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Building Envelope Supplement

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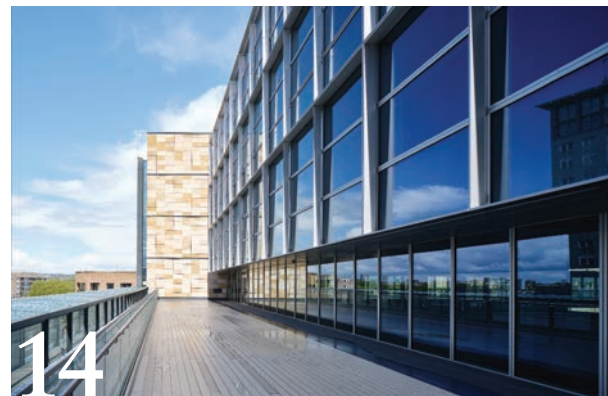
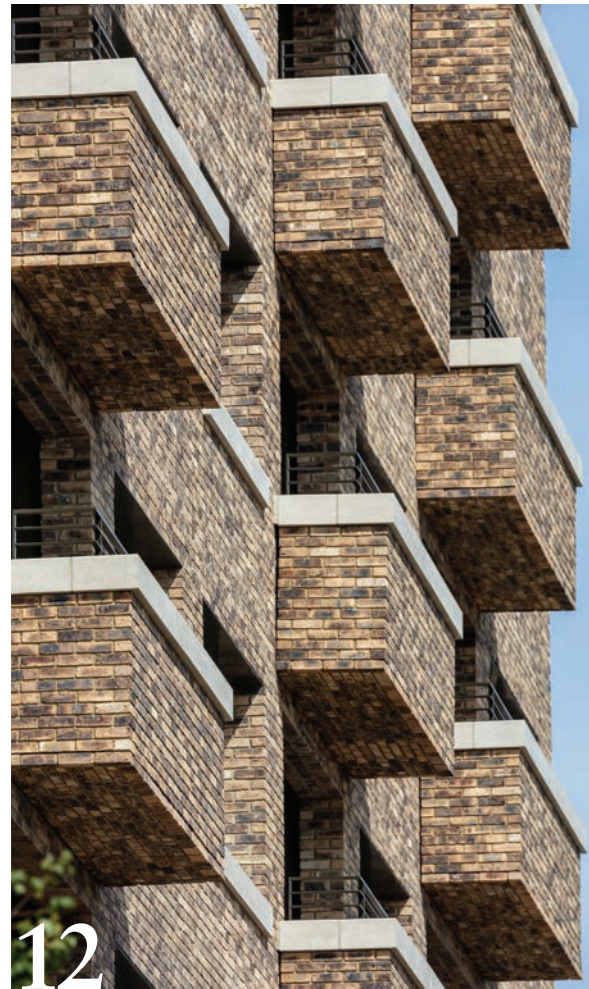
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FROM THE EDITOR



At the time of writing, COP26 is about to begin in Glasgow, and by the time you read this, it may have been the scene of some pretty alarming protest activity, designed to bring home the critical urgency of humanity's need to change its ways on carbon.

Boris Johnson has accepted he is very concerned about the event. Not so much about the likely lukewarm promises from some major nations on carbon reduction, which admittedly won't give him much to cheer in TV interviews, more the prospect of Insulate Britain/Extinction Rebellion shutting down parts of West Scotland and stealing the headlines from what's supposed to be a landmark event for his premiership.

For Johnson, COP26, which began on Hallowe'en, could be a horror show. However any political embarrassment for him pales into insignificance compared with the possible scenarios in a couple of decades, if the climate change activists' predictions are proved right. Fires, floods and more, meaning huge areas of the globe becoming uninhabitable and leading to population flight like we have never seen. For my part, I don't want my kids to have to endure a world where we can't even function, due to the damage we could have done more to mitigate.

What does all this doom and gloom have to do with building envelopes, I hear you cry? Well, with 40% of UK emissions reportedly coming from buildings, and 14% of that from our current 28 million homes, it seems actually quite a lot.

However, all is not lost. As our project report by Tom Boddy shows, on page 14 of this envelope-focused supplement, applying the 'recycle, reuse, reduce' agenda being widely advocated to existing buildings (in this case, Arup's 1990s workplace Triton Square) can reap huge carbon rewards.

The project is an inspiring example of a practice revisiting and fully investigating its former work, and saw Arup removing the outer layer of the double-skin facade, repairing, and replacing it. Of course, such an all-encompassing approach may be tough to achieve for projects without the resources Arup were able to bring to bear, but that doesn't mean it shouldn't be sought.

Here, Lendlease set up a temporary facility to clean and refurbish 3000 m² of facade panels, a massive investment. However, according to Arup's calculations, this plus the other refurbishment measures employed saved 57,000 tonnes of carbon, compared to a new build.

Architects are increasingly embracing the reuse agenda, for aesthetic and functional as well as sustainability goals. The kind of savings the planet needs to really make a difference to climate change are within reach if such approaches are widely adopted.

James Parker
Editor

**ON THE COVER...**

Arup's redeveloped 1 Triton Square is one of the UK's first large-scale projects where a circular economy approach has been applied to the facade, saving over 19,000 tonnes of carbon and represented a 66% reduction in costs.

Cover image © Simon Kennedy

For the full report on this project, go to page 14

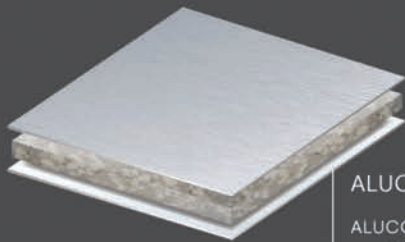
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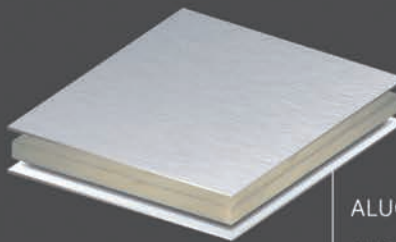
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WORKPLACE

A twist on NYC prefab to lure workers back

New York architectural firm HWKN has partnered with German developer Landmarken to create what the practice is claiming as the “next generation of the office,” with one of their ‘Spirit prototypes,’ BrainFactory in Bochum, Germany, scheduled to open in January 2023.

“We have to lure people back to the office,” commented HWKN’s Matthias Hollwich. “With Spirit, we achieve that by turning the building into a destination, adding lifestyle amenities, greater flexibility, and openness to what was once just a commodity. By adding emotion, we turn the commonplace into the unforgettable.”

BrainFactory Bochum will be followed by AlphaSpace Aachen and KiteLoft Köln, to be completed in the next two years. At 86,100 ft², BrainFactory Bochum will house approximately 600 employees.

The architects commented: “Spirit’s futuristic, socially innovative workspaces first utilise the latest generation of custom,

prefabricated real estate products. Then, the shapeshifting begins.”

HWKN continued: “We playfully removed sections of the ‘prefabricated box’ to create a defining and iconic disruption of the standard exterior.” Since the prefab system does not allow for cantilevers, HWKN opted for a “daring, distorted-column grid.” Hollwich added: “We uplifted and twisted the standard image of ‘the box.’”

On the inside, to enhance the “sociability” of this workplace, HWKN exposed internal structural columns, cutting out sections of the prefab box. Light now reportedly “floods” into the seating lounges. The same reconfiguration – a cut-out turned 45° – also creates light-filled co-working areas. The brass finish of the sculpted exterior extends throughout, “adding personality and forging an aesthetic link to the building as a whole and the city surrounding it.”

