BUILDING ENVELOPE

02.18

adf materials for architecture

Bespoke PIGMENTO®

Make it yours

VMZINC launched the PIGMENTO® range of finishes in 2005. Due to the success of this product VMZINC is now available in bespoke colours. Orange, yellow, purple, grey and beige are examples of the colours that are offered whilst still retaining the grain and warmth of VMZINC. For other colours, just provide a RAL colour or sample and VMZINC will endeavour to produce the PIGMENTO® of your choice.

VMZINC
Tel.: 01992 822 288
www.vmzinc.co.uk

VMZINC
passionate about zinc

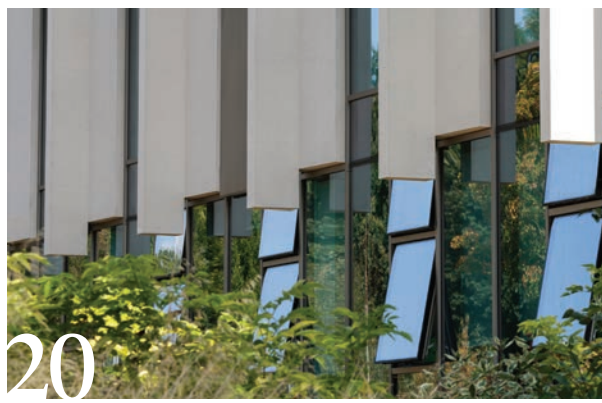
02.18

Building envelope supplement

CONTENTS

PROJECTS

FEATURES



Managing Editor
James Parker
jparker@netmagmedia.co.uk

Advertisement Manager/ Joint Publisher
Anthony Parker
aparker@netmagmedia.co.uk

Assistant Editor
Sébastien Reed

Editorial Coordinator
Sue Benson

Editorial Assistants
Roseanne Field
Jack Wooler

Studio Manager
Mikey Pooley

Production Assistants
Carmen Simpson
Shelley Collyer

Sales Executives
Suzanne Easter
Ian Fletcher
Kim Friend
Steve Smith

Audience Development Manager
Jane Spice

Managing Director
Simon Reed

Advertising & Administration
t 01435 863500
info@netmagmedia.eu
www.architectsdatafile.co.uk

Press Releases
editorial@netmagmedia.eu

Subscription circulation enquiries
circulation@netmagmedia.eu

netMAGmedia Ltd
Cointronic House
Station Road, Heathfield
East Sussex, TN21 8DF

Annual subscription costs just £48 for 12 issues, including post and packing. Phone 01435 863500 for details. Individual copies of the publication are available at £5 each inc p & p.

FROM THE EDITOR

The external envelope is where most users, and non-users, first interact with a building. When people use the term architecture, it's fair to say they normally mean what a building looks like, externally. So the external envelope in terms of its materials, detailing and crucially, the resulting overall form which combines those with the structural elements, is perhaps the truest location of architecture as we know it.

This is why decisions on the envelope are so important, for stakeholders but also for the ongoing reputation and popularity of a building. The coming together of elements such as timber, metal cladding, brick and glass is often the recipe for the particular character of a building, beyond merely its shape. After all, many buildings tend to be nondescript rectangular objects externally, with their personalities emerging only once the cladding is added.

While issues such as energy efficiency and safety (with Grenfell Tower being the only too glaring recent example) being paramount to get right first for architects, other considerations must also be borne in mind when it comes to exteriors. The new ETFE-clad American embassy in Nine Elms has been lambasted by Donald Trump, although whether or not this was firstly, a reason to like it, or secondly, part of a ruse to not visit a hostile UK, is hard to say. However it appears that it's the site that offends him more than architect KieranTimberlake's unusual elevations of repetitious yet sculptural transparent forms.

This scheme, like the projects featured in our supplement, illustrates just how much the treatment of a building's exterior can transform not only its fortunes, but those of its surroundings. On page 16, we see how a university halls of residence in a prestigious part of London has been transformed using carefully-designed brick cladding, mounted on precast panels in a way that you 'can't see the join'.

And on page 20 we visit Canterbury in Kent to hear how architect Penoyre & Prasad combined an inversion of form in a new library extension's exterior with a judicious use of materials. The result cleverly helps the building blend with, and enhance, its brutalist predecessor.

James Parker
Editor

ON THE COVER...

The University of Kent's extension to the Templeman Library in Canterbury, designed by Penoyre & Prasad.

For the full report on this project, go to page 20

LAYERED FACADE

Bogle Architects to design Bogotá tower with innovative facade system

Bogle Architects has been appointed to design the facade of a 19-storey residential tower in Bogotá, the capital of Colombia.

Working in collaboration with local architects and consultants, Bogle Architects has developed an "innovative, layered facade system that respects the local context while maximising views across the city."

The local climate has allowed for a solution to be developed utilising large glazed panels which are, according to the architects, "further enlivened by contrasting balconies and terraces of varying sizes with greenery, vegetation and panoramic views out over the city."

The building's design puts the emphasis on lightness and has been developed with a clearly defined range of materials.

Responding to the varying internal configuration across the envelope, the depth of the facade layers changes accordingly. In the bedroom, small planters are included plus a large window, while on terraces planters are larger and the glass plane becomes the balustrade. Secondary solid elements appear when bridging between two adjacent spaces, for example, between social areas and private areas.

