

buildoffsite



Enabling the construction industry to deliver far greater project value. As membership grows, we are moving from a niche group into the construction mainstream.

Addressing the UK Housing Challenge. An opportunity to review key developments taking place within the UK housing market.

Heathrow launches drive for off-site construction. Plans to use its £16bn expansion to drive growth in off-site construction across the UK.

High quality precast solutions faster with Tekla Software. Incorporating Tekla software from Trimble into business – saving an impressive amount of time and money.

Davyhulme WwTW Modernisation Project. A £200 million modernisation programme at wastewater treatment works, in Greater Manchester.

Arup Associates – Sky Believe in Better Building. Demonstrating the use of offsite prefabrication and timber construction to achieve a unique workplace.

The OFF SITE Construction Show

11th -12th October 2017
ExCel, London
In association with **buildoffsite**



www.offsiteconstructionshow.co.uk

- The **UK's most prestigious Offsite event.**
- Top Class **Seminar** program in **2** in-hall theatres.
- **LIVE** in-hall **Demos** and **Masterclasses** - all **FREE!**
- **FREE** entry to the **show** and all **seminars!**

"The quality of visitors has been fantastic. . . to showcase a good range of products and solutions, here is the perfect audience" - Kieran Fields, F P McCann.

"Amazing, been going non stop since 9 o'clock" - Christine Lamont, Premier Modular.

"This is our second time at the Offsite Show, it's a great Show and even better this year" - Jill Willoughby, Trimble Solutions.

Welcome

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Front cover photo

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With sustained public and private sector investment in infrastructure projects, and sustained market confidence, the UK construction industry is steaming ahead.

The challenges that the industry faces in terms of skills shortages are not going away and may become just another management challenge for those in the industry. With upward pressure on prices and low levels of productivity still a fundamental strategic issue, it comes as no surprise that interest in offsite construction is growing from strength to strength. The clear message is that offsite construction is increasingly being seen as 'business as normal' practice, with the search now on for better understanding of effective engagement with the offsite supply chain and the need to gain the skills required to integrate offsite alongside traditional construction practices. In future issues, we will report on some of the game changing investment decisions that are currently underway.

In this issue, Interim Director Tim Hall talks about how Buildoffsite is evolving to meet the developing needs of the Membership, to help support the growth in the understanding and use of offsite solutions across all sectors. The issue also includes an update on the Comparator Tool, which provides real time cost and carbon information on offsite enabled construction compared to traditional construction at a point when this can inform investment, design and project decisions, Case Studies and contributions from our Members.

We have also included information on Buildoffsite's upcoming events including our participation at the Offsite Construction Show, which takes place at The ExCeL on 11 and 12 October.

We thank all of our Members for their continued support. If you would like to contribute to our autumn newsletter, please contact Louise Smith on the left.

Contents

Hello

Did we just have a General Election? 4

News

Buildoffsite: Enabling the construction industry to deliver far greater project value 5

Everything you need to know about the UK Build To Rent Market 6

Addressing the UK Housing Challenge 6

Comparator – special offer to Buildoffsite members 8

Offsite helps NG Bailey put 'eco-heart' into Old Oak Common 9

Lucideon Releases New Offsite Construction Testing White Paper 10

Howick partners with Autodesk 10

Heathrow launches drive for off-site construction 11

High quality precast solutions faster with Tekla Software 12

School of the future unveiled by the McAvoy Group 13

Case Studies

Davyhulme WwTW Modernisation Project (United Utilities) 14

Arup Associates – Sky Believe in Better Building 18

New Members

ApplyStructure 20

Evolution Innovation 20

Design Automation Systems Ltd 21

Yorkshire Water 21

Events

Offsite Construction Show 2017 22

Encon Insulation Spray Plaster Demonstration 23

Hello

Did we just have a General Election?

So the surprise General Election 2017 has been and gone. The political dust has settled, and although the outcome might have some significance in terms of political egos and careers in terms of UK housekeeping, it has all been a bit of a non-event. Viewed from a construction industry perspective, things looks remarkably similar to where they were on 7 June.

The challenges the UK faces have in no way changed. Money is still tight, disposable incomes for most are in long term decline, the pressures on public services increase inexorably, the housing shortage in many parts of the country continues to deteriorate and so on. Big issues and horribly complicated.

Clearly the construction industry has a vital role to play in addressing many of the challenges that the UK faces. Sustained investment in infrastructure is absolutely essential in order to develop the assets that we need to operate as a leading economy, to generate wealth and to create jobs. Spending on the delivery of education, health and social care requires appropriate investment in buildings. Spending on housing is essential in order to create and then maintain the homes that people need and want to live in. It is an immense set of challenges – but precisely the same set that existed before 8 June.

One of the most intractable problems that the UK faces is the long term slide in our productivity as compared to our international competitors. The emerging economies have been able to benefit economically from rapid industrialisation, and step-change in technology and industrial practices.

There is a direct relationship between declining relative productivity in the UK and average UK incomes. If the UK fails to make the necessary investment in infrastructure of all types and in skills, then productivity will continue to decline and the challenges we face will get worse.

Action to improve productivity and efficiency is long overdue in the construction industry. Given that around 80% of the cost of typical construction is represented by the cost of labour, the key to transforming productivity is investing in smarter ways in which people can work. Sure some of this can be enabled by technology but much is dependent on driving the use of more efficient (people based) processes, by identifying and taking out those activities that add cost but deliver little or no added value to the client. Working smarter and working differently. It is not difficult to see how things can be done – you only have to look at how leading manufacturers of consumer goods operate and thrive in a market that in most cases is global. To a significant extent UK construction's woeful levels of productivity and intractably poor client value have been protected because there is relatively little challenge from companies that operate much more efficiently. By and large the construction sector globally is not blessed with companies that have the ability and muscle to act as game-changers.

Achieving transformational change in the UK construction industry is a massive ask. For many the comfort that comes from sticking with the same old same old is compelling and avoids any personal, project or commercial risks that often accompany change.

Driving an approach to construction based on ubiquitous acceptance and understanding of optimising the use of offsite methods is perhaps the single most important step-change measure the industry can embrace. This is a multi-faceted challenge and it is one that Buildoffsite as the recognised voice of the offsite industry is delighted to lead on.

However, let's not kid ourselves – the inertia that exists within many parts of the construction industry will require a sustained effort before wholesale change happens. Until it does – until the industry transforms the way in which people work – the prospects of a productivity revolution will remain on the thin side of slim.

Government has an important role to play in giving client and policy leadership. Let's hope that the new batch of Ministers and their advisers quickly get the twin-edged message that a much more productive construction industry is a strategic priority and to help make this happen they need to become active players and not just sit in the Directors' Box.