“We have reinvented the box while still taking advantage of mass production,” said Hollwich. “The early Modernists of the Twentieth Century sought to make elegant, mass-produced housing. A hundred years later we are doing the same for the office with an emotional twist.”

The Spirit brand embodies HWKN’s core design principles: respect for nature, a happy and healthy work environment, intelligent design, and dedication to both neighbours and the community at large.

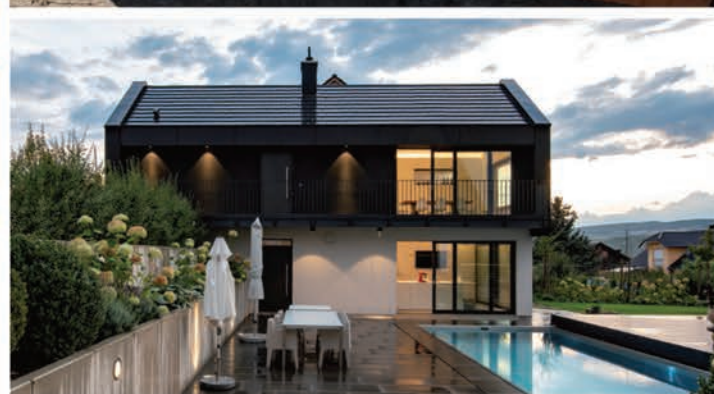
A design breakthrough, Spirit has resonated with HWKN’s client, Landmarken. “We were excited by an office design that was inspired by the progressive urban design of New York while still being affordable”, says Landmarken’s Jochen Hermanns. “When they open, Spirit Offices will help our clients attract top talent by creating an energised workplace and culture that beats the home office.”

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COMMENT

Offsite gets another chance

Dr Jonathan Evans of metal envelope supplier Ash & Lacy gives a counter view to the consensus on offsite, saying that in the push towards MMC there is a strong case for some key design elements remaining onsite

20 years ago, I gave my most unpopular talk. At an event promoting offsite construction shortly after the publication of the Egan Report, I somewhat rained on the parade by stating that it would never take off unless one or both of two things happened. Either the Government should make it mandatory, or acknowledge there wasn't enough skilled labour to build onsite.

In general, people have massively underestimated the benefits of not having a factory, sending materials directly to where they're finally used, and only employing workers when they're needed. Add to that the misplaced notion that main contractors would delight in their supply chains making no mistakes whatsoever, and offsite construction was really up against it.

A previous business of mine was a specialist rollformer, and I set up a company that supplied modular and unitised solutions. We were very excited about it, and pursued many innovations, but like many others, I closed it due to well-meaning clients procrastinating so long that we couldn't support the factory. It was

crushingly disappointing, as anybody will know who has had to look people in the eye and tell them they have lost their jobs.

Despite this experience, it's time to try again. We are established players in the load-bearing light gauge steel market and building envelope experts, and have just announced an investment in a new framing line and are setting up a new factory to assemble frames. Why? Because something feels different this time.

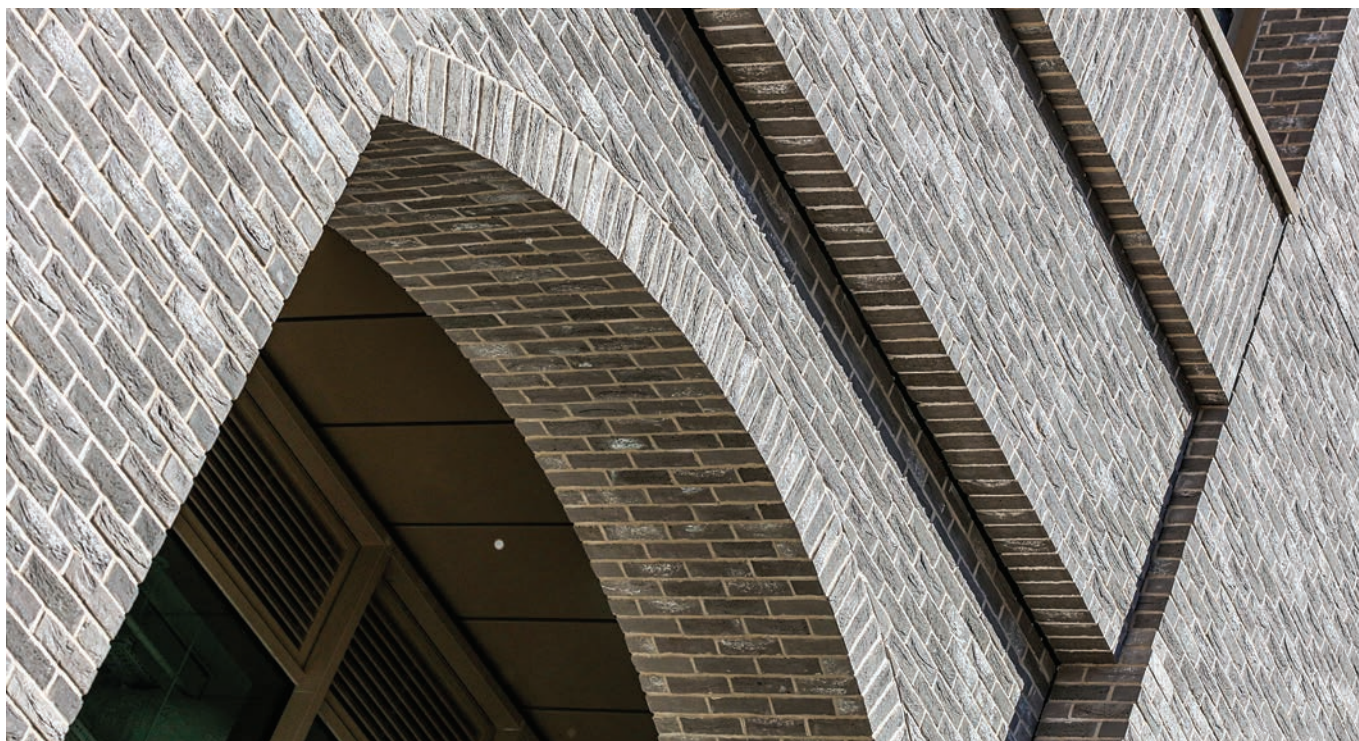
The inevitability of labour shortages

The labour shortage needs to be allowed to play out. This is what offsite construction has been waiting for 20 years. There is enormous latent capacity within the industry. It's been a constant source of surprise and disappointment to me that we haven't had more approaches from housebuilders about the supply of 2D and 3D frames.

We've been making pre-assembled frames for flat-to-pitch conversions for 30 years. I think the chronic shortage of labour is now possibly irreversible, and is reminiscent of what happened



Lewisham Exchange in south London, two residential towers using 3D structural modules by Vision Modular, plus unitised Mechslip brick cladding panels



Intricate detailing, patterns and textures can be achieved using a 'hybrid' method combining offsite tech and onsite installation

about 20 years ago with blockwork infill walling. The lasting legacy of our failed offsite enterprise was a successful SFS (Steel Framing Systems) business. SFS initially struggled to gain traction for the infilling of frame bays. It was faster and tidier, but there was no shortage of blockwork installers and Building Control inspectors were unfamiliar with it, demanding calculation packs for every job. They stopped doing that over time and as the popularity grew, there were fewer blockwork installers available, and very quickly SFS became the standard method. In about five years there was a complete turnaround, and it will never go back to the way things were.