Bogle Architects said that this layering provides an opportunity to introduce copper panels to the facade; "evocative of the orange glow of Bogotá's many brick facades."

Founder of Bogle Architects, Ian Bogle, expressed his enthusiasm for the project: "It has been a fascinating city to visit and I personally look forward to undertaking more projects in this remarkable country."

The client, Nicolas Manrique Sanchez, CEO, Nicolas Manrique Construcción, said: "We appointed Bogle Architects because of their wide experience across the globe. Our goal with this project is to create something special in the Bogotá skyline, and the architects' approach of innovating materials and construction methods while remaining respectful to the context, is what we expect for a project of this calibre."

The building is currently under construction and is expected to be completed in early Spring 2019.

COOLING DOWN

'Auto-reactive' facade ventilation saves energy

Architects at Technical University of Munich (TUM) have developed a ventilation system for double-glazed facades that is claimed to cut energy consumption nearly in half with very little technical effort, thanks to "auto-reactive" components.

High-rise buildings with glass facades require large amounts of energy, needing to be cooled for most of the year.

It is hoped that the auto-reactive ventilation system, developed by the TUM team together with the facade vendor Frener & Reifer, may help contribute to the climate goals agreed on in Paris in 2015. Heating and air-conditioning for buildings worldwide currently accounts for 40 per cent of total energy consumption. Compared to residential buildings, skyscrapers with glass facades are big energy guzzlers.

Dr. Philipp Molter, architect at the TUM Professorship of Architectural Design and Building Envelope, developed the ventilation system, which automatically opens when the temperature rises above a certain point and closes once again once the temperature cools off.

Paraffin-filled thermal cylinders are the core element of the Ventflex technology developed by Molter. The wax-oil mixture inside the cylinder expands when the temperature rises above a certain value. The increase in volume generates pressure which pushes the cylinder apart like a telescope. When the temperature drops, the cylinders contract once again.

"Our approach is fundamentally different from all previous concepts," he commented. "For decades, efforts to air condition glazed office and administration buildings have grown continuously more complicated. We on the other hand are developing low-tech solutions that are also highly efficient."

He continued: "Our model is the human skin: It protects us from overheating by opening up our pores. And that works automatically, we don't even have to think about it."

SFS fixings shape

Great architecture creates our skyline but

Architects may shape how buildings are designed, built and refurbished but it's the humble fastener that ensures the structural strength and aesthetic beauty of the building's original design intent.

To extend the building envelope's lifespan, SFS, world leader in the design and manufacture of fastening systems, recommends its range of A4 stainless steel fasteners.

T: 0113 2085 500
W: www.sfsintec.co.uk
E: gb_technical@sfsintec.biz

our landscape

it’s our fasteners that keep it standing

A4 fasteners provide better corrosion resistance, durability and longer warranties than carbon or A2 stainless steel fasteners. And with the option to powder-coat heads to match any profile, colour longevity is far better than for fasteners with moulded heads.

The combined performance and aesthetics of our A4 fasteners give you the confidence to create sustainable buildings that will shape our landscape long into the future.

SFS

COMMENT

Meeting brick aspirations

Andy Batterham of Ibstock looks at the ongoing renaissance in brick, and how providing for increasing demand for colours, as well as the trend for grey brick, is helping architects and specifiers reinvigorate this traditional building material

It is fair to say that brick is going through a renaissance. Even *The Times* recently reported on the substantial demand for brick built buildings throughout the supply chain. From architects to builders down to home-buyers, there is a sense of a reinvigorated aesthetic appreciation of traditional building materials, and brick is at the forefront of this trend.

Localism's role in specification

Why is there such renewed interest in brick, a material which many would already see as the natural choice for building?

Firstly, local planning requirements, particularly in rural or historically sensitive locations, are stringent regarding the use of materials which fit in with the surrounding buildings. There is also a wider interest in the planning process on a community level since the adoption of the powers made available through the 2011 Localism Act, which allows communities to decide on the 'look and feel' of new developments as part of the Neighbourhood Planning process. This interest includes the specification of construction materials, right down to the finer details.

Planning regulations always have and will impact on the design, appearance and materials considered for use when building. But with the pursuit to use materials that blend with the local vernacular, brick is often the material that best offers a sense of familiarity for an envelope to blend into its surroundings.

Colourful thinking

It is this familiarity of bricks that means the likes of buff and rustic red brickwork will always be a popular choice of finish. And with the resurgence of brick, these colours have been the first to experience a rise in popularity from the palette available.

But far from brick being the safe choice for buildings, some of the strongest opportunities for innovative brickwork – something that fits in with the local vernacular but also stands out with a sense of individuality – come from using a wider colour palette. This ranges from the 'sympathetic' to the 'imaginative'; thus, meeting the more creative design aspirations of architects and homeowners.

The specification of bolder colours is encouraging a new

approach to the design of buildings, opening up a wider range of possibilities and creating inspiring facades.

Emerging trends

Awards such as the Stirling Prize and the Brick Awards are showcasing what can be achieved with brick, and in particular colour and setting the benchmark for future housing concepts.

As an example, the RIBA Stirling Prize finalist Barretts Grove, a residential project by Amin Taha + Groupwork, is creating a buzz. Here brick is used to create a stunning perforated facade, and the project has been described as an exemplar of the brick renaissance.

