



# architectural acoustic finishes

Oscar Elite exceptionally smooth acoustic plaster was used throughout this impressive office reception to control reverberation, give clarity of sound & reduce overall noise levels for this multi-award winning refurbishment at the Halo Building, Kings Cross, London.

With our extensive range of recycled, seamless, acoustic decorative finishes, we enable designers to create beautiful & inviting modern spaces that sound just as good as they look.

Credit to Steffian Bradley Architects & Gary Britton Photography.

















### 06/20

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Construction consultancy Balancing academia and business









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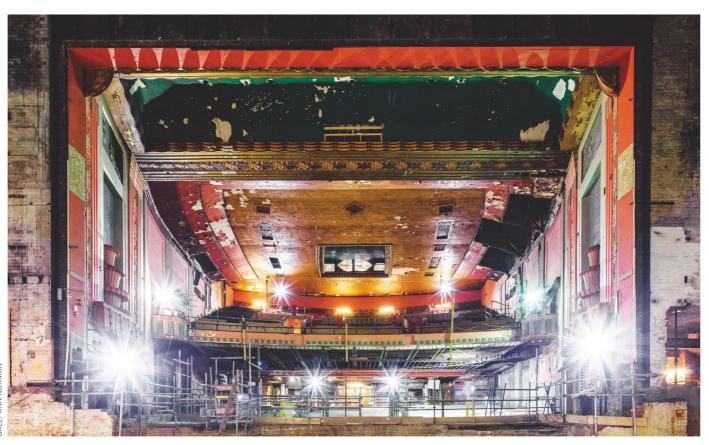
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# News



SALLY ANN NORMAN



#### ▲ Willmott Dixon opens over 95% of projects

Willmott Dixon has opened over 95% of its projects after implementing the Construction Leadership Council's Site Operating Procedures. At its renovation of Stockton-on-Tees' 1913 Globe Theatre, a motion-activated voiceover system reminds workers to abide by social distancing when entering the site.

#### ◀ Health risk monitors repurposed for site social distancing

A wrist-worn device designed to monitor exposure to health risks such as hand arm vibration has been repurposed to manage social distancing. Reactec's Safedistance system alerts workers if they have strayed within 2m of a colleague and informs employers of the frequency of breaches.



HS2 and CSJV (Costain and Skanska), its early works contractor on Euston station in London, have adopted smart ear defenders from Eave to reduce work-related hearing damage. The digitally enabled headset gathers noise data to assess noise exposure.



#### ▼ FM Conway trials e-cargo bikes

FM Conway, in partnership with Transport for London (TfL), is trialling e-cargo bikes to carry materials in a bid to reduce the number of construction vehicles travelling into London. Pictured, from left: Michael Barratt MBE, development impact manager, TfL, and Adam Barnes, senior contract manager, FM Conway.





#### ◀ Amey trials monster long-range drone

Amey claims to have completed the first successful drone inspection of UK infrastructure to go beyond visual line of sight (BVLoS). The VTOL Flying Wing drone surveyed an area of 2km autonomously, opening up possibilities for inspections of linear infrastructure such as roads.



#### ▲ Interserve trials social distancing warning system

SiteZone Safety supplied six personnel distancing systems (PDS) to Interserve for use on site at the Nightingale Hospital, NEC Birmingham. The PDS consists of a 2kg pack and a wearable tag. If workers get too close, both tags vibrate and the PDS sounds an alarm.

#### **▼** Posters to stop construction worker abuse launched

Posters aimed at protecting workers undertaking essential construction tasks from abuse have been launched. The Construction Industry Coronavirus Forum (CICV) has started distributing protective signage for key workers carrying out essential projects in Scotland after reports of contractors at work being intimidated.



**Total Activity** Index fell from 39.3 in March to

## **CIOB Members'** Forum to be held as virtual event

Event in Australia postponed until 2021

The CIOB is to hold a virtual Members' Forum, in place of the event planned to take place in Sydney, Australia, this month.

The CIOB said that the wellbeing of its members and staff had to take priority and that it had taken the decision to postpone the Sydney event until 2021. Meanwhile, the Australian government has stated that all people (citizens or visitors) to Australia will be required to self-isolate for 14 days on arrival, making the logistics of the event impractical.

Instead, the CIOB will be holding an online event between 22 June and 26 June, using a mixture of live and recorded webinars.

The programme has been designed to allow delegates across the world to join events live or engage at their convenience, recognising members may be working during the week and have other commitments to juggle.

Both optional and required sessions are being scheduled for delegates, with virtual sessions lasting no longer than two hours. Many events will run twice to allow delegates from across the world to take part at different times. Once a pre-recorded event has been launched it will be available for delegates for two weeks.

Two highlights from the week will be a session led by CIOB director policy, research and public affairs Eddie Tuttle, past president Paul Nash and current CIOB president Mark Beard on quality, and a session on mental health with past president Charles Egbu and Eddie Tuttle.

The online sessions can be found at: https://membersforum.ciob.org.



## **CIOB** calls for support from government

CIOB CEO CAROLINE GUMBLE SEES HOPE FOR CONSTRUCTION IN SPITE OF SLUMP IN ACTIVITY, BUT URGES GOVERNMENT TO SUPPORT THE SECTOR

#### The Chartered Institute of Building

(CIOB) has called on the government to continue to support construction, following news that buyers reported the biggest fall in activity on record in April.

The IHS Markit/CIPS UK Construction Total Activity Index fell from 39.3 in March to 8.2 in April, where 50 indicates no change. Its previous record low was 27.8 in February 2009. But CIOB chief executive Caroline Gumble said there was hope for the future of the sector, so long as government continued to offer its support.

Gumble said: "A key factor in our economic recovery is how the

Above: A team from Willmott Dixon practises social distancing

pipeline of work for the future. "Construction professionals clearly feel confident about their ability to get and keep a job, to improve their financial situation and advance in their careers, which shows that despite the output stagnation, the industry

> "But while we remain strongly supportive of getting the construction industry back to work, we must continue to follow government guidelines and find pragmatic ways to ensure the workforce and the general public are kept safe. We must also continue to work collaboratively within the industry, taking an approach to our partners and the supply chain which is focussed on communicating effectively and cooperating to pragmatically resolve any contractual issues that may come up between us."

remains hopeful for the future.

government supports industry. It is vital

that government takes steps to ensure the

construction industry remains strong

during this uncertain time, and provides

support for trained professionals to

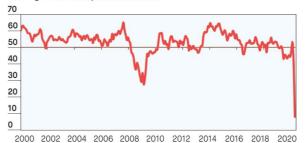
deliver current projects and develop a

According to the index, all three main categories of construction work experienced a survey-record fall during April, with declines in housebuilding (7.3) and commercial activity (7.7) exceeding that for civil engineering (14.6).

The lower volumes of output were almost exclusively attributed to business closures during April, with many respondents citing complete stoppages of activity on site.

#### **Total Activity Index**

>50 = growth since previous month



# Construction warned to prepare for building safety duty-holder roles

CONSTRUCTION FIRMS URGED TO PREPARE FOR DUTY-HOLDER ROLES UNDER NEW BUILDING SAFETY REGIME CHANGES BEFORE LEGISLATION COMES INTO FORCE



CIOB past president Paul Nash

Construction firms and building managers and owners need to prepare more seriously for the introduction of the forthcoming Building Safety Act, which is expected to come into force next year.

That's according to CIOB past president Paul Nash, who is a member of the Industry Safety Steering Group, chaired by Dame Judith Hackitt.

Speaking in the run-up to the third anniversary of the Grenfell Tower disaster, Nash said he was concerned that the construction industry as well as building owners and managers were acting too slowly to develop competencies for the new duty-holder roles.

Under official plans, the Building Safety Regulator will oversee the safety of all multi-occupied residential buildings of 18m or more in height, or more than six storeys. It will also have responsibility for a new duty-holder regime operating over a building's lifetime, with greater responsibility on designers and contractors to explain how they are managing safety risks.

Meanwhile an 'accountable person' will be responsible for understanding the fire and structural risks in the buildings they own once they are occupied, and

will have to manage those risks by appointing a building safety manager.

Nash said that with hundreds of companies owning buildings expected to fall into the scope of the regime, the number of building safety managers needed was likely to be in the thousands.

And while there are pockets of good practice, he warned that other organisations appear to have made little progress.

Nash said: "Although there is no official estimate at this time, the number of residential buildings in scope of the new Building Safety bill is likely to be in the thousands, so it is reasonable to assume that the number of building safety managers required to ensure compliance will also be in the thousands, even taking into account that some building owners may appoint one building safety manager to oversee several buildings.

"The challenge for our industry right now is ensuring that there will be sufficient trained and competent individuals to perform the role in time for when the bill receives royal assent, which is expected sometime next year."

#### **Duty-holders**

The duty-holders in construction and refurbishment of buildings in scope under the planned new building safety regime are:

- the clientthe principal
- the principal designer
- the principal contractor
- designer(s)
- contractor(s).

Once the building is occupied the 'accountable person' (effectively the building owner) is a duty-holder. They will also be required to appoint a competent building safety manager, who will also be a duty-holder.

## Hackitt: Coronavirus proves construction can change 'at pace'

Construction's rapid adaption to the challenges of coronavirus shows it can implement changes to building safety and quality, says Dame Judith Hackitt



The way construction has responded to the coronavirus crisis shows it can make the changes needed to improve building safety and quality.

That's according to Dame Judith Hackitt, the chair of the Independent Review of Building Regulations and Fire Safety commissioned by the government in the wake of the Grenfell fire disaster.

Speaking as the guest presenter on the latest covid-19 update webinar hosted by the Building Service Association (BESA), Dame Judith said the sector had demonstrated it was "capable of massive change at pace" and had been able to dump old practices quickly "without compromising safety or quality".

But she warned that there was still a widespread lack of leadership across the sector and too many businesses were waiting to be told what to do despite the fact that the new regulatory regime would be retrospective.

She added that "change is coming" and that the timetable for a new regulatory regime would not be derailed by the current crisis. And she urged everyone to emulate the methods used to deliver vital projects for the NHS and other essential services where "collaboration and co-operation replaced fragmentation and adversarial behaviour".

#### CIOB backs Armed Forces Day on 27 June

The CIOB will be supporting Armed Forces Day on 27 June, as well as promoting the BuildForce initiative, which encourages former servicemen and women into the construction industry.

Every year, 20,000 men and women leave the armed forces, many of whom have worked

in challenging environments, demanding strong collaborative and leadership skills.

More details about the CIOB's campaign to attract military leavers into construction can be found here: https://www.ciob.org/campaigns/attracting-military-leavers-construction.



The number of quoted UK construction companies who issued profit warnings in Q1 2020. There were only 18 profit warnings in the whole of 2019.

## What shape will the covid recession be?

Infrastructure spend will help construction's post-covid recovery, but is a rapid bounce back likely? Kris Hudson examines the data



The UK economy saw its fastest contraction since the 2008 global financial crisis in Q1 of 2020. The Office for

National Statistics (ONS) reported a 2% fall in GDP over the period. A much steeper decline in Q2 could be expected to reflect the nationwide lockdown through April and May.

As anticipated, the data shows that construction was badly hit, with output dropping by 2.6% during the quarter, and by 3% quarter-on-year. Just three sectors posted positive growth, with falls driven mainly by the slowing of housebuilding and residential repair and maintenance work.

Infrastructure, however, increased by 3.7% in Q1. Continued infrastructure spend, fuelled by government commitment to key projects, also saw new orders rising by 77.7% in Q1.

New order data is notoriously volatile, and these movements don't therefore necessarily predicate a trend. However, a healthy pipeline of national and regional infrastructure programmes could provide a crucial bright spot for construction as it weathers the storm.

With recession more of an inevitability than a possibility, thoughts are now turning towards recovery as lockdown measures are eased across England.

During the 2008 crash we saw a demand-led, 'balance sheet' recession. As asset prices fell, economies switched from investment to paying down debt. This triggered a sharp fall in output.

The impact was significant, yet recession and recovery were not mirrored equally across economies.

Canada avoided a banking crisis, meaning less disruption to capital investment. This kept employment high, helping growth return to pre-2008 trends - a 'V' shape recession.

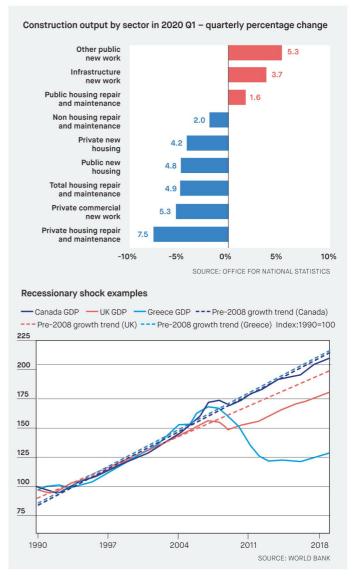
An enduring credit crunch saw UK growth fall. Following recovery, growth now runs parallel to pre-crash trends, at a lower level - a 'U' shape recession.

Greece never recovered: its growth rate deteriorated and the output gap is widening - an 'L' shape recession.

Currently, the Bank of England expects a V-shaped recession in the UK. While welcome, a sharp bounce back would not be without concern for the construction industry.

Rapidly accelerating growth, coupled with restraints on supply chain capacity and capability would impact cost and programmes adversely.

The probability, however, is that we're caught between a V-shape and a U-shape, producing at a lower threshold to keep people safe, and making a rapid return less likely. One thing that is certain is that the further we move away from a V-shape towards an L-shape, the more construction firms would need to brace for weakening demand. Kris Hudson is an economist and associate director at Turner & Townsend.



#### News in numbers

Percentage of Build UK members' sites open in May, despite health and safety concerns.

Deaths per 100,000 from covid-19 among lower-skilled male construction workers, some of the professions worst-hit by the virus.

Value in billions of property transactions stalled by the crisis, according to Zoopla.

Percentage of construction businesses using the government furlough scheme in May. It has been extended until at least September.



# CORONAVIRUS STAY SAFE ON SITE

To be COVID-19 Secure, we must do all we can to reduce the risk of infection:

- - **⊘** Stay a safe distance apart
  - **⊘** Limit face-to-face contact

For further guidance relevant to your business go to **gov.uk/workingsafely** 

STAY ALERT > CONTROL THE VIRUS > SAVE LIVES

# **Opinion**







John Gummer

# **Dealing with** construction's plastics time bomb

CONSTRUCTION FIRMS ARE ABOUT TO SEE COMPLIANCE COSTS FOR DEALING WITH NON-RECYCLABLE PLASTIC PACKAGING SKYROCKET UNLESS THEY START ACTING NOW, WARNS JOHN GUMMER

Chancellor Rishi Sunak announced in the spring Budget that a plastic packaging tax will come into force from April 2022. This will see businesses whose products have less than 30% recyclable material being charged £200 per tonne and forms only a part of the significant increase in the cost of plastics and packaging facing the construction industry.

Compliance costs, which have already increased by around seven times since 2017, are set to skyrocket further by 2023. Yet while a handful of construction and building companies are addressing this fundamental change in a meaningful way, many have yet to grasp the extent to which the costs and pressures associated with plastic packaging will fundamentally threaten their current business model.

So what do construction firms need to know?

#### Rising cost burden of current regulation

Packaging Recovery Note (PRN) charges are the compliance fees that companies must pay towards the collection and disposal of plastic packaging waste they put on the market. On its own, the per-tonne increase of plastic compliance - from an average of £50 in 2017 to over £400 in 2019 - is eye-catching enough. However, when these costs are modelled for large and mid-sized businesses it is calculated that for every £1,000 a company was spending on plastic compliance in 2017, they are now spending over £8,000. The cost of these PRNs has effectively risen from a level many businesses might have considered a manageable marginal cost of doing business, to a major cost centre.

#### New regulations will further increase costs

The Extended Producer Responsibility (EPR) rules, due to go live in less than three years' time, will force producers and users of packaging to pay local authorities the full net cost of collecting, reprocessing and recycling packaging. By the government's own calculations, EPR is set to increase the cost of packaging compliance fees by an estimated 21 times what businesses were paying in 2017. The chancellor's plastic packaging tax will add to this but his rules will mean that businesses that reduce the amount of packaging they use, ensure it is made from the maximum recycled content, and insist that it's universally recyclable will benefit significantly.