The same thing looks set to happen with brickwork. If people see the emergence of quality brick slip systems, why would they spend their apprenticeship training for what might be a dying art? We began developing our brick slip system about five years ago. As a super-critical person myself, I didn't want anything that could be accused of being 'fake'; I wanted a modern interpretation of the use of clay as a robust, durable cladding material. When developing all our systems, we always have offsite compatibility in mind. We have firm ideas about what a successful offsite construction company should do, and I think you can predict those who will fail.

For example, our envelope business has shown us that it's not necessary to standardise the componentry. When a building is surveyed, what looks like 500 identical cladding panels can often end up being 500 unique panels with just a few millimetres of variation. The key is to have a process that can cater for this – usually a digital order-processing and manufacturing environment. Each one of our cladding systems has up to 100 pages of internal design guide documentation associated with it, covering such things as span capabilities, connection locations, stiffener locations etc.

Furthermore, I firmly believe that the final finish should be applied onsite. This deserves an article in its own right, but in summary, it allows you to disguise the fact that the building is modular – it saves space, and gets the module out of the factory quicker and it allows for a degree of refinement of the aesthetic not possible in the factory. It also allows larger modules to be transported and reduces pressure on potentially performance-damaging efforts to make the external wall slender. You also don't have to retain the envelope installers on your payroll.

Aces in their places

Finally, I think many companies would benefit from working in partnership with specialists in two key areas – the load-bearing frame, and the building envelope. If you buy an off-the-shelf load-bearing frame, in 10 years that's what you'll still have. By contrast, partnering with a company that does this as a core business puts you at the forefront of product and process technology.

For building envelopes, the case is even more convincing. External walls are extremely complex and subject now to more regulatory requirements than ever, possibly including a 15-year statutory defect period. Cladding systems fail much more frequently than people think, and they're very expensive to rectify. Designing a ventilated system without cold bridges that doesn't result in long term moisture problems is not straightforward.

Materials and finishes are changing all the time. Economies of scale mean that envelope specialists can offer you state-of-the-art solutions at reasonable costs. The envelope is what everybody sees when the job is finished and it defines the quality perception of the project, so it's important to investigate the best solutions.

Dr Jonathan Evans is CEO at Ash & Lacy

A large background image showing construction workers on a flat roof. One worker is using a spray gun to apply a material to a wooden beam, while another worker stands nearby. The roof surface is covered with a patterned insulation material.

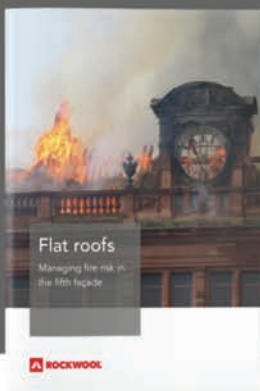
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COMMENT

The devil is in the brickwork detail

What are the modern techniques that enable housebuilders and developers to produce details in masonry facades that take buildings to new levels in terms of design and aesthetics? Scott Denham from IG Masonry Support investigates

Deep reveals, soffits, flying beams and arches transform a building into a thing of beauty. Traditional facades that have withstood the test of time are much-applauded feature details, but are increasingly being ignored in favour of building cheaper and more quickly. This results in buildings that are bland in appearance.

Brick has been around for centuries and has been the go-to material for use in the construction of many homes across Europe. Its consistent shape, compressive strength and ability to absorb water – not to mention its ability to hit the mark on aesthetic – has made brick a solid choice when it comes to the creation and refurbishment of buildings.

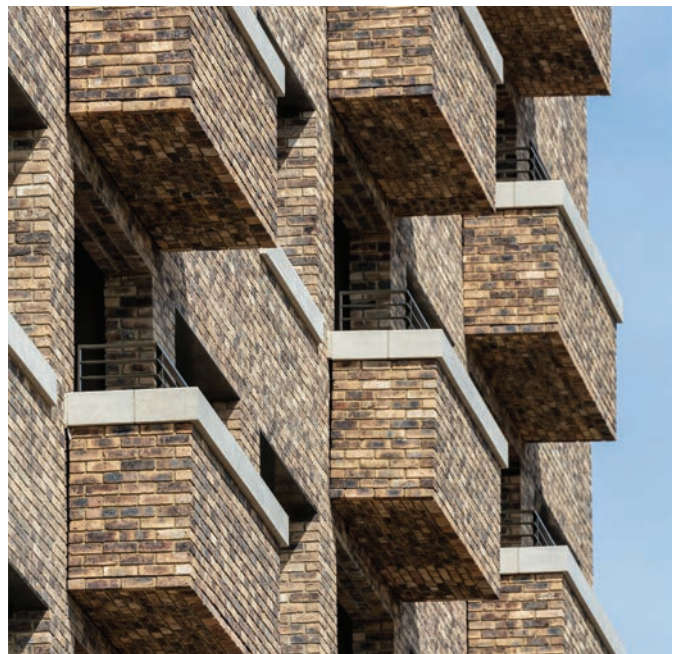
While trends towards other materials come and go, housebuilders' love affair with brick continues. Over the past decade however, and in line with the advent of modern methods of construction, brick has been competing with other solutions. Brick was the popular material in the UK and Ireland, but the likes of the modern cladding system have become quick and cost-effective ways to create bright and modern looking buildings. However, it comes at a cost and this is partly due to the long-term aesthetics, as modern cladding systems can look tired and dated over time. There can be no denying however that many brick facades look as impressive today as they did when they were created decades ago.

Currently, brick is experiencing something of a resurgence and with this has come a wave of housebuilders returning to brick and the many qualities it has to offer. Architecturally, the intricate detailing that brickwork enables is like no other. Brick detail in the form of arches, brick soffits, deep reveals and flying beams, continually make for stunning exteriors, enabling housebuilders to create truly unique facades.

Quality is achieved

As a result of brick's popularity and design potential, there has been a need for a solution that enables intricate brickwork patterning to be achieved in many iterations. And what is this solution? Prefabrication.

Prefabricated brick solutions can help the industry in a host of ways including the skills shortage. There is a huge skills shortage in the brickwork sector, with the average age of a bricklayer being 59 years old. To overcome this issue, prefabricated solutions have been tipped as a potential answer, as they negate the need for a



high number of skilled craftspeople onsite.

Prefabricated solutions reduce the need for skilled labour onsite as systems are cut and bonded in controlled manufacturing facilities. Not only does this ensure quality and consistency of product, it eliminates the need for lengthy assembly onsite.

As prefabricated systems are made in a manufacturing environment, these conditions offer more control than traditional trades onsite. This level of quality control means products can be easily verified and made in a standardised way. This translates into better performance guarantees for specifiers – and a higher performing system that functions well for years to come.

The same finish every time

Moreover, the uniformity that is essential to brickwork designs can run the risk of being compromised if offsite solutions are not employed. With modular construction, replication simply isn't an issue. Taking the construction of complex brick features offsite into factory-controlled conditions, drives the level of quality and consistency that is needed to achieve excellence and reduces the need for skilled craftspeople onsite, who are a growing rarity in the current house building climate.

Brick's popularity will certainly flourish in the coming years considering there are systems which now make it far easier to create sophisticated brick patterns. These systems provide all the traditional aesthetic benefits in a modern solution, offering limitless creative potential for housebuilders. With this union, brick will certainly be a building material that is here to stay.