“If the UK fails to make the necessary investment in infrastructure of all types and in skills then productivity will continue to decline”

News

Buildoffsite: Enabling the construction industry to deliver far greater project value



Tim Hall, Interim Director

It has been a privilege to take on the mantle of leading the Buildoffsite team, despite the difficult circumstances following the loss of Andy Dix.

I have been impressed by the enthusiasm of many Members to be part of the transformation of the way we build, as well as the commitment of the dedicated Buildoffsite staff and Industry Experts. There are further changes to the team, with Roisin moving to the Royal College of Pathologists, having been offered a fantastic opportunity as their Membership Manager. We wish Roisin well and thank her for her tireless efforts in Buildoffsite. Into the team comes Louise Smith, who has a wealth of experience in Housing and Local Government. Watch this space for further new faces to strengthen our Hubs and Communications resource.

I have had great support from our Non-Executive Directors, who have strongly encouraged us to continue the evolution of Buildoffsite from promoting offsite, to enabling far greater construction value.

- Buildoffsite remains the voice of the Offsite sector, promoting the benefits of all aspects of smart construction
- Our emerging priority is to be the focal point for construction innovation, enabling our members to deliver their projects better, faster and more cost-effectively
- Buildoffsite brings together innovators from across the value chain, providing a platform for members to share opportunities, collaborate on projects, and achieve our goals of a transformation in productivity and far greater construction value

As membership grows, we are moving from a niche group into the construction mainstream. This will increase Buildoffsite's value to all Members, and I would encourage you all to introduce ambitious and curious organisations so that they can explore the value of membership.

Hubs

It is in the hubs that the voice of clients is crucial – ensuring that design and supply chain members focus on improving value for specific markets, and set new standards for construction as usual.

The Water and Rail Hubs have clear client leadership, and the focus is now on creating common approaches to achieve highly productive project delivery.

Housing is a priority, with a huge amount of current activity and investment. Buildoffsite will take a lead to ensure that clients can have confidence in capable supply, and we will support manufacturers to scale sustainably and profitably. We are looking for strong client voices in the Housing Hub to steer the development of remarkable new products and value propositions.

Hubs are launched and resourced in response to client and market needs. The Pharma Hub is in the pipeline, led by GSK and AstraZeneca, and supported by Enterprise Ireland.

There is plenty of opportunity for new and long-term Members to engage and benefit from market-focused Hubs. Buildoffsite will work with the lead Members to ensure Hubs are set up with clear objectives and are then supported with the right resource to deliver greater project value in their sector.

I'd encourage current and prospective Members to get involved early and help shape the future for your markets.

Our industry is on the move and I envisage that spectators will get left behind. Buildoffsite is a not for profit organisation, focused on enabling greater project value. Make the most of membership to ensure that your organisation is at the forefront of a dynamic industry.

News



Everything you need to know about the UK Build To Rent Market

Build To Rent (BTR) is a fast growing sector of the UK Housing Market. With substantial investment capital available from the international investment community, it is estimated that within a few years BTR could deliver in excess of 25,000 homes a year. For this market, the use of offsite construction methods to deliver quality homes at scale as quickly as possible is particularly attractive.

Regarded by investors as a new asset class, a superb briefing document on the BTR market has been prepared by the London School of Economics with support from Barclays. The Report is available from: <https://www.barclayscorporate.com/content/dam/corppublic/corporate/Documents/Industry-expertise/BTR-Report.pdf>

Addressing the UK Housing Challenge

On 25 May, Buildoffsite together with Members: Enterprise Ireland and Invest Northern Ireland, jointly presented a knowledge and networking reception, hosted at the Irish Embassy, London. Around 100 Buildoffsite Members and guests joined us in the magnificent surroundings of the Embassy Ballroom. The Event was chaired by Tim Hall, Interim Buildoffsite Director on behalf of the Buildoffsite Housing Hub with John Hunt of Enterprise Ireland hosting the Panel session.

Enterprise Ireland is responsible for the development and growth of Irish enterprises in world markets. They work with a clientele of Irish enterprises to help them start, grow, innovate and win export sales in global markets.

Invest Northern Ireland provides support for sectors that offer high returns for the Northern Ireland economy. This involves helping to build the connections and infrastructure that will promote excellence in specific areas.

The 25 May event was crafted to provide an opportunity to review key developments taking place within the UK housing market including in particular the emergence of an increasingly significant Build to Rent (BTR) market and to address the opportunities and challenges for the offsite supply side.



The event featured an afternoon of great speakers drawn from across the investor, client, research, design and delivery sectors, comprising:

- Vanessa Hale, Partner for Research at Strutt & Parker
- Shamez Alibhai, Real Estate Partner at Cheyne Capital
- Ray Theakston, Construction Director for Essential Living
- Brendan Geraghty, Partner at Geraghty Taylor Architects
- Keith Taylor, Managing Director of F3 Group Construct
- Dennis Watson, Managing Director, Barclays Corporate
- Ana Nekhamkin, Managing Director of Inhabit
- Giles Carter, Operating Partner at TDR Capital (Keepmoat)

Copies of the presentations are downloadable from the Buildoffsite website: www.buildoffsite.com



The issues arising included factors influencing demand for tenure types, project funding, the issue of affordability, the range of housing solutions coming to market, opportunities for collaboration between the private and public sector, innovation in design and product solutions and ensuring long term asset value. Across the piece it was recognised that the opportunities for offsite solutions at scale to deliver the quality, performance in use and the number of new homes needed to meet UK housing need are becoming increasingly significant.

Following the success of the event the Buildoffsite Housing Hub will now be considering the structure of additional events to showcase and debate additional key elements of UK housing provision including in particular the increased role for Local Authorities, Housing Associations and other organisations. The details will be promoted on the Buildoffsite website.

“Invest Northern Ireland provides support for sectors that offer high returns for the Northern Ireland economy. This involves helping to build the connections and infrastructure that will promote excellence in specific areas.”

News

Comparator – special offer to Buildoffsite members



Buildoffsite members are offered a link to their website from the Educational version of Comparator FREE OF CHARGE.

Comparator is an upgraded version of the CombiCycle whole-life Cost and Sustainability programme developed by IFPI. Comparator takes its name from the UKCES-funded research project sponsored by Buildoffsite, which led to the extension of the CombiCycle programme to facilitate comparison between on-site and off-site alternatives at feasibility stage.

Progress on the new 'eclectic' cost estimating process being built into Version 6 of the CombiCycle Comparator model is progressing well and a hybrid Version 5/6 has been developed to allow demonstration of the model's functionality, while the data for Version 6 continues to be inputted.