#### Supply chain and investor pressure

In the face of higher costs, the impact of commercial and consumer pressure on businesses to reduce the use of non-recyclable plastics, and the concerns of employees and the wider public - businesses are pressing their supply chains to reduce the use of plastic packaging. Initiatives from large construction firms who want their suppliers to remove or reduce packaging put product manufacturers unable to meet these targets at risk of delisting or reduced orders. At the same time, with the growing power of Environment, Social and Governance (ESG) responsible investment, investors are increasingly aware of the impact of plastics and packaging on the future viability of businesses.

Construction companies need to work with suppliers immediately to minimise exposure to increasing packaging costs. As a sector which works on tight margins and uses a large amount of plastic packaging, builders and developers will need to engage with their suppliers to make sure they are working on solutions to reduce their financial exposure to PRN increases, EPR, and the plastics tax. If they do not take action, costs are likely to be passed on by suppliers.

This new operating environment demands that construction firms rethink their business model. They will need to move from one that takes little account of plastics and packaging, considering it no more than one of the costs of doing business to one that recognises this is a cost sufficiently important to repay real effort to minimise its incidence and more actively manage recycling and reuse. These will be changes that need to be made to every construction business if it is to thrive sustainability and profitably.

The Rt Hon John Gummer, Lord Deben, was environment secretary from 1993 to 1997 and is chair of sustainability consultancy Sancroft.



Samantha Mepham

# Health and safety is changing. And not just in construction

COVID-19 HAS BROUGHT HEALTH AND SAFETY TO THE FOREFRONT IN NEARLY EVERY WALK OF LIFE. FLEXIBILITY AND FLUIDITY WILL BE KEY, EXPLAINS **SAMANTHA MEPHAM** 



The impact of the coronavirus pandemic has brought health and safety to the forefront of the global stage. From households to schools and from industries to governments – health and safety will remain a priority as we go through the covid-19 journey.

The process is going to be gradual and fluid – something that we will all need to adapt to constantly. Every sector will need to review their working practices to see how they can do things better – from healthcare considering how it can gear up for any further peaks, to offices considering their future commercial viability.

The pandemic made us take a step back and recognise that we are now looking at our workplaces through a different optic. The health and wellbeing of our staff is truly at the epicentre.

From an operational point of view, one dilemma will be how to balance the financial

"None of us fully know the restrictions that will be in place next week, let alone next year.

Not only do we have to consider how we work safely on site now but we must also consider how we plan and design for the future"

health of the organisation with the published government guidelines recommended as best practice to be covid-19 secure. As we work through the covid-19 alert levels, and restrictions are relaxed, I remain sceptical that people will rush back as one to shared workplaces, not least because of potential prosecutions.

And that is the crux of the matter for the construction industry too. With the announcement that those that cannot work from home should return, and more sites reopening, those operating them will be managing them against an ever-shifting backdrop of guidelines. None of us fully know the restrictions that will be in place next week, let alone in a year. Not only do we have to consider how we work safely on site now but we must also consider how we plan and design for the future.

How we manage the process going forward will be driven through collaboration with our colleagues – be they contractors or clients. There is no doubt that the pandemic has sparked efficiencies and best practice in health and safety through the adoption of digital innovations and fostering collaboration. Health and safety will need to remain at the forefront of building for our future.

Samantha Mepham is a partner, health and safety, at consultant RLB UK.

# A platform for human flourishing

Jennifer Schooling and Mark Enzer call for a reframed infrastructure to deliver better outcomes for people

The response to covid-19 has shone a light on what can be achieved through leveraging the collaborative power of government, academics, industry and community working together against a common threat towards a shared goal. Our current national crisis also brings unprecedented focus to the value of data and digital to help save lives. Modelling risk and impact continues to play a key role in tackling the covid-19 crisis, and data is informing decision-making as we prepare tentative steps from total lockdown and back to business.

As we make crucial strategic plans to revive our post-pandemic society and economy, we must reflect on lessons learned and the potential prize of our sector working together to secure a greater good for the people served by our infrastructure and built environment. Infrastructure is a complex and interconnected system of systems on which we wholly depend. In order to make our infrastructure sustainable and fit for purpose to provide the services that enable human flourishing – and unlock the full value of digital transformation across the built environment – we need to reframe and manage it accordingly.

We have the technology to make this happen. We can bring digital and physical assets together to create smart infrastructure. Data, information, algorithms and digital twins are assets which we can collect, curate and connect to create new digital assets of value for owners, operators, end users and nations.

Transformation is within reach. The Information Management Framework currently in development, led by CDBB, provides the key to catalysing the information economy, enabling federated digital twins and ultimately the national digital twin.

Let's shift our understanding of value from outputs and initial cost to peoplefocused outcomes and whole-life costs: the Construction Leadership Council. the Infrastructure Client Group and the Construction Innovation Hub are already working to align procurement processes with this definition of value. Let's act now to adopt systems-based solutions to mitigate the ruinous consequences of not securing resilient and resource-efficient infrastructure. Jennifer Schooling is director of the Centre for Smart Infrastructure and Construction, and Mark Enzer is head of the National Digital Twin Programme at the Centre for Digital Built Britain (CDBB). They are lead authors of Flourishing Systems, which is available at www.cdbb.cam.ac.uk.



Caroline Gumble

## **New opportunities** in the 'new normal'

THE CIOB HAS JOINED FORCES WITH THE CONSTRUCTION CLIENTS' LEADERSHIP GROUP TO HELP THE INDUSTRY RESPOND TO THE ISSUES RAISED BY THE PANDEMIC, EXPLAINS CAROLINE GUMBLE



In my first Construction Manager column of 2020 I wrote that it was important to see the CIOB through the lens of our members, including our international membership, to understand the many lessons there are to learn - and to see the opportunities.

In looking at where we are now, there seems to be a constantly changing present with sites reopening and work restarting in the UK and elsewhere - but new ways of working being adopted, whether you're on site or in the home office.

But we have to look forward and assess what the opportunities will be, while we are finding our 'new normal' - or 'next normal', as some are saying. To that end, the CIOB has joined forces with the Construction Clients' Leadership Group (CCLG) to engage our client members and focus on client leadership in our industry.

The impact of covid-19 is, of course, a focus for everyone at the moment and we now have a Covid-19 Client Working Group to help the industry better respond to the issues raised by the pandemic. It will also provide that key insight from clients and support the critical working relationships between contractor and clients, including supporting small and micro suppliers, who are arguably the engine room of our industry.

The working group has representatives from companies and organisations across the world, including two CIOB Trustees, and work is progressing at pace in four areas:

- Carrying on with critical and essential work
- Remobilising and maintaining communication with suppliers
- Reaching and supporting the client community
- International collaboration.

Being part of this working group will bring the CIOB closer to clients and will help develop our understanding of their issues. But more importantly for the short term, it will support the industry as it goes back to work. All client members are welcome to join - please contact Gren Tipper FCIOB: gren.tipper@cclg.co.uk.

#### Collaborative effort

Economic data released a few weeks ago indicates that construction professionals feel confident about their ability to get and keep a job and that there is optimism within the industry.

But while the CIOB is, of course, supportive of getting the construction community back to work, we must continue to work collaboratively. This is a theme I have written about before but now more than ever it needs to be emphasised.

Delivering a project, whether new build, maintenance or refurbishing, requires a collaborative effort from the whole team, with a focus on effective and open communication, cooperation and a pro-active, non-adversarial approach. That may be novel for some but needs to be part of our 'new' behaviour and our 'next normal'....

Caroline Gumble is chief executive of the CIOB.

## Collaborate through online learning

Lockdown changes could benefit future learning, says Kate Lindsay



Covid-19 has led to teaching and learning in establishments across the world moving from physical spaces to being more

online than ever before.

I've always been fascinated with the 1960s movement to relocate the residents of city slum housing collectively into high-rise estates, or as they were called 'streets in the sky'. We had two such projects in my home town of Sheffield that have moved through phases of utopian vision and abandonment; one has survived into a phase of gentrification.

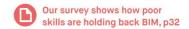
However, both these projects had significant social failures. Moving an on-ground community into the sky will only work if that community is cared for, if the fabric that they reside in is maintained and improved over time, and if differences in ways of living are recognised and supported. The same is true for the design of online learning.

Looking forward to the next academic year, our universities are likely to look very different. There is no doubt that some, if not a significant amount, of teaching will have to take place online. Emergency remote-teaching methods in place now are going to have to undergo renovation, if not a complete rebuild, to provide high-quality online education where both teachers and students can reside

For many institutions this will require significant investment at a time when finances are strained, but there is an alternative model. There are opportunities to collaborate - with others who already have purpose-built online curriculums, and as subject communities to develop them. There is a small collection of universities in the UK, such as UCEM, who have designed fully online programmes that can be easily adapted to suit different delivery models and embed different types of teaching.

There are opportunities to enter into a dialogue about reusing and expanding the existing educational products we have. In doing so we can become much more sustainable as a sector, and resilient against future disruption. We may be socially distanced, but we could end up being more connected than ever before. We just need to develop the right place. Kate Lindsay is head of digital education at University College of Estate Management.







A selection of readers' comments about news and issues in the industry from www.constructionmanagermagazine.com

The CIOB's economic report broadens the statistical definition of construction



## CM 29/04

Intimidation of essential workers

Darren Wisbey I experienced the same in New Zealand. Some members of the public have nothing better to do and think they have the right to decide what is essential and what isn't.

Numerous visits from the police, who supported us, didn't stop these busybodies complaining to anyone they could think who might listen including city council, regional council. TV. the mayor. local MPs and WorkSafe (the NZ equivalent of HSE).

All came to nothing except wasting everyone's time. It was stressful enough working through the lockdown without these well-poisoners poking their unwelcome noses in.

#### W Davey

Abuse and harassment while conducting works are something no worker should experience and employers have a duty

to ensure this does not happen. Risk assessments will now need to be done properly, corners can no longer be cut, and safety will need to be a priority.

#### CM 06/05 Record drop in activity

James Sizer

I'm guessing this is because everything is shut! We work in the residential market, and are seeing strong demand still in this sector, increasing as the lockdown persists.

Of course, the virus is causing a downturn at the moment but this feels very different to me than other recessionary pressures.

There are a lot of people who haven't been badly negatively affected so far. These people, I firmly believe, are ready and willing to meet the obvious challenges and pick up the baton and run with it once this is over, myself included.

We can't change what has happened, but let's try to rebuild consumer confidence as we return to liberty.

#### CM 06/05 Kit of parts

Philip Bishop When I first joined the quantity surveying profession in February 1966 as a trainee at **West Sussex County** Council's architecture department, the county, in conjunction with other county councils such as Dorset and Hampshire, was instrumental in the formation of the Second Consortium of Local Authorities (SCOLA).

This consortium utilised common designs. procurement methods, suppliers and construction processes for school buildings, libraries etc, thus securing financial, planning and construction advantages for the consortium members.

It would appear from the recent 'kit of parts' article that the wheels of construction may have turned full circle yet another circa 10 years is required to perfect this 'new innovation'.

#### CM 06/05 The Real Face of

Construction Richard Saxon

The CIOB report The Real Face of Construction 2020 (https://bit.ly/3cA6qjn) is useful in broadening the statistical definition of construction. However, it doesn't attempt to bottom the options it uncovers, nor does it venture into the yet wider world of the built environment.

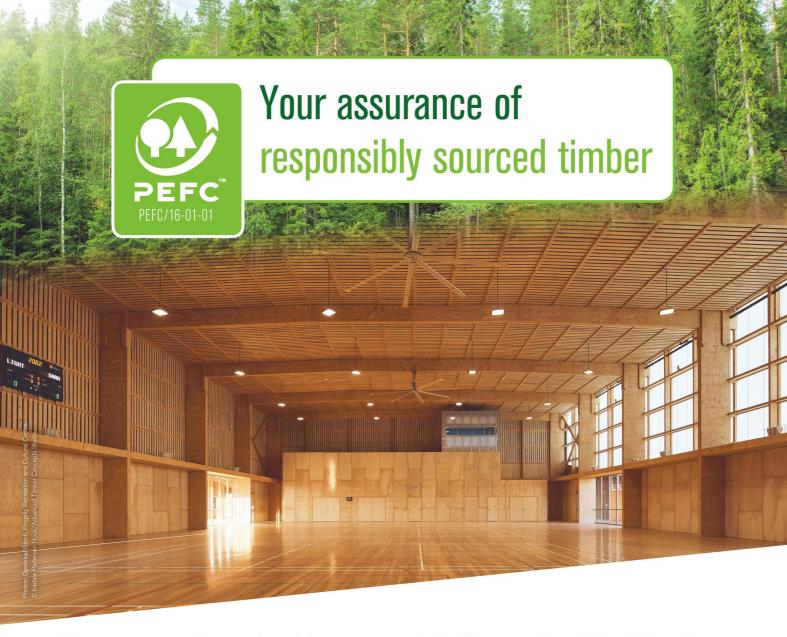
Built assets deliver value over their life cycle, not just in the capital phase. The facility, property and asset management sectors which deal with through-life value delivery are counted as real estate activities, yet these activities overlap and extend construction; half of construction is repair, maintenance and improvement. Then there are the regulators, in planning, building control and health and safety.

The information technology inputs to design, construction and operation are ballooning. Forty percent of the energy sector serves built assets. Seventy-five percent of fixed financial assets are built ones.

It is high time that a university set about a full analysis of the whole-life benefits and costs of the built environment industries to the economy. My hunch is that costs could total nearer 20% of GDP

As we drive further into digital built Britain, the flow of data between use, operation and creation of our built assets could be very revealing. Let us have a proper model of our broader industry to enable understanding and sustainable new business models.

Provide your own feedback on latest industry issues by posting comments online at www.constructionmanagermagazine.com or by emailing the editor at construction-manager@atompublishing.co.uk



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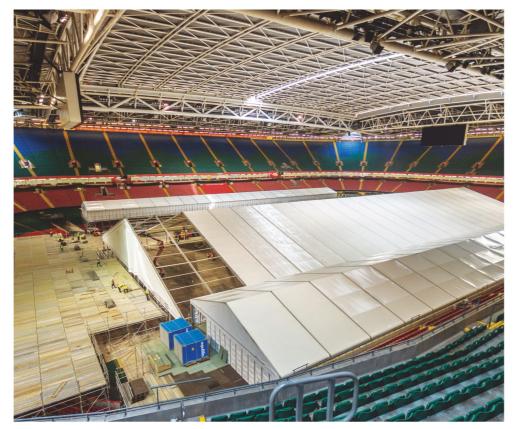






# CARDIFF STADIUM'S BIGGEST TEST

THE CORONAVIRUS FIELD HOSPITALS PRESENTED A CONSTRUCTION CHALLENGE LIKE NOTHING BEFORE. **WILL MANN** TALKS TO THE PROJECT MANAGERS ON THREE OF THE HOSPITALS, STARTING WITH DRAGON'S HEART IN CARDIFF, WHERE MOTT MACDONALD LED A TEAM INCLUDING EVENTS SPECIALIST ES GLOBAL



The Principality Stadium in Cardiff normally provides the backdrop to Welsh rugby internationals. In March, it was picked as the venue for a different kind of test – as one of the 'field hospitals' which were hastily being constructed for coronavirus patients around the UK.

Dragon's Heart, the name chosen for the facility, was unusual in requiring construction of a tented area inside the stadium to accommodate the clinical facilities. Its construction team was unusual too. Consulting engineer Mott MacDonaldled the project team and gave the contractor job to a non-construction firm, events specialist ES Global.

Ciaran Willcocks, project director at Mott MacDonald, takes up the story.

"We got the phone call at 3pm on Sunday 29 March. Over the next 12 hours,

Above: Tent space was constructed on the stadium's pitch Top right: Exterior of Cardiff's Principality Stadium



we pulled together the project team and the supply chain for the project. We were on site at 8am on Monday morning the next day with ES Global as contractor and architect BDP.

"On that Monday, we talked through the project with various stakeholders, including the Welsh government and NHS Wales. We agreed that by the end of that day, a decision had to be made on the scope of the hospital so work could get underway the next day. The CEO of NHS Wales gave the go-ahead at 6pm.

"We took that as formal confirmation and mobilised the team to start work the next morning, Tuesday 31 March. We received our letter of authority on Friday 3 April. NHS Wales deserves credit for making the decision on the spot and issuing a substantial letter of credit to a contractor they'd never heard of before – ES Global – to the tune of £2m."

But Willcocks was confident the events contractor could deliver, having worked with ES Global on the shooting venue for London 2012 at Greenwich Park and the velodrome at the 2018 Asian Games in Jakarta, Indonesia.

"The major difference with Dragon's Heart was constructing the tented overlay space, which was not a requirement at other hospitals like ExCeL.