Another strong example is South Gardens – the Supreme Award Winner at the Brick Awards. Here, the architects Maccreanor Lavington demonstrated how bricks of different colours can be blended together to create visual interest while linking the building to its original Victorian surroundings.

While these are one-off projects, their designs appeal to the wider audience, filtering down the supply chain to both commercial and housing projects alike.

Shades of grey

One of the most recent emerging trends from the colour palette is the specification of grey brickwork. As a colour, grey has long been popular for interior design projects. Indeed, Dulux Paint's Colour of the Year 2017 was Denim Drift, a smoky, calming grey-blue. This colour choice is migrating to the exterior of buildings and is now a major trend for building products too.

The popularity of grey brickwork originated from Northern European countries, particularly Denmark and the Low Countries; it is now influencing architects and specifiers here in the UK, and it's easy to see why. The elegant hue of a 'true grey' brick offers an exciting alternative to traditional 'brown greys'.

Of course, in the cool, 'blue-ish' light spectrum that is so dominant here in the UK, greys work well with the natural ambience and tone. The specification of grey bricks provides the perfect balance between a sense of familiarity with its surroundings while realising a state of individualism for a modern twist. This movement has been years in the making, but this shift in colour choice will continue to gain momentum in the coming years.

With the sheer variety of colour options available, architects and specifiers have the opportunity to be experimental and make inspirational building ideas a reality, and not just for one-off projects

We have worked with architects across the country who are increasingly integrating grey brickwork into the specification of their commercial and domestic projects. As an example, grey brickwork was specified for a housing development where the architect used red brick as an accent; combined it created an inspiring look for an otherwise standard housing development. Other projects which have used grey brickwork include Oasis Academy in London (Bradgate Medium Grey in combination with glazed bricks), Corduff Primary Care Centre in Dublin (Dark Grey), an apartment complex in Motherwell (Multi Grey Rustic) and Park View School in Glasgow (Kingscote Grey Multi). Many other projects are also underway with architects and specifiers recognising its appeal.

Brick will continue to be the number one construction material. But with the sheer variety of colour options available, architects and specifiers have the opportunity to be experimental and make inspirational building ideas a reality, and not just for one-off projects. Larger housing developments can also benefit from the spectrum of brickwork available.

Brickwork that resonates with its environment while creating an aesthetically pleasing finish offers the ultimate kerb appeal. And with many homeowners – the end users in the supply chain – now looking to achieve this, architects and specifiers have a wide range of options available that retains familiarity while stepping away from the norm.

Andy Batterham, head of group technical services at Ibstock

COMMENT

Cladding: is our response to tragedy adequate?

FunderMax's Paul Hughes questions whether the UK is doing enough to prevent further disasters following the Grenfell fire, and suggests where improvements should be made

In the early hours of 14 June 2017 Grenfell Tower, a 24-storey social housing tower block in the borough of Kensington & Chelsea became engulfed in flames.

Almost instantly following the disaster which claimed 71 lives, the cladding system retro-fitted to the building became the main focus of attention for the media, grieving families and the UK Government. A rapid response from Governmental leaders then followed, to quickly establish and deploy initial blanket-testing measures on all residential buildings above 18 metres high.

It is worth considering this initial reaction in greater detail. In doing so, we can not only understand the implications for the UK's rainscreen industry, we may just be in a better position to adopt the changes needed to ensure the safety of Britain's high-rise buildings and more importantly their occupants.

Missing the point

It has been widely reported from numerous sources that the building's facade presented risks to fire safety and as such, the UK Government in collaboration with the Building Research Establishment (BRE) took immediate steps to conduct an audit of all similar tower blocks across the country. The prime motive was to ensure risks were identified and addressed.

However, it has become apparent that these initial tests were merely to check whether the core, or filler, of the Aluminium Composite Material (ACM) cladding panel samples, were of a type that would fail the limited combustibility test for an individual element of a wall in a tall building. As the panels only form one part of a whole wall system, rather than isolate and individually test a single component, BRE should actually have audited and fire tested 'complete systems' more akin to the system used at Grenfell.

The reality today is that a building and its rainscreen cladding might be deemed safe if it is installed as part of a whole wall system. One that when all elements are combined, offers sufficient fire spread resistance in-line with required standards.

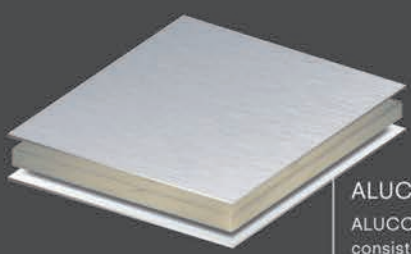
Arguably, the immediate reaction to deploy tests that are not as robust as they could be, and that do not check whole wall systems,