This highly sophisticated web-enabled programme is designed to facilitate prediction of the whole-life cost and sustainability of any building, of any specification, at the feasibility stage of a project and throughout the design development stages. Importantly, from a

CombiCycle Whole-life Cost & Sustainability Prediction	
Business Case - Accelerated Project Completion	
£	
Cost differential	
Default construction cost	£2,000,000
Accelerated construction cost	£2,200,000
	Cost of acceleration £200,000
Consequences of acceleration	
Time saved by acceleration - months	3
Additional net income generated during the time saved	£400,000
Interest on construction costs - saving over reduced period	£15,000
Inflation on construction costs - saving over reduced period	£1,500
Gross benefit/deficit	£416,500
Net Benefit or Cost	£216,500

Buildoffsite perspective, off-site alternatives can be called up at an early stage so that prospective users have the chance to consider the implications at a point when off-site solutions can be made most cost-effective.

Apart from predicting the capital and whole life costs, and the carbon (embodied and in-use) emanating from selection of fabric and services, Comparator also predicts the programme time of any design solution and allows users to modify the output.

This programming functionality enables the model to calculate finance charges against its calculated project cash flow. Taking advantage of this functionality, Version 6 now includes a template to illustrate the Business Case for acceleration or deceleration of the project programme, using the output from the model.

IFPI, developers of the model, are now preparing to launch a limited edition of Comparator for use in the education sector. The provision of the educational version was a self-imposed condition of the funding received from UKCES for the Buildoffsite-sponsored Comparator research project in 2015.

There will be no charge to the carefully selected end users for this Educational version, the cost of which will be subsidised by payments from suppliers and manufacturers for URL links to their websites. However, by way of saying thank you to Buildoffsite members for their support in achieving the UKCES funding, IFPI are offering Buildoffsite members a FREE URL LINK to their websites from whichever section of the model they choose. If any members taking up this offer would like to populate specific components with cost and sustainability data for use in the Educational version this will be welcomed but it is not a condition of the offer.

The opportunity presented by this ex gratia version of Comparator to expose some 40,000 full and part-time construction industry students to the benefits of offsite construction during their early training is expected to be an important factor in the expansion of the offsite industry in years to come.

The launch of the Educational version is now planned for the beginning of the autumn term, so any members who wish to discuss this offer should contact Prof Bernard Williams at IFPI by emailing: bernardw@int-fpi.com as soon as possible.

Offsite helps NG Bailey put 'eco-heart' into Old Oak Common

NG Bailey has successfully completed the design, build and installation of a new modular central boiler plantroom that is at the heart of Transport for London's new Elizabeth Line train maintenance and stabling depot at Old Oak Common Lane, North West London.

The Old Oak Common (OOC) depot will include stabling sidings for 33 of the 66 new Elizabeth Line trains being built in Derby by Bombardier Transportation, and a state-of-the-art nine-track operating, maintenance and control (OMC) building.

Taylor Woodrow is the main contractor and lead coordinator of the building services design for the £142m depot, with NG Bailey responsible for the circa £14m mechanical, electrical and plumbing services.

Lee Taylor, director of Rail at NG Bailey, said: "This is one of the largest depots to be built in the UK in recent years and sets a new sustainability benchmark that will undoubtedly form a blueprint for future depots."

The new plantroom is an integral element of the building services system.

The plantroom will be the heart of the building, integrated with the renewable energy systems and distributing the energy generated by the numerous eco systems.

It comprises six 24 sq m prefabricated modules, each weighing in excess of a tonne, and contain the central boiler plant and pipework interfacing with the renewable energy systems. Due to its streamlined prefabricated design, the installation of the modules took just two days to install on site and was completed in two weeks.

Each module was manufactured in NG Bailey's dedicated off-site manufacturing facility. The traditional build time for the full installation and testing would have been 3,000 site labour hours but, by using offsite manufacture, this was reduced to just 400 hours.

The quality of the central boiler plant has also been improved through construction under factory conditions. This enabled much of the complicated work to be completed offsite, allowing a much simpler on-site installation.

The building services design, build and installation at OOC embraces a collaborative team approach, with early engagement of all key design and development partners.

The award-winning hybrid renewable energy system has been developed by renewable energy specialists GI Energy in collaboration with Taylor Woodrow, NG Bailey and Uponor Building Services, with the lead designer role fulfilled by Atkins Global.

Uponor Building Services is responsible for the underfloor heating and cooling distribution pipework throughout the main depot building accommodation and workshop areas.

Together the team has created a solution which meets the demanding sustainability requirements set by TfL.

The whole scheme will exceed the initial design target of 20% of the main building's energy requirements coming from renewable sources, with the hybrid scheme set to deliver over 30% of the energy demand.

"Due to its streamlined prefabricated design, the installation of the modules took just two days to install on site and was completed in two weeks."

For more information, please contact Cal Bailey by email: cal.bailey@ngbailey.co.uk visit: www.ngbailey.co.uk or view the video at: <https://youtu.be/Pru47wtrGks>

News



Lucideon Releases New Offsite Construction Testing White Paper

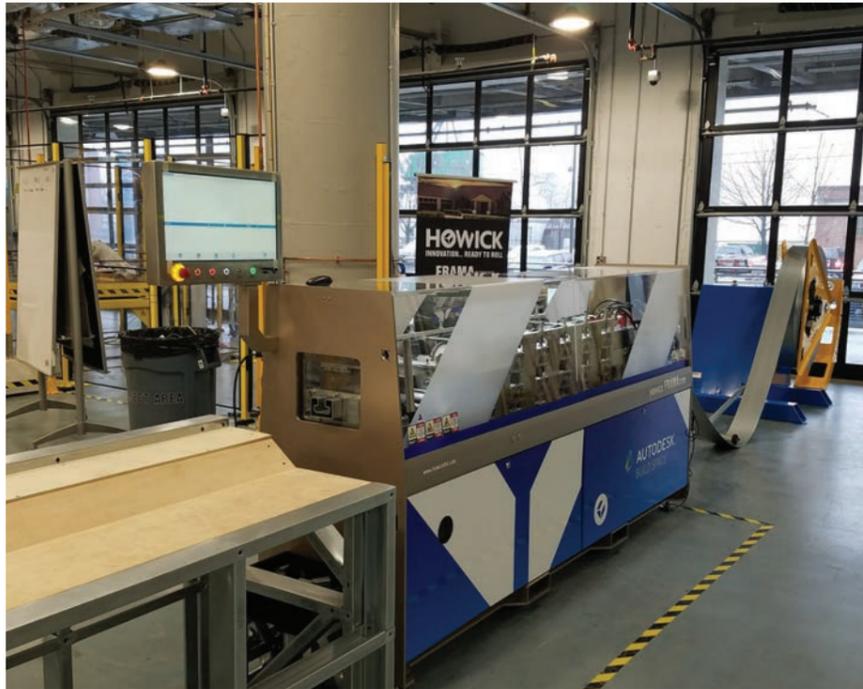
Lucideon, the international materials development and commercialization organisation, has released a new white paper: Offsite Construction: The Relevance of Full Scale Testing.