"This falls within the purview of ES Global, but not the traditional construction contractor. We've had to source one of the biggest tents in Europe for Dragon's Heart, and construction contractors wouldn't have the contacts and knowledge for that job."

In numbers: Dragon's Heart Hospital

2,000 maximum bed capacity

15,000 sq m area of medical overlay tent 300 km of cabling

80 tonne weight of main oxygen supply tank 14,000 sq m of flooring

MW of extra generator capacity

Jeff Burke, owner of ES Global, explains the company's approach: "Our mobilisation plan went hand in hand with the design; one depended on the other. We mocked up three or four possible tent layouts on the pitch first; we needed to understand how different arrangements could work depending on what products were available in the market the next day.

"This is a pragmatic approach which we're very used to, and it ensures we can deliver projects quickly, rather than being delayed waiting for a specific bit of kit."

#### Modular solution

The design and construction planning were necessarily condensed, a process that would normally take two years completing in five days, Willcocks explains. Where possible, modular construction was used.

"Most of the units are temporary plug and play, including air-handling units, chillers, scaffolding and tents. We used a standard 2m x 1m panel to build all headboards and bed partitions, and we've installed 6,000 of those on the site.

"The biggest tent measures 150m by 50m and there are also four smaller tents, roughly 150m by 24m, and three around the edges, each about 100m by 10m each. Altogether, that is 15,000 sq m – around eight times the size of the Glastonbury main stage.

"These were assembled using a 100-tonne crane, plus an army of skilled operatives at pitch level, then a single cherry picker put the final bolts in. There was almost zero working at height."

However, the M&E provided a major technical challenge, Willcocks says.

"There are no M&E connections whatsoever under the pitch so we had to bring in our own – water, waste, oxygen, power, heat, cooling. We've installed 10MW of generators inside the stadium –enoughto power 15,000 homes – ontop of the stadium's existing 3.3MW of capacity. All this kit stands on scaffolding around the covered tented area on the edge of the pitch. There are also hundreds of cables and pipes feeding into the hospital, including water pipes 10 inches thick.

"Oxygen has been the limiting supply factor - valves, terminals, fitters are all in national shortage, and most of all, the main oxygen control panel. We've put in an 80-tonne main supply tank and a 40-tonne ancillary oxygen tank.

"A massive amount of brand-new ducting has been put into place. Installing the air handling was a major challenge. We fabricated these huge steel ducts, 3m x 3m in diameter, which had to be 'flown' over the tents and suspended from the stadium roof."

Dragon's Heart also makes use of space under the stands, Willcocks explains.

"The concourses under the stands have been converted into wards, and we had to board off the vomitories with acoustic panels, then connect ductwork into this area so we could create a temperature-controlled space.

"The home and away dressing rooms serve as office spaces, the waste compactor room has been converted



"We've installed enough generators inside the stadium to power 15,000 homes"

Ciaran Willcocks, Mott MacDonald

Project team
Project managers:
Mott MacDonald,
Archus
Main contractor:
ES Global
Architect: BDP
Structural engineer:
Momentum
M&E engineer:
Hoare Lea
Tent installation:
Nine Yards



Workers observe social distancing during the opening by Prince Charles on 21 April press box is used for project management meetings and I used the police cell when I had to make a private call."

into a lead-lined CT scanner room and

fully functional blood laboratory, the

#### Social distancing strategy

Bringing together a site workforce of over 1,000 and delivering the work within a tight timeframe while maintaining social distancing protocols has been a challenge, admits Willcocks.

"Finding the skills needed in those numbers was difficult. We've worked 24/7 using a shift pattern but we couldn't fill night shifts for some of the work packages like fit-out – some 1,500 beds needed to be wired.

"The social distancing puts an extra layer of complexity and anxiety on everything, but people got used to it. With fit-out, we had electricians, pipe fitters, carpenters and plumbers all working in the same spaces – but also separated. And then this is complicated further when the army arrives to put the beds together hot on the heels of the final fit out."

He says the site workers were "mostly" happy with the safeguarding measures.

"Clear communication from the NHS clinicians on site helped. We took workers' temperatures every morning, had handwashing facilities everywhere, washed their clothes whenever they required it. We fed them 24/7 using a catering company that normally does rock concerts. We also opened up four hotels nearby where many of them are staying."

Dragon's Heart became an operational hospital on 21 April, with the first 300 beds in the stadium concourses. A further 1,200 in the stadium bowl opened on 8 May, though total potential capacity is 2,000, Willcocks adds.

"Nobody was happy that this needed to be built, but we're glad to have been a part of it. It is one of the most interesting and gratifying engineering challenges I've ever had to work on."



## **EXPRESS DELIVERY** IN MANCHESTER

THE HEALTHCARE JV BETWEEN VINCI AND SIR ROBERT MCALPINE TRANSFORMED A FORMER RAILWAY STATION INTO THE NORTH WEST'S COVID-19 HOSPITAL IN JUST TWO WEEKS. WILL MANN HEARS THE CONSTRUCTION STORY FROM VINCI DIRECTOR JOHN ROBERTS

#### Patients admitted to Manchester's new

Nightingale hospital will be able to look up at the distinctive arched roof of the city's former central railway station. Turned into a vast exhibition centre after the station's closure in 1969. with over 17,000 sq m of floor space, Manchester Central was quickly identified as a suitable venue for one of the covid-19 field hospitals once the pandemic struck Britain.

Integrated Health Projects (IHP), a joint venture between Vinci and Sir Robert McAlpine, was selected to convert the convention centre, after delivering numerous other hospital projects in the north west through the P22 framework. The P22 contract template was used for this 750-bed hospital project.

Above: The former station was fitted with 750 hospital

Right: Signage marks the hospital exterior Far right: Bed heads and wall panels use demountable hygienic wall panels

John Roberts, regional managing director for Vinci and IHP, picks up the story.

"The call from the NHS came on Friday 17 March at 5pm and we confirmed our interest in the Manchester Nightingale Hospital. We didn't expect to hear anything further for a week or so but on Saturday morning at 11am IHP was confirmed for the job.

"We didn't have much of a weekend. The Saturday was spent calling our key suppliers, notably M&E specialist NG Bailey. On Sunday, our director Gary Bowker and contracts manager John Fowler walked around the centre with McAlpine's clinical liaison manager Caroline Mulholland, plus designers, key subcontractors and the army. On



Monday, we started on site. Our flooring contractor Horizon laid over 2,000 sq m of vinyl that first day and would lay 14,000 sq m in total.

"Some subcontractors wanted letters of authority before continuing, but most got on with it. We didn't get our letter of authority till the Monday after we'd started, but money has been largely removed from the picture here; the usual commercial blockers were put to one side, with the whole team focused on actually delivering."

IHP worked with architect BDP, which had experience from the first field hospital built at ExCeL in London, to develop the design for Manchester Central. As the Nightingale name suggests, the wards were laid out

In numbers: NHS Nightingale Hospital North West

days construction programme

300 workers on site 750 beds 14,500 sq m of flooring

150 km of cabling 7.2 km of copper pipes

in long rows of beds, to help nurse observation. Fitting a new hospital into a listed building while achieving healthcare compliance was a major design challenge, says Roberts.

"The army had been in beforehand and worked out a basic plan to max out bed capacity, but the design hadn't been finished when we started building. As the spec changed, bed layouts and corridor widths had to change too. We used 13 different 3D Revit models which were adapted as work progressed.

"On the first Monday, we constructed a mock-up of a bed head. By the next morning, we were building 750 of them. As we built more and more, we had to find another supplier. The bed heads and ward separation use demountable hygienic wall panels, 2.3m high and 600mm-wide, which were also used to form corridors, line old walls and create staff areas. We fitted over 6,000 of these panels.

#### Modular M&E

"There was variation after variation. Medical air was added midway through the first week. IT was added to every bedhead in the second week. But the trust worked closely with us and any design questions could be answered quickly as the team were based on site.

"Most of the M&E plant was modular. The morgue, which can handle up to 100 bodies, was essentially made from giant fridges, which would normally be used for outside catering, and tented over. For clean air areas, we used mini air-handling kit which would also typically be used for event hire. We also had to bring in back-up generators though the centre was well-served for power.

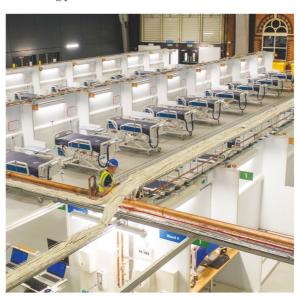
"Some materials were hard to source. Every spare oxygen connector in the country was taken up by the Nightingale hospitals during the period we were working at Manchester. We had to install over a mile of oxygen piping on this project. Any shortages were compounded by existing hospitals increasing their capacities to overcome the demand covid-19 patients created.

"The other big shortage was PPE. And toilet rolls. In the first two weeks, half of my time was spent to trying to buy toilet rolls, because people were stealing them as they didn't have them at home. Toilet rolls were even being used in card games."

Despite the fear and uncertainty created by the lockdown, IHP had no problem finding suppliers and labour to work on the project, Roberts says, with workforce peaking at 300.

"Our supply chain have reacted extremely well. Furloughing created a short-term glut of labour which would normally be delivering non-hospital projects.

"The Department of Health letter allowed our workforce to be classed as key workers, making it easier to get factories reopened or make special deliveries. We sometimes had to pay up front, due to lacking existing accounts. The police registered the number plates of our people and this avoided any of them being pulled over.



Project team

Main contractor:
Integrated Health
Projects (Vinci/Sir
Robert McAlpine JV)
Project managers:
Mott MacDonald,
Archus
Architect: BDP
M&E contractor:
NG Bailey



"Having soldiers on site in camouflage focused minds on how serious this was" John Roberts, Vinci "Workspace, our furniture supplier, produced specific units for our covid-19 wards and I'm guessing their team never slept, as they delivered over 1,000 kitchen units in a fortnight, including nurse bases.

"The army presence has also made a difference. Having soldiers on site in camouflage and berets probably focused minds on how serious this was. Major Matt Fry from the Royal Engineers would address a room and say, 'Right, what's the problem – we're not leaving here until we've solved it'. The army helped us open up hotels for workers on the project to use and we fed them with an onsite canteen."

"Yes, the 2m social distancing rule posed significant challenges. For tasks like installing the 600mm-wide panels, where two workers had to work within 2m of each other, specific risk assessments were carried out and face masks and other PPE were worn. The 24/7 working helped as with three shifts there was more space for the operatives.

"We took the temperature of workers every day as they came on to site, which was actually quite a quick and painless operation. In the men's toilets, we blanked off urinals with tape to observe the 2m rule, and we turned off hand driers and used paper towels instead. Queueing for the canteen, which we set up with the army, and a staggered break system, worked well. Management meetings were held standing up at 2m spacing.

"None of our team at Manchester - or the 1,000 workers across all our north west covid-19 hospitals - showed any symptoms of the virus."

IHP completed the Manchester Central Nightingale hospital in 13 days. Additionally, IHP's north west healthcare business delivered a 31-bed covid isolation ward for The Christie in Manchester inside six weeks, plus further coronavirus hospitals in north Wales at Deeside – a 430-bed scheme in a leisure centre – and at Bangor, providing 223 beds. ●



## **SETTING THE STAGE IN YORKSHIRE**

HARROGATE CONVENTION CENTRE REQUIRED EXTENSIVE RECONFIGURATION BY BAM TO CONSTRUCT YORKSHIRE'S NIGHTINGALE HOSPITAL, A PROCESS COMPLETED IN JUST NINE DAYS. WILL MANN REPORTS

Above: Oxygen tanks stand 9m tall outside the centre's Royal Hall entrance

#### Harrogate Convention Centre is used to hosting major events. Various political party conferences, concerts and even the 1982 Eurovision Song Contest have been held there over the years. But with the coronavirus outbreak, a different kind of stage had to be created at the North Yorkshire venue.

With over 17,000 sq m of space across its eight exhibition halls, the centre was chosen for the 500-bed NHS Nightingale Hospital Yorkshire and the Humber, after a lengthy search around the county. BAM Construction was appointed as main contractor and project manager Matthew Garnett was involved from the outset.

"On Monday 23 March, I received a call from my director, asking if I'd be willing to look at the project. I'd been working from home for two weeks so was it great to get out. The next day, I went with our building services director Adrian Cairns to look round Church Fenton airfield and then Leeds Arena, along with the army and Craige Richardson, director of estates at Leeds Teaching Hospitals Trust, who we knew from the P22 framework. But neither venue was suitable for a temporary hospital.

"Then on Friday we walked round Harrogate Convention Centre. And stayed there for most of the next two weeks! From that moment on, we worked for 14 to 15 hour days and only went home to sleep.

"We pulled our key suppliers together in barely a morning. Every company was happy to be asked and some contacted us and wanted to be involved so they could be doing something. BAM is very lucky to have a strong local supply chain and everyone felt they were building the hospital for their family and friends."

The input of BAM's in-house M&E team played a key role on the project, including the design, says Cairns.

"The eight exhibition halls are quite odd shapes and it was difficult to use the space efficiently. The design team worked round the clock to get the layout

In numbers: NHS Nightingale Hospital Harrogate

500 beds

days construction 400 workers on site km of copper pipe

tonnes capacity of oxygen tanks

and clinical flow of the spaces correct, collaborating with clinical leads and M&E services. The halls were divided into eight wards and once we had the right design for the first one, we could quickly repeat the design concepts in the other seven.

"The NHS produced a 'Standard Operating Procedure' specifically for the covid response requirements for clinical areas. This document, along with the standard Health Building Notes and Health Technical Memoranda were used to inform the design.

"The existing services infrastructure was not designed for a 24/7 operation, so a huge amount of new M&E had to be designed and installed to suit the clinical requirements, ranging from complete med gas installation to new CCTV systems. Any areas with long lead times for equipment were prioritised, such as the cold rooms for the pharmacy and the morgue.

#### Design challenges

"Infection prevention and control (IPC) was difficult in a temporary hospital. We agreed that up to 2.5m high would be a clinical environment, but above that it was impossible to achieve, so that decided the height of all partitions and bed pods. We designed the bays with our supply chain and ended up with 9 sq m for each bay.

"One of the biggest design challenges was the PPE 'don and doff' areas for clinical staff. As there's a huge risk of the virus being on PPE when it's being put on or taken off, this is a painstaking process which takes seven minutes per person. So we had to create areas 8m long by 4m wide in every ward, where a 'conveyor belt' system operates, to allow clinical staff to don or doff their PPE while still maintaining 2m social distancing."

When it came to construction, a huge amount of work was required to adapt the convention centre for its new healthcare function, continues Cairns.

"There wasn't a single M&E service in the existing building that didn't need to be modified or newly installed on the project. The existing ventilation systems and main plant have been fully cleaned inside and out, modifications made to ductwork routes, fire dampers added, and much more – to ensure clinical spaces are serviced with the right quality of air.

"We've added new mains cold water infrastructure and hot water services to all clinical spaces, 'pumped' drainage installation, IT systems including two new server rooms, six new electrical generators, intercom system..."

"It wasn't always easy to source the materials. With medical grade copper pipe and associated valves, we were having twice daily conversations with suppliers to check progress on manufacturing and delivery. Similarly for clinical grade electrical trunking and socket outlets. Oxygen enrichment monitors and alarms had to be delivered by hand from Germany."

Where possible, elements of the M&E build were modularised, with NG Bailey's nearby factory in Bradford working 24 hours a day, says Garnett.

"Modular pipe services for the medical gas systems helped the speed of installation. Bedhead electrical services were prefabricated offsite for the bed bays. Water heaters were mounted on to backboards for almost all the 127 sinks.

"One lesson from the project is just how fast you can build when you modularise elements like M&E.



Project team
Main contractor:
BAM
Architect: BDP
Project manager:
Arcadis
Structural engineer:
BAM Design
M&E engineer:
Silcock Leedham
M&E contractor:
NG Bailey



"From day one, we worked 14 to 15 hour days and only went home to sleep" Matthew Garnett, BAM

M&E needed to be modified or newly installed "The biggest pieces of kit installed were the oxygen tanks, these hold 45 tonnes of oxygen and stand 9m tall, outside the centre's grand Royal Hall entrance. We had to involve statutory authorities, Yorkshire Water in this case, which is normally a slow process, but they were on site the day after our call, excavating the roadways, making sure their valve systems were up to scratch."

#### Sequencing work

With 400 workers on site at peak, BAM planned work carefully to make social distancing easier to control, says Garnett.