Scott Denham is sales director at IG Masonry Support



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Renewed sense of purpose

Arup believes that its redevelopment of the workplace it designed in the 1990s in West London, including a refurbished facade, will save 40,000 tonnes of carbon compared with a new build approach. *ADF's* Tom Boddy reports

Situated on London's Euston Road between the British Library, University College London, and Regent's Park, sits 1 Triton Square – a trading building originally constructed for the First National Bank of Chicago in the 1990s by British Land and designed by Arup Associates. More than 20 years after completion, the project is now being redeveloped, with the original Arup team taking on the challenge to reuse as much of the structure as possible, and enhance it for carbon gains.

The original concrete structure was six storeys high including plant, with four corner cores clad in French limestone. A unique aspect of the development was that it featured what at the time was considered a “pioneering” double-skinned facade, says Matteo Lazzarotto, senior facade engineer at Arup, with an outer layer of monolithic glass and an inner layer composed of double glazed units. “It was one of the earliest building examples using this technology,” he tells *ADF*.

In 2015, because of the “evolving needs of the customers,” British Land decided it was time to re-evaluate the existing structure and transform it to meet the demands of “today’s workstyles,” says Lazzarotto. The main drivers included increasing the office floorspace by 125,000 ft², reconfigure the layout to provide modern, flexible and affordable workspace, and create an “exemplary” sustainable as well as healthy place to work.

Acknowledging the complexity of the redevelopment, British Land commissioned Arup to deliver all architecture, engineering and specialist design services, as well as involving most of the companies that worked on the original design.

Reuniting the original team and having companies that had worked on the building initially was a “fundamental prerequisite” for a successful redesign, explains Lazzarotto. The team had access to all of the original records and as-built drawings which “really helped during the early stages when key decisions had to be made.” Additional intrusive surveys could be avoided as they already knew the original function and performance of the elements.

Circular economy

“Everything was already set up for an office building,” explains Lazzarotto; the existing building had “very good bones; a very good framing structure with high loading capacity and good floor to floor heights, as well as good ventilation infrastructure and voids.” On account of this, the team of Arup, British Land and main contractor

Triton Square is one of the UK's first large-scale projects where the circular economy approach has been applied to the facade





The project reused around 3,300 m² of limestone, 35,000 tonnes of concrete and nearly 1,900 tonnes of steel

LendLease took a circular economy approach from the outset, sharing a “genuine commitment in creating a sustainable building in design, construction and operation.”

Instead of knocking down and starting new, the focus was to retain and reuse as many materials and components as possible. The circular economy approach aims to maintain the value of assets even as staff and processes change. Throughout the project, the team operated with a highly collaborative philosophy – including challenging one another’s ideas. “This was essential to achieving a successful outcome for the client,” says Lazzarotto.

Their commitment to this underlying philosophy in the project has seen the reuse of around 3,300 m² of limestone, 35,000 tonnes of concrete and nearly 1,900 tonnes of steel.

Facade

According to Arup, Triton Square is one of the UK’s first large-scale projects where this circular economy approach has been applied to the facade. As the team examined the existing facade and how it was originally constructed, they realised that because of its robust condition and how it was still achieving sustainable targets in terms of energy and solar gains, the opportunity to dismantle and reuse the external skin was a realistic and carbon saving alternative to designing a new one.

Contractor Lendlease had to carefully plan the sequencing of the facade renewal operation, which involved the removal of 3000 m² of panels and around 25,000 separate pieces. As the final component to be taken off was the first to be put back – all of the components had to be refurbished together.

The panels were then shipped to a pop-up factory set up by Lendlease in Essex (less than 30 miles away) where they were inspected, deep cleaned, refurbished and then sent back to site to be reinstalled. Establishing this factory instead of sending the panels abroad to Germany – the initial plan – saved around 25,000 transport miles – reducing carbon and also supporting UK jobs.

Overall, opting to refurb the external facade has saved over 19,000 tonnes of carbon and represented a 66% reduction in costs. The process started in April 2018, and reinstallation did not begin until summer 2019.

Key interventions

As well as reusing the exterior part of the double-skin facade (the internal skin was replaced) the team’s approach to meet the objectives of the project were to reassess the original layout of the square plan with corner cores. “The key challenge was to keep to the brief without changing the footprint of the building,” says Lazzarotto.

When the building was first designed, the

height of surrounding structures limited how high the team could go. However, over the last 20 years, 10 to 11 storey buildings have been constructed in Regent's Place, which has established a higher horizon line in the area.

The redevelopment added three storeys – producing an 85% increase in net office area. The four corner cores have been extended to support these floors, with the original type of limestone cladding having been sourced to enclose these new sections. As well as serving the office levels, Lazzarotto explains that these stair cores also serve the mixed-use “ground floor-plane,” which is accessed via the perimeter.

The designers set back the additional levels to create roof terraces. “The aim was to achieve amenity and maintain the consistency of proportion across the elevation,” says Lazzarotto.

The original building's octagonal atrium which was on completion regarded as the largest enclosed atrium in London at 36 metres x 36 metres, has been reduced to 17 metres x 17 metres and infilled with a new steel structure. Lazzarotto explains how “consolidating the atrium transforms the building from a very sterile space, glazed off at every floor to a dynamic open plan allowing for collaboration across floorplates as well as maximising natural daylight and increasing office floor area.”

The southeast corner core – where the main entrance is located – has been redesigned to give it “better prominence and engagement,” says Lazzarotto, “creating a more dynamic reception area that fronts onto Regent's Place.”

Socially active

1 Triton Square is set to become a workplace for 3,500 people. Arup's design puts a major emphasis on creating a ‘healthy’ workplace that prioritises “wellness and interactivity,” with specific focus on incorporating amenity, daylight and social connectivity throughout the building.

To help achieve this, the refurbished facade has been reinstalled one storey up from its original position – “a special part of the project,” says Lazzarotto, “it will allow the building to interact with the square at ground level.” The shifted facade will enhance the lower level space and maximise daylight on the ground and first floor. Also, the 282 m² rooflight in the atrium and the floor-to-ceiling glazing in the offices and stairwells floods the interior with an abundance of natural light.



As part of the healthy workplace philosophy, the layout incorporates breakout space and stairs between floors to promote walking and visibility. There is also a large gym and health club in the basement, and over 500 spaces of bicycle storage at ground level – incentivising healthy and green personal transport.

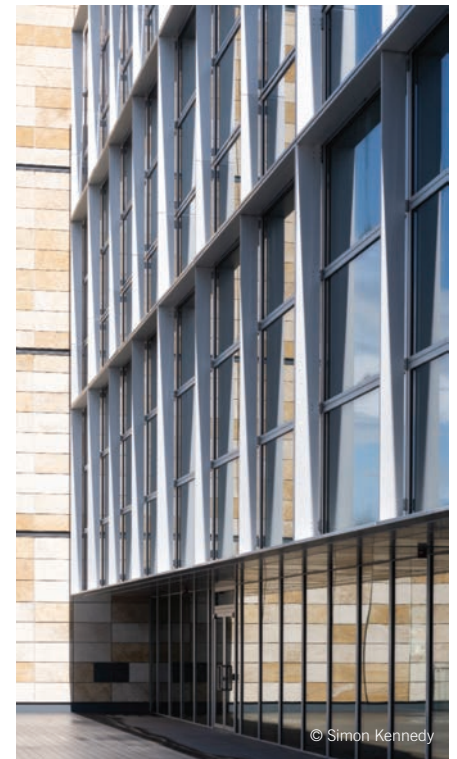
The five terraces, formed by setting back the facades on the new upper floors, provide space for socialising, working, and relaxing. They will offer panoramic views of the city and Regent's Park, and facilitate a variety of uses from rest and contemplation to events and sporting activities. The terraces have “established the relationship between the outside and the inside,” says Lazzarotto.