Written by Dr Geoff Edgell, director and principal consultant at Lucideon, the paper discusses the benefits of testing whole structures, as opposed to independently testing the elements that create a structure. Dr Edgell draws upon his years of experience in the construction industry, and recent trends seen in the Lucideon structural testing laboratories, to provide case study examples that support his argument.

Download the free white paper at www.lucideon.com/construction

For more information, please contact Dr Geoff Edgell by phone: 01782 764400 or email: geoff.edgell@lucideon.com

Howick Partners with Autodesk



In October 2016, Autodesk launched their new BUILD Space facility in Dry Dock Avenue, Boston, MA. The building space they occupy is contained within the renovation of the Innovation and Design Building for research into technologies that are changing the building industry. Under one roof they offer an industrial digital fabrication workshop, start-up incubator and innovation studio.

During April Howick installed and commissioned in the BUILD Space a new FRAMA 3200 smart technology roll-forming framing machine, and worked with Autodesk to provide training on the technology.

Autodesk's focus will be using BIM data that can help automate the construction process. Howick is excited that their technology will be in the lifecycle chain of the R&D efforts. This autumn, Autodesk will conduct a pilot using our technology

along with other technologies and software to build out the 17,000 sq ft second phase of the BUILD Space.

We look forward to working with Autodesk as they move forward with their R&D efforts. If you are interested in visiting the facility to obtain more knowledge on Howick machines, see a demonstration and get a better outlook on Autodesk's efforts with their cutting edge new facility, please let us know.

You can find out more about BUILD Space at: www.autodesk.com/build-space

For more information or to arrange a visit, please contact: Nick Coubray, Director on tel: +64 9 534 5569 email: nick@howickltd.com or visit: www.howickltd.com

News

Heathrow launches drive for off-site construction



Heathrow has announced plans to use its £16bn expansion to drive growth in off-site construction across the UK. It is inviting places across Britain to compete to host one of four new off-site logistics hubs.

Suitable locations will have good connectivity, access to a relevant supply chain and strong local skills. The hubs are seen as the key to Heathrow's plans for building as much off-site as possible, with the aim of making the project more affordable and environmentally sustainable while driving growth across Britain.

Heathrow CEO John Holland-Kaye announced that the airport would be making

a major push to support more off-site construction in the UK. The announcement comes as new research from economic consultancy WPI Economics said that growth in the sector could lead to a £15bn boost for the construction industry outside London by 2020 alone.

The new logistics hubs will pre-assemble components of the expanded airport before transporting them in consolidated loads to Heathrow. One of the benefits is seen as spreading the jobs created by the project across more communities.

John Holland-Kaye said: "The global construction industry is set to be worth £15 trillion by 2025 – that's a huge prize

that Britain deserves a bigger share of and Heathrow can help. We want to use Heathrow expansion to not only upgrade Britain's infrastructure, but cultivate a new world-leading sector and drive growth across the whole country. Boosting off-site construction will help make expansion more affordable and environmentally friendly and give Britain a lasting legacy of expertise that it can sell around the world – helping Britain lead the pack in global construction."

For more information, please contact Procurement Director Maya Jani by email: mayajani@heathrow.com or call: 07786 171085

News

High quality precast solutions faster with Tekla Software



O'Reilly Concrete, Ireland's leading precast concrete manufacturer, moved from 2D design to 3D design over 10 years ago, by incorporating Tekla software from Trimble into its business – and has been saving an impressive amount of time and money ever since.

Like most manufacturers in the past, O'Reilly Concrete produced all of its designs and fabrication drawings using 2D CAD software. However, with the company dedicated to researching new products to increase its range, it knew it had to upgrade its software. In 2005, O'Reilly Concrete decided to move to 3D design by adopting Tekla Structures in its drawing office.

Richard Kowalski, Technical Director at O'Reilly Concrete, said: "Prior to incorporating Tekla software within the business, we employed traditional 2D design methods that were slow and time consuming. We used 2D CAD software for fabrication drawings, which meant there was no link between GA drawings and individual cast unit drawings, and any alterations made in the general design had to be changed manually on the production drawings – and any late changes

made to a design from the architects or engineers resulted in mistakes and time delays. After a lot of market research, we made the decision to implement Tekla Structures as our main design package. Tekla Structures is a very clever piece of software, as you can view the future development in a 3D model, and identify and correct all design clashes. It also finds potential sections where the design could be improved, which is not possible in 2D, as well as helping to split a building into precast elements, create accurate drawings and help you to manage transport, the erection of the building and all of the design processes."

O'Reilly Concrete fully utilised the software on, at the time, one of the biggest residential developments in Dublin – Adamstown. Richard said: "Using the software on this project was a completely new way of working for our drawing office, but it did come with a lot of benefits and time-savings. In fact, we managed to reduce the programme of Adamstown from 20 weeks to 16 weeks and reduced design errors by 80%. These savings were made mainly in the design and detailing phase; if the 3D model was correct then the production drawings generated directly from

the model, were accurate too. The 3D model also allowed for any late changes to be accommodated easily and update all of the drawings. With a model based process we avoided a lot of drilling and coring on site, which was quite common when we were working in 2D."

In addition to using Tekla structures, O'Reilly Concrete also recognised the potential of using Tekla BIMsight, which allows everyone on the project to look at the building and check the designs.

Richard said: "Tekla BIMsight is a very useful piece of software that allows everyone on the project to keep track of the design and production. We also use colour coding on the model to show the progression of a project to our client enabling them to see where the project is at all stages. Tekla software has indeed become a centre point of project organisation for our company. At O'Reilly Concrete, we don't only just use Tekla Structures and Tekla BIMsight, we also use Tekla Structural Designer and Tekla Tedds and our future plan is to integrate Tekla software more into our production planning and management process. If you have already invested in a package like Tekla Structures, it would be a waste of potential and a waste of investment not to use it to its full extent."

For more information please visit: www.tekla.com/uk/solutions

News

School of the future unveiled by the McAvoy Group



The opening of Lynch Hill Enterprise Academy in Slough illustrates a new era in educational infrastructure and stands as a beacon of inspirational innovation. Equipped from top to bottom, inside and out, with the zenith in cutting-edge school design elements, Lynch Hill is an extraordinary and motivational new learning environment for children.