"We were able to use separate suites for project management and architects worked remotely using videoconferencing and file sharing. We sequenced work so that design and construction planning happened during the day, then the night shift could proceed without having to stop and worry about what came next.

"There was some demolition work, dismantling units in storage halls, where it was always going to be difficult to maintain the 2m social distancing rule. But our demolition contractor brought in some workers who lived together, and they carried out the dismantling in a team of four.

"We took workers' temperatures every day, but nobody showed any covid-19 symptoms."

Nine days after work started on site, the reconfigured convention halls were ready to receive their first patients. It was officially opened by Captain Tom Moore on 14 April, though the hospital is yet to admit any covid-19 patients. Meanwhile, Garnett is back working from home on another project.

"It was one heck of an experience, quite emotional. Having the army there as a presence makes you understand how serious the situation is. But there was a genuine comradery evident on site among everyone involved."

# Analysis



# EMBODIED CARBON: A BLACK MARK FOR CONSTRUCTION?

EMBODIED CARBON ACCOUNTS FOR A HUGE PROPORTION OF THE GREENHOUSE GASES THE BUILT ENVIRONMENT PRODUCES. AHEAD OF THIS MONTH'S WORLD ENVIRONMENT DAY, **KRISTINA SMITH** ASKS WHAT THE INDUSTRY IS DOING ABOUT IT

#### When the UK Green Building Council

launched in 2007, the first event it hosted was about embodied carbon – the carbon that has gone into a material or product before a building has started its working life. "It was packed out," remembers Richard Twinn, senior policy adviser at the council. "Since then, it seems to have gone in waves: there will be a bit of progress and then it will die down."

Calculating and reducing embodied carbon seems to have fallen into the 'too difficult' category, while efforts have focused on the low-hanging fruit that is operational carbon. But today, there is a new wave of interest in embodied carbon, much of which is due to mounting pressure from board level and above.

"Investors are starting to push science-based targets," says Twinn. "They want to know what companies are doing about embodied carbon."

Science-based targets are about setting meaningful and measurable goals and reporting on them. Several UK built environment sector clients have already signed up to the global Science Based Targets initiative, among them the Crown Estate, Landsec, Derwent London and Barratt Developments.

Contractors might feel that they are off the hook here, because their direct impacts on embodied carbon – energy to assemble buildings and waste – are low compared to the energy needed to create materials and products in the first case. However, some contractors are going beyond that boundary to look all the way back along the supply chain

39%

of energy-related global carbon emissions come from buildings



"If more construction companies treated their supply chain's emissions as their own, we would get

better transparency" David Mason, Skanska

"We have been measuring our direct emissions for around 10 years and it was very clear that it was not telling the whole story," says David Mason, senior sustainability manager for Skanska.

"It's only when you look at the actions of all the players in the construction value chain that you look at the full picture of the impact of what you are doing. If more construction companies treated their supply chain's emissions as their own, we would get better transparency on what it takes to build a project."

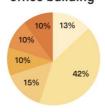
#### **Upfront carbon**

The embodied carbon of a material is the carbon emissions associated with it throughout its life cycle, which includes impacts from any repair or maintenance work and the carbons spent dismantling or demolishing it. Upfront carbon or capital carbon is the embodied carbon spent up to the point where a building starts being used.

According the to the World Green Building Council, buildings account for 39% of energy-related global carbon emissions, with 28% coming from operational carbon and 11% from embodied carbon. Embodied carbon can account for anything between 30% and 70% of a building's lifetime carbon. As we design buildings to be more energy efficient in operation, so the embodied carbon becomes a larger proportion of emissions (see pie charts, p24).

"The focus on operational carbon has driven it downwards to the point where we cannot ignore embodied carbon anymore," says Conor Will

# Embodied carbon in new office building



- Substructure 13%
  Superstructure
  42%
- Cladding 15%
  Fit out 10%
- Mechanical and electrical 10%
   Transport and

construction 10%

SOURCE: GREENGAGE

#### Low carbon foundations

Homes provider Kiss House devised a system to reduce embodied carbon in foundations

When Kiss House was looking for a Passivhaus-compliant foundation system for its low-carbon houses, it couldn't find one. So, it went away and invented one.

"A large proportion of a building's embodied carbon is in the foundations, so we wanted to find a way to drastically reduce that," says Kiss House co-founder and director, Mike Jacob. "All the existing systems are dominated by either steel or concrete or both which are high embodied carbon materials."

Kiss's solution, which has a patent pending, consists of glass reinforced fibre beams and joists that sit on small steel screw-piles. An independent assessment by consultant oCo Carbon compared the Kiss foundation system to three standard ones: strip and poured slab; strip, beam and block; and piles, beam and block. It found that its carbon footprint was 70% lower than the nearest alternative (see chart below).

"This system also means that we can omit the ventilation space," explains Jacob, "and there are no issues with degradation or thermal bridging."

As well as using it for its own housing developments, Kiss House plans to market its GRP foundation system as an off-the-shelf solution for other housebuilders.

Jacobs believes it will be an attractive proposition to the housebuilding industry because of the growing appetite from investors for sustainable technology and products.

# Comparing embodied carbon for Kiss House's foundations with standard systems

Life cycle stage	Kiss House	Strip & poured slab	Strip, beam & block	Piles, beam & block
A1-A3 materials	4,407	16,131	22,788	18,893
A4 transport to site	159	624	386	263
C1-C4 end-of-life	413	732	585	405
Total	4,979	17,487	23,760	19,561

(unit= kgCO<sub>2</sub>e) Life cycle stages as defined in BS EN 15804 Sustainability of Construction Works.

SOURCE: OCO CARBON

Hayes, global structural sustainability skills lead at Arup.

"And in the UK, the decarbonisation of the grid is reducing the carbon impact of energy, putting even more emphasis on the embodied carbon proportion."

Methodologies and tools for calculating embodied carbon are well established now. RICS published a guide to whole life carbon assessment in 2017 and in 2018 BREEAM introduced credits linked to embodied carbon assessments. Commonly used tools include eTool and One Click LCA.

"Calculations for embodied carbon are easy, you just need the quantity and the rate. The challenge is managing the data and the uncertainties,"

of energy-related global carbon emissions come from operational carbon

## **Graphene** and waste plastic paving

Skanska trials new lower carbon surfacing



Skanska lays Gipave asphalt

Skanska is trialling new technology from Italy that leads to longerlasting roads and a lower carbon footprint, thanks to an additive made from graphene and waste plastic.

Gipave, developed by asphalt additive specialist Iterchimica and graphene-based product supplier Directa Plus, has been laid on a 750m-long stretch of road in the village of Curbridge in Oxfordshire.

According to Iterchimica, which has already carried out trials of the material on roads and runways in Italy, Gipave will extend a road's life by a factor of between two and three. As well as reducing whole life costs and disruption to road users, this also means lower carbon emissions

Gipave, which is added in pellet form at the asphalt plant, is made of specially selected plastic waste, a compound of Iterchimica additives and G+ graphene from Directa Plus.

The plastic is sourced from waste that is usually not recycled but has to have the right chain of polymers. The graphene makes the asphalt stronger without making it more likely to crack.

Skanska is also talking to **Highways England about using** Gipave on a section of the M25. says Andrew Cripps, regional director, sustainability at Aecom.

Calculations are typically done at RIBA Stage 2, when big decisions are made, and Stage 4, when more detail is added. "It can be tricky at Stage 2 because things are changing quickly," says Cripps.

There's a tension between the design being far enough advanced to get a meaningful answer and making design decisions based on the embodied carbon impact. Arup, like many design firms, is developing its own tools to try and tackle this issue. "We are keen to build tools for normal engineers to use in their normal workflow," says Mel Allwood, an associate director at Arup who leads the sustainability team in the building engineering group.

Skanska, too, is developing tools to help its engineers consider embodied energy when making decisions. "We have been improving our software tools to allow us to generate information and undertake assessments much more quickly," says Mason. "To allow us to do our estimating, we have created a process to assess carbon. Otherwise, you have to wait until you have got the design and the material quantities before you can get the carbon footprint, so you are working behind the curve."

So a Skanska engineer could look at reinforced concrete and see that every £1m spent would require a certain amount of concrete and rebar and this would produce a certain quantity of carbon.

The databases for these various tools are populated by generic life-cycle assessment data and, in some cases, specific data. Some manufacturers have invested in creating Environmental Product Declarations (EPDs) - independently certified calculations of the lifetime impact of a product or material.

EPDs are voluntary however, which means they don't exist for every product. And only a tiny handful of clients ask for these at the moment, says Hayes. Arup has two in Ireland, where he is based. "We would like to see embodied carbon limits included in performance specification, says Hayes. "That way, manufacturers who have invested in EPDs would be rewarded," adds Allwood.

#### Do materials matter?

The big hitters, in terms of embodied carbon, are concrete and steel, which means the bulk of a building's impact is in its foundations and frame. The manufacture of cement, which accounts for around 8% of the world's carbon emissions, produces carbon dioxide due to the fuel needed to heat it and in the chemical reaction itself. Steel smelting is largely powered by coal.

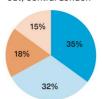
There are no fast answers to reducing the impact of either of these emissions, says Twinn, although steel may be the easier proposition, involving a switch to hydrogen and renewable energy in future. Cement is far more challenging.

"No one has really worked out how we are going to produce cement without producing carbon," says Twinn. "The solution seems to be carbon capture and storage, pumping it underground until we can work out what to do with it." Research to create lower carbon

#### Examples of total whole life carbon emissions breakdown for new buildings

#### Office

Speculative office building with Cat A fit out; central London



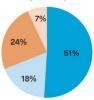
#### Warehouse

Typical warehouse shed with office space (15% by area); London perimeter, UK



#### Residential

Residential block with basic internal fit-out; Oxford, UK



#### Whole life operational carbon emissions

#### Whole life embodied carbon emisions

- Carbon emissions to practical completion
- Carbon emissions in use
- Operational emissions regulated
- Operational emissions unregulated

SOURCE: STURGIS CARBON PROFILING





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"Investors want to know what companies are doing about

embodied carbon" Richard Twinn. **UK Green Building Council** 

cement has been underway for decades but to date there hasn't been a viable solution for use at a large scale (see box).

Using lower carbon materials comes quite low down on the list of top ways to reduce embodied carbon. One of the best approaches is to reuse or repurpose existing buildings. "We are constructing buildings to last 60 to 120 years and, in our most expensive locations, we are knocking them down after 20 years," says Allwood.

Buildings need to be designed with flexibility in mind, perhaps with additional capacity built into the foundations and frame. But this must be balanced against the need to avoid over engineering.

Reusing components is the next best thing, but this would call for a change of approach. 'Design for dismantling' has been talked about for years but is rarely executed. More design-formanufacture could change that.

Beyond those decisions comes the opportunity to make choices about materials, looking for lower carbon options and making comparisons between suppliers, where EPDs come in.

Mason says more work is being done currently on elements where embodied carbon is more difficult to measure. "There are surprising impacts from raised floors, suspended ceilings, insulation and M&E systems," he says.

#### More pressure required

While investor pressure and board level commitment will take us so far, legislative intervention will be the key to really tackling the issue of embodied carbon. The New London Plan offers some insight. The latest version, due this year, requires all referable developments (above a certain size or on green belt or open land) to provide calculations for both operational and embodied emissions.

"Central government has really not picked up on it yet," says Twinn. "They did receive a lot of responses through the recent Part L review that talk about embodied carbon. We will have to see how quickly they will move."

"There need to be incentives to push people to take measures, because there may be no operational or capital expenditure benefit from reducing the embodied carbon," says Cripps.

Meanwhile, more far-sighted clients are starting to drive the pace, says Allwood: "They are much more engaged and moving fast. In some cases, where we used to be the advocates or flag bearers, we are now being challenged, which is brilliant."

"Most of the clients we work for care." says Mason. "The difference is maturity. You could take a mix of political pressure, investor pressure, market or societal interest and mix that in any market and get a reason for caring."

#### Lower carbon cement

Formerly niche materials are now gaining traction in the mainstream



Cemfree pour at the M25's Woodford West Viaduct

Cementitious materials, such as pulverised fuel ash (PFA) or blast furnace slag, have been used in concrete mixes for years to replace a proportion of the Portland cement, say 20%.

The reason for adding them is usually practical: they can help improve the density and hence the performance of concrete and lower the heat of hydration, reducing the risk of cracking during curing. They also reduce the embodied carbon of the concrete.

Geopolymer cements, or alkali-activated cements, which substitute materials such as PFA or slag for all or most of the Portland cement, are used in concrete for specialist applications such

as sewer locations which are susceptible to biocorrosion.

They have great potential for wider use, because they are stronger and therefore lower amount of concrete could be used in some applications. However, they have remained a niche product, too expensive for mainstream applications.

Now, major contractors and cement manufacturers are getting involved. One of the leading players in low carbon cement is France's **Hoffmann Green Cement** Technologies which has developed three technologies for producing low-carbon cements, based on flashed clay and alkali-activated slag.

Last year it signed deals with Bouygues Construction and GCC to further develop concrete mixes based on two of its technologies. Hoffman Green says that its cement has one-fifth of the embodied carbon of standard cement.

Another low carbon cement product is Cemfree, which replaces Portland cement completely using 95% ground-granulated blast-furnace slag and a 5% alkali activator instead.

Aggregates firm DB Group, which produces Cemfree, says its CO, value is 114kg per tonne, 77% lower than conventional mixes.

The product was used recently on the M25 motorway's Woodford West Viaduct in Essex.







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# BIM & Digital



# WINVIC'S SENSOR STRATEGY FOR GREENING BUILDINGS

CONTRACTOR WINVIC IS USING DIGITAL TECH TO HELP CLIENTS REDUCE THEIR CARBON FOOTPRINTS. WILL MANN EXPLAINS

A Winvic 3D M&E visualisation.
Smart sensors in new projects will collate building performance data

#### BIM and digital tech have the potential to transform the sustainability of the built environment – and Winvic is

leading the way.

The contractor has started installing sensors into new buildings, which track energy performance and behavioural patterns of the occupants, with the aim of benchmarking then reducing the carbon footprints of both its own business and its clients.

"We are looking to create a baseline of energy usage which will give us an understanding of what contributes to a building's carbon emissions," explains Tim Reeve, Winvic's technical director, who leads the contractor's digital strategy. "Then we can adjust the spec on the next building and bring down the carbon footprint from that baseline."

The initiative is part of Winvic's digital strategy which includes a 2,000sq ft Centre for Innovative Construction (CIC), complete with a BIM Cave and VR technology (see box). Winvic's plan is to work with clients such as Newlands Developments, a logistics property specialist with over 2m sq ft of space currently under development.

Ken Brown, construction director at Newlands, believes the digital tech will have a significant impact on how Newlands plans, builds and delivers its developments, as well as cutting energy consumption.

"Our aim is to move towards net zero carbon buildings, which means looking at both the design and construction stages and passing on the benefits to

# Inside Winvic's BIM Cave: changing the client conversation

3D model viewing allows clients and suppliers to visualise projects



"Our aim is to move towards net zero carbon buildings, which means looking at both design and

construction stages and passing on the benefits to the occupiers" Ken Brown, Newlands Developments

the occupiers for their operational use of the buildings," he says. "We need to understand the carbon footprint of our developments and so too do the occupiers – increasingly we are being asked questions about operational energy usage."

#### Thermography monitoring

To that end, Winvic is installing sensors with a range of low carbon energy technologies on new projects for Newlands. These include onsite renewables such as air source heat pumps and photovoltaics, battery storage where possible, while thermography will be used to monitor building fabric performance. Sensors will also collate information including room temperature, CO<sub>2</sub>, humidity and lighting levels.

"The sensors are effectively smart meters, linked to the BMS (building management system), which is installed in line with CIBSE recommendations," says Arun Thaneja, senior design manager at Winvic. "The sensors pump out data to the BMS and we build up a catalogue of how they are performing."

"We have a huge range of occupiers – food processing, manufacturing, bulk warehousing, temperature-controlled storage – all with different energy uses and we want to ensure they have the most energy-efficient buildings possible," says Brown. "In a warehouse with 20 chillers running, if you can use smart technology to

Winvic has invested significantly in its BIM Cave, including software and hardware, VR headsets, plus the partitions which make up the structure. It also features a 125in screen for 3D model viewing, and the centre in which it is housed comprises an interactive meeting room allowing real-time design changes on an 86in smart screen, a training space and a study room.