ALUCOBOND® PLUS | A2

Certified fire characteristics – class B-s1 d0 | class A2-s1 d0

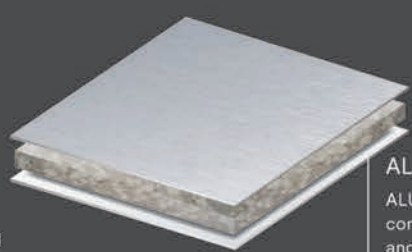
- ALUCOBOND® is the original German quality ACM with full BBA approval and highest fire standards for cladding materials.
- On-going commitment to provide the safest, highest quality, innovation façade solutions to the architectural façades market.
- 3A Composites proved with four BS8414 Large Scale Fire Tests carried out by BRE in late 2016 and early 2017 that the general requirements of the Building Regulation, Approved Document B, provide sufficient fire safety when adopting the European fire classifications: Rainscreen systems with limited combustible mineral insulation (min. EN-class A2) and ALUCOBOND® PLUS (EN-class B-s1, d0) shows no spread of flame or critical temperature rise.
- These systems exceed the requirement of BR135. The tests commissioned by the DCLG later in 2017 confirmed the following results: Rainscreen systems with polymeric insulation show a much higher risk for internal and external spread of flame to the façade system when compared to systems with mineral insulation. Only in combination with limited combustible cladding, particular fixing systems and cavity barriers, rainscreen systems with polymeric insulation might meet the requirement of BR135.

The Old Arla Dairy – Cineworld Ruislip, South Ruislip | ALUCOBOND® PLUS black metallic | DLA Wakefield | Booth Muirie Ltd | © Paul Scott



ALUCOBOND® PLUS

ALUCOBOND® PLUS is a composite panel consisting of two aluminium cover sheets and a fire-retardant mineral-filled core (>70%).



ALUCOBOND® A2

ALUCOBOND® A2 is a composite panel consisting of two aluminium cover sheets and a core with a high content of non-combustible minerals (>90%).

3A COMPOSITES

Sales Manager UK / IE
Richard Geater
+44 75 84 68 02 62
richard.geater@3AComposites.com
www.alucobond.com

Specification Manager UK / IE
Paul Herbert
+44 75 84 68 02 63
paul.herbert@3AComposites.com

Business Development Manager UK / IE
Richard Clough
+44 77 60 88 43 69
richard.clough@3AComposites.com

The classification of products used in the construction of rainscreen systems should now be done using the European coding and standards, which are clear and cannot be compromised

has resulted in tower block residents up and down Britain being evacuated from their homes needlessly. It could also be argued that, because the focus has been almost exclusively on the cladding systems, failures and fire hazards of whole systems could well be overlooked, potentially posing future risks.

What's more, creating this sense of urgency could well prove to be counter-productive; as many landlords begin to remove and replace cladding, the question to be asked is; are they also considering the impact that this action may have on the remaining wall elements, and therefore, the overall fire integrity of the building?

The initial tests that have been carried out so far have resulted in a 100 per cent failure rate. However, this may not be a true indication of the current risk potential; BRE should be testing fire resistance holistically, and in the context of the entire building.

Omitting industry experts

Another area that would benefit from a rethink is the "expert panel" that has been assembled; to provide advice to the public enquiry. At present it does not include professionals drawn from the rainscreen industry, who would be able to contribute from both a relevant and 'real' perspective, thereby providing more rounded, suitable and robust guidance.

For example, the insight and market knowledge which architects and manufacturers of non-combustible materials could bring to such an advisory panel would prove invaluable – providing assessments and viewpoints to ensure the immediate response and subsequent ongoing guidance is suitable, adequate and safe.

Recommendations

While the UK Government understandably needed to mobilise quickly, and take visible steps to ensure the risk of a similar tragedy occurring again is minimised, there are some weaknesses in its response that need to be addressed.

Firstly, avoid creating any further alarm among the British public and landlords by taking a more considered approach and consulting industry experts such as architects and manufacturers at an early stage. This will provide a more responsible and informed response that focuses on the facts known at the time, and would also deflect the array of supposition and assumptions that we have seen. A single source of information would also be beneficial, where actual facts can be provided to the media, and disseminated, simultaneously depoliticising the issue.

It's clear that BS 8414 standards are simply not robust enough and as such, an urgent review of current Building Regulations has begun. The damning interim review, chaired by Dame Judith Hackitt, has already found that the whole system of Building Regulations in the UK is "not fit for purpose" thanks to confusing rules and a lack of enforcement enabling abuse of the system.

In the next phase of the review, regulators will come together with the construction industry, councils and the Government to establish a new system with improved safety standards.

As an industry, we should be striving for every material used in high-rise buildings to be non-combustible. Only then can we feel truly assured that buildings are meeting modern day standards, occupants' safety is at the forefront of design intent, and that standards are both enhanced and maintained.

The classification of products used in the construction of rainscreen systems should now be done using the European coding and standards, which are clear and cannot be compromised by interpretation.

It is also apparent that there is a lack of knowledge in the construction industry with regards to rainscreen technology/design, and fire performance requirements. The Government should look seriously into funding a school of technology where courses in building envelope design – including rainscreen technology – are taught, maybe through the network of UTC training centres.

Finally, we need to lower the 18 metre height rule to include any buildings above 11 metres, and apply the same non-combustible requirements to them. By making this significant change, regulations would then encompass a wider range of buildings where there could be an unexpected and significant risk. This would also aid in the development of future professional design teams, whom would instinctively look to implement fully fire resistant cladding solutions as a first resort, rather than as an afterthought.

If this change is made, consideration also needs to be given to supporting regulations and advisory notes, which should be amended to ensure any contradictory terms are removed so that it is crystal clear what the requirements are.