Standing as a 'best in class' model of the school of the future, Lynch Hill Enterprise Academy marked a record-breaking building project by The McAvoy Group who completed the school 17 weeks ahead of schedule – despite a three-month delay.

The £20m school, situated at the town's Stoke Road, is understood to be one of the UK's largest ever post-primary modular schools. Spanning a massive 8750m² the building accommodates 1140 pupils across a 2.87 hectares site. The project was commissioned by The Learning Alliance Academy Trust, with the contract being awarded through the Crown Commercial Service (CCS) Framework for Modular Building Systems which is funded through the Education Funding Agency (EFA).

The completed three-story secondary school development is a truly state-of-the-art educational campus and comprises a four-court sports hall, multi-use games area, playing fields, car parking areas and extensive landscaping.

Like other major developments completed by The McAvoy Group, the new Lynch Hill Academy offers compelling evidence of how offsite construction has truly established itself as the smarter choice for education projects, large and small. As principal contractor, McAvoy was responsible for leading the project from feasibility approval, outline and design, through to planning and delivery of the challenging and complex scheme. McAvoy engaged with the client, planners and local authority at the earliest possible opportunity to agree a design plan, giving each stakeholder a comprehensive input into the blueprints.

Each link in the supply chain was carefully overseen by McAvoy to avoid potentially costly chinks with the collaborative liaison between the stakeholders succeeding in keeping the manufacturing facility abreast of any changes. Regular meetings were also held with Slough Council, which was in the process of constructing a football stadium concurrent with the Lynch Hill scheme, to agree the movements of heavy construction vehicles from both developments which shared a single and tight access point.

School head, Jane Everton, identified early engagement as a key attraction of offsite as it enabled her to specify the optimal fixtures, fittings and equipment bearing the school's bright and inspiring brand colours to create the most educationally conducive

environment for children. The McAvoy Group's Executive Chair, Orla Corr said: "We pride ourselves in our ability to take the stress, uncertainty and project concerns off our clients' shoulders. Our unique approach which incorporates partnership, collaboration and engagement underpinned by unparalleled sectoral experience has been a key element in the building of our reputation as acknowledged experts in offsite modular construction throughout the UK and Ireland. The scale of Lynch Hill marks a new era in McAvoy's offsite capability with the project requiring us to produce our largest-ever modules to facilitate one of the largest-ever modular schools ever to be made in the UK."

The McAvoy Group became the first company of its kind to achieve BRE BIM Level 2 accreditation. It is now well on its way to Level 3 certification.

It was also the first offsite modular company to become involved in the Offsite Management School, an industry-wide leadership group aimed at helping suppliers meet the challenges of the Government's 2025 Industrial Strategy which incorporates a range of targets for the construction sector including 33% lower costs, 50% faster delivery timescales, 50% lower emissions and 50% improvement in exports. School head Jane Everton said: "The joy of the development was having the opportunity to be involved with the design of the school, and to make it perfectly fit our purpose."

For more information, email: buildsmart@mcavoygroup.com visit: www.mcavoygroup.com

Case Study

Davyhulme WwTW Modernisation Project

United Utilities: Leading the way with offsite enabled construction

Introduction:

Davyhulme WwTW is United Utilities largest wastewater treatment works, which serves over one million people in Greater Manchester. It has been undergoing a £200 million modernisation programme, which started on site in 2015 and is now close to completion. The upgrade is required to ensure it complies with tighter discharge consents and the impact of local population and trade growth. This year sees the start of the commissioning phase which will be completed by November. The plant will be run by Laing O'Rourke commissioning staff and plant operators for six months to optimise the plant before handover, expected September 2018.

The objective of this optimisation is to make Davyhulme the most efficient plant of this type in the UK, with stringent targets for power and chemical usage as well as significantly reduced operational working hours.

What is being provided?

The new works will screen up to 8,264l/s through the new inlet works. The existing grit plant has been refurbished. All channels and skip buildings are to be odour controlled to minimise offsite odour impact. A new inter-stage pumping station will convey 60% of flows to six new primary settlement tanks (PST). From there it will pass through a ten-lane nitrifying activated sludge plant (ASP) to ten final settlement tanks (FST). The surplus

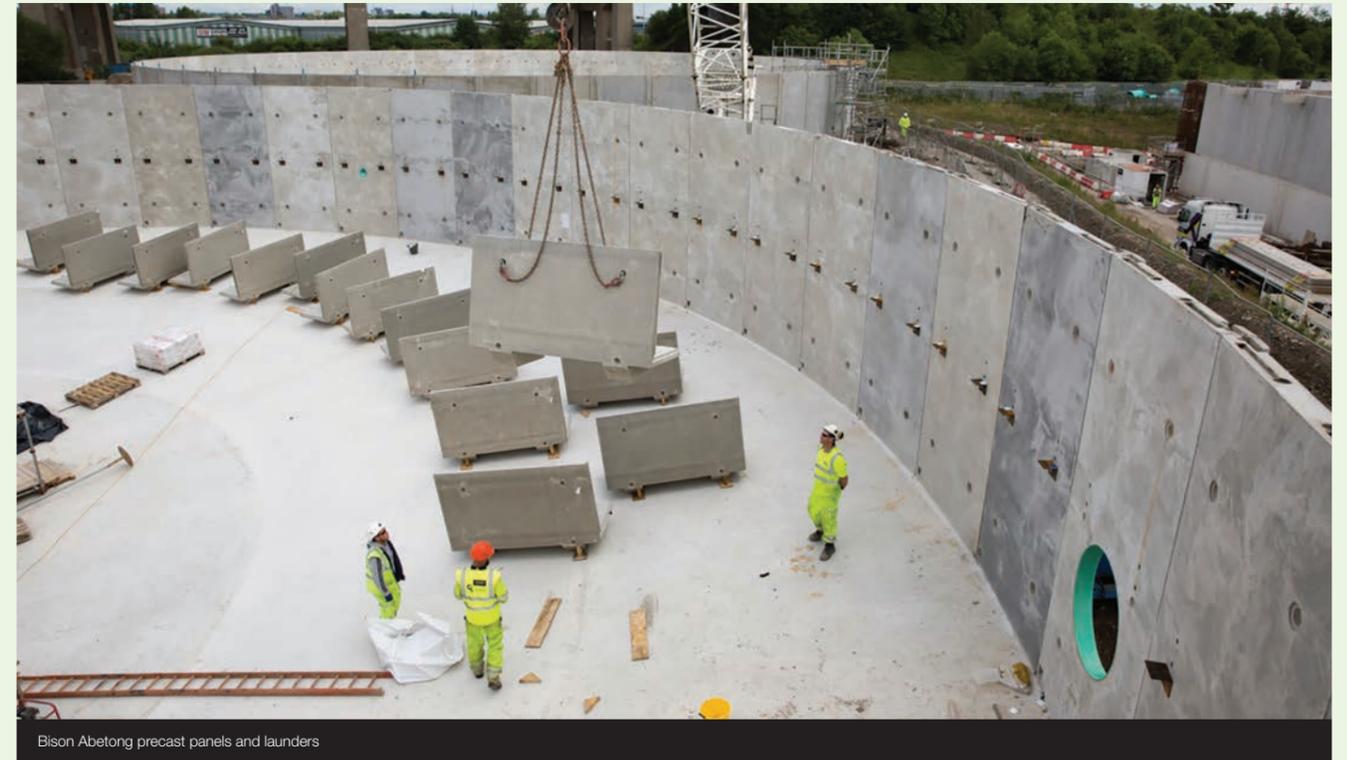
activated sludge (SAS) will be removed and thickened in a new SAS treatment plant consisting of a 2000m³ storage tank, four drum thickeners and a liquid polymer dosing plant.

