

# BRITPAVENEWS

ISSUE 43 - SUMMER 2022



A first for soil stabilisation

Proving the worth of IBAA

Cement carbon capture  
and storage

Flying to carbon reduction

Britpave industry  
conference news

*Trialling  
next generation  
concrete surfaces*

## IN THIS ISSUE:

Chairman's welcome	2
Specifying the road ahead	3
Updated guide to roller compacted concrete	4
Prototype urban airport	
Britpave 2022 industry conference	5
A soil stabilisation first	6
Trial proves environment benefits of 0/16mm IBAA	7
The role of carbon capture and storage for net zero cement	8
Green light for carbon capture facility	9
Flying to carbon reduction	10
Good connections	11
The next generation	12
Transforming bad carbon into good carbon	14
Under pressure	15
Members' news	16
Britpave Members	

## CHAIRMAN'S WELCOME

Welcome to the Summer 2022 issue of Britpave News.

Our transport infrastructure faces a number of challenges, not least of which is that of achieving net zero carbon. This issue of Britpave News highlights a number of Britpave member innovative developments that promise to have a real impact in addressing those challenges. This includes the development and trialling of new aggregate and cement alternatives, concrete surface finishes and new industry approaches such as the first residential warranty scheme for soil stabilisation and technological information transfer. It also covers the investment in developing the exciting potential for cement carbon capture and storage which offers a step change in the manufacture of cement.

The theme of innovation will underline the Britpave industry conference to be held in October and for which details are included in this issue. Speakers from both industry and academia will examine how concrete pavement solutions offer the best long-term minimum maintenance, sustainable and most cost effective answer to meet the demands facing Strategic Road Network. Last year's conference and networking event was a well-attended informative and enjoyable success. You are advised to book your place early.

Britpave acts as an industry focal point for the exchange and development of new ideas, the collaboration between major clients and industry and the forwarding of industry best practice. It also, as this issue of Britpave News shows, highlights how its members can think 'outside the box' to provide infrastructure solutions that are not only innovative but also realistically practical.

### Joe Quirke

Britpave Chairman and Engineering Manager, VolkerFitzpatrick

**Britpave**, the British In-situ Cementitious Paving Association, promotes the better and greater use of concrete and insitu cementitious infrastructure solutions. Its members include major contractors, specialist equipment and material suppliers, consulting engineers and interested trade associations. Together, they provide a single voice for the insitu concrete paving industry.

**Britpave News** is published regularly by Britpave with the aim of keeping members up to date on Association matters, industry developments and member company news and views. Please help keep us in the picture on all of this by sending us any relevant information that you feel may be of interest to the membership.

**Disclaimer:** All articles are published in good faith. Britpave will not be held responsible for any errors, misinformation and opinions in articles submitted for this newsletter.

## > SPECIFYING THE ROAD AHEAD

**Britpave and its members are having active input into National Highway's updating of the Manual of Contract Documents for Highways Works (MCHW).**

The MCHW suite of specification documents is being rewritten and refreshed during the second roads period (RIS 2). In March 2020, the Design Manual for Roads and Bridges (DMRB) was relaunched in a new consistent format in order to enable a digital framework for standards content to forward and support innovation in digital design, construction and operation of highways infrastructure. Following the publication of DMRB,

National Highways is updating the MCHW suite of documents in partnership with the highways organisations of the devolved administrations of Northern Ireland, Scotland and Wales. As part of the updating process and its consultations with industry, National Highways is working closely with Britpave and its members for input and feedback.

It is planned to have all the specification documents revised and changed by December 2023 to allow for the necessary required notifications to the European Commission and publication in 2024.

## > UPDATED GUIDE TO ROLLER COMPACTED CONCRETE

Britpave has updated its guide to Roller Compacted Concrete. Roller compacted concrete (RCC) takes its name from the construction method used – it is placed by modified asphalt paving equipment, but it is stiff enough to be compacted by vibratory rollers. RCC provides a high strength, durable pavement structure. RCC requires no formwork, surface finishing, dowelled joints or reinforcement. These characteristics make RCC pavements simple, fast and economical to construct.

Although RCC may be included under the generic umbrella of hydraulically bound materials, it is important to differentiate between traditional cement bound sub-bases and bases, and higher strength RCC. If the intended use is as a surface slab, then it is likely that the requirements for surface finish and regularity will demand the use of a RCC specification. A suggested guideline, bearing in mind UK pavement design methods across all sectors, is that material with a cube compressive strength of C30 and higher, should be regarded as RCC.

The guide describes the benefits, properties and applications of RCC, provides recommendations on mix design and materials selection, and discusses applicable

pavement design methods, construction methodology and techniques. Quality control recommendations are given in the context of standard UK tests and procedures. It has been updated to reflect new industry practices and specifications. The guide is free to download from [www.britpave.org.uk/publications](http://www.britpave.org.uk/publications)



# PROTOTYPE URBAN AIRPORT

**The UK's development of an urban airport for flying cars and drones could be the shape of urban infrastructure to come.**

The world's first airport for electric drones and flying cars just opened in the centre of Coventry. If it's a success, it will be the blueprint for hundreds more around the world. Air-One is designed for zero-emission electric drones and air taxis and the airport itself is powered by hydrogen fuel cells.

The project is the result of a partnership between Coventry City Council and UK start-up Urban-Air Port Ltd to demonstrate the potential of urban air mobility to cut congestion and air pollution.