With so many innovative building products available in the market each year, it is evident that an evolving approach to safety standards is required. As an industry, we need to review current Building Regulations as a priority and ask ourselves, in modern day construction, are they adequate and do they provide sufficient levels of protection?

Paul Hughes is director of sales UK at FunderMax

SITE LINES

Designing envelopes for Passivhaus townhouses

Architect Gavin Finnan describes the design of Passivhaus townhouses in a south London regeneration project, focusing on how their external envelope was fundamental to performance

South Gardens is the first phase of Elephant Park, a major regeneration project that sits on the site of the former Heygate Estate in Southwark, which when complete, will deliver 360 new homes. A total of 15 townhouses within South Gardens have been designed as 'future homes', i.e. aspiring to a raft of sustainable innovations which include Passivhaus standards, use of CLT (cross laminated timber), green roofs, additional renewables and local community initiatives.

The townhouses are composed of three- and four-bed house types, forming part of a terrace. The primary aim is to make homes in the best tradition of London architecture that allow inhabitation in a clearly defined manner. It is also important that the materials age gracefully and are low maintenance, in order to ensure that the area will continue to look better over time.

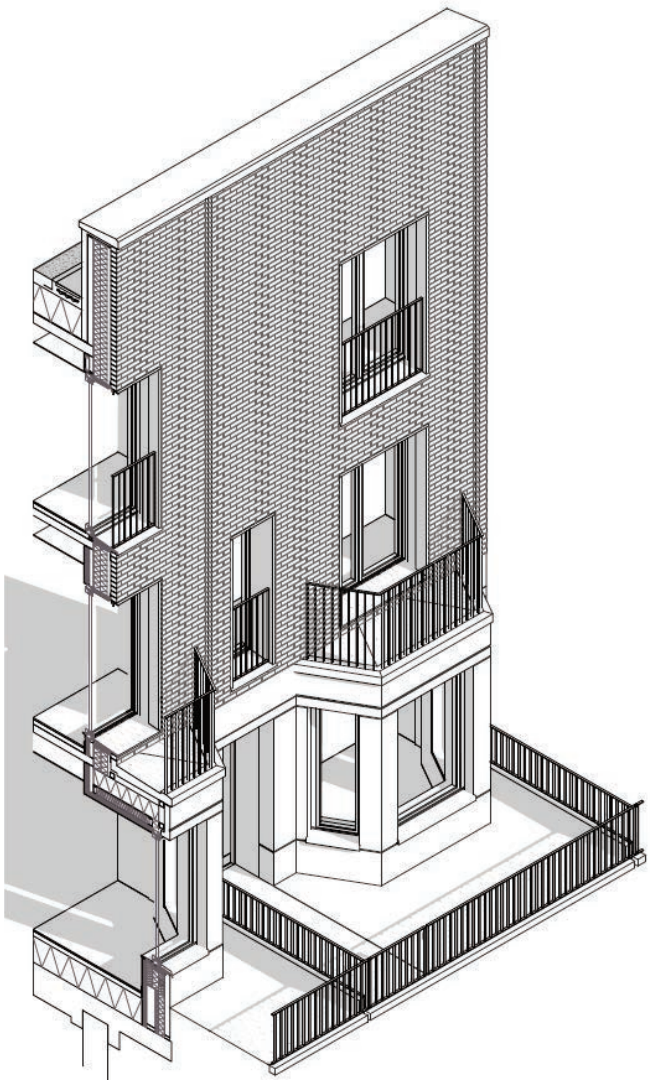
The design of the terrace has been informed by the architecture of the traditional Victorian era housing which is found within the nearby conservation area. The new townhouses have projecting bay windows and their materials will sit comfortably with the existing buildings.

The simple brick terraces have elegant, vertically proportioned windows with vertical opening casements recessed behind a brickwork facade. All external rainwater goods are attached to the rear of the terraces to provide a clean, crisp, uncluttered facade to the street. Recessed timber lined entrances and projecting bay windows break up the elevation at lower level, and give a scale and rhythm to the street. Front doors have fixed glazed panels to the sides, and in some case have a glazed light above.

The structure of the townhouses is formed from cross-laminated timber (CLT), a highly sustainable material as trees absorb carbon dioxide while growing. In addition, the CLT panels can be re-used at the end of a building's life. Walls, floors and roofs have been constructed from pre-fabricated panels. Off-site production has meant less on-site waste, a shorter build programme, and whole-life cost savings. A lighter frame and reduced weight has ensured a lighter building and smaller foundations. The ultra-low energy buildings require very little energy for space heating or cooling, thus reducing their ecological footprint.

Passivhaus standards are rigorous and result in ultra-low energy buildings that require little energy input in use. A range

SOUTH GARDENS
The terraces mimic the style of a traditional Victorian terrace



of passive design measures have been incorporated in the project to ensure energy demand and associated CO_2 emissions are minimised, including clean and zero or low carbon energy technologies are proposed, including connection to the CHP-powered Heygate Masterplan District Heating Network.

Design challenge & solution

The larger the thermal envelope, the more challenging it becomes to keep the heat in the building. Projections and recesses like bay windows increase the thermal envelope of a building which in turn increases the potential for it to lose heat. This is why they are generally discouraged in Passivhaus design. As a result, on this project higher target U-values were set when compared to a standard Passivhaus to compensate for the increased envelope, and particular care had to be taken to avoid cold bridges.