The BIM Cave can be easily dismantled and taken off site to deliver demonstrations, for instance at a client or a school, says Tim Reeve.

It allows Winvic to interact with clients, consultants and suppliers, using digital models, to work on clash detection, design checks, spatial awareness assessments and asset information retrieval.

"Visualising their projects is the light bulb moment for clients, and that is why we built the Cave," Reeve explains. "Until then, they often couldn't fully understand the benefits. Now they can understand everything, from the impact of design changes at the planning stage through to the logistics of managing a road closure during the construction."

Brown's first visit to the Cave, with Newlands investors, was in late 2019. "We had not seen it anywhere else, but now this will be the norm for how we progress construction projects with Winvic," he says. "It has huge advantages from planning through to completion.

"We have new development schemes coming through which may require public consultations. These digital tools will allow views to be demonstrated from any angle and saves us ferrying around a physical model to help visualise the whole development. It will help with our conversations with planning departments and make it easier for us to understand the earthworks models and the sitewide infrastructure designs."

Brown also feels that smarter working with digital technology will flush out labour and materials savings.

"We see obvious potential for waste reduction," says Brown. "Plasterboard waste, for example. We can build up the design by co-ordinating full-size sheets into the BIM model, making walls bigger if necessary, which means quite a few design changes, but that's a big saving on waste."

Working processes are more efficient, notes Reeve: "One project had 92,000 clashes identified during the design stage, which we've brought down to 8,000 clashes by working with the digital model. In 2D, we wouldn't have found them till we got on site.

"When we changed the structural design on another project, we had to change the piling, but were quickly able to give accurate take-offs on what this would cost because we'd brought our piling subcontractor's design into our model."

Full 5D BIM is some way off, Reeve says, though Winvic is increasingly working with clients' facilities teams to help their operational planning (6D BIM). Newlands projects will have QR codes fitted on to components during construction, which can be scanned to check progress against the model during the build, and on completion allow facilities staff to look up product information including 360-degree photos, installation date, manufacturer, and maintenance requirements.

"Operations and maintenance (O&M) manuals are increasingly electronic – approximately one-third of all projects we delivered last year – and that will be even higher this year," adds Reeve. "There are a few old-style contracts that still require paper O&M manuals, but they are dwindling."

The contractor recently achieved BIM Level 2 certification, following assessment by the BRE.

"As part of that, we will have an annual audit each November, where we have to demonstrate continuous improvements, which the BIM Cave helps with," explains Thaneja. "We will table eight BIM Level 2 projects next year for audit, around 20% to 25% of Winvic's workload."

Winvic's Bim Cave can be transported to clients (photo taken before social distancing was introduced)







"As we travel the path towards 6D BIM, we're developing the platform to

provide Gemini digital twin level analysis of buildings"

Tim Reeve, Winvic

reduce the power use of those units, that's a major saving."

To collate all the baseline data, the sensors need to run for a full year. "We have to go through all the seasons," explains Reeve.

Winvic has appointed Yonder Consulting, a WELL and BREEAM specialist, to gather and hold this data, though the information will be owned by the client.

"The tech feeds the measurements back to Yonder's cloud platform, where things like unexpected upticks in energy use can be analysed," says Reeve. "The system can be rolled out in any building with a BMS, with the initial results used to guide further investments, such as installing more sensors or upgrading plant and equipment.

"We are discussing with Yonder installing the platform at our own head office and on a Newlands project," he adds.

"As we travel the path towards 6D BIM, we're developing the platform to provide Gemini digital twin level analysis of buildings, where a full building physics model is used to analyse the real-time performance of the building."

The next step is to install 'room use sensors' to understand occupier behaviour. "If a room isn't being used very much, the client might decide to turn it into a breakout area." Reeve says. "This can also be useful for electric vehicle charging points or bike racks."

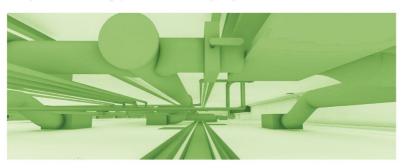
#### **Building dashboards**

The initiative is currently for new build projects only, though both Reeve and Brown see potential for extending it to existing buildings following the pilot. "There are obvious benefits for our occupiers in being able to understand and reduce their energy use," says Brown.

The platform can build dashboards to give a building's FM team a snapshot of the operational state of the building, adds Reeve.

The success of the strategy will be measured partly through energy performance certificates (EPCs), says Thaneja. "Around 85% of our project portfolio achieve an EPC 'A rating', including all of Newlands projects," he says.

"If we can push those projects into an A+ rating, that means those buildings are actually generating more energy than they consume. We are currently working on two jobs where we're going for EPC A+."



The digital modelling will help FM investment decisions in new M&E plant

## Using VR and digital tech to help site operations

A voice-activated hard hat will display the model on its visor



The visor responds to voice requests

Winvic will this summer extend its application of digital technology to site level, using a voice-activated hard hat that connects with a BIM model.

The contractor is 15 months into a three-year partnership with the University of West England (UWE) and Costain to develop the product, which will allow workers to make voice requests that display the model on the helmet's visor.

"The technology will allow a worker to request information about the structure or the windows or any other component, which the software interprets based on GPS location," Tim Reeve explains. "It then displays the model in virtual reality graphics onto the visor."

Reeve expects the first test on site to be launched in August. "We have got the voice working with the Revit model, next we need to get the live stream connecting on site with the hard hat," he explains.

Over time, the software will recognise individual users' voices and be able to anticipate requests.

Reeve also expects to extend its use of VR and digital tech to training site workers. "We think it can help with higher-risk activities such as work at height," he says.



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# POOR DIGITAL SKILLS HOLD BACK BIM ADOPTION

BIM USE IS NOT MEETING GOVERNMENT TARGETS AND MANY BARRIERS TO DIGITAL ADOPTION IN CONSTRUCTION REMAIN, OUR EXTENSIVE INDUSTRY SURVEY FINDS. BY **DENISE CHEVIN** 



#### The fifth annual Construction Manager

BIM survey, in conjunction with *BIM+*, shows a mixed picture of a sector still not wholly at ease with digital technology. The adoption of BIM shows little sign of accelerating, but the use of technologies that enable remote working, such as VR, teleconferencing and drones, is on the rise.

In this year's survey of almost 300 construction professionals, over half of respondents say they hardly ever make use of BIM on their projects, with the results highlighting a lack of digital skills holding uptake back. One in five, however, are using it regularly. And there is a strong indication that the impact of coronavirus and working

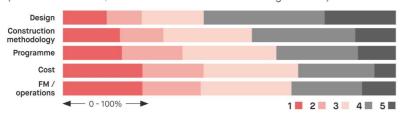
patterns would drive uptake going forward, though this would mean finding more money for investment – currently another key barrier.

Digital technologies have not been embraced at pace across the sector according to 45% of respondents, with only 3% saying construction is 'going digital' rapidly (scoring five on a scale

"There is a strong indication that the coronavirus impact could drive BIM forward"

#### What benefit have you seen from using BIM on projects?

(On a scale of 1 to 5, where 1 is little benefit and 5 is high benefit)



of 1-5). Nearly four in 10 estimate the pace of digital uptake as moderate, scoring it 3.

Architects have been the most enthusiastic in finding BIM beneficial: nearly 60% say they have found it very helpful/helpful on projects in which they were involved with the design.

Across the sector, BIM is acknowledged as moderately useful for construction methodology, programming and cost control. In the FM sector, which has historically been slower to adopt BIM than construction, as many as nearly one-third (31%) have found BIM to be useful or very useful on projects.

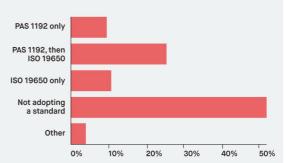
Supplying digital asset data at the completion of a project is commonly understood to be one of the main benefits of BIM but here again the trend follows findings in previous years: over half of respondents have not or have rarely been asked to supply digital asset data. Just over a quarter, however, have often or very often been asked to do so.

The main organisational barriers to BIM's adoption, or further adoption, were identified as the lack of digital skills (64%); limited funds to invest in new technology (56%); uninterested clients (52%); not enough evidence of benefits (45%); the boardroom out of touch with technology (41%); and confusing messages from technology vendors (33%).

More than six in 10 respondents (62%) said organisations would invest more

## **Changing standards**

Results show slow uptake of ISO 19650



Perhaps surprisingly, just over half of respondents have not adopted a BIM standard, with the rest of the respondents on board with one.

That aside, the results show there has been a transition from the British PAS 1192 suite to the international ISO 19650 suite, which was introduced last year: fewer than 10% of the respondents say they are still using PAS 1192; 26% have transitioned from the old to the new; and 11% say they are using ISO 19650.

The results mirror research carried out recently by John Ford. technical development lead for Galliford Try, and set out in BIM+ in late April this year.

Ford found that only "a tiny fraction of our projects are truly following the process defined in the PAS/ISO under whichever framework banner you want to use".

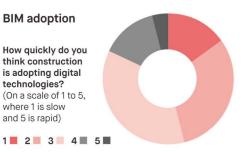
Despite the government mandate of four years ago that by 2020 all centrally funded projects adhere to the information management processes defined in a UK-centric. whole-life approach to built assets in PAS 1192-2/3, and reiterated in ISO 19650 - or BIM Level 2 - the full set of steps that must be taken to deliver building and client benefits is not happening.

Ford said: "We are certainly not at business as usual when it comes to delivering projects to the process... defined within the old PAS/BIM L2 framework and the new ISO 19650/UK BIM framework, because we still have a great majority of projects that don't get clear employer information requirements (EIRs).

"Those that do obtain a clear EIR often don't go on to use all the information provided to them as requested, especially the information requirements for FM purposes."

#### **BIM** adoption

How quickly do you think construction is adopting digital technologies? (On a scale of 1 to 5. where 1 is slow and 5 is rapid)



How often do you use BIM on your projects? (On a scale from 1 to 5, where 1 is not very often and 5 is very often)



How often are you required to supply digital asset data at completion of a project? (On a scale of 1 to 5, where 1 is not very often and 5 is very often)





## **Useful technologies**

Tablets and smartphones seen as providing most value for operations on site

Questioned about the most useful technologies they use, 68% of respondents named tablets and smartphones for their value in their operations. This 15% rise from the previous year's survey demonstrates how mainstream such devices have become.

Closely following tablets and smartphone as the most useful technology was video conferencing, which was nominated by 66% of respondents - undoubtedly a reflection of the current circumstances.

Design for manufacture and assembly (DfMA), which last year's survey showed to be on the rise, has made very little progress across the sector in the past 12 months. Just under half of respondents (47%) said the technology was being used on projects they were involved in, compared to the previous year's figure of 46%.

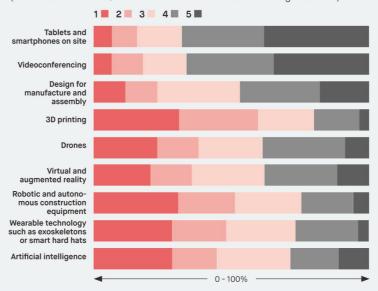
Drone usage increased year on year, with over half of respondents (53%) reporting it as a moderate benefit on site. But just 9% said drones were providing really positive onsite value.

Indicating that virtual and augmented reality (VR and AR) has started to come of age, 38% said it is of high benefit in onsite applications.

Artificial intelligence is also making advances, with just under a third of respondents saying it is proving useful (18%) or very useful (11%), and 27% saying it's being used to a moderate extent.

#### Which of the following technologies are benefiting or are likely to benefit your operations?

(On a scale of 1 to 5, where 1 is little benefit and 5 is high benefit)



#### requirements on public tenders (52%); the Hackitt reforms mandating handover of digital asset information - the so-called golden thread (32%); and the effect of

coronavirus on working patterns (30%).

commissioned from Northumbria

University by the Centre for Digital Built

Britain (CDBB) in partnership with the UK BIM Alliance, which highlighted a

lack of effective tools for assessing BIM maturity, or for evaluating its benefits.

Factors that survey respondents

say would add impetus to BIM/digital-

isation were: strict enforcement of BIM

With those points in mind, the role of BIM in government reforms following the Hackitt Review could prove very influential. However, a document released in April costing changes alongside the government's plans to respond to Hackitt seemed to suggest that BIM requirements had been downgraded for new, refurbished and existing buildings.

#### Respondents

The 291 professionals who responded to our survey conducted between the middle of April and early May were drawn from across the UK construction sector, as follows: 14% public sector client 11% private sector client 25% main contractor

14% project manager/QS

14% consulting engineer

10% architect

8% specialist contractor

3% housebuilder.

Organisations they work for ranged in size from fewer than 20 employees (27%) to over 1,000 employees (29%).





# CPD: HOW DO ROBOTIC TOTAL STATIONS WORK?

ROBOTIC TOTAL STATIONS HAVE HELPED REVOLUTIONISE SURVEYING IN THE CONSTRUCTION INDUSTRY, SAVING TIME AND MONEY AND INCREASING PRODUCTIVITY. BUT HOW DO THEY ACTUALLY WORK AND WHAT DOES THE FUTURE HOLD FOR THIS TYPE OF TECHNOLOGY? THIS CPD, IN PARTNERSHIP WITH TOPCON POSITIONING GB, EXPLAINS



#### A total station is an electronic, optical

instrument that is used in surveying and building construction. Combining an electronic theodolite with electronic distance measurement (EDM), the technology allows for the measurement of both vertical and horizontal angles and the distance from the instrument to a particular point. Traditionally a

manual instrument, robotics have revolutionised the tool, making it more efficient than ever.

#### The history of surveying

Before the construction industry had even begun to dream of this technology, the origins of land surveying can be traced back to at least 1400BC in Topcon's GTL-1000 robotic total station incorporates a high-quality laser scanner ancient Egypt. During this period, Egyptians used various instruments including rope and plumb bobs to manually survey plots of land for building projects such as the pyramids and land taxation.

Fast forward to the early 19th century and with the Industrial Revolution in Europe came the official recognition of surveying as a profession. At this point in time, with the development of new roads, buildings and railways, the role of land surveying became more important than ever for the smooth development of infrastructure.

During this period, the plane table survey was frequently used to perform land surveys. Using a plane table, tripod and alidade (sighting device), the method involved fixing the plane table on to a tripod in the necessary position in the field, placing a sheet of paper on top for drawing and using the ruler-like alidade to sight distant objects, determine directions and measure angles.

The surveyor would then draw the plans, using the alidade to find measurements and angles, moving the plane table around the field when necessary.

The plane table method enabled surveyors to draw plans while observing the area that needed to be surveyed – meaning that field observations and plotting could be done simultaneously. Comparing the plotted work with the actual field, the method offered a simple and cheap way of surveying.





Information can be accessed on site via Topcon's FC-5000 handheld field computer

However, the method had many limitations that led to it being replaced as technology advanced. For example, the method was not appropriate for use in harsh weather conditions and many other accessories were also required to improve accuracy, such as compasses. The plane itself was also heavy, meaning it was inconvenient to transport to different sites.

Finally, the potential for human and instrumental error while plotting and drawing did not allow for very accurate work and, as a result, the method was later replaced by the use of the theodolite.

Consisting of a movable telescope, a theodolite is a precision optical instrument whose telescope rotates around horizontal and vertical axes to provide angle measurements. Originally a non-digital piece of equipment, theodolites were upgraded to become electronic, with their non-electric counterparts now rarely in use.

As the technology has developed, electronic theodolites have been incorporated with EDMs to become the modern-day total station.

#### What is a robotic total station?

Simply put, a robotic total station is a total station that can be operated remotely from a distance, meaning that only one operator is needed in the field rather than the traditional two-person team of surveyor and assistant.

While previously site workers had to physically turn total stations

vertically and horizontally to sight them to the positions to observe or set out, through automation robotic total stations follow human lead by tracking a prism held by the surveyor at the pole end.

The instrument constantly transmits the angle and distance information measured to the prism on to the data logger, also at the pole end with the surveyor, via developments like Topcon's LongLink Bluetooth technology. This enables them to take measurements for surveys and set out points, lines and surfaces without having to return to the instrument.

Motor technology is the driving force behind robotic total stations, making sure the instrument moves without human touch. Topcon's GT Series uses some of the fastest ultrasonic motors available. At 180 degrees per second, these offer smooth and accurate prism-tracking.

The instruments are also one-third smaller in size than others, making them a compact and high-performance solution in providing long-range operation and reflectorless

"The instrument's increased accuracy means fewer errors, reducing the need for rework and the cost of time and resource associated with this"

measurements – perfect for surveying and construction needs.