Hyundai's air mobility arm has even sent along a full-size model of its SA-1 air taxi which will be on show at the airport. Urban-Air Port says that the lack of suitable infrastructure is one of the biggest obstacles to the development of electric vertical take-off (eVTOL) aircraft.

Air-One is designed to be fully autonomous and to integrate with electric vehicles to create a completely sustainable public transport network. It's also easy to build. The whole project in Coventry took just 15 months from planning to completion.

Describing the opening as a momentous moment, Ricky Sandhu, founder of Urban-Air Port, said it was the start of "a new age of transport, an age of zero-emission, congestion-free travel between and within cities that will make people healthier, happier and more connected."

Researchers say the market for advanced air mobility could reach \$12.4 billion worldwide by 2027.

Air-One will be open to the public throughout summer 2022 and then Urban-Air Port plans to dismantle it and move it to other sites in the UK so that more people can see the concept in action. While the Coventry site is open there will be demonstration flights by police and freight drones.

Sandhu plans to open more than 200 "vertiports" worldwide, with planning already under way at sites in London, Los Angeles, Australia, South Korea, France, Germany, Scandinavia and South East Asia.

He said: "Cars have roads. Trains have rails. Planes have airports. Now, eVTOLs have an Urban-Air Port."



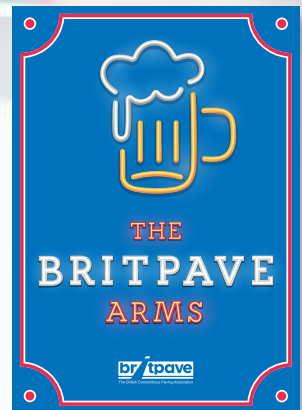
A full scale model of Hyundai's a full- SA-1 air taxi for four people will be on show at the airport

## ➤ BRITPAVE 2022 INDUSTRY CONFERENCE: CONSTRUCTING THE 100 YEAR CONCRETE ROAD

The 2022 Britpave industry conference will examine how concrete solutions can provide roads that last in terms of minimum maintenance and maximum performance, reduced whole life CO<sub>2</sub> and costs and be future proofed to meet the transport demands of tomorrow.

In particular, the speakers from both industry and academia will highlight new construction processes and techniques, new cements, electric vehicle charging, carbon sequestration and new concrete pavement research. The conference will be held on 6th October 2022 at the Delta Warwick Hotel, M40 Junction 15.

The conference will be followed by unique industry networking event: a pop-up 'The Britpave Arms' pub complete with a range of bar games including skittles, table football and giant darts board plus a pub supper.



Delegates rates and booking information is provided below:

Venue	
Delta Warwick Hotel Stratford Road Warwick CV34 6RE	Tel: 01926 499555 www.deltahotelwarwick.com Motorway reference: M40 Junction 15 Nearest rail station: Warwick Parkway
Conference delegate rate	
Day conference includes lunch and car parking:	£80 plus VAT (Britpave members)
	£160 plus VAT (Non-members)
Evening networking event:	£40 plus VAT (Britpave members)
	£80 plus VAT (Non-members)
For both conference and networking event:	£110 plus VAT (Britpave members)
	£230 plus VAT (Non-members)
To book, email: <a href="mailto:info@britpave.org.uk">info@britpave.org.uk</a> or visit: <a href="http://www.britpave.org.uk">www.britpave.org.uk</a>	
Hotel accommodation	
Overnight B&B accommodation and car parking is £85. To book, contact the hotel direct. Tel: 01926 49955 and quote 'Britpave event' or visit: <a href="http://biy.ly/3GcALUN">http://biy.ly/3GcALUN</a>	



## > A SOIL STABILISATION FIRST

**The provision of a new construction warranty scheme will help forward the use of soil stabilisation for residential projects for difficult sites thereby reducing the pressure to build on greenfield land.**

The new scheme is significant as, although the use of soil stabilisation is widely adopted for commercial and industrial projects, its use for residential developments has been obstructed by the unavailability of a specific housing industry warranty.

The potential that soil stabilisation offers for residential developments on difficult sites is underlined by its successful use at the Gifford Lea retirement village in Tattenhall, Cheshire. The Tattenhall project is one of two firsts: the first documented use of lime to improve soils for a residential development and the first such project to receive a comprehensive industry warranty developed by Premier Guarantee.

The first two phases of the retirement village were constructed on vibro-stone column foundations. However, difficult ground conditions for the construction of Phase 3 - which comprised eight blocks of three storey timber-framed buildings - called for a different approach to achieve the required subgrade levels for the access roads and parking areas and to provide a platform for the piled foundations.

The natural ground of the site for Phase 3 predominately comprised a stiff clay with areas of gravelly sand and significant groundwater inflows. Site investigations found that the stockpiled soils from Phases 1 and 2 were

unsuitable and too wet for re-use as general fill for phase three. With the removal of the stockpiled soils and the importation of new suitable fill materials having significant cost and project time implications, the contractor, Seddon Construction, worked with WSP consulting engineers and Combined Soil Stabilisation to develop an alternative on-site lime modified solution.

Using soil stabilisation offered significant project time, cost and environmental savings not least of which was the removal of the need to dispose of the unsuitable stockpiled soils offsite and then having to import new replacement fill materials.