The houses demonstrate that good passive design does not have to be an attachment or supplement to architectural design, but can be a process that is integrated with it and which is free to respond to its context.

Each bay window measures 3200 mm tall x 3000 mm wide x 950 mm deep, and is divided into three glazed sections comprising two side opening windows and one fixed window to the front. The unit comprises of a European manufactured composite wood and aluminium thermally broken frame with high performance triple glazed units.

To adhere to Passivhaus requirements for reduced thermal bridging, the 'future home' bay window is formed from two independent steel sub frames. An inner frame is mechanically fixed onto the thermally broken concrete upstand and secured back to the CLT structure; this supports the composite window frames and supports an insulated timber roof cassette. A 240 mm layer of rigid Alumasc insulation is laid on top of the roof cassette and is then waterproofed, creating a warm roof that forms a sealed, airtight and watertight enclosure. Independent of this, a second, outer sub frame is mechanically fixed to the concrete footing which supports the reconstituted stone and forms the cold part of the structure.

It's also worth mentioning here that the external brickwork to the elevations of the townhouses are restrained to the CLT structure using wall ties. Typically, when building a brickwork cavity wall the inner leaf is tied to the outer leaf. However this method creates too great a cold bridge and wouldn't comply with Passivhaus. The solution involved using Basalt fibre wall ties, which have a lower conductivity and can be drilled into the CLT inner wall, therefore tying together the inner and outer leaf to provide stability.

The houses demonstrate that good passive design does not have to be a supplement to architectural design, but can be a process integrated with it and which is free to respond to its context

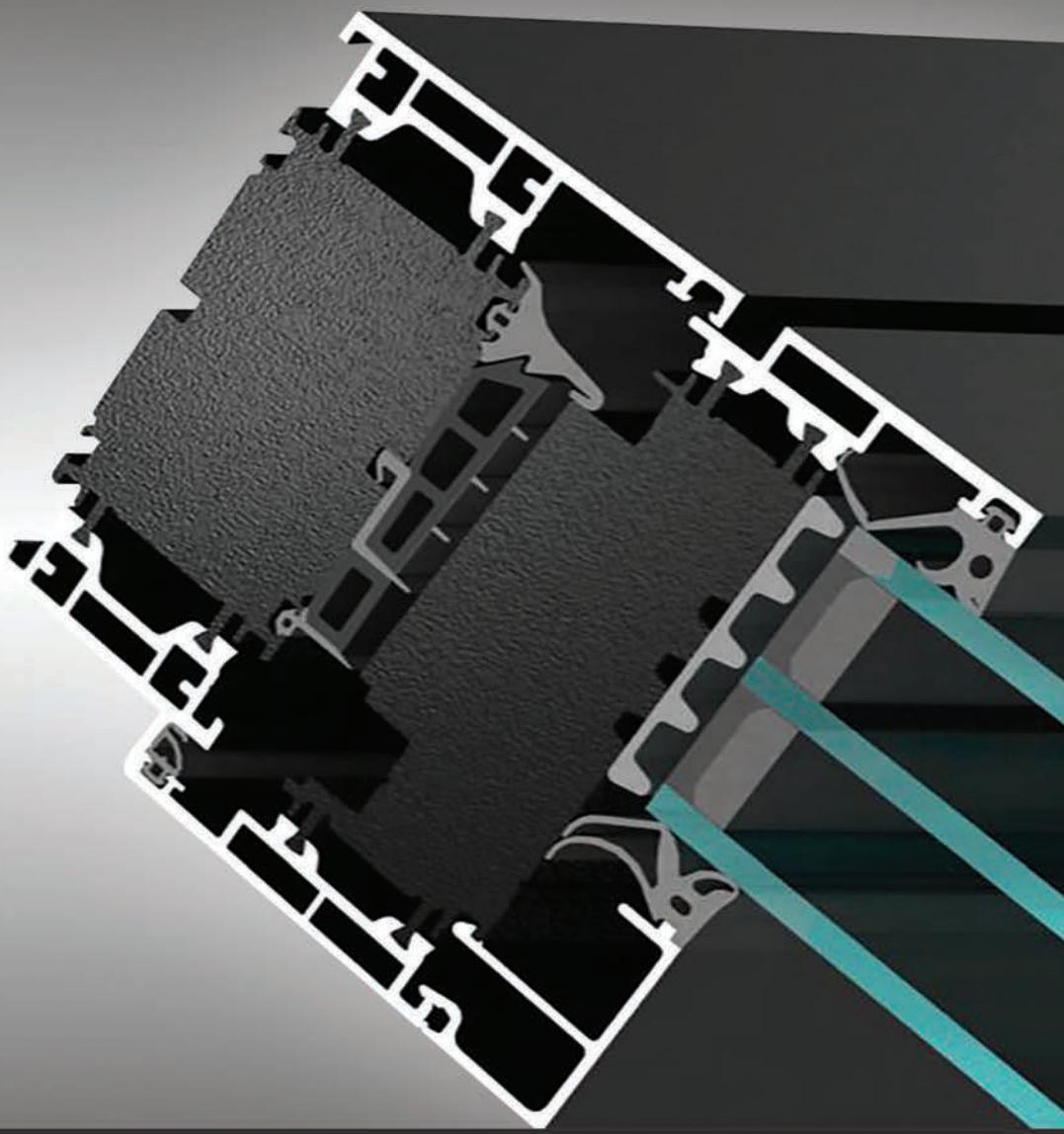
The reconstituted stone pillars that sit between the three sections of the window come to site in several pieces and are supported off the reconstituted stone plinth which rests on the concrete footing. The stone mullion is tied back to the outer steel frame along with the lower and upper panels and attached with stainless steel bracketry and pins. Once the stone is embedded into place the joints are mortared.