#### Reduced costs and resources

As a single-operator robotic system, robotic total stations reduce the cost of having an additional person on site, improving efficiencies and related costs by freeing up team members who would have otherwise been on site, allowing them to perform other tasks elsewhere.

The instrument's increased accuracy also means that there are fewer errors, reducing the need for rework and the cost of time and resource associated with this. Additionally, improved accuracy reduces the cost of wastage.





"Construction professionals are able to import and display a digital drawing or a model on the screen of the logger"

#### Increased productivity

Since professionals don't have to manually turn the instrument to collect or set out a point, robotic total stations save time on the process of surveying and setting out — increasing onsite productivity.

Some workflows, for example as-built survey projects for concrete slab levels, can comfortably see a 50% increase in productivity. This is because, where previously professionals used an auto level for observations and then manually plotted the points and calculated heights to produce an as-built drawing, robotic total stations can shoot to the prism and calculate coordinate values and heights for those points almost instantly.

This data is collected and saved to the data logger and can then be exported into a CAD-based software package like MAGNET Office Survey to produce digital drawings for as-builts that show deviations in height.

Furthermore, the instrument can be used to confirm the verticality of walls and columns by taking reflectorless measurements for the top and bottom of walls and columns using codes to differentiate between the measurements. This data is again taken into a CAD package, such as MAGNET Office Survey, to compare the surveyed data against design drawings, giving deviations and producing as-built drawings almost instantly.

The positional information relayed from the instrument via Bluetooth technology, like Topcon's LongLink,



A single operator can work on site with Topcon's GT Series total stations

to the data logger also speeds up the setting-out process as it means the professional at the pole end with the logger already has the information available to them.

Through the use of software like Topcon's MAGNET Field, construction professionals are able to import and display a digital drawing, such as a DXF/DWG, or a model, such as an IFC format of the project, on the screen of the logger. As a result, they can work directly from the drawings or the model depending on the information available to them on site.

This process is also more time and cost efficient as it eliminates the need for a surveying/engineering assistant on site and negates the need to have people manually inputting data for setting out into the instrument or data logger, which in turn reduces the capacity for further errors on site.

When on site, the person controlling the instrument is comfortable in the knowledge that the robotic total station is accurately measuring the data, and sending it to the data logger for them to collect a point or set out a position that they are happy with. Professionals are then all working from the same drawing, reducing mistakes and discrepancies in the overall process.

With easy-to-use CAD-based software like Topcon's MAGNET Office Survey, time is also being saved when pulling reports together. Whereas reporting traditionally could take hours, this technology is allowing companies to pull together as-built reports in just 15 minutes, again increasing overall workflow productivity.

#### The future of robotic total stations

As more construction and surveying professionals have begun to recognise the value that robotic total stations have on productivity, they have become commonplace on sites.

The future of the instrument has also arrived in the form of Topcon's GTL-1000. Featuring a robotic total station, the equipment includes a scanner to allow construction professionals to scan and verify in addition to carrying out traditional robotic total station functions.

Operating as a fully functional robotic total station and a high-speed,



To see past CPD articles visit www.constructionmanagermagazine.com/cpd-articles

high-quality laser scanner means that, with a few clicks and few minutes of time, the GTL-1000 can produce a complete, 360-degree, locally registered point cloud of an area. As a result, the time taken for data capture and processing is sped up, saving a significant amount of time.

There are not only short-term, but long-term time savings too. Using the GTL-1000 along with Verity software, it is easy to identify potential issues long before errors incur onsite costs.

For construction professionals this is extremely beneficial, as finding out something may have been installed incorrectly early in the construction process eliminates the extra costs of time and resources. This can also avoid any negative reputational impacts that mistakes and additional work may bring.

Without the GTL-1000, scanning and analysing data can take days. However, with the technology, the process can be done in a matter of hours. An engineer can go out to the field in the morning to scan the latest installed elements, analyse the scan data and then be back on site before lunch with a list of changes that may have been identified. In the past, this was not possible because of the time taken to complete the scanning and analysing process.

The practicality of having just one instrument should also not be underestimated. Usually, to register scan data, engineers would require a robotic or manual total station to

Robotic total stations can survey, scan and analyse data within hours



coordinate scan targets, with these then scanned with the laser scanner then identified within a processing software package to register the point cloud. However, with a combined unit such as the GTL-1000, engineers no longer need to set up two different instruments in the same location. Instead, it can all be done in one swift movement, potentially halving the amount of time spent on site.

A combined unit is also more costeffective than having two separate instruments, with the price of purchasing two pieces of equipment often amounting to up to 50% more than buying a single instrument.

Although there are different technology combinations available on the market which may be cheaper, the overall cost savings for projects have still proved significant when a combined device is used.

Despite the powerful technology the GTL-1000 contains, the device weighs only 7kg and fits into one case. As a result, it is easy to carry around site, transport, set up and operate. This ease of transportation acts as a time-saver as energy is not wasted stopping and starting when carrying heavy materials. Instead, professionals can swiftly set up once they have arrived on site.

#### Investing in technology

The surveying profession has come a long way since its origins in ancient Egypt, with technology and digitalisation allowing the industry to continually improve its accuracy, efficiency and speed.

The future looks bright, with many more professionals recognising the benefits that robotic total stations bring. Businesses investing in this technology are saving time, money and resources thanks to innovations like the GTL-1000, which are capable of much more than the average total station.



#### **CPD Questions**

1 What is the

main benefit of a robotic total station? a) It can be operated remotely from a distance. b) It can think for itself. c) There do not need to be any surveyors in

the field alongside

the instrument.

- 2. What is the driving force behind Topcon's robotic total stations?
  a) Virtual reality.
  b) Ultrasonic technology.
  c) Biotechnology.
- 3. Using specialist software, what can professionals see on the screen of the logger?

- a) Instructions on how to carry out a survey using the plane table method. b) Facebook. c) A model of the project.
- 4. A robotic total station captures data and sends it to the logger, meaning that professionals: a) Can work from the same drawing, reducing mistakes and discrepancies. b) Are all working from a different drawing, reducing mistakes and discrepancies. c) All have to create their own drawing of the project.

To test yourself on the questions above, visit www.constructionmanager magazine com/cpd-articles



## CPD: SOURCING TIMBER RESPONSIBLY

TIMBER HAS BEEN USED IN CONSTRUCTION FOR MILLENNIA. BUT TO ENSURE A CONTINUED SUPPLY, WE MUST PROCURE THIS VALUABLE RESOURCE RESPONSIBLY. THIS CPD, PRODUCED IN CONJUNCTION WITH PEFC UK, EXPLAINS HOW THIS CAN BE ACHIEVED

#### More than one in five people worldwide,

an estimated two billion people, depend on forests and the services they provide for their livelihoods, including food, heat and energy, medicine, wood for building, and other forest products.

Forests are also an integral part of the water and carbon cycles. Every cubic metre of timber can sequester up to a tonne of carbon and play a fundamental role in climate regulation. Yet, in the last two centuries an imbalance has occurred in certain parts of the world, where more timber has been removed than the woodlands can naturally regenerate, causing mass deforestation.

The Food and Agriculture Organisation of the United Nations (FAO) estimates that around 178m ha of Above: Softwood such as this pine forest timber makes up the majority of timber consumed in the UK forested area has been lost since 1990. Brazil alone is estimated to be losing an area the size of three and a half football pitches every minute. Although nearly half of this loss was due to expanding food and palm oil production, illegal timber harvesting is still a major driver.

The construction industry must therefore ensure all the timber and wood-based products procured through its supply chains is sourced responsibly from well-managed forests.

#### UK timber market and sources

It is helpful to understand where the timber used on UK construction sites is sourced from, so that the risks associated with illegal and unsustainable practices in some parts of the world can be managed.



The majority of the timber consumed in the UK is softwood, followed by various panel boards such as plywood, MDF and OSB. The vast majority of this material is sourced from the UK and Europe, which are considered low-risk sources (see the Nepcon Timber Risk Map: www.nepcon.org/sourcinghub/ timber), however there is a higher risk of illegality in the supply chain for some products from certain countries:

- Over 80% of the 1.5m cum of plywood used is from higher-risk nations including China, Brazil and parts of Malaysia:
- 5% of the 6.6m cu m of imported softwood is sourced from Russia;
- 13% of the 587.000 cum of imported hardwood is from tropical sources;
- A growing percentage of MDF is sourced from Russia, Brazil and China.

#### **CPET** and certification schemes

In 2004, the UK government set up the Central Point of Expertise on Timber (CPET) following claims by Greenpeace that illegally felled timber had been used on high-profile construction sites, including the Home Office. The UK government's Definition of Legal and Sustainable for Timber Procurement was subsequently developed, along with the UK Timber Procurement Policy (UK TPP) which states:

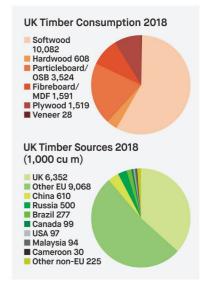
- Only timber and wood-derived products originating from an independently verifiable legal and sustainable source will be demanded for use on the government estate;
- Appropriate documentation will be required to prove it;
- It applies to all virgin timber and wood-derived products used on the government estate, including temporary site works and material supplied by suppliers.

CPET subsequently developed two routes to demonstrate compliance with the UK TPP:

Category A Evidence - independent, third-party forest certification schemes:

- Programme for the Endorsement of Forest Certification (PEFC);
- Forest Stewardship Council (FSC). Category B Evidence - all other forms of evidence including:

"The Food and **Agriculture** Organisation of the UN estimates that around 178m ha of forested area has been lost since 1990"



- UK Forestry Standard source -Grown in Britain (GiB) certification provides evidence of this;
- Forest Law Enforcement Governance and Trade (FLEGT) licensed timber;
- Compliance with the *Framework for* Evaluating Category B Evidence.

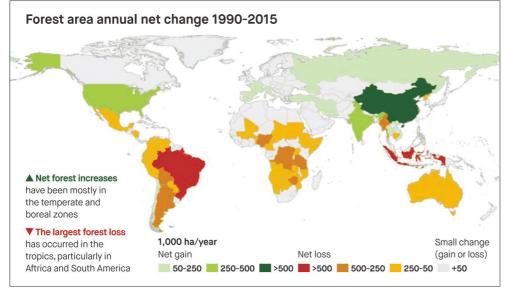
Of these, only the PEFC, FSC and GiB schemes provide full 'chain of custody' to the site of use.

#### Differences between the schemes

FSC was the first to be established in 1994, and developed principles and criteria based on the UN Agenda 21 non-legally binding Forest Principles.

PEFC was established in 1999, based on principles and criteria recognised by the FAO, which it uses to approve independent national forest standards (eg PEFC Finland, USA's Sustainable Forest Initiative [SFI], and Canadian Standards Association [CSA]).

The UK Woodland Assurance Standard (UKWAS) is the endorsed standard for both FSC and PEFC in the UK, which means all timber produced under this standard can be dual certified as FSC and PEFC. Grown in Britain



WWW.SUSCONSOL.CO.UK

Want to learn more about responsible timber sourcing? For details of a free, fully accredited Responsible Timber Sourcing CPD visit: www.pefc.co.uk/events

4. Manufacture 1. Forest 2. Sawmill 3. Merchant

adopts the UK Forestry Standard (UKFS) for its minimum criteria, which requires the production of approved Forest Management Plans and associated felling licences to confirm legality and sustainability.

Only around 11% of the world's forests were certified as of 2019, with 326m ha certified to the PEFC standard, and 200m ha certified to the FSC standard. with around 93m ha dual certified to both PEFC and FSC. Twelve percent of the UK's 3.19m ha of woodland is certified to the Grown in Britain standard, with 44% certified under UKWAS.

Due to the way the schemes operate, FSC tends to dominate in higher-risk nations, with less developed or no national forest management standard, such as in some South American and African countries and the Far East.

Conversely, as PEFC requires a national forest management standard, PEFC tends to dominate in Europe and North America. However, many countries will have a mix of FSC and PEFC-certified forests. For example, Canada has the largest area of certified woodland in the world, of which 137m ha is PEFC-certified and 51m ha FSC-certified.

#### **Drivers for certification**

The UK Timber Procurement Policy has been a key driver for certification, and this was reinforced by the Timber and Timber Products (Placing on the Market) Regulations 2013, which placed additional legal duties on anyone handling wood products to assess the risk that they may have come from an illegal source and act to mitigate that risk. It lists two main types of organisation:

- Operators, such as timber importers, are the first to place timber on the UK market and must ensure they employ a due diligence system to prove legality. A contractor could be an operator if it procures timber directly from a supplier outside the UK.
- Traders, including merchants and contractors, need to keep records of who they procured timber from for five years.

Another driver for construction has been the adoption of responsible timber sourcing by assessment schemes such as BREEAM, CEEQUAL, Ska and LEED.

Left: Chain of custody Each certified organisation in the chain is audited on an annual basis by an accredited certification body, eg BM Trada or the Soil Association. and issued with a certificate which states the scope of their certification and the products they sell.

These are available to view online at the relevant certification scheme websites, and should be checked prior to procuring any timber products.

PEFC certified CLT and glulam on The Pavilion, Manchester

However, the principal driver for many is avoiding the reputational damage of getting it wrong, and being connected with the illegal timber trade in the press.

#### Inclusive timber procurement policy

To ensure your supply chain knows your requirements, an inclusive timber procurement policy statement is a must. There are five key elements to a good policy:

- Reference to timber and other wood-based products
- Definition of scope, including both temporary and permanent works
- Reference to CPET definition of legal and sustainable
- Requirement for full chain of custody to the site of use
- Examples of schemes that meet the criteria.

An example of a responsible sourcing policy statement is outlined below:

"All timber and wood based products for either temporary or permanent inclusion in the works must be from legal and sustainable sources, as defined by the UK government CPET, and be delivered to site with full chain of custody.















# CONSTRUCTION MANAGER

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\*ABC audited July 2018 to June 2019



"Chain of custody schemes recognised as meeting the above include:

- Programme for the Endorsement of Forest Certification (PEFC);
- Forest Stewardship Council (FSC); and
- Grown in Britain (GiB)."

Having an inclusive timber procurement policy provides contractors with a wider choice of products, ensuring good competition is maintained.

#### Chain of custody

Chain of custody certification is "a mechanism for tracking certified material from the forest to the final product to ensure that the wood, wood fibre or non-wood forest material contained in the product or product line can be traced back to certified forests".

How does this work? If we have a forest in the UK certified to UKWAS, logs leaving it can carry a PEFC, FSC and GiB claim. These go through various points in the chain including the sawmill, timber merchant and/or product manufacturer - all of which require certification to the PEFC, FSC and/or GiB chain of custody standards to be able to pass on a PEFC, FSC or GiB claim to the next in the chain.

The timber or product can then be delivered to a construction site with full chain of custody. The site itself does not need to be certified to any standard.

#### Onsite checks

The key piece of evidence required on site is the timber delivery document, which must contain the following information to confirm a valid claim:

- Supplier's name and address, which must match those on the certificate
- Site delivery address
- Delivery date
- Correct product description and valid product claim
- Delivery quantity for each product
- Supplier's chain of custody certificate number.

The valid product claims that can be included for each certification scheme are as follows:

- PEFC '100% PEFC Origin' or 'xx% PEFC Certified'
- FSC 'FSC 100%', 'FSC Mix xx%' or 'FSC Recycled xx%'
- GiB 'GiB-FP' or 'GiB-S'.

The minimum percentage claim recommended by CPET is 70% - at least 70% of the material in the product must be from a forest certified by the relevant scheme, with the remaining 30% from another approved legal and sustainable source (eg., a UKFS source).

To help with these onsite checks, PEFC has produced pocket-sized timber checklist cards which are available free of charge from: info@pefc.co.uk.

By ensuring all timber and woodbased products are from certified responsible sources you are helping to ensure we have a sustainable future supply for the projects of the future. For more information on PEFC visit: www.pefc.co.uk or email Charlie Law, Sustainable Construction Solutions, at info@susconsol.co.uk.