Stefan Stansfield of Combined Soil Stabilisation explained, "Soil stabilisation solutions are not the norm for residential projects. Ours and WSP's experience of soil stabilisation convinced us that this was right approach for the Tattenhall project. We believe the Tattenhall project to be the first residential project in England to be so underwritten by an industry warranty and hope that this will forward the use of soil stabilisation for other such projects."

To download a case study of the Tattenhall soil stabilisation project 'Forwarding the use of soil stabilisation for residential projects', visit: [www.britpave.org.uk/publications/soil-stabilisation](http://www.britpave.org.uk/publications/soil-stabilisation)



**Stop press: Combined Soil Stabilisation has been shortlisted for two categories for the Ground Engineering Awards 2022 - Contractor of the Year and Best Geotechnical Project under £500,000. The awards will be announced in September. Best of luck CSL!!**

# ▶ TRIAL PROVES ENVIRONMENTAL BENEFITS OF 0/16MM IBAA

**Britpave member Blue Phoenix UK (BPUK) has undertaken site trials that underline not only the environmental benefits, in particular the lower carbon footprint, of Incinerator Bottom Ash Aggregate (IBAA) but also how the use 0/16mm IBAA can fully meet the performance benefits of specifications CD225 and the MCHW Series 800. National Highways accept the report provides adequate justification for a 'departure' from the grading requirements of CI 803 on their schemes.**

IBAA is a sustainable alternative to natural aggregates. It is derived from the Energy-from-waste (EfW) processing of residual municipal solid waste. The main residue of the process, approximately 25% of the initial volume of waste, is Incinerator Bottom Ash (IBA) which consists of materials such as metals, brick, stone, glass and ceramics. IBA can then be processed to remove the metals and screened to the required particle sizes. The resultant Incinerator Bottom Ash Aggregate (IBAA) can be used as a manufactured aggregate. IBAA is a prime example of the circular economy, where waste material is turned into a sustainable cost-effective construction material, with a lower carbon footprint than natural aggregates.

Typically, IBAA does not routinely meet the 0/31.5mm grading requirements for SHW CI 803 Type 1, it needs to have an addition of coarse natural aggregate. This is both expensive in financial and carbon terms and technically unnecessary, as grading and performance as subbase are not directly related.

Encouraged by National Highways' focus on innovative products and processes to meet the sustainability targets of the Road Investment Strategy, BPUK was determined to examine the potential of finer grade 0/16mm IBAA as an unbound subbase to achieve a Foundation Class 2 as specified within MCHW CD225. The company believed that the use of 0/16mm grade offers further environmental and construction benefits including lower carbon footprint, less segregation issues, reduced density compared to primary aggregates and improved compaction.

To prove these benefits BPUK commissioned fellow Britpave member AECOM to undertake an independent technical assessment of the mechanical performance of IBAA when used for an unbound subbase within standard pavement construction. A range of trial pavement areas were constructed and then monitored for a year at the Ferrybridge Multifuel 2 (FM2), West Yorkshire, site. FM2 is a new £300 million thermal power plant for Enfinity. The trial areas included both 0/16mm IBAA, 0/31.5mm IBAA and a local natural aggregate Type 1 for comparison.

The trial found no measurable or observable difference between the 0/16mm IBAA sections and the 0/31.5 control sections. The 0/16mm IBAA behaved as a granular material with visibly high interlock, it did not segregate during placement, could be readily compacted and fully met the design requirements of >100MPa restricted Foundation Class 2. Indeed, it was found that the 0/16mm IBAA achieved slightly higher foundation stiffness modulus than the limestone Type 1, that was used for comparison. Rut measurements taken in the vehicle wheel tracks proved that the design requirements of CD225 were met whilst the trafficking trials demonstrated that the requirements of MCHW Clauses 802 and 803 were met.



To download a copy of the case study 'The benefits of using 0/16mm incinerator bottom ash aggregate' visit [www.britpave.org.uk/publications](http://www.britpave.org.uk/publications)

## > THE ROLE OF CARBON CAPTURE AND STORAGE FOR NET ZERO CEMENT

**Carbon capture and storage has a key role to play in achieving net zero infrastructure and construction, says Iain Walpole, head of process and sustainability, carbon capture utilisation and storage, at Hanson UK.**



Cement is essential to the development of green energy projects and the UK's overall transition to net zero. It is fundamental to the development of everything from new offshore wind farms to nuclear power stations, to clean transport infrastructure and it underpins the thousands of green jobs that these projects will create.