Improved imported waste tanker facilities are also being provided with automatic sludge loggers.

The existing Programmable Logic Controller (PLC) automation on the retained assets is to be migrated onto the Distributed Control System (DCS) giving better visibility and control of process units. New 15.5MVA dual power supplies have been installed by Electricity North West Ltd (ENWL) to give improved operational resilience to the whole site.



Photographs courtesy of Laing O'Rourke



Bison Abetong precast panels and launders

Undertakings:

The scheme is the largest live wastewater treatment project currently being constructed in the UK. It is a collaborative design and build scheme between United Utilities and the principal contractor Laing O'Rourke.

Design for Manufacture and Assembly (DfMA):

To do more for less, United Utilities identified the use of offsite solutions and DfMA as a key efficiency strategy. DfMA was core to the Laing O'Rourke tender proposal and built on the expertise gained on previous treatment upgrades of major water industry sites, where the use of precast elements and off-site manufacture provided significant benefits for site safety, time and cost compared to traditional construction methods on site.

By developing a detailed component tracker for co-ordinating production, delivery and offloading the team were able to overcome significant logistical constraints due to limited

storage space available on site. Each component was delivered just-in-time to maximise installation efficiency and optimise hook time. Installation of cast-in items also virtually eliminated the requirements for drilling and fixing on precast elements.

PST and FST tanks:

The six polygonal PSTs and ten FSTs were constructed using Bison Abetong C14 pre-stressed wall panels and outfall launder channels founded on a piled cast in-situ base slab. The vertical joints between the precast panels and the horizontal joint between the bottom slab and the panels are grouted with concrete. The circumferential mono strands are then post-tensioned and once this is complete all the strand ducts are pumped full with grout.

Each of the 41m diameter x 5m tall PSTs consists of 54 precast wall panels with a unit weight of 6.3 Tonnes with the 46m diameter FSTs comprising 61 panels. Early engagement

between the manufacturer, Bison, and the design team identified the opportunity to slightly reduce the height of the PST Abetong panels, which in turn allowed the supplier to use one mould to cast two panels at the same time, increasing production throughput during manufacture.

Continued overleaf

Case Study

When compared to traditional construction methods, Laing O'Rourke's use of Abetong pre-cast panels has resulted in 2,466 fewer construction working days across all 16 tanks.

Activated Sludge Plant:

The ASP is made up of a 7,111m³ common anoxic zone and ten aeration lanes; each lane is 10.5m wide and 9.5m deep. At 158m in length, these are as long as the Blackpool tower is tall, with one lane taking over 3 million pints to fill. The design utilised over 2,000 pre-cast concrete units, consisting of the Explore pre-cast twin wall system and Bison pre-cast beams and walkways, each was modelled in detail to enable extensive clash detection on both the pre-cast units and the in-situ stitch reinforcement. This additional effort at the design stage resulted in no clashes being recorded during construction.

Laing O'Rourke drew on experience from working on constrained central London construction sites to overcome issues with limited available storage space both on site and at the factories. Working closely with the supply chain and Explore Transport, the team challenged the construction sequence and manufacturing programme, optimising just-in-time manufacture and delivery and utilising of offsite staging areas to buffer deliveries to site. This ultimately improved productivity on site and minimised damage to pre-cast units through storage and loading.

During the tender construction review the width of the lanes was increased to allow Select tower cranes to be installed on rails within the lanes. This reduced the number and types of cranes on site, which in turn reduced the requirements for additional crane pads, haulage roads and lay down areas. By utilising split shifts to place in-situ concrete during the day and pre-cast units in the evening, the hook time of these cranes was optimised to maximise productivity.

Laing O'Rourke's commitment to digital engineering meant that the project benefitted from pre-building the ASP in a virtual collaborative data environment. This led to changes in build tolerances and joint design, but more importantly let the construction team visualise installation sequences and constraints well in advance of construction works. This allowed temporary work to be designed and optimised earlier; generating significant safety and programme benefits.

As part of the installation of the ASP, Crown House Technologies provided the required galvanised structural steelwork: 57 walkway bridges, 28 mixer platforms and 15 step-overs. These came preinstalled with stainless steel pipework, hand railing and cable trays.

The collaborative approach to the construction of the ASP from tender stage to construction has saved 6,800 working days and generated significant savings.

Motor Control Centres (MCC):

As part of the Modernisation Project, 14 new MCCs enclosed in GRP kiosks were required around the site. With assistance from the supply chain, Laing O'Rourke created an innovative design where the MCC was pre-assembled offsite on a steel frame, inside a GRP kiosk complete with building services. Quality checks and Factory Acceptance Tests were carried out off site prior to transportation.

Smaller MCC kiosks consisted of a single pod design with two of the larger U-shaped MCCs being housed within a double pod design. The largest of these was 14m long and 7.5m wide for the split-kiosk design.

Excluding crane set up, each MCC pod was installed on the cast in-situ base within 15 minutes. The traditional method to install the flat-packed kiosk panels over a two week period with building services, heating, lighting, support steelwork, flooring and internal cabling following afterwards. Separately, the MCC would be built up at the supplier's factory, tested and then broken down into 1.5m to 3m-wide tiers for delivery. These would need to be reconnected at site and re-tested. For the largest of the MCCs at Davyhulme, this would have required over 7,000 reconnections and would have taken four people two weeks to complete. This was reduced to just 16 reconnections on site using the DfMA solution. By building the MCCs within the kiosks, supplier Lloyd Morris Electrical (LME), realised an unexpected benefit. By not using the factory to assemble the MCCs, as they would have traditionally, they freed up production space that would have normally been used, therefore allowing them to increase throughput.