Responsible forestry practice in the UK

"Chain of custody certification is a mechanism for tracking certified material from the forest to the final product"

#### **CPD Questions**

1: How much forested area does the Food and Agriculture Organisation of the United Nations (FAO) estimate has been lost since 1990?

a) 3.5m ha b) 69m ha c) 178m ha d) 512m ha

2: What percentage of the world's forests are PEEC/ FSC certified? a) 11% b) 23% c) 37% d) 44%

3: How much of the UK's woodland is certified under

the Grown in Britain standard? a) 7% b) 12% c) 26% d) 44%

4: The Timber and Timber Products (Placing on the Market) Regulations 2013 require a contractor to keep the records of who they purchased timber from for how many years? a) One b) Three c) Four d) Five

5: What is the minimum allowable percentage claim required by CPET for the PEFC and FSC schemes? a) 50% b) 66% c) 70% d) 90%

To test yourself on the questions above, visit www.constructionmanager magazine com/cpd-articles

#### Monitoring certified timber on site

Most major contractors require the use of certified timber on their projects to ensure they comply with legal and building certification requirements. But how is this monitored on site?

BAM Construct UK accepts timber certified to the Grown in Britain, PEFC, and FSC standards, and requires all timber to be delivered to site with full chain of custody.

Details of the requirements are included in its Responsible Sourcing Policy and its Supplier Sustainability Requirements document, with copies of chain of custody certificates requested prior to delivery of timber to

site. It also requires copies of delivery notes as evidence of chain of custody.

The BAM SMART online portal is used to record delivery note information, and upload a scanned copy as evidence. Information on the delivery note is automatically crosschecked against the information on the centrally held chain of custody certificate for the supplier, to ensure a valid claim can be recorded.

Data for each site can be collated to give a picture for the region and for BAM Construct UK as a whole.

The latest data for 2019 shows that almost 5,000 cu m of timber was delivered to BAM sites, of which over 92% had full chain of custody certification, over 7% was otherwise verified as legal and sustainable or reused, with less than 0.5% missing chain of custody evidence.



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## Smart thinking: contract automation explained

COULD SMART CONTRACTS TRANSFORM
THE OFTEN TORTURED LEGAL PROCESS
BEHIND MANY CONSTRUCTION PROJECTS?
MISHA CHAPLYA LOOKS AT WHAT'S INVOLVED



First, let's explain the terminology: contract automation is the technology that exists here and now and allows developers and builders to prepare standard form contracts at the click of a button – 'smart contracts'.

If you are a developer or a main contractor engaged on a major project where you need to let 200 appointments or produce 100 warranties, all based on a standard form, with only the contract particulars and appendices being the variables, how many hours will your contracts manager or in-house lawyer spend:

- collecting each of the contract particulars;
- inserting the scopes of works and services into the correct appendices;
- seeking management approval of high-risk items;
- drafting optional clauses or special conditions; and
- printing and collating the documents?

In addition, how much time will you spend managing the contract execution process and then scanning and storing hard-copy originals? And finally, have you ever issued a contract for execution only to have it returned with last minute handwritten amendments?

There are just some of the common problems that a contract automation system can solve.

#### How smart contracts work

Your business will have a template form of contract which it uses to engage various service providers. It will contain a section where the contract particulars are inserted – the contract sum, start date, date for completion and so on – plus appendices such as the site plan and scope of works. There may be some standard clauses too.

All of these variables will be programmed into an online questionnaire, usually referred

to as a 'decision tree'. This can be as simple or sophisticated as your business requires.

If your contractor is required to provide performance security, you will need to insert the form and the value of that security. Alternatively, if no security is required, then the decision tree will not ask those questions. The decision tree can also be programmed to alert those people in your business who are responsible for a specific contract particular.

If your company has internal governance procedures requiring sign-off on contract particulars, alerts can be set up to notify whoever is responsible. Access to completion of certain contract particulars can be given to your counterparty.

Once questions are completed, the contract can be automatically created. If you have coupled your contract automation system with e-signature software like DocuSign, the entire execution process can be paperless.

Once the contract is executed, it can be stored in an online library, sorted by site, counterparty, contract sum, date for completion, or any other category.

#### Set-up costs

Contract automation can increase efficiencies in your business, but the cost and time of initial set-up can be significant. However, evidence from adopters of contract automation shows that the benefit far outweighs the cost.

The setting-up of the various template forms of contract intended to be automated usually involves lawyers working closely with IT specialists. While the technology is intended to benefit construction businesses mainly, law firms assisting clients with preparation of standard form contracts will enjoy efficiency gains.

And the reality is that law practices engaged in high-volume work will have no choice but to embrace smart contracts. In the context of programme pressure and the prospect of monies being withheld until all warranties or appointments are in place and delivered, contract automation may soon become the industry standard.

Misha Chaplya is an associate at Trowers & Hamlins.

## Supporting your business journey to



## Project Success



When choosing an electrical or electrotechnical contractor, minimise your risk by selecting an ECA Member.

#### **ECA** members:

- ✓ Are thoroughly assessed for technical capability
- ✓ Are supported by the ECA Warranty & Bond
- ✓ Have access to industry-leading technical support
- ✓ Have access to industry-leading health, safety and other business & CSR support
- Have access to extensive industry information, advice and updates
- ✓ Have access to eRAMS task/project-specific risk assessment and method statement software.











## **CIOB** announces Rising Star award category for 2020

APPLICATIONS ENCOURAGED FROM CANDIDATES IN THE INDUSTRY FOR SEVEN OR FEWER YEARS

The CIOB has announced a brand new 'Rising Star' category for this year's Construction Manager of the Year

Awards (CMYA).

This brand new category is for rising stars who have been in the construction industry for seven years or less, and demonstrated excellence in their work, the industry and among their peers. Specifically, the CIOB encourages those that have made a real difference to the business or projects they have been involved with.

The CMYA has a reputation for showcasing the very finest talent in construction and is unique in the sector as these awards celebrate and recognise the achievements of the person and not the project.

CIOB chief executive Caroline Gumble said: "CMYA has been a unique barometer for management and leadership talent in our sector for more than 40 years, and I am delighted that this new category will showcase the best of the emerging talent in our industry, while giving the opportunity for firms to recognise the achievements of those at every level."

"CMYA has been a unique barometer for management and leadership talent in our sector for more than 40 years, and I am delighted that this new category will showcase the best of the emerging talent"

Caroline Gumble, CIOB

You can submit an entry yourself, or your employer can submit an entry. The judges will be looking for evidence of contribution within the timeframe of the last 12 months, and 500 words on why you wish to be nominated. More information on the entry requirements is available here. This award is free to enter.

Applications close on 29 May 2020 at 5pm, with finalists being announced on 1 July. The first ever CIOB Rising Star presentation will occur alongside the CMYA celebration in London on 30 September 2020.

www.cmya.co.uk/how-to-enter

The award will be presented alongside the CMYA celebration in September





#### Mental health

#### Remember CIOB can help with anxiety

CALL OUR SPECIAL HELPLINE



Earlier this year the CIOB's Benevolent Fund partnered with Anxiety UK to offer specialised support to members living with anxiety, stress or anxietybased depression.

If the current situation has seen your anxiety levels rise, contact: +44 (0)1344 630877. This dedicated UK number will lead enquirers to a member of the CIOB Team, who will in turn facilitate referral to Anxiety UK.

Take-up of the service for CIOB members will be monitored and members will be encouraged to provide feedback to help the CIOB ensure that consistent and useful support is being delivered and that member needs are being met.



Story for Community? Email Nicky Roger nicky@atompublishing.co.uk

#### Event

## Institute presents at Irish conference

GALWAY-MAYO INSTITUTE OF TECHNOLOGY HOSTS 350



Over 350 delegates attended various sessions during the day event at GMIT's Dublin Road campus in Galway. The annual conference is the largest construction event in the west of Ireland and is hosted by the Department of Building and Civil Engineering at GMIT.

The event is a fixture in the calendar for academics, contractors, architects, engineers, surveyors, property professionals as well as delegates from the public sector and semi-state organisations. It is also attended by senior students from GMIT built environment programmes and other colleges from around Ireland.

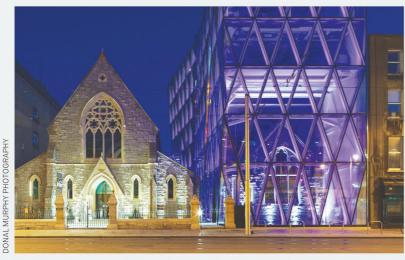


CMYA Ireland winner Alan Barnes (right)

The conference was officially opened by Dr Michael Hannon, acting president of GMIT, who welcomed delegates from all over Ireland and the UK.

Eddie Tuttle, director of policy, research and public affairs at CIOB, and Paul Nash, past president of CIOB, presented a talk titled 'Quality, Competence and Professionalism in a post-Grenfell World'. Alan Barnes, winner of CMYA Ireland 2019, gave a presentation of the refurbishment and extension of the Scots Church project off Abbey Street in Dublin.

The conference is sponsored and supported by the CIOB, the Society of Chartered Surveyors Ireland (SCSI), the Chartered Association of Building Engineers (CABE) and the Construction Industry Federation (CIF).



Alan Barnes gave a presentation on the Scots Church project in Dublin

#### Education

## CIOB Academy launches virtual classrooms

PROFESSIONAL LEARNING MOVES ONLINE



Adrian Montague

The CIOB Academy has launched its courses as virtual classrooms in order to continue to support professional learning during the pandemic.

Using specialist software designed for online classroom delivery, each delegate will be given access to an online classroom.

In the classroom, delegates can speak with their trainer using a microphone, type and answer questions using a messaging facility, engage in quizzes and polls, and follow an interactive presentation given by the subject matter expert. Electronic handouts will also be distributed.

In his blog on the launch Adrian Montague, associate director of the Academy, says postponing courses was not an option and taking learning online was the best solution.

"Being in lockdown or subject to restrictions on movement is making us all consider not just how we work. It is also making learning providers, such as the Academy, look at how they can support professionals during these difficult times, but also in the future as more and more people become comfortable with technology and more open to working and learning remotely.

"For the Academy, this has meant looking at a large proportion of our portfolio, which was delivered at the hub in central London using the traditional face-to-face training method and examining whether to postpone classes or look at another solution.

"From my perspective, postponing courses is something that would not serve to demonstrate the Academy is willing to be innovative and look at all solutions available. I believe that during this crisis, there should still be the opportunity to attend training and develop your skills.

"I know a number of people may be sceptical of the benefits of online classrooms and whether you can truly recreate the classroom online. However, I am positive online classrooms are an effective, fun, interactive and practical way to absorb content and develop new skills."

For more information on our virtual classrooms, visit www.ciobacademy.org or email the team at

academy@ciob.org.uk.

#### International

### Tales from Nepal

TOBIAS VOKUHL, FORMERLY OF BEARD CONSTRUCTION, DESCRIBES HIS LIFE IN NEPAL UNDER LOCKDOWN



Former contracts manager with Beard

Construction and active member of CIOB Oxford Hub Tobias Vokuhl took a sabbatical where he and his young family moved to Nepal to project manage various construction projects.

Tobias is now working in a voluntary capacity supporting INF, a local NGO, in disaster response and resilience building, as well as acting as a CIOB representative with a view to supplying input into the CIOB South Asia Strategy development later in the year. He has posted a regular blog about his experiences. Here is an extract from the most recent post in early April:

"These are indeed unusual times, wherever one is in this world. Recorded numbers of covid-19 positive individuals in Nepal are very low at five, but only 1,000 tests have been done to date in a country of 30 million, so it is hard to know what the real picture is. The health system certainly is not equipped at all for a wave of intensive care-requiring patients, so it is better to keep people apart as best as possible.

"Several other expat families have left Nepal prematurely within the last three weeks due to the pandemic, which has been emotional for the children, as good friends have suddenly departed.

"We are expecting to see the current situation through from here in Pokhara, and a good group of other expats have remained and are supporting each other, and critically, are supporting any INF medical response if required. INF medical facilities are already actively preparing for eventualities, and INF's medical and disaster response staff are supporting the local government covid-19 response team in their planning efforts.

"I am working from home now, and we are also putting a mixed daily programme of activities together for our kids to keep the days interesting. In that respect we share the fate of many other families around the world.



"If you are a Nepali on daily labour wages and live 'hand to mouth', the current lockdown circumstances are certainly more than a distraction"

Tobias Vokuhl, INF

"If you are a Nepali on daily labour wages and live 'hand to mouth', the current lockdown is certainly more than just a distraction; it can literally mean hunger for you and for your family.

"It is great to see that local government and Pokhara churches have started to collect money in support of vulnerable families in the area and are getting support systems in place. More, however, needs to be done as time goes on and funds will start running low for many more low-income families.

"For us, knowing of such bigger existential challenges, sharply puts our minor inconveniences in perspective." Connect with Tobias and read more blog posts at LinkedIn www.linkedin. com/in/tobias-vokuhl-60605b5a.

#### **Chartered Members**

#### **Helping members** become Chartered - PR moves online

TWO-HOUR SKYPE SESSIONS

The CIOB free professional review (PR) workshops can now be accessed online.

Pokhara residents exit houses for

shopping only

The live Skype sessions last about two hours and are fully interactive, with question and answer sessions for more individual advice. Numbers are limited but the frequency of the workshops has increased.

The workshops cover:

- The PR process and application requirements and tips for completion
- Supporting documentation which should accompany your application
- Continuing professional development (CPD) requirements how to present your evidence
- Checklist pointers

- The assessment process
- The result
- Timings
- What is required of a Chartered Member
- Q&A.

Contact your local hub staff member for dates and times www.ciob.org/near-you



#### Networking

#### Novus gets quizzical

HARRIET HOSKING, MEMBERSHIP SERVICES AND CO-ORDINATOR WITH CIOB CHELMSFORD AND IPSWICH HUB, ON A NOVUS LOCKDOWN INITIATIVE

#### The Novus community is always looking

for new and engaging ways to encourage the emerging talents of the industry and maintain a united global reach, through our events and networking.

Once covid-19 hit the world, we were faced with a sudden need to think innovatively. It became essential to maintain, and drive forward, Novus's work in bringing together like-minded industry professionals.

We needed to focus on raising morale among our peers and bringing positivity to our platforms. There was a clear increase in appetite for online networking, among colleagues and families, so why not bring it to Novus?

The idea of the Virtual Quiz began, to bring fun and a little competition

during lockdown. With the support of Novus chair Anne Okafor, and Friel marketing consultancy, the quiz was advertised on LinkedIn with the intention of uniting our regional hubs.

We held a successful event that transcended geographical boundaries. The evening helped us to reach members and students from across the globe, with around 25 individuals dialling in to Zoom to take part, from Birmingham and Scotland to Dubai and Toronto.

It gave us the ability to network with our international counterparts, which makes for an exciting future within Novus. We want to create a network with no limitations, and plan on using this experience to enhance our global relationships and support the industry with a united voice.

The virtual aspect has also opened the doors to our connection with accredited colleges and universities, which have expressed interest in hosting their very own Novus Virtual Quiz!

The Novus group will be hosting a second Virtual Quiz Night on 11 June. To book your place, please visit the CIOB events page.

#### **CPD** goes live online



NOTTINGHAM MEMBERS LOG ON FOR KINGSPAN'S BARRY SHERRY Nearly 40 CIOB members dialed in for an online CPD in April, organised by Nottingham Hub.

Barry Sherry from Kingspan (pictured) presented the Facades, Fire Testing and Delivering Quality CPD live online, followed by an active and informative Q&A session.

The hub received positive feedback after the event and plans to move other events online in the near future.

#### Education

## FCIOB hosts lockdown career development webinars

STUDENTS LEARN ABOUT SKILLS AND APPRENTICESHIPS ONLINE

CIOB Fellow Peter Egan has responded to the call for mentors to help with UK Construction Week by creating a series of webinars.

Egan, who is a QMSI Construction with the Professional Engineering Wing at the Royal School of Military Engineering, felt that the crisis was the perfect time to help construction students.

"With many industries now feeling the pain caused by the covid-19 crisis and a number of students wondering what their future will entail, there could be no better time for construction professionals to step up and help others see a way forward," he says.

"It was this idea which inspired me to step up to UK Construction Week's call for professionals and mentors to conduct webinars to help people and the industry deal with present problems."

Egan put himself forward to lead a series of webinars focused on apprenticeships, skills transitioning and professional development to help fill this gap. The first focused on apprenticeships and engaging with the younger generation.

He invited Alison Watson from Design, Engineer, Construct (DEC) along to show what her organisation has been doing to engage students in online work experience.

This DEC package gives children in their last year at high school the opportunity to undertake 30 hours of structured online learning and work engagement, speaking to engineers, site managers and tradesmen to see how projects are undertaken.



Egan: stepping up in a crisis.

Watson presented this alongside a description of available apprentice schemes and how students and companies can get involved in the process.