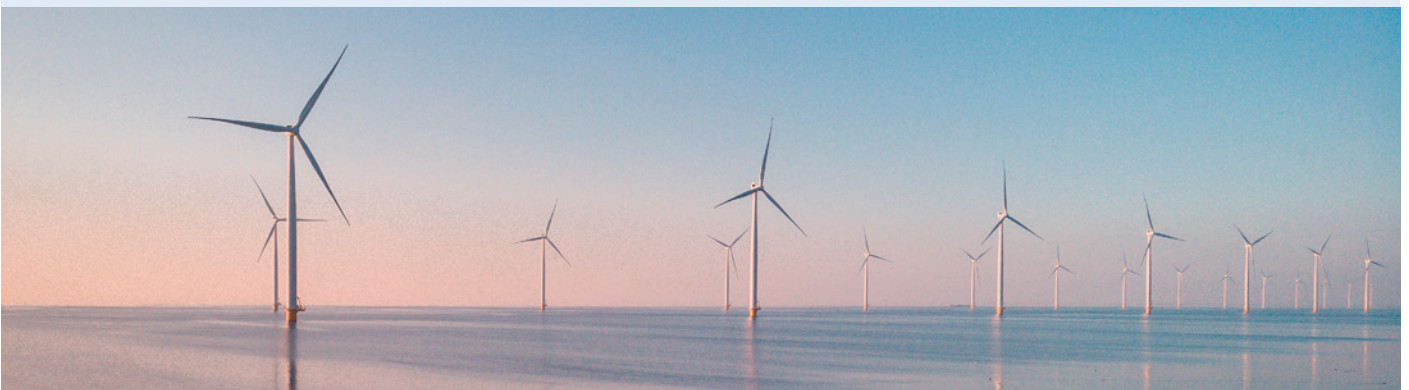
The production of cement is currently the most carbon intensive part of concrete. A large proportion of the carbon emissions come from the chemical processes involved in making cement and cannot be addressed by using low or zero carbon energy. Similarly, there is no viable alternative to concrete in the construction industry. The only way to produce the cement that the UK needs to deliver large scale net zero infrastructure without significant amounts of carbon emissions, is to use carbon capture and storage (CCS).

Hanson UK is at the forefront of this transition. The company is planning to develop the UK's first cement CCS scheme at its Padeswood works in north Wales. As part of this, its parent company, HeidelbergCement, is prepared to invest £400m to construct carbon capture and compression equipment, a combined heat and power plant to operate the capture plant, along with a pipeline to link up with the HyNet CCS network. The direct benefits of Padeswood CCS would be substantial, as it has the potential to capture 800,000 tonnes of carbon every year, equating to 24 million tonnes over the 30-year lifespan of the plant.

The project will act as an exemplar for sustainable cement production across the UK and will also support the transition of the construction industry to a net zero future, ultimately helping the UK meet its 2050 net zero targets.

Net zero is a far greater challenge for the cement sector than other industry sectors because it cannot rely on electrification, or hydrogen, alone to eliminate carbon emissions. Carbon capture is the sustainable long-term solution and Padeswood is the ideal project because it is close to an established CCS cluster, which is already developing a pipeline to connect to permanent CO<sub>2</sub> storage under the Irish sea.

Cement will remain critical to low carbon energy and climate change mitigation projects for decades, possibly indefinitely. As long as we need to build nuclear power stations, floating offshore wind farms or flood defences, we will need cement, and having a supply of net zero material will substantially reduce the whole-life carbon impacts of these projects. The Padeswood CCS project has the potential to be genuinely game changing by supporting the development of the critical infrastructure that will put the UK on the path to a net zero future.







## ➤ GREEN LIGHT FOR CEMENT CARBON CAPTURE FACILITY

**The LEILAC 2 (Low Emissions Intensity Lime and Cement) carbon capture project has successfully passed its Financial Investment Decision milestone, confirming that the project can now enter the implementation phase. To minimise the use of fossil energy for carbon capture, the project will also test the use of alternative fuels and electrical energy.**

Together with the Australian technology company Calix and a European consortium, HeidelbergCement is building a demonstration facility integrated into HeidelbergCement's plant in Hanover, Germany. The installation will be capable of capturing 20% of the cement plant's CO<sub>2</sub> emissions, corresponding to around 100,000 tonnes of CO<sub>2</sub> per year.

The LEILAC consortium is led by the LEILAC Group (technology provider Calix), and comprises HeidelbergCement, CEMEX, Cimpor, IKN, Lhoist, Port of Rotterdam, BGR, RBINS-GSB, CERTH, POLIMI, LEAP, and Engie. It is supported by GCCA, GCCSI, CEMBUREAU, ECRA, University of Clausthal and EuLA. The project aims to apply and demonstrate a breakthrough technology that will enable Europe's cement and lime industries to reduce their carbon footprint significantly.

"LEILAC 2 is one of several carbon capture projects we are currently pursuing at HeidelbergCement," says Dr. Dominik von Achten, Chairman of the Managing Board: "We are very pleased to advance this key technology at industrial scale at our plant in Hanover, Germany. The location is ideally suited for further utilisation and/or transport to offshore storage of the captured CO<sub>2</sub>." The company targets CO<sub>2</sub> reductions of up to 10 million tonnes with several CCUS projects already underway by 2030.

As part of the prior LEILAC 1 project, a CO<sub>2</sub> capture pilot installation with a capture capacity of 25,000 tonnes of CO<sub>2</sub> per year had been developed at HeidelbergCement's Lixhe plant in Belgium. With LEILAC 2, an installation around four times as large will be operated in Hanover. The project now enters the detailed design phase through 2022, followed by procurement and construction of the plant itself. Construction is expected in 2023, dependent on flag points over the coming months. The project scope for LEILAC 2 also includes a thorough analysis of the potential destination of the captured CO<sub>2</sub>, either for utilisation purposes or for safe geological offshore storage.

With the patented LEILAC technology, the CO<sub>2</sub> released during cement production can be captured in a highly pure form via a separate waste gas stream and used in other processes. As minimal additional energy is needed and no chemicals are required, this happens in an especially cost-efficient way. The technology can also be retrofitted in a modular form at any scale and use any fuel or energy source, including biomass, hydrogen, or electricity – providing a 'future proof' solution.