The reconstituted stone lid or roof to the bay is the largest, arriving on site in one single piece and providing the ground surface to the balcony above. It acts as the primary water stopping layer draining any water falling on top of the bay. The reconstituted stone mullions, positioned on either side of the window, are profiled with narrow vertical flutes to direct the water down to the ground to reduce staining.

In contrast, a conventional bay would have more connections made through it and would probably incorporate one frame. An inner skin would probably be made from the CLT and smaller individual steel brackets would be fixed through the insulation and the reconstituted stone would be hung off the CLT.

Gavin Finnan is an associate director at MaccreanorLavington

innovation delivered



phB
CERTIFIED COMPONENT
Passive House Institute

comar10

Innovation is often spoken about but very rarely delivered

Comar 10 offers a new departure; a Passivhaus Certified "B" product with U-values as low as 0.66 coupled with processes that cut manufacturing costs by up to 70%.

Comar 10 Windows are available as inward opening, tilt & turn and fixed lights and are internally glazed and beaded.

The main features of Comar 10:

- U-values as low as 0.66 W/m2K
- Cut manufacturing costs by 70%
- Certified by Passivhaus Institute for cool temperature areas
- Future-proof & energy saving
- High thermal insulation with ground breaking technology
- 90mm deep outer frames
- Minimal care & maintenance
- 100% recyclable

For more information about comar10 please contact us:

Tel: **020 8685 9685**

Email: **projects@parksidegroup.co.uk**

Web: **www.comar-alu.co.uk**

comar

BUILDING PROJECTS

GARDEN HALLS
UNIVERSITY OF LONDON

Craft & design masterclass

A project to redevelop student halls for the University of London presents an exemplar of attention to detail in cladding, achieving a mix of traditional and modern to blend into its historic built environment. Jack Wooler reports

In the heart of the Bloomsbury Conservation Area of King's Cross in central London, a new £140m redevelopment of affordable student accommodation called 'Garden Halls' has been completed, replacing the former 1930s and 1950s buildings.

Architects Maccreanor Lavington worked alongside executive architects tp bennett to design the principal nine-storey facade facing Cartwright Gardens, along with a lower seven-storey building at the corner of this historic and prestigious site.

A reworking of the Canterbury, Commonwealth and Hughes Parry Halls, the new structures were formed using an in situ concrete frame with brick-faced concrete cladding panels on all external elevations, while two new internal courtyards feature a render finish. The private gardens were also redeveloped, and four new tennis courts installed.

Built for the University of London in partnership with student accommodation provider University Partnership Programme, the result is one of the largest halls of residence in London, housing 1,200 rooms.

Accommodation

The project has already achieved widespread critical acclaim from the architectural fraternity, partly due to the extremely high quality of finish and level of attention to detail.

The client said that the accommodation would allows students to live, study and unwind in an "inspirational, safe and secure environment," supported by pastoral care. Shared kitchens, peer learning space, TV lounges, a games room, music room, dining facilities and a cinema room all create a sense of comfort for students to relax away from home.

Hoping to engender a healthy environment outdoors as well as in, bike storage, landscaped gardens, green courtyards and the free use of the four tennis courts are all included for the student residents.

The provision of a 24 hour reception, catering and security services provide an extra sense of ease. Garden Halls are also security patrolled, utilising CCTV to keep the building as secure as possible.

Included in the design are a range of room options to cater for different budgets and requirements, comprising a mixture of single and double bedrooms, ranging from 9 to 23m^2. There are 759 en-suite rooms, 12 self-contained studio rooms, 154 townhouse rooms, 225 shared superior rooms and five three-bed apartments on offer. Space has been used economically throughout the apartments, providing a high level of style and function in restricted spaces. All the apartments are fully fitted, ready for students to move in with a minimum of hassle.

Set in the heart of the capital, the halls benefit from unrivalled travel links, just a short walk from St Pancras International and King's Cross stations, as well close proximity to a host of local amenities.

The site

The area of Bloomsbury is often noted for its formally planned arrangement of streets and leafy squares, boasting some of the best-preserved London squares within its conservation area.

Gavin Finnan, associate director at Maccreanor Lavington explains the architects' approach to what is a historically sensitive site: "The challenge was to design a contemporary nine storey facade along one side of a historic garden square, opposite a crescent of listed four-storey Georgian townhouses.

He adds: "The project takes its cues from the larger Victorian and Edwardian buildings that have been previously added to the fabric of Bloomsbury. The design shows a meticulous approach to scale, order and relief."

The previous student lodgings of Garden Halls were architecturally typical of the mid-20th century, lacking in the modern facilities necessary in state of the art university accommodation, and according to the architect, were "uninspiring to look at."