This approach to DfMA has so far saved 140 working days and, generated significant interest from other projects.

Building information modelling (BIM):

The BIM, or digital engineering execution plan has proved to be invaluable in setting the rules on the exchange of 3D models, data, their required naming conventions, location, units and level of detail required. This project-centric information is to be created, controlled and stored on United Utilities' Common Data Environment (CDE), which is compliant to BS 1192.

Laing O'Rourke's digital engineering (DE) team has created an overall site federated model that consists of 142 civil, 271 mechanical, 26 electrical and 304 supplier models covering the new works across the 200-acre site. Working collaboratively with the civil design JV partners and supply chain, the DE team has created workflows from the various different software packages to ensure efficient transfer of design information.

The model has not only been used for the expected BIM requirements of clash detection and design reviews, but also for 4D construction sequencing, cut and fill volume calculations, temporary works design, induction videos, visual risk assessments and method statements, procurement and design management progress, access and lifting reviews, hazard and operability studies and tracking DfMA components. Laing O'Rourke also called upon their experience in the use of Fieldview on other major construction projects. By adapting it to digitally capture the installation, testing and commissioning data, the team saved time in the back office when reporting on progress. This data will be passed onto United Utilities for use in their asset data management system.

One of the aims of the DfMA component tracking was to provide a live link to the progress of pre-cast components being produced at Laing O'Rourke's manufacturing facility. The SAP database was linked to the 3D model to visualise the status of each component, highlighting potential delays and ensuring call-offs could be managed based upon a live schedule. This allowed the site engineers to quickly and easily view the status of all components in real time and increase accuracy in correct call-offs.

Surplus Activated Sludge Treatment Plant (SAS):

This collaborative approach of digital design integration and visualisation has helped Laing O'Rourke complete construction of the SAS plant three months ahead of programme.

Conclusion:

Laing O'Rourke's considered approach to DfMA and digital engineering from the tender designs to the final construction, in collaboration with United Utilities, has saved money and time with a saving of over 11,000 working days on site. This significantly contributed to the exemplary health and safety performance of the project, currently over 1.3 million working hours on site without a reportable incident. It will also leave United Utilities with a greatly improved major asset, fit for the envisaged future demands of Greater Manchester.

The full case study is available on the Buildoffsite website.

"Working collaboratively with the civil design JV partners and supply chain, the DE team has created workflows from the various different software packages to ensure efficient transfer of design information"

"By building the MCCs within the kiosks, supplier Lloyd Morris Electrical (LME), realised an unexpected benefit. By not using the factory to assemble the MCCs, as they would have traditionally, they freed up production space that would have normally been used"

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Case Study

Arup Associates – Sky Believe in Better Building



Conceived as a home for Sky's schools outreach and academy training programmes, the Believe in Better Building in Osterley, west London has a clear social idea based around community focus, education, and super-flexibility.

Arup Associates took the project from inception to site in three months and the project was completed in one year. The first multi-storey timber commercial office in the UK, it demonstrates the use of offsite prefabrication and timber construction to achieve a unique workplace in half the normal time-frame. Part of the brief was that the spaces should be adaptable over the long-term and none of the main spaces were conceived with fixed uses in mind: partitions slide and unfold to interconnect a shifting landscape of creative thinking rooms and party spaces alternating as venues for breakout, clusters, mingling, informal meeting and school party role playing. A large, open-plan, column free space accommodates large meetings and

gatherings, and room partitions are designed to achieve enhanced acoustic separation commensurate with the potential multi-media teaching in adjacent rooms. An open staircase rises through the triple height atrium to the rooftop terrace and restaurant. At first and second floors the stair width is increased to incorporate breakout spaces, providing not only circulation, and visual communication across the floors and out to the plaza, but creates a social and interactive focus to the building.

Sky sets high standards in sustainable design, is registered as a 'Carbon Neutral' company and targets a 15% reduction in embodied CO₂ emissions. The glulam and CLT structure, unheard of in a commercial



building of this size in Britain, could achieve beyond zero embodied CO₂ emissions. Where concrete is used, it has 100% secondary aggregate and uses the minimum cement through 40% PFA OPC replacement.

Mixed mode ventilation is used with openable windows and intake louvers in the façades, drawing warm air from perimeter spaces through and out of the atrium. Adiabatic cooling and heat recovery provide energy-efficient cooling without using conventional chillers, supplemented by DX coolers which operate at peak temperatures. The building's fabric is finely tuned to optimise performance, with its 'shop window' frontage avoiding excessive

solar gain because it faces north. On the other façades, vertical strip windows with deep internal reveals restrict heat transfer and solar glare and angled window reveals help to minimise solar gain. Passivhaus-level U-values and air-tightness were achieved with timber cassettes which shroud window frames, avoiding weak links in the external envelope. Low flush fittings and rainwater harvesting conserves water resources, employing a Flowstow system, developed by Arup, which saves pump energy and tank space by providing a gravity system using oversized cisterns which store rainwater and provide direct feed to the toilets. Further measures include low-energy lighting and rooftop PVs.



All Images ©Simon Kennedy

For more information, please contact New Business & Publicity Manager Jo Ronaldson by email: joanne.ronaldson@arupassociates.com or visit the website: <http://www.arupassociates.com/en/projects/bskyb-believe-better-building/>

New Members



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Visit: www.applystructure.com

ApplyStructure is an integrated design company serving the off-site manufacturing sector. We provide expert, independent advice on business, product and process development to clients engaged in capital projects:

- Developers targeting earlier return on investment
- Manufacturers wanting to develop their capability
- Designers and contractors managing the risk inherent in delivering new buildings

As experienced leaders in the design, specification, and selection of off-site components and building systems, we are focused on delivering the cost, quality and programme benefits for our clients.

We set out to answer three fundamental questions: What is desirable? What is feasible? And What is viable?

Our services include:

Architectural design, Structural Engineering design, Product design, System design, Production Process design, Research and Development and Project Management.

ApplyStructure

Manufacturing processes are transforming the delivery of new buildings. Our knowledge of available technologies and lean production techniques gives us the capability to select the most appropriate production methods.

With an interest in light-weight structures and a shared culture of delivering great new environments, the principals have collaborated for more than 15 years, focused on the valuable contribution of design for manufacture and assembly.

Working with the UNITE Group plc, Anthony, David and Stuart developed products and processes for the manufacturing facility at Stonehouse, and have subsequently worked with many other high performing teams.