## ▶ FLYING TO CARBON REDUCTION

**FlyZero, the UK study into zero-carbon emission commercial air travel, has published its vision for a new generation of aircraft powered by liquid hydrogen. Britpave members Jacobs and Mott Macdonald provided industry-leading advisory services to the study.**

The report 'Our Vision for Zero-Carbon Emission Air Travel' marks the conclusion of a 12-month study which set out to consider the feasibility of zero-carbon emission aircraft. The project concludes aviation can achieve net zero 2050 through the development of both sustainable aviation fuel (SAF) and green liquid hydrogen technologies.

Led by the Aerospace Technology Institute and backed by the UK Government, FlyZero has concluded that green liquid hydrogen is the optimum fuel for zero-carbon emission flight and could power a midsize aircraft with 280 passengers from London to San Francisco directly, or from London to Auckland with just one stop.

Industry has collaborated with five UK airports to define the hydrogen infrastructure needed to support the operation of hydrogen powered aircraft. Three scenarios were investigated for the application of on-airport hydrogen infrastructure: (1) on site production of hydrogen through electrolysis and liquefaction, (2) off-site production of hydrogen gas transported to the airport via a pipeline where it is liquified and (3) off-site production of hydrogen which is transported to the airport by delivery trucks.

Industry Minister Lee Rowley said: "It's great to see FlyZero's final outputs following a year of intense research, successfully bringing UK industry together to think through how to reduce aviation's impact on our Earth and

sky while ensuring and celebrating the immense benefits of air travel and connecting the world."

"Hydrogen-powered, zero-carbon flights are now a step closer as a result of FlyZero's study," stated Jacobs global solutions director Andrew Gibson. "If they are to become a reality, evolving airports to meet the needs of hydrogen-fueled planes must become a priority. While we can start with off-site hydrogen production transported by road, as demand grows more investment will be required at airports to ensure hydrogen fuel is available. This can be achieved through the integration of Net Zero strategies, airport masterplans, capital planning, and infrastructure."

James Cole, Mott Macdonald's head of aviation strategy and forecasting, said: "The FlyZero project has shown that not only is zero carbon emissions flying with green hydrogen possible, but that it will be the most sustainable and affordable solution to decarbonising aviation in the future."

The FlyZero project has published its detailed conclusions through a series of reports which explore the technology challenges, manufacturing demands, operational requirements, market opportunity and sustainability credentials of zero-carbon emission commercial aircraft. A series of more detailed and technical reports together with new supporting research from industry and academia are also available to organizations that meet the requirements of an access test.

To download 'Hydrogen infrastructure and operations: Airports, airlines and airspace' visit: <https://bit.ly/3u7ASNa> For a full list of associated reports, visit: [www.ati.org.uk/flyzero-reports](http://www.ati.org.uk/flyzero-reports)

## > GOOD CONNECTIONS

**Partnering with National Highways, i3P (Infrastructure Industry Innovation Partnership) and TRL, Britpave member Costain has managed the development of a new industry-wide scoring system for Connected and Autonomous Plant (CAP) that is set to revolutionise complex infrastructure projects by making work faster, safer, and more sustainable.**

The term Connected and Autonomous Plant refers to construction plant that is connected to its environment through sensors or wireless transfer of data between a remote operator while the autonomy element refers to aspects of the vehicle's operation and movement around a site.

Automation may range from vehicles with sat nav and park assist to fully automated digger trucks or automated cone laying vehicles, with more innovative solutions under development.

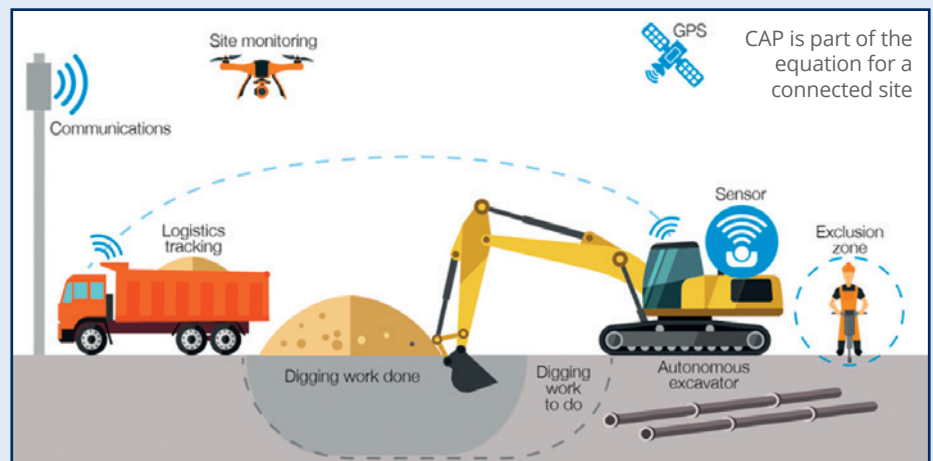
By establishing a common language this first of its kind framework, the CAP levels, will enable connected and autonomous plant to be specified and deployed on construction schemes. This standardised measure will offer clarity and a straightforward way to compare several types of machinery to suit different tasks.

Tim Embley, Costain's research, development and innovation director and i3P founding member, said "Our expertise in complex projects and digitally optimised delivery as well as our role as industry leader places us at the heart of delivering the new CAP levels. We are creating a blueprint for infrastructure that harnesses the power of secure, trusted, meaningful data and the benefits of digital technologies."