Marginal gains

Adopting the circular economy approach and reusing as much of the existing structure and fabric as possible accounted for 45% of the total carbon saving. The remaining interventions stem from Arup's ‘marginal gains’ approach.

As the project evolved during the design process, they discovered there was scope to ‘go greener’ than originally planned. “The marginal gains strategy demonstrated that we could get from BREEAM Excellent to BREEAM Outstanding for a minimal extra cost,” says Lazzarotto. As it turned out, this was roughly 0.3% of capital expenditure, compared to a perceived industry norm of around 5%.

The opportunity to dismantle and reuse the facade was a realistic and carbon saving alternative





“We chipped away at every aspect of the building to save carbon, cut waste and deliver the best working environment”



The data emerged from assessing the embodied and operational carbon footprint of the building over the 20 year period and referenced this against a “business-as-usual scenario” to establish the carbon savings. “We chipped away at every aspect of the building using our collective expertise to save carbon, cut waste and deliver the best working environment,” explains Lazzarotto. He adds: “every possible system, component and strategy was analysed and refined to improve performance and deliver the most sustainable outcome.”

Significant ‘marginal gains’ included positioning the stair cores outside of the building’s thermal line – enhancing efficiency and airtightness. Low energy LED lighting and energy ventilation systems, as well as hybrid air source heat pumps, contribute to the building’s low energy usage. In addition, where feasible, existing columns were strengthened with carbon fibre wraps, taking up to 58% less area than a standard twin column solution and increasing the axial load capacity by 40%. Lastly, the more sustainable cement replacement used contributed to 41% less carbon than standard concrete.

Conclusion

The redevelopment of 1 Triton Square is an exemplary piece of integrated architecture and engineering which prioritises retention of structure and fabric, and one where the team has reunited to improve on its original design, and achieve an important sustainability result.

The project relied on the wide experience of Arup, Lendlease, Permasteelisa and Gartner, and the “innovative approaches that the whole team adopted,” explains Lazzarotto. “The requirement was to produce a building that had much higher ambitions around sustainability, carbon and energy usage than the original,” says Lazzarotto. However, he asserts that Arup’s objective was also to create a “wonderful building” to be in, with good daylight, and enjoyable spaces in which to work and circulate.

The decision to refurbish large sections of the existing building based on circular economy principles represents a challenge to the industry status quo in terms of sustainability approaches. There arguably remains a widely-held perception that new structures are more sustainable than regenerated buildings.

However, Arup has investigated the carbon savings achieved by choosing to retain and renew the structure, finding a 45% reduction in emissions in construction and operation – i.e. whole life carbon – versus a typical new build alternative.

Overall, the building has contributed to an estimated CO₂e savings of 40,000 tonnes – equivalent to powering 9,900 average UK houses for a year. Of this, just under 25,000 tonnes was embodied carbon with the remaining saving in operational carbon over 20 years of the building in use. Arup concludes: “This achievement would not have been possible without this partnership, and the collective vision of Arup, British Land and Lendlease.” ■

A construction revolution

With Brexit closing the doors on many highly-skilled workers, Paul Richards of Aquarian Cladding Systems discusses the struggle to bring young people into the industry and why MMC techniques can provide a solution

It's no secret that the construction industry must work harder than ever to attract young people into the industry and to re-skill those who have perhaps reached a crossroads in their careers in other industries.

Right now, the whole country is going through a consolidation period because of Brexit and the pandemic, with staff shortages affecting many industry sectors. It has been reported that large online retailers are paying as much as £22 an hour to their drivers, making it very difficult for sectors reliant on lower-skilled labour to compete.

Due to the unsettling nature of coronavirus, it's also been reported that baby boomers who are 'empty-nesters' and have paid off the mortgage have made life decisions to retire early. You can hardly blame them but who will do the jobs they once did?

Traditionally we've been able to turn to Europe to help with our labour shortages but for now, Brexit rules and rhetoric have not been inviting so while the Europeans stay at home, solutions have to come from this side of the Channel.

For our industry to recover and grow post-pandemic, we've got to re-skill individuals looking for a change in career and engage with the younger generation living in England right now.

Struggle to engage

This is easier said than done. For any industry to be sustainable it needs to evolve both organically and by bringing in new, fresh ideas making it essential that we encourage energetic and creative talent on board to take the industry forward.

Unfortunately, the industry's perennial struggle is in engaging with a younger generation and thinking 'outside of the box' in terms of our message of encouragement for them to join us.

I'm disappointed and frustrated to say that our company struggled to find an apprentice for six months this year



and the cladding industry is being affected by recruitment difficulties and the skills shortage.

That said, the apprenticeship providers we're engaged with are saying they haven't had many applications for apprenticeships for any sector as we come out of the pandemic, so we are not alone. But if the cladding industry does not start resolving these issues now, we may see a detrimental impact on the growth in our sector.

Our industry must therefore behave smarter than others and do something



It essential that we encourage energetic and creative talent on board to take the industry forward

about it. If we get what we've always got by doing what we've always done, then the message in our invitation must change to get the desired results. Fortunately, we have a powerful message with a wide range of opportunities to offer to young people, as they look to take their first steps in their career.

The key messages

Only by engaging better with young people will we be able to get rid of misconceptions and negative views they might have around construction which are currently proving hard to shake.

Our industry is the second highest paid sector in the UK and can offer a long-term career in an environment that is constantly growing and evolving.

It's responsible for building homes for the future, schools and universities, to produce future world leaders, research labs to find cures for the modern world's illnesses and to prevent environmental disasters, green energy plants for cleaner fuel, and transport hubs to enable us to explore the world.

Future generations can either talk and protest about climate change or join our industry to truly make a difference. There is no more rewarding place than the construction industry to turn words into action.

Driving improvements

The continuous failure to encourage more labour on site now means that whereas a reduction in construction time used to be the greatest driver and commodity in the industry, it's now its people.

So, if we can't find the people to do the work, then the materials and the processes must be able to compensate to do the work instead, which is why offsite manufacturing and other forms of modern methods of construction are a huge part of the solution.

Smart, progressive businesses will find a modern solution, and excel. Those stuck in the past, who fail to change their ways, will fall behind. I know which side of the fence I'm on. Do you?

Paul Richards is managing director of Aquarian Cladding Systems



Building innovation

George Spreckley from the Brick Development Association reviews the projects shortlisted for the innovation category in this year's Brick Awards

The Brick Development Association was excited to once again host the Brick Awards after a busy but disrupted two years for the construction industry. The Royal Lancaster Hotel in London hosted the awards ceremony with a live audience, celebrating the very best of brick architecture on 10 November.

The judges had the tough task of assessing the best examples of brick architecture submitted by developers, specialist brickwork contractors and housebuilders and brick manufacturers over the past two years.

Innovation is always a fascinating category at the Brick Awards, with the judges seeking projects that demonstrate an innovative application of clay bricks or clay products. This award can be interpreted in varying ways – and tends to ignite a heated debate!