In Egan's next webinar Rebecca Lovelace and Terry Watts from Build People will highlight how individuals in other industries and trades can utilise their existing skills to grow a new career in construction. Egan will talk about his experience of supporting military engineers to map existing skills against qualifications in order to start new careers when leaving the services.

The final webinar is aimed at enabling professional growth. "It will allow tradesmen and managers to progress into positions where they can mentor these new additions to the industry and drive forward the sustainable industry we will need in the future," explains Egan.

Adrian Montague from the CIOB Academy will help show routes to professionalism and how institutions like the CIOB can help with professional development. He has written a blog on how to benefit from online classrooms (see www.ciob.org/blog). https://register.gotowebinar.com/register/6808482069789728528? source=summit



## Learning Today, Leading Tomorrow

The CIOB Academy delivers high quality education and training for the construction industry.

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If you have experience in construction but lack an Honours degree level qualification, our Chartered Membership Programme is your springboard to MCIOB.

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## Liverpool hub members work on UK's first concrete dome in 25 years

CONSTRUCTION ON TRACK AT JODRELL BANK OBSERVATORY NEW VISITOR CENTRE



Andy Logan, the CIOB Liverpool Hub

vice-chair, and member Ryan Southern are among the team responsible for work that has started on the First Light Pavilion, a new visitor centre at the Jodrell Bank observatory in Cheshire. It will be the first concrete dome construction in the UK for over 25 years.

Logan works as a consultancy manager at CE Building Control & Land Charges Service - the building control service at Cheshire East Council - part of the LABC network of 3,000 surveyors across the UK. Southern is the senior site manager with Kier Construction.

The visitor centre development follows the completion of the Square Kilometre Array (SKA) Headquarters at Jodrell Bank. Jodrell Bank was founded in 1945 and forms part of Manchester University. It became a World Heritage Site in January 2018.

Development of the visitor centre has been 11 years in the making. The total project value of £20.5m has been funded by the Heritage Lottery Fund (HLF), Department for Digital, Culture, Media and Sport with additional funding from central government.

Manchester University appointed Hassell for the design of the pavilion, maintaining the working relationship already built between the company and Cheshire East's building control team.

The exterior (above) and interior (top) of the First Light

Contractor Kier has developed bespoke construction techniques for the dome and plans an 18-month delivery programme.

The visitor centre will house a new exhibition and engagement space. incorporating the original fabric of the 1957 dish of the telescope, an auditorium devoted to displaying immersive digital presentations, an education hub and a new cafe.

The building will be fully grassed over to submerge into the surroundings of the Cheshire countryside, with cut-outs located for an entrance foyer and exterior seating area for the cafe.

The circumference of the dome will be an exact match to that of the Lovell Telescope and will offer 745 sq m of floor space, reaching 7m at its highest point. It's estimated that a total of 1,800 cu m of concrete will be used during construction.

Substructure works have continued during the lockdown period, with the building control team carrying out essential inspections of foundations, drainage and ground floor preparations, using video inspections for other elements.

The fully managed inspection framework is allowing progress to continue and ensures stage by stage compliance with requirements while following government guidance and social distancing restrictions.

Construction is currently moving at pace, with completion due in 2021.

#### Charity

### **Redrow founder** pledges £1m a week to support charities

HOUSEBUILDER URGES OTHERS TO DONATE DURING CRISIS

Redrow Homes founder Steve Morgan is pledging to channel £1m a week to charities hit by the coronavirus outbreak. The cash will be distributed through the Steve Morgan Foundation to charities in Merseyside, Cheshire and North Wales.

Morgan, who founded Redrow in 1974, has also urged other entrepreneurs and philanthropists to do the same.

Morgan made the decision despite seeing an estimated 50% wiped off his own fortune in March by the economic crash caused by covid-19.

He said: "Aside from the obvious difficulties that the charities are facing, supporting thousands of disadvantaged people, this crisis has already caused substantial cashflow issues. Normal day-to-day fundraising efforts that the charities undertake have been pulled from under them. The London Marathon alone puts around £65m into the charitable sector.

"As the economy shrinks it will be the charities and the vulnerable people who suffer first and we can't allow that to happen.

Redrow supports candidates on its graduate scheme as they work towards CIOB memberships.

#### Housing

## Regeneration boost for deprived area

PLANNING WIN FOR LIVERPOOL SITE

A 2.4ha regeneration project in a deprived area of Liverpool has taken a step forward with the granting of planning permission for community housing.

#DestinationBootle is a 2.4ha stretch along the Leeds-Liverpool Canal which social enterprise organisation SAFE Regeneration intends to transform into a live-work community space.

Architect Ellis Williams created the masterplan to provide over 100 new homes within a community-focused landscaped public realm linking the existing surrounding communities with the heritage canal frontage.

Accommodation will include family townhouses, one- and two-bed apartments and an 80-bed extra care facility, in a mixture of housing tenures

that includes affordable and shared ownership.

Homes will be arranged around an 1,718 sq m purpose-built Hub Building and the pub, The Lock and Quay, which will be refurbished and extended to 700 sq m, incorporating B&B accommodation.

Indices of Deprivation place the neighbourhood among the worst 0.5% in the UK, with highlevels of unemployment and crime, poor health, educational achievement and housing. The area is run down, with boarded-up buildings and derelict wasteground. Cramped terraces sit alongside industrial spaces, with few green spaces.

Brian McGorry, chair of the CIOB Liverpool Hub and associate with Rider Levett Bucknall, was part of the team overseeing the project management. The current SAFE site already houses workshops, studios, business incubation units and community arts programmes as well as its own microbrewery and community pub. It is also host to multiple community initiatives including the popular Bootle Music Festival.

destinationbootle.org.uk



New housing and a community hub will transform the canalside site

CIOB HELP

financial hardship

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due to Covid-19

and are on the

membership

If you are

experiencing

Correction: In the March issue of Construction Manager (p54), Tommy Drumm from Collen Construction was named incorrectly in a photograph as Adrian Lynch.

#### Michael Castle FCIOB

#### Meet a member

MICHAEL CASTLE, SENIOR SITE MANAGER, KNIGHTS BROWN



How did you get into construction? What else would you have done? I entered the industry when I left school, joining a City and Guilds

apprenticeship in bricklaying. I didn't know what I wanted to do at the time. My father told me to go and get a trade whilst I was deciding what I wanted to do. This way I would always have something solid to fall back on.

Since then I have never looked back; the industry gave me the confidence to achieve more than I ever thought was possible. I attended university to do an HND in Building Studies then a degree in Construction Management. I've always been interested in ancient civilisations so if I had my time again I might have become a stonemason or something that involves historic buildings.

### What do you love about your job and what are your frustrations with it?

There are so many things that I love and this has grown as my career has evolved. The main ones will be meeting new people from all walks of life, who all have a different story. Just by talking to people you see the pride they have with the some of the projects they have been involved in.

Another part that I love is spending time in schools talking about the industry inspiring the next generation. And also being part of something that makes a difference to people's lives.

What frustrates me is that it's not until you have entered the industry that you get to see the opportunities it has to offer. It's not until children reach school-leaving age that we get involved: we need to do more to catch children's imagination at an earlier age.

#### What are your future ambitions?

I would like to be more involved helping promote the industry and help to inspire the next generation of builders.

#### What do you do in your spare time?

Until recently I used to play basketball, but I'm more an armchair fan now. My time now is usually filled up spending time with family and the garden. I never thought I would get green fingers.

"WRW Construction had to ensure the museum remained open to the public throughout, without compromising the visitor experience"

Stuart Brown, WRW Construction



Me and my project

## Height at the museum

STUART BROWN FCIOB ON ROOF WORK AT A GRADE I-LISTED PROJECT BY WRW CONSTRUCTION



I was delighted to learn that we'd been awarded the essential maintenance works contract at the National Museum of Wales, Cardiff. One of my first projects as an assistant site manager was on this fantastic Grade I-listed building and it was great to return some 15 years later with WRW Construction.

This time around, however, the challenges were greater, and it wasn't just working around Dippy's short stay during his national tour of British museums, or the Da Vinci exhibition. In a relatively short period we've lived through Brexit, Storms Ciara and Dennis, and are currently navigating the challenges that the global covid-19 pandemic has presented us with as we move towards completion.

The works focused on the repair and replacement of defective roof coverings, rooflights and associated areas, together with the items of work within the spaces beneath in 45 weeks. WRW Construction had to ensure that the museum remained open to the public throughout, without compromising the visitor experience and that there was no risk to the public or any of the collections.

Our approach to planning this project was uncompromising: we didn't take any chances in relation to water ingress or Joint Fire Code compliance and worked closely with our partners at LT Scaffold Services to develop a complex temporary works solution to encapsulate the work areas.

One of the biggest challenges we had to overcome was how to erect such a large sheeted structure without physical ties, but we achieved it. The scaffold was restrained through buttressing and 1,000kg kentledge loads per bay, which supported a 750mm alloy spine beam spanning the width of the museum. The Asterix HD 1330 temporary roofing system was secured to the scaffolding and the spine beam.

Top: The National Museum of Wales building in Cardiff Left: Stuart Brown, operations director at WRW Construction

Below: CIOB CEO Caroline Gumble (centre) visited the site last November

Once we had encapsulated the roof areas, we set about the works in accordance with our Safe Systems of Work and in collaboration with all project stakeholders, ensuring the works were completed to the satisfaction of Cadw. which works to protect the historic buildings of Wales.

Many challenges presented themselves, such as finding a tradesman that could manufacture lead rainwater pipes to match the existing ones.

In November 2019 we were delighted to be visited by CIOB CEO Caroline Gumble. It was great to introduce WRW Construction and review the project with her and members from the Wales Hub, sharing our experiences.

Upon reflection, I'm glad that we remained uncompromising in our approach to risk, considering the events that presented themselves after the works commenced. It was a pleasure to be involved with such a high-profile project on such an important building in Cardiff.

Stuart Brown is operations director at WRW Construction, which is a CIOB Training Partner.







## **Saving lives**

CIOB PARTNER CLOCS EXPLAINS WHAT CONSTRUCTION MANAGERS CAN DO TO PROTECT THE COMMUNITY FROM COLLISIONS WITH HGVS SERVICING THEIR SITES



Every working day at least two people are killed or seriously injured in collisions involving HGVs and vulnerable road users

Four times more people die in collisions involving HGVs than die as a result of incidents on site.

Every working day, at least two people are killed or seriously injured in collisions involving HGVs and pedestrians, cyclists and motorcyclists. Every year 117 of those people die as a result of their injuries. Many of those vehicles are servicing construction sites.

Construction managers have a keen focus on their accident frequency rate (AFR) and are undoubtedly aware of the 30 fatal injuries to workers in 2018/19, but how many know about collisions causing death or serious injury to vulnerable road users on journeys to and from their construction projects?

Here's what you can do to prevent these deaths:

1. Implement a corporate strategy to ensure the safest journeys

- 2. Plan for road safety
- 3. Procure for safe projects:
  - Construction Logistics Plans
  - Safe routing
  - Delivery management
  - Site conditions
  - Vehicle choice and driver training.

#### The CLOCS Standard

Developed collaboratively by the fleet and construction sectors, the CLOCS Standard aims to ensure the safest vehicle journeys. It provides construction managers with a clear set of duties and provides a consistent

"Training for Construction Logistics **Planning** has been developed and is delivered in partnership with CIOB"

framework for all the stakeholders in a construction project, supported by clear guidance for regulators, clients, consultants, principal contractors and the supply chain.

Construction logistics planning, mobilising your supply chain, effective delivery management, efficient and safe site access/egress are all within a construction manager's control, as are the onsite ground conditions which are a key factor in determining which category of HGV will be sent to site. Procuring suppliers that only operate vehicles with optimum safety features can prevent death and serious injury to pedestrians, cyclists and motorcyclists.

#### **Construction Logistics Plan**

The Construction Logistics Plan (CLP) is the golden thread that runs through the CLOCS Standard. It's a tool that can be deployed by all stakeholders to plan, monitor and review site operations to ensure optimum efficiencies as well as to eliminate risk to local communities.

Training for Construction Logistics Planning has been developed and is delivered in partnership with CIOB. CLOCS is currently reshaping Day 1 (CLP Foundation), providing a virtual classroom to enable more people to begin their CLP journeys during the covid-19 lockdown. More information will be available on the CLOCS and CIOB websites before the end of May.

#### Act now

Consider the devastating consequences of not acting now. Think about the casualties and their families, the emotional impact on drivers and witnesses, the financial implications for those involved and their companies and damage to reputation. Construction managers are in a strong position to lead change - sign up to become a CLOCS Champion today.

www.clocs.org.uk

### 🛂 Training & Recruitment

Job spotlight

Steve Payne

Director, Steve Payne Consultants

## **BALANCING**

STEVE PAYNE COMBINES CONSTRUCTION CONSULTANCY WORK WITH ACADEMIC RESPONSIBILITIES



#### You combine consultancy with academic tasks. Describe a typical day.

A typical day consists of balancing the needs of both. The consultancy work is very varied and primarily covers business processes and improvement in project, programme and portfolio environments. Risk management against time quality and cost is also a big part.

The academic aspect draws on my university-level teaching qualification to deliver courses and professional qualifications accredited with a range of professional bodies.

My day can vary from providing professional review mentoring and marking for MCIOB status, and the professional review for the Association for Project Management Chartered Project Professional (APM ChPP) status, to delivering courses.

#### What qualifications and experience have you needed to balance these twin skills?

Having started as a self-employed carpenter and then working through site management, contracts management, and on to lead regional businesses for several of the major PLC construction companies, I have gained a unique perspective of the industry which prepares me well for the challenges of consultancy. Nothing prepares you better than actually having done it, or experienced it. The status of FCIOB has without doubt been a significant aspect of being regarded as an expert in this field.

To be regarded as a consultant I think it is necessary to have both experience and academic qualifications and this prompted me to take a master's degree in Construction Management in 2000, and a Postgraduate Certificate in Higher Education (PGCHE) in 2012.

#### What are the most challenging and rewarding aspects of your job?

One of the main challenges is balancing the workload between training and consultancy to make the business as agile as possible and adapting to changing markets.

The covid situation has made us look at other options for course delivery and we now also provide all our training as an online option of blended learning (a mix of e-learning, virtual classroom, and one-to-one mentoring).

The main reward I get is the satisfaction of our candidates on courses achieving their aspirations. Particularly when we have trained and then mentored construction professionals through the CIOB process to achieve MCIOB. I also get great satisfaction from seeing businesses improve their performance as a result of our intervention and support.

## CONSTRUCTION

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#### Manage opportunity

Paul Caunce urges fellow employers to do more for management apprentices



As I write, I'm confined to my home office, contemplating, in these unusual circumstances, the almost

unique opportunity to work on personal development. Of course, there are some fantastic free-to-access MOOCs (massive open online courses), not least those from CIOB covering ethics, quality and sustainability - worthy of a place on any CPD planner.

But for people hoping to enter the industry in construction management positions, gaining accredited qualifications can come at a prohibitively high cost, with many schoolleavers reluctant to incur mountainous student debt. Apprenticeships offer a great way to learn while in paid employment and, with government subsidies, are a relatively low cost for the employer too.

However, the number of apprenticeships for construction management roles seems remarkably low. In the Sheffield area, there are 1,500 construction apprentices, of which only 40 are higher apprenticeships (typically Level 4, leading to an HNC). Since 2015, degree apprenticeships have promised to deliver an alternative to mounting student debt while acquiring the best combination of vocational and academic learning - win-win?

Britain's biggest employers are already funding this route through the apprenticeship levy, yet in a desktop survey of 15 of Build UK's biggest names only five made mention of degree apprenticeships on their careers page. Searching sites like LinkedIn, Indeed and the government apprenticeship website doesn't make for better reading either.

This puts a somewhat different complexion on opportunity. Degree apprenticeship pathways, capacity among training providers and funding are all in place, yet industry employers do not appear to be offering opportunities in sufficient numbers.

When I advertise higher apprenticeships for construction management roles, I typically receive over 100 applications, with at least a dozen worthy of consideration for interview. The challenge isn't how to make our industry more appealing to candidates but how to say no to bright and hopeful applicants.

As employers, we must do more to offer positions with meaningful training and progression opportunities, perhaps by adopting the aims of the 5% Club, to overturn a 40-year culture of non-investment in training coupled with risk transfer to individuals.

Paul Caunce is a board member of construction consultant Five Oceans and electrical contractor J Monks.





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Construction Manager

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