National Highways Head of Innovation Annette Pass said "We know that Connected and Autonomous Plant offers opportunity to revolutionise the construction sector by making work safer, quicker and brings significant benefits for the environment. That is why we are committed to introducing more CAP onto sites as we continue to develop the roads of the future."



According to National Highways, the ongoing digital revolution in the construction industry can increase productivity dramatically and generate billions of pounds in savings. At the same time, digital transformation can reduce disruption to the public and improve safety. The system is the latest development in the CAP Roadmap launched by National Highways and i3P in 2020 which identified challenges and workstreams to support a goal of making automation business as usual in construction by 2035.





## > THE NEXT GENERATION

**Using the latest international developments in concrete surface treatment, Connect Plus and Connect Plus Services, in collaboration with Atkins, Milestone Infrastructure, RoadGrip and National Highways, are trialling an exciting new solution on the M1.**

Next Generation Concrete Surfacing (NGCS), is an innovative two stage process comprising longitudinal grinding, followed by grooving. This has been proven internationally, to reduce road/tyre noise for concrete pavements. The application of NGCS represents the first of its kind on the Strategic Road Network (SRN).

The 440km M25 network is one of the busiest roads in Europe, and one of the UK's most strategically important road infrastructure systems, supporting over 200,000 journeys a day. Connect Plus has a 30-year contract to operate and manage the M25 network on behalf of National Highways. Together with their strategic supply chain partner, Connect Plus Services (CPS), they are committed to making journeys safer, smoother and more reliable for all road users.

As part of this commitment, Connect Plus and CPS have invested in an initial programme to evaluate the benefits of NGCS in the UK, following successful implementation internationally.

Connect Plus brought together a team of experts including CPS, Atkins, Milestone Infrastructure, RoadGrip and Tyrolit in collaboration with the IGGA, to support the development of a potentially suitable solution for the Strategic Road Network.

NGCS is an innovative concrete surface treatment developed in the United States in 2007 for new and existing concrete. The technique is a refinement of conventional Longitudinal Diamond Grinding (LDG), which has also been successfully used to restore concrete surface characteristics and for noise reduction elsewhere in the UK.

NGCS was developed following an extensive 3-year research programme in the US by the Federal Highway Administration (FHWA), the International Grooving & Grinding Association (IGGA), the American Concrete Pavement Association (ACPA) and the Minnesota Department of Transportation (MnDOT). The research identified that refinements to the operation (by



incorporating a grooving process) and blade configuration significantly improved the noise performance, texture depth and durability of the treated surface, compared to conventional LDG.

NGCS comprises two key processes:

- Longitudinal Diamond Grinding is carried out using 3.2mm width blades at 0.9mm spacings. This process minimises positive texture elements that can cause an increase in noise levels, and removes existing shallow defects.
- Longitudinal grooves are created using 3.2mm width blades. The grooves are saw-cut to a depth of 3mm to 5mm, with a 12.5mm to 16mm groove spacing, to create a negative texture finish.

The NGCS technique has been successfully applied in 15 US States, as well as in South Korea, Australia and Canada, amounting to 4 million m<sup>2</sup> globally.

The first application of NGCS was implemented on the M1 Southbound carriageway in November 2021. This is part of a larger trial that Connect Plus are undertaking aimed at finding a solution to sustainably manage exposed concrete



on the M25 network. This installation will enable the performance of the NGCS to be assessed against UK specific traffic volumes and climate conditions. It will also provide quantifiable performance data relative to other existing concrete surfaces, such as Longitudinal Diamond Grinding and other surface treatments.

Initial findings, together with the previous research, have identified that NGCS has encouraging potential to positively impact the driving experience associated with existing concrete pavements, by reducing noise, whilst still providing adequate safety in terms of skid resistance.

## > AGGREGATE INDUSTRIES EXPANDS LOW CARBON PRODUCT RANGE

**Aggregate Industries, has added to its market-leading ECOPact low carbon concrete product range with the launch of ECOPact Prime AS**

ECOPact Prime AS is a new and unique active setting carbon-saving concrete that delivers even greater carbon reduction compared to ECOPact, with no compromise on performance – with the same setting time plus active development of strength.

As well as over 50% carbon reduction, the other key benefits of ECOPact Prime AS include its active strength development compared to the existing ECOPact product and the flexibility to provide bespoke products to fit site specific requirements. It is also available in most consistence classes to meet the evolving needs of customers and clients, without compromising on quality or build-time.

Lee Sleight, managing director at Aggregate Industries, said: "We're delighted to add to our ECOPact green concrete product range ECOPact Prime AS - a low embodied carbon concrete product but with an improved performance, meaning our customers don't need to compromise when choosing between sustainable concrete and technical performance. Being

at the forefront of sustainable materials has long been a goal of Aggregate Industries and we have invested heavily in a range of low-carbon solutions that assist in meeting the sustainability goals of the construction industry."



ECOPact Prime AS is readily available from most of Aggregate Industries batching plants. For those opting to utilise ECOPact products in projects, Aggregate Industries offers a range of technical and dedicated support, ensuring the provided solution meets the necessary industry standards, requirements and construction schedule.

What's more, clients are able to get a clear understanding of their individual requirements and potential carbon savings through Aggregate Industries' carbon calculator; a tool which recommends all ECOPact options together with embodied carbon for each level, making the product selection much easier.

