts to provide goods and services to Russian businesses or within the territory of Russia. The restrictions include:

- Effectively an embargo on operating in Crimea and the two breakaway regions in the Donbas;
- Numerous individuals and entities being added to the UK, EU and US assets freeze lists, including business persons whose companies are also sanctioned as a consequence;
- Russian chartered ships being banned from UK ports;
- Significant sectoral sanctions restricting capital markets and the ability to be paid though certain Russian banks including VTB and Sberbank;
- Restrictions on insurance and reinsurance;
- New export control restrictions relating to dual-use items to, or for use in, Russia, irrespective of end-user. The UK government has suspended all existing export licences for dual-use items into Russia and has suspended the approval of any new export licences for dual-use items into Russia.

THE MORAL QUESTION

Despite these financial sanctions and trade restrictions, much business with Russia remains lawful. There is a moral question for all businesses to ask about whether they consider it ethical or sustainable to continue with Russian business: many companies have withdrawn or ring-fenced their Russian related business operations; other businesses have decided to continue Russian related operations and contracts because they have no contractual right to terminate or they consider there to be a greater moral obligation to their staff and customers to continue with those projects so that jobs and livelihoods can be maintained. If a decision is made to continue with Russian contracts, the need for effective risk management has never been more essential. Companies should be:

- Carrying out due diligence and sanctions list screening. This entails checking that customers, suppliers and business partners in Russia or connected with Russia are not on a sanctions list or owned or controlled by someone who is;
- Undertaking classification exercises to ensure that the goods and technology to be exported are not dual use or otherwise controlled from a licensing perspective;
- Checking and sanctions screening proposed payment routes to ensure the payment mechanism is legally compliant. From a practical perspective, there is a need for companies to speak with their banks to see if their bank will continue to transact Russian payments;
- Checking and speaking with the company's insurers to ensure contracts of insurance remain valid and enforceable;
- Ensuring contracts are under English law; consider the INCO terms to ensure compliance with the shipping related sanctions; consider payment terms to provide for advance payment or payment on delivery; add a sanctions clause that allows the contract to be suspend if there is any further escalation in sanctions or the company's banks, insurers or suppliers refuse to support any Russian related business;
- Taking legal advice and signing up to the sanctions alerts issued daily by the UK, EU and US authorities. ce

> "Many companies have withdrawn or ring-fenced their Russian related business operations."

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Pinsent Masons LLP is a construction law firm with a true infrastructure and energy sector focus. Pinsent Masons LLP is ranked No 1 for construction law by all legal directories in the UK. It is an international law firm with offices across Europe, the Gulf and Asia.

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