Operating in established and emerging markets, we build on our clients' core competencies to generate valuable new outcomes. With projects in the UK, the Far East, Australia, and East and West Africa, we have a deep understanding of the opportunities and risks associated with off-site manufactured components and building systems, enabling us to realise our clients' ambitions.

New Members



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Based in the Midlands, DAS are specialists in the automation of engineering design processes. For 15 years we have been helping customers to achieve fast, high quality design processes, both to support the sales process and detailed engineering. We are both a specialist Autodesk partner focusing on their ETO products, as well as having our own .NET based automation platform.

Our customers are spread across many fields, with diverse products that have included pre-cast concrete wall and floor systems; large pressure pipe layout and design; modular foundation systems; plant room and modular services design and detailing; exhibition stand design; electrical distribution systems; hospital room configuration; furniture layout visualisation and costing; and even airport signage design.

Because our staff are experienced engineers and software designers, we are able to understand and capture engineering workflows using our specialist software platforms, usually quickly and

at a price that provides a very fast return on investment.

The following is a list of indicators that a product or design process is suitable for automation:

- The frequency of design iteration is medium to high
- The engineering rules are stable and can be defined (though often not documented)
- The drawing/design office has become a bottleneck to either sales proposals or delivery
- The design process is not supported by any off-the-shelf software



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Evolusion Innovation is an international construction technology consultancy, specialising in modern methods of construction with a focus on modular and panelised light gauge steel, and successfully exploiting the current prevailing growth in the use of offsite construction methods.

The Evolusion team provides a complete suite of superior specialist services, from structural engineering design through to specification development. They utilise their skills and expertise in Building Information Modelling (BIM), thermal bridging analysis, hygrothermal analysis, BBA-accredited elemental U value calculations and dynamic simulation modelling to design cost-effective, practical and energy efficient solutions for clients. Acoustic and fire performance design of building systems and individual

construction products are also included in the field of expertise.

Evolusion Innovation ensures savings in construction costs by eliminating costly over specification, while still providing full compliance with relevant regulations. This gives our customers, who include several world market leaders, much enhanced overall value and a competitive advantage in their respective markets.



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Yorkshire Water manages the collection, treatment and distribution of water in the region, supplying around 1.24 billion litres of drinking water to over 5 million people every day. We have 2,500 colleagues and rely on a huge network of more than 700 treatment works, 130 reservoirs and 62,000 miles of mains to transport water around the whole county using our unique grid system.

To keep such a complex system working effectively we've got to constantly invest in it, that's why between 2015 and 2020 we'll be putting £3.8 billion back into the local economy. But we're more than just a water company, we're also the second largest landowner in Yorkshire, with 80,000 acres of land and we welcome thousands of visitors to some of the most scenic spots that you'll find anywhere in Yorkshire every year.

Our company vision is 'taking care of the water environment for good' and we were delighted to be awarded platinum status in the Business in the Community environment index for our work in the area. We are continually striving to improve the efficiency of our asset investment programme and see off-site build and assembly as one of the key initiatives for now and into the future.



Events

The Off Site Construction Show

Visit the Off Site Construction Show on 11-12 October 2017 at ExCeL, London, and find out everything you need to know about offsite construction services, products and techniques.

The Offsite Construction Show 2017 (OSCS 2017) is all set for an early sell out. It is the only UK Exhibition and Networking event wholly dedicated to the OFFSITE Construction Industry. The Show is geared to meet the information needs of Construction Industry Professionals. It aims to bring people together and provide focus to give the industry perspective. It is also a fantastic launch-pad for new products and systems.

The Show targets the whole industry. It is a bespoke event – not an add-on, or an afterthought. The UK Offsite industry's very own dedicated showcase with close to 100 Exhibitors representing the full range of offsite products, services and technologies.

The Show is supported by many leading companies and the following have already booked their stand space: Trimble, Howick, FP McCann, Modulek, Wetherby Building Systems, Telling Architectural, Shay Murtagh Precast, Actavo Building Solutions, Enterprise Ireland, JJ Smith, Caledonian Modular, Apex Wiring Solutions, Morland, Creagh Concrete and British Precast.

We live in an increasingly remote digital age, but there is simply no substitute for face-to-face networking at the Off Site industry's leading Show.

The Show is supported by Buildoffsite and we are working with them to develop the seminar programme, and some new and exciting one-to-one sessions.

This Event is a must-visit for anyone seriously involved in any aspect of the construction industry. All of our exhibitors and partners are working with us, so that visitors can see what is new in the market, and gain essential insight and understanding of the UK's fastest growing construction method.

If you are involved in the offsite sector, you cannot afford to miss this Show; the only national event supported by many major industry figures.

Buildoffsite members receive a 10% discount on stand space, so call us now to book one of the final few exhibition stands.

Contact Marwood Events:

Eddie Milton on tel: 01327 226412
mobile: 07739 519797
email: eddie@marwoodevents.com

Paul Shelley on tel: 020 3086 9296
mobile: 07872 489790
email: paul@marwoodevents.com

For Delegate registration visit:

<https://offsite2017.smartreg.co.uk/Visitors/Visitors/register?promoid=bosjulynewsletter>

The
OFF
SITE
Construction Show

Upcoming Buildoffsite Member Events

For full list of Buildoffsite events visit www.buildoffsite.com/news-events/events/

Events

Encon Insulation Spray Plaster Demonstration



Date:

Friday 7 July

Time:

Live demonstrations at 8.00am and 10.30am

Location:

Unit 4 Langage One, Western Wood Way,
Langage Science Park, Plymouth PL7 5BE

To Register:

Email: PlymouthSprayDay@Encon.co.uk with your session preference (8.00am or 10.30am)

Buildoffsite Member Encon Insulation is holding a Spray Plaster event with a full live system demonstration of Knauf Readymixed Airless Finish to show how fast, clean and efficient the system is. Attendees will have the opportunity to use the spray machine and see the benefits of a premixed finish and experts will be on hand to offer advice. Free breakfast for all attendees.

The new way to achieve a quality finish:

- Best Site Product in the Housebuilder Product Awards 2017
- Extremely fast drying – 12-24 hours
- Ability to factory finish off site
- Minimises cracking caused by transportation
- Same system can be site and factory installed
- Can decorate within 24 hours
- No water required
- Less than 1% waste
- Higher constant finish
- Machine applied
- Flexible and innovative

An aerial, black and white photograph of a city. In the foreground, a large, circular stadium is under construction, showing its tiered seating bowl and the intricate steel truss structure of its roof. The stadium is surrounded by a dense urban landscape with various buildings, streets, and parking lots. The overall tone is industrial and architectural.

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THE DEFINITIVE VIDEO
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