## > TRANSFORMING BAD CARBON INTO GOOD CARBON

**CEMEX has successfully tested a process that converts flue gases emitted by the cement kiln into carbon nanomaterials, thereby transforming "bad" carbon into "good" carbon. Due to their unique mechanical, thermal, electrical, and chemical properties, carbon nanomaterials have several potential applications in a wide array of industries, from construction to biomedicine.**

The technology was born out of Smart Innovation, CEMEX's internal open innovation platform. CEMEX's Research and Development team has achieved promising results, a carbon conversion rate of 50%, in a lab setting. The next step is to scale the technology in a cement plant pilot within a year.

Nanomaterials include high-tech materials such as nanofibers, nanotubes, graphene and carbon black, that have applications in several industries including electronics, automotive, refractory ceramics, agriculture, chemicals, pharmaceuticals, textile, and construction materials. Thus, the proposed technology can turn CO<sub>2</sub> emissions into a value-added product, achieving a circular process that is key to sustainable development.



CEMEX is exploring and evaluating different applications of carbon nanomaterials to develop cement-based materials with novel and advanced performance, such as mechanical, chemical resistance, or thermal and electrical properties. The novel properties also enhance the sustainable attributes of cement-based materials as the same CO<sub>2</sub> emitted is used to improve the performance. Reintroducing CO<sub>2</sub> emissions in the construction value chain would boost the industry's contribution to the circular economy.

## A strategic approach to concrete reinforcement can overcome load transfer issues and extend the service life of industrial floors and pavements explains Matt Bolle of Danley.

In industrial environments, concrete flooring and pavements are commonly made up of a number of individual panels measuring approximately 6m x 6m. The point where one panel meets another is known as the joint. When a load is applied to the concrete the slabs must work together to share and support the load. This interaction between the slabs is known as load transfer – i.e. the ability of the slab to safely and effectively transfer a load between adjacent panels. Correct load transfer is vital to ensure rigid pavement performance and longevity.

When it comes to reinforcing concrete flooring against issues to do with load transfer, there are two main solutions:

### Mesh reinforcement

Sawn joints in mesh-reinforced concrete slabs rely primarily on aggregate interlock for load transfer. Installation of mesh can be highly variable, with excessive lapping of mesh sheets creating localised areas of high restraint. If positioned near sawn joint locations, this can prevent joints from activating, leading to random cracking within the slab. In addition, the process can be costly, with the purchase, transportation, storage, cutting and fitting of steel mesh adding to the project cost and installation time.

### Fibre reinforcement

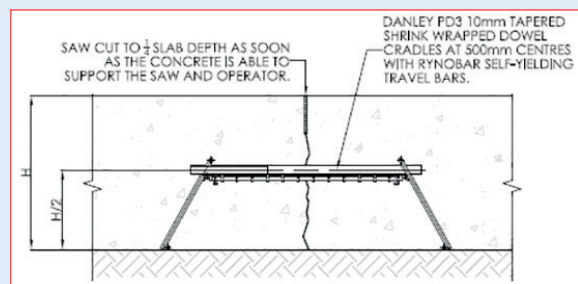
Here fibres of steel and synthetic materials are distributed throughout the entire concrete matrix. The process is designed to improve the structural integrity and tensile strength of the concrete, with increased ductility and abrasion resistance.

Fibre Reinforced Concrete (FRC) typically avoids the use of sawn joints within the slab due to industry concerns over the load transfer performance of aggregate interlock coupled with fibres at these locations. As a result, FRC is most often used in “jointless” solutions with significantly larger panels, where steel construction joints are located at 30-50m centres. These joints open significantly more, due to the fact that they are accommodating the shrinkage of the much larger panels. Where a jointed FRC solution is specified, dowels should be used to overcome any concerns around load transfer capabilities.

## Overcoming known issues with mesh and fibre reinforcement

With poor joint performance and ineffective load transfer being a known issue in slab-on-ground and industrial pavement applications, greater attention should be given to the joint design.

Danley's PD3® tapered plate dowel and sleeve system offers a load transfer capacity of 90%. Its use can overcome many of the issues associated with mesh and fibre reinforced concrete and provide a more consistent joint performance over the full design life of the concrete floor or pavement. The dowels are specifically designed to ensure that the concrete can shrink freely in both the lateral and longitudinal horizontal plane, without inducing restraint that leads to out-of-joint cracking.



## Strategic reinforcement - when structural integrity counts

By leveraging the high load transfer capacity of the PD3® tapered plate dowels at the sawn joints, and combining them with the equally high performing Danley® Dowels at the construction joints, Danley® is able to offer an optimised Strategic Reinforcement™ Design solution. Joints are strategically placed at closer centres to mitigate shrinkage cracking in the early age concrete, thereby eliminating the need for mesh or fibres. The geometry and alternating orientation of the tapered plate dowels allow forgiving installation tolerances at the joint, while limiting spalling and reducing the risk of cracking caused by restraint.

Corner and edge loading conditions are the controlling factors in concrete slab design. The 90% load transfer capacity that Strategic Reinforcement™ provides at every joint means that individual panels can be designed to accommodate less load than in conventional mesh slabs, resulting in thinner slabs, reduced materials and labour costs and reduced carbon. The design also ensures a fast and hassle-free installation with reduced time on-site when compared with standard alternatives. The final result is a superior floor or pavement with an extended service life.