This year we have seen a growing trend in the use of bespoke brick along with the use of digital tools. We have also seen great demonstrations of brickwork contractors using innovative solutions to meet the architects design brief. A number of projects have cut the completion time on jobs by using prefabricated masonry systems.

The shortlisted projects this year were:

Brentwood Preparatory School

The facades of the newly designed school combine both traditional hand-laid methods and contemporary prefabricated techniques. Cottrell Vermeulen Architecture sought to create a seamless whole; to materialise the ideas of the architecture and to celebrate the versatility of working with brick.

By supporting the brickwork via shelf angles to the perimeter at first floor level it enabled the arcade spring points to shift, and allow the corner arches to be open and floating as they wrapped the corners. This was achieved by forming a series of prefabricated steel arched elements clad in brick that were constructed by IG offsite in their Derby factory and craned into place on site in Brentwood. For this project,

Ibstock Brick were the manufacturers and Global Brickwork, the contractors.

Derby flood defences

This project showcased Fonterra's new and innovative prefabricated masonry walling system, which achieved the desired outcomes and contributed to a six-week time saving against the project's original construction programme.

The wall has the same thickness as a traditionally built brickwork wall, but with up to twice the flexural strength and a compressive strength designed to be 30% higher.

The real innovation of the project, designed by NMCN, was the quick and easy production methods, making installation up to 12 times faster than traditional building methods requiring no skilled bricklayers.

Ornamental Wall

Ornamental wall demonstrates how the craft tools of the 21st century – digital CAD and CAM technologies – used in industrial settings enable the creation of bespoke bricks that combine robust, long-lasting qualities with bespoke craft aesthetics.

The innovative bespoke bricks, manufactured by Wienerberger and HG Matthews, were designed and made by utilising digital tools in combination with industrial manufacturing processes and ceramic craft techniques. Digitally altered moulds were used to make hand-made textured bricks and double curved scriptural brick capping, designed to drain water from the top of the wall. The architect was Maria Gasparian Studio and the brickwork contractor, Thomas Aginskis.

Three New Bailey

The technically challenging woven elements of this complex facade were achieved through close collaboration with Make architects. Thorp Precast constructed the facades from 650 large scale brick faced precast panels using over 500,000 Ketley brick units and were installed onsite over



Brentwood Preparatory School



Derby flood defences



Ornamental Wall



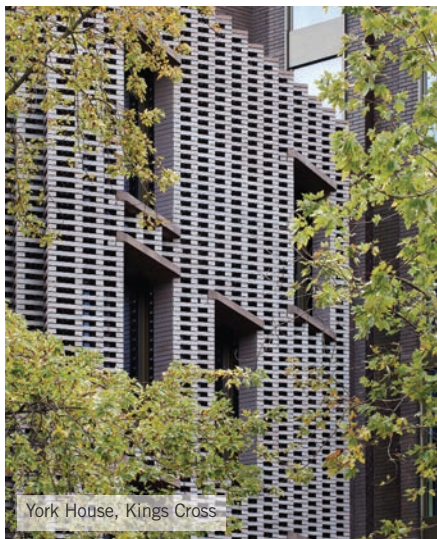
Three New Bailey



UCLH phase 5



Walker Court



York House, Kings Cross

13 weeks, without the need for scaffolding.

The hit and miss brickwork in the staircase windows give the impression that it is built using conventional masonry – the bricks visible through the windows from the inside and use of ceramic adhesive in the mould instead of traditional concrete backing.

The use of the latest ultra-high performance fibre reinforced concrete (UHPFRC) technology to make super slim panels, minimised the weight and removed the need for conventional steel reinforcement.

UCLH phase 5

The challenge of this project was that the brickwork – manufactured by Michelmersh Brick Holdings – needed to be built offsite, within precast panels and then driven 200 miles before being craned onto the building facade. The construction process did not need metal reinforcement and has been incredibly well received by designers. As scaffolding was not required to seal the building, working at height risks were dramatically reduced. Pilbrow and Partners were the architects behind this design, working alongside Swift Brickwork Contractors.

Walker Court

The Walker Court project has introduced different heights and structures, bringing a modern present to this historical site. Designed by SODA, the nightclub is overlaid using a lattice of hit and miss Bembridge brickwork, manufactured by Wienerberger and Ibstock Brick. The style of brickwork creates a veil like effect and houses LEDs programmed to produce a

We have seen a growing trend in the use of bespoke brick along with the use of digital tools

light show, which peaks through the hit and miss wall. In contrast Tigra Multi (TBS) Glazed Engels Oeffelt was also used, using the stretcher bond, helping to create the contrasts of brickwork. The brickwork contractor for this project is Grangewood Brickwork Services.

York House, Kings Cross

The new brick element is formed from an innovative arrangement of long format clay bricks in a staggered lattice, which form a self-supporting skin around the new highly glazed, CLT structure within. The brick lattice design – as a new addition to the principal elevation – needed to possess a degree of permeability so as to reduce its visual mass. dMFK Architects and Structural Engineers Webb Yates developed a proposal which was inherently efficient, self-supporting and allowed for a high degree of visual permeability. Forterra's long format block was the ideal fit for the design, with closely-matched colour and a custom perforation arrangement that allowed the bricks to stack using vertical rebar through the overlapping elements, assisting Swift Brickwork in the construction.

See the full list of winners of the Brick Awards at www.brick.org.uk

Bridging the gap in design

Improving the thermal performance of the building envelope is central to the drive for sustainability, energy efficiency and meeting the criteria for the impending Future Homes Standard. Simon Hill of Schöck considers the issues involved

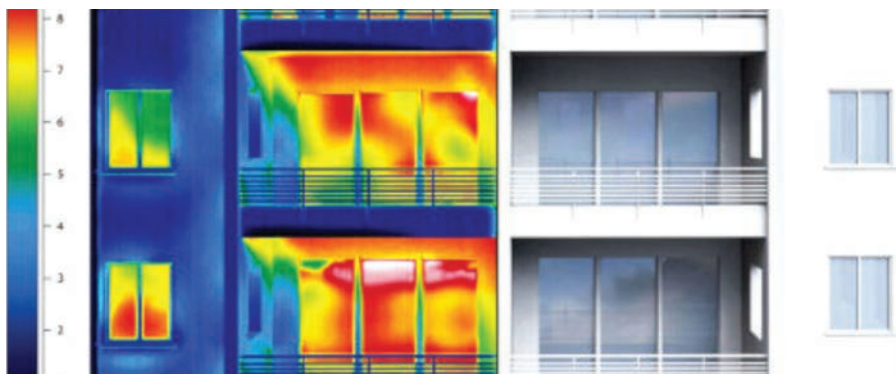
Critical to improving the thermal performance, is the avoidance of thermal bridging. Understanding how significantly thermal bridges can compromise the value of the installed insulation is essential.

A thermal bridge is a localised area of the building envelope where the heat flow is usually increased in comparison with adjacent areas. In other words, thermal bridges act as a 'heat highway' headed straight out of the building. As a result, the temperature of the interior surface near the thermal bridge is lower and if this area becomes too cold it can lead to condensation. Over time, mould is likely to form, potentially damaging the building structure and even posing a health risk to the inhabitants. Cantilevered balconies are the most critical thermal bridges. Poor design detailing at these connectivity points will, in addition to higher energy consumption and condensation problems, result in non-compliance with the Building Regulations.

Meeting required standards

The latest version of the Building Regulations Part L (2013, with 2016 amendments) and associated guidance document for residential construction Approved Document L1A (ADL1A) require that thermal bridging be included in the fabric heat loss calculations. The Government Standard Assessment Procedure (SAP 2012) is the model used to provide evidence that the carbon emissions target has been achieved. Also the SAP calculation includes the term HTB (heat loss due to thermal bridging).

The Future Homes Standard will come into effect in 2025, with the aim of ensuring that new homes in England are futureproofed – and there are of course also voluntary certification schemes such as BREEAM and Passivhaus. However, despite this background of increasingly stringent standards for



envelope thermal performance and heat losses, many designers are still not fully aware of how significantly some common thermal bridges compromise the value of the installed insulation.

Thermal performance and structural integrity

The most effective way to minimise thermal bridging at cantilever balcony detailing is to incorporate a load-bearing structural thermal break. This is a highly efficient balcony connector that minimises the flow of thermal energy between the interior and exterior of a building, providing both structural integrity and ensuring that the balcony is thermally isolated.

The units have a very specific purpose and to work effectively over a long period require certain physical characteristics. Namely, thermal insulation with an optimum thickness for the particular application, load-bearing components and a combination of reinforced steel and stainless steel. The bearings in the compression module transfer the compression forces, steel bars transfer bending moment and shear forces; whilst the stainless steel results in lower thermal conductivity and is corrosion resistant too. A wide variety of structural thermal break solutions are available for connectivity applications such as concrete-to-concrete,



Understanding how significantly thermal bridges can compromise the value of the installed insulation is essential



concrete-to-steel and steel-to-steel. Some are designed specifically for renovation projects, parapets, balustrades and even Passivhaus.

Condensation & mould growth

One consequence of thermal bridging is that surfaces can form condensation, resulting in visual deterioration and structural damage. However, an even bigger concern is mould growth. To identify areas where there is a risk of condensation and therefore mould growth, a 'surface temperature factor' (fRsi) should be used. It allows surveys under any thermal conditions and compares the temperature drop across the building fabric with the total temperature drop between the inside and outside air. Using the formula, the recommended (fRsi) value for offices and retail premises is equal to or greater than 0.5; and to ensure higher standards for occupants in residential buildings, equal to or greater than 0.75.

Passivhaus – a special case

With Passivhaus being the highest building insulation standard, the use of energy-efficient building materials and the

prevention of thermal bridges are essential to the concept. Until recently, cantilevered building components – particularly balconies – posed a construction challenge for Passivhaus design. As the components penetrate the insulating outer shell of a thermally highly sensitive building, the performance demanded could not be met totally effectively by thermal break products on the market at the time. However, product development means that high specification 'Passivhaus certified' structural thermal breaks are now available for some applications.

A fine balance with heavy balconies

One consideration that demands a fine balance of design and technical optimisation involves heavy balconies. Where a balcony is heavier due to its method of construction and/or its unusual cantilever length, there will be a greater load transferred back to the structural thermal break connectors. The load capacity of those connectors will therefore need to transfer the higher loads. The likelihood here is that there will be more steel reinforcement required, which in turn

will increase heat loss. However, as long as the total heat losses remain within acceptable levels and the minimum temperature factor requirement (fRsi) is exceeded at a specific junction, then it is usually acceptable.

Responsible design for the future

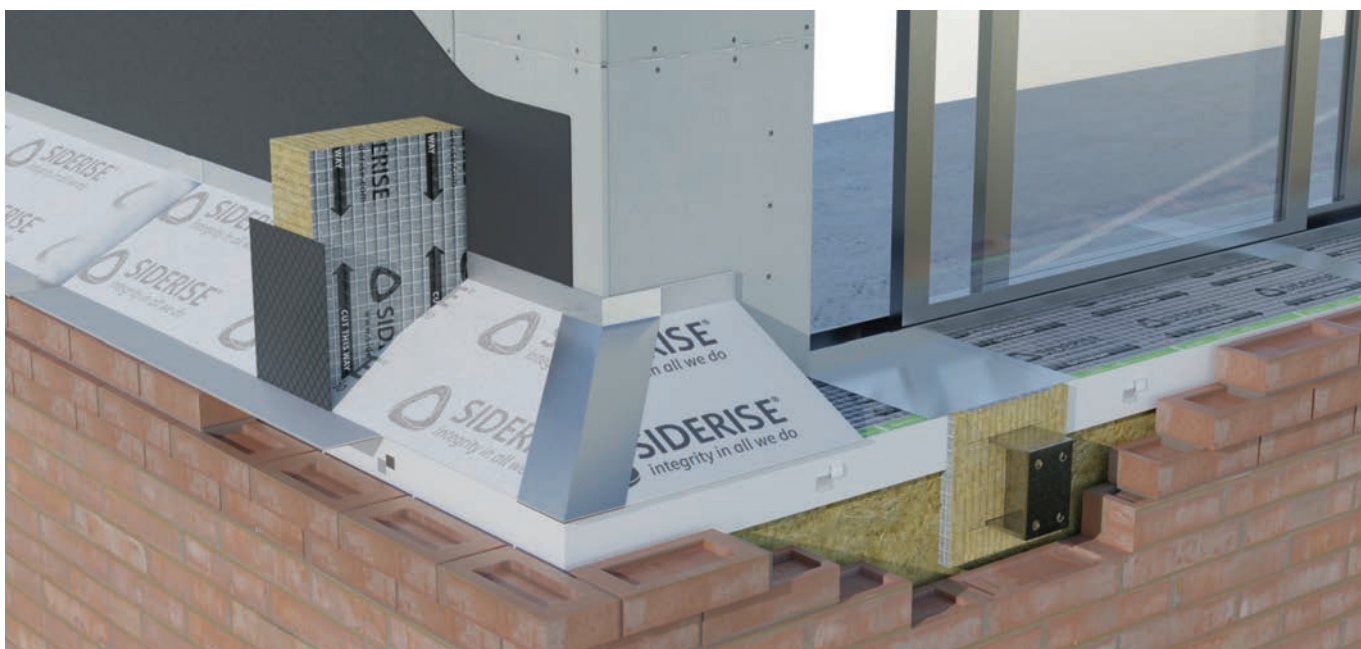
The UK has set in law a target to bring all its greenhouse gas emissions to net zero by 2050. As part of that journey, there is the commitment to introducing the Future Homes Standard in 2025. A key part of this involves uplifting the minimum standard of whole building energy performance and improving minimum insulation standards. The thermal performance of the building envelope is therefore becoming increasingly important – and critical to this process is the avoidance of thermal bridging. Mitigating this problem may result in a limited upfront cost, but represents a small investment when weighed against the long-term savings gained through energy savings and future maintenance issues.

Simon Hill is product and marketing manager for Schöck



Protecting decorative projecting brickwork

Projecting brickwork is a popular design feature on masonry building envelopes. However, the resulting inconsistent cavity depths can add complexity when ensuring structures' passive fire protection – Graham Laws of Siderise Insulation explains more, and describes solutions



Masonry finishes have long been a desirable facade choice for all kinds of buildings around the world. Its robust properties and earthy colours lend a sense of safety, solidity and shelter. Aesthetically, beyond the wide range of textures and sizes it offers, brickwork can also be laid offset to create projecting bands or shapes to add interest to large elevations or around windows and doors. However, the inconsistent cavity depth this creates can be a challenge to effectively protect using standard passive fire protection cavity barriers.