# MEMBERS' NEWS

## BALFOUR BEATTY APPOINTS UK DIRECTOR OF SUSTAINABILITY

Balfour Beatty, the international infrastructure group, announced the appointment of Jo Gilroy as UK Director of Sustainability. She will be responsible for supporting and guiding the business in driving forward Balfour Beatty's sustainability strategy across the UK, as well as reporting the Group's performance against the bold targets and ambitions set out in its "Building New Futures" sustainability strategy. Jo joins Balfour Beatty from Kier where she held the position of Group Head of Sustainability & Environment. Prior to Kier, she was Head of Sustainability & Corporate Responsibility at the FTSE 100 distribution and logistics group Bunzl.

## MOTT MACDONALD PUBLISHES NEW POLYCENTRIC POWERHOUSE REPORT

Mott MacDonald has published its second report into the role of rail projects like Northern Powerhouse Rail in the delivery of the UK Government's levelling up agenda. The 'Polycentric Report' calls for the implementation of a model in which cities and towns across the Northern Powerhouse region can harness and play to their specialist strengths in business, culture and public services, trading with one another through upgraded transport, digital and other links. To download a copy of the report visit:

<https://bit.ly/3Nom8A7>

## VOLKERFITZPATRICK RECEIVE ROSPA PRESIDENT'S AWARD FOR HEALTH AND SAFETY ACHIEVEMENTS

VolkerFitzpatrick has been presented with its fifth President's Awards from the Royal Society for the Prevention of Accidents (RoSPA). The internationally-recognised award comes as a result of winning fourteen consecutive Gold Awards and recognises health and safety performance throughout 2021. It is only presented to companies who have previously achieved 10 or more Gold Awards, the highest level available.



## BRITPAVE MEMBERS

As the focal point for in situ concrete and cementitious infrastructure solutions, Britpave offers its members a recognised industry voice, market sector development and beneficial industry networking opportunities. Britpave members include clients, consultants and engineers, contractors, material and plant suppliers and academia.

AECOM Ltd - [www.aecom.com](http://www.aecom.com)

Aggregate Industries - [www.aggregate.com](http://www.aggregate.com)

Atkins Ltd - [www.atkinsglobal.com](http://www.atkinsglobal.com)

Balfour Beatty Ltd - [www.balfourbeatty.com](http://www.balfourbeatty.com)

Blue Phoenix Ltd - [www.bluephoenixgroup.com](http://www.bluephoenixgroup.com)

Barton Plant Ltd - [www.barton-plant.co.uk](http://www.barton-plant.co.uk)

British Lime Association - [www.britishlime.org](http://www.britishlime.org)

CEMEX UK - [www.cemex.co.uk](http://www.cemex.co.uk)

Combined Soil Stabilisation Ltd - [www.combinedssl.co.uk](http://www.combinedssl.co.uk)

Complete Design Partnership Ltd - [www.cdpbroms.co.uk](http://www.cdpbroms.co.uk)

Costain Ltd - [www.costain.com](http://www.costain.com)

Danley Ltd - [www.danley.co.uk](http://www.danley.co.uk)

Dyer & Butler - [www.dyerandbutler.co.uk](http://www.dyerandbutler.co.uk)

Geofirma Soil Engineering Ltd - [www.geofirma.co.uk](http://www.geofirma.co.uk)

Gill Civil Engineering Ltd - [www.gillgrouphouse.com](http://www.gillgrouphouse.com)

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Hanson UK Ltd - [www.hanson.biz](http://www.hanson.biz)

Jacobs - [www.jacobs.com](http://www.jacobs.com)

Lagan Aviation and Infrastructure - [www.laganaviation.com](http://www.laganaviation.com)

Mick George Ltd - [www.mickgeorge.co.uk](http://www.mickgeorge.co.uk)

Morgan Sindall Construction and Infrastructure Ltd - [www.morgansindall.com](http://www.morgansindall.com)

Mott MacDonald - [www.mottmac.com](http://www.mottmac.com)

Norder Design Associates Ltd - [www.norder.co.uk](http://www.norder.co.uk)

PJ Davidson (UK) Ltd - [www.pjd.uk.net](http://www.pjd.uk.net)

Power Better Soil Solutions - [www.powerbetter.biz](http://www.powerbetter.biz)

RJT Excavations Ltd - [www.rjtexcavations.co.uk](http://www.rjtexcavations.co.uk)

Roadgrip Ltd - [www.roadgrip.co.uk](http://www.roadgrip.co.uk)

Roocroft Road Restraints Systems - [www.roocroftfencing.com](http://www.roocroftfencing.com)

SGE - [www.sgeworks.co.uk](http://www.sgeworks.co.uk)

Smith Construction (Heckington) Ltd - [www.smithsportscivils.co.uk](http://www.smithsportscivils.co.uk)

TAG Construction - [www.tagconstructionltd.co.uk](http://www.tagconstructionltd.co.uk)

Tarmac Ltd - [www.tarmac.com](http://www.tarmac.com)

Tata Steel Shapfell - [www.tatasteeleurope.com](http://www.tatasteeleurope.com)

Techjoint Ltd - [www.techjoint.co.uk](http://www.techjoint.co.uk)

TKL Earthworks - [www.thetklgroup.co.uk](http://www.thetklgroup.co.uk)

TR Stabilisation - [www.trstabilisation.co.uk](http://www.trstabilisation.co.uk)

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