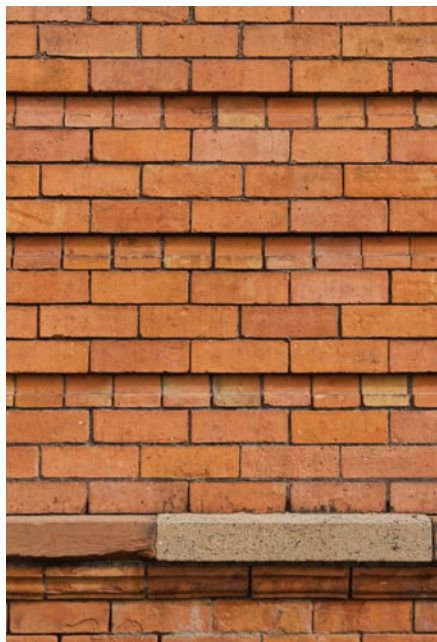
Inconsistent cavities

It is a legal requirement in line with BS 9991 for steel-framed masonry constructions with a ventilation cavity to include vertical and horizontal cavity barriers and fire stops, even if the cavity is

fully filled with A1 rated (non-combustible) insulation. These are blocks of fire-resistant material that seal the cavity and prevent fire, smoke and heat spreading up the facade and into different building compartments. On a typical build up with a consistent cavity depth, these will be standard full-fill products that are installed between the inner leaf and masonry wall to effectively seal off the cavity.

Cavities that vary in depth are more complex, as a full-fill cavity barrier will be unable to meet the masonry leaf and therefore close the gap. For straightforward applications, it may be possible to simply notch a standard full-fill barrier, so it fills the cavity, or to place a board into the gap to flatten out the irregularity. However, this is more difficult to do for more complex and increasingly popular brickwork patterns. The accepted market solution for

Intumescent cavity barrier solutions are designed to help protect inconsistent cavities



Projecting brick bands are a common feature on many masonry buildings

projects with uneven inner masonry surfaces or irregular design features is to use an intumescent material.

Intumescent cavity barriers

Often referred to as open state cavity barriers, these passive fire protection products are designed to leave a ventilation gap allowing free vertical movement of air when ventilation is required, or when caused by irregular brickwork patterns. In the event of a fire, the intumescent material in the product will activate at a critical temperature (typically around 130°C) and expand to meet and mould to the face of the outer construction, forming a robust seal across the gap.

Third party testing

As with any fire safety product, it is essential to make sure that any cavity barriers are third-party tested to ensure they are fit for purpose. This includes making sure they have been tested in conjunction with a DPC (damp proof course).

Open state cavity barriers cannot be effectively tested using the standardised tests for typical full-fill products as the time taken for the gap to close could in theory

lead to a 'fail' even though compartmentation is quickly established and the product performs well. To resolve this, the Association for Specialist Fire Protection (ASFP) outlines the test configurations and failure criteria for testing of 'Open-State' Cavity Barriers in their Technical Guidance Document (TGD 19). This is a "small-scale" test, typically using 1.2 m long seals and is a modified version of the standard EN 1366-4:2006 Fire resistance tests for service installations – linear joint seals. Working with a manufacturer's technical department or fire safety specialist can help you to ascertain which products and tests are most suitable for your application.

Decorative and safe brickwork

Passive fire protection solutions that have been specifically developed and tested for masonry facades can help to ensure that this beloved building material keeps pace with modern construction standards and regulations, remaining synonymous with robust and long-lasting buildings.

Graham Laws is technical director at Siderise Insulation

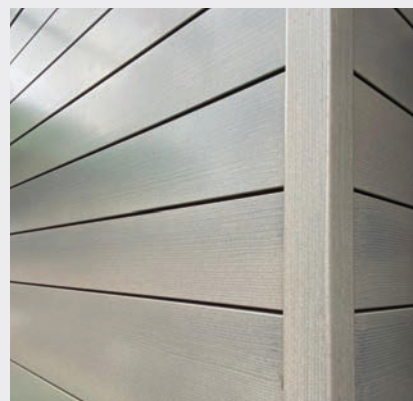
Metalline launch new Aluminium Extruded Plank System to their Unity Range

Metalline are delighted to announce they have developed a new aluminium extruded plank system to add to their Unity rainscreen range. Unity X-TRU is a cost effective cladding solution designed with simplicity and versatility in mind, making it the perfect solution for both new builds and the replacement of non-compliant ACM, HPL and timber cladding. The new X-TRU plank is functional with exceptional mechanical properties including strength, durability and fire-resistance and is particularly suited to buildings where dangerous timber cladding is present and needs replacing.

Available in a number of finishes, including wood grain, the X-TRU system is a unique way of transforming the exterior of a building and currently offers designers flat faced interlocking 100 mm and 150 mm planks. In addition to the wood grain effect finish, the extruded aluminium planks can be supplied in a variety of lengths and a vast array of



powder coated or anodised colours to achieve A1 & A2 classifications. The panels offer a desirable fast track install and secret fix, connected by an interlocking male/female joint which can be easily fixed either horizontally or vertically to an adjustable support system. This drained and ventilated



system creates a weather shield in front of a primary structure.

To find out more about the benefits of X-TRU planks, visit Metalline's website.

01543 456 930
www.metalline.co.uk

MEG makes a splash!

Located in the foothills of the Franklin Mountains in El Paso in Texas, Camp Cohen is one of three new waterparks designed to celebrate the culture of the city's diverse communities.

Parkhill Architects were appointed by the City Authority to design them and Camp Cohen was the first. It was decided to use Abet Laminati's MEG exterior grade laminate for this exciting and creative camp-themed park which includes water slides, a toddler pool, lazy river and more amenities for all ages.

MEG was specified as the architects were looking for wood effect cladding which would complement the camp theme and which could be cut into planks to simulate a cabin. It was also heavy duty enough to cope with the sustained usage and the extremes of sunlight and temperatures which can easily range between -2°C in the winter and 35°C in the summer. As a result, MEG 754 Padouk was seen as the perfect solution. This visual plank look can now also be achieved with the newly-



Photography: Keith Talley, Talley Photography

launched and competitively-priced Easy MEG siding product.

Camp Cohen is another example of MEG in action where the need for high performance and durability is married up with low life-cycle costs, aesthetic design and resistance to weathering. The range comprises 58 colours and 29 woodgrains together with 5 concrete and metal effect finishes.

MEG is a self-supporting high pressure laminate (HPL) for cladding the exterior of buildings, balconies and other applications. It features high resistance to temperature, climate shock, weathering, UV light and impact. Samples and technical literature are available from Abet Ltd.

020 7473 6910
uk.abetlaminati.com

Fit for purpose?



A specification validation service has been developed to help ensure the practical and aesthetic longevity of screening louvres. Gilberts Blackpool – one of Britain's leading independent manufacturers of screening and ventilation louvres – has developed the service to enable specifiers to be assured, from the outset, that the material, finish and format of the louvres will deliver, within budget. Gilberts has developed its own louvre product range over the years to provide a comprehensive package to keep pace with the evolution of building design and structural interfaces, initially and as/if the building structure is altered. Thus it now has ranges of standard, high performance, site assembled and acoustic louvres, available in a range of ratings for weight, ventilation, weather, insects and even bird ingress. With its in-house design expertise, Gilberts has the capability to create bespoke configurations which can be both CFD modelled, and tested within its own laboratory to give customers complete 'fit for purpose' peace of mind. Gilberts also offers a comprehensive range of PPC, PVF and PVF2 coatings across its louvres, available in any RAL colour, applied to louvres of almost any size.

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