He describes the historic context from a designer's point of view: "Townhouses arranged in terraces are the predominant building form across the area, with a large majority of residential development from the Stuart, Georgian, Regency and early Victorian periods.

"This provides a distinctive, repeated grain to large parts of Bloomsbury. Overlain on this pattern is the significant influence of a series of much larger buildings associated with a number of large institutional uses, which have shaped the development pattern over time."

Such buildings include the site of the former Foundling Hospital, The British Museum, Great Ormond Street, and the University of London itself. Several of these larger buildings form a significant frontage to some of the squares within the area.

"These buildings date from a variety of periods and architectural languages, but

The method delivers a building akin to traditional masonry, while minimising on-site labour, reducing the programme and cost of the facade by a third

Gavin Finnan, associate director at Maccreanor Lavington

REVEALING
The architects were able to design intricate window reveals for the brick facade, using a precast panel method which would conceal joints and give an authentic monolithic appearance

BRINGING UP THE REAR
The rear facade is flatter with a much shallower relief, and a mix of brindled bricks was chosen

PROJECT FACTFILE: GARDEN HALLS

Gross external floor area: 59,831m²
Construction cost per m²: £2,340
Executive architect: tp bennett
Facade architect: Maccreanor Lavington
Clients: The University of London and University Partnership Programme
Structural engineer: Cundall
M&E consultant: Cundall
Quantity surveyor: McBains Cooper
Planning consultant: CBRE
Cost consultant: McBains Cooper
Main contractor: Brookfield Multiplex
Brickwork Contractor: Thorp Precast

Brick Manufacturer: Wienerberger
Brick: Ashley Red, Oakington, Pagus Red

share a common theme in terms of their approach," notes the architect. "They all have a significant amount of relief in their facade,"he continues, "This can be in the form of a bay window, perimeter balcony, column or pier."

Facades

In keeping with the area's rich architectural heritage, Garden Halls' facades have been meticulously designed to provide a striking counterpoint to the building's adjacent garden square.

Maccreanor Lavington worked as an integral member of the design team, preparing detailed design intent information that was incorporated into the Employer's Requirements as tender. Following the appointment of Multiplex as the main contractor and Thorp Precast as the specialised sub-contractor, Maccreanor Lavington stayed client side and worked in partnership with executive architect, tp bennett, Multiplex's design managers and the design team at Thorp to oversee the design, manufacture and installation of the facade.

A buff water-struck Petersen brick is the key cladding material, offset by white reconstituted stone, glazed terracotta cills and a two-storey mansard. The upper five storeys consist of a series of stepped brick piers and frames over various window openings gathered together to form a vertical order over the facade. The ground and first floor are grouped to form a single base to the building, with brickwork piers rusticated by recessing every fifth course.

"The facade sits behind new painted metal railings that match those within the surrounding square," explains the architect. The new double-height entrance is lined with panels to the side, with walls and floor of stone mosaic, inlaid with brass letters and lit by large brass coloured pendent fittings designed by Tom Dixon.

The Leigh Street corner building is expressed as a pair of simple punched brick elevations, with darker water-struck bricks to match the local 'sooted' aesthetic. The windows have reconstituted stone surrounds, and the brick sits on a single-storey stone base echoing the 1950s buildings.

At the North end of Sandwich Street there is restricted access to a large internal courtyard, where a combination of standard white Portland reconstituted stone panels were installed to the lower two levels and light buff brickwork to the upper levels, all intended to maximise light reflection to the accommodation blocks looking into the courtyard areas.

Finnan summarises the building's key attributes: "The main facade facing Cartwright Gardens is a highly articulated and finely crafted brick building, made from high quality materials and featuring simple, crisp detailing."

Utilising offsite manufacturing techniques with precisely executed detail, the facade is indistinguishable, apart from some well concealed panel joints, from hand-set brick.

The principal rear elevation along Sandwich Street presented a slightly different challenge in that the facade is flatter with a much shallower relief. A large expanse of brickwork, punctuated by regimented window openings, made panel joints harder to conceal. These bricks are characterised by a mix of brindled colours, and had to be carefully placed in the moulds to achieve the desired effect. Casting your eye along the full length of the completed elevation therefore gives the immediate impression of controlled consistency, with the brickwork occasionally broken by slender white concrete window surrounds that are an integral part of the storey-height panels.

Precast panels

There are some 1,100 precast panels incorporating four types of brick across the entire scheme. Thorp Precast assumed full responsibility for the scheduling and procurement of all the bricks, preparing them individually, and ensuring they were cast onto precast concrete backing in a way that provided a monolithic look.

All the panels were supplied to the site fully finished and factory-pointed on specially adapted trailers. As the facade was initially designed for traditional hand-laid brickwork, one of the key factors in adopting a precast approach was the need to conceal panel joints, while maintaining a nominal 10 mm joint between panels.

"What is interesting about the offsite method is how the techniques and refinement of the technology has allowed us to do something quite crafted, such as the steps and the reveals, in what is actually a monolithic way," says Finnan.

"All the brick elements are load-bearing to the ground and there aren't massive joints in between, which gives the brick an almost stone-like, carved appearance."

Thorp manufactured the vertically emphasised corbelled brickwork mullion units as individual three-storey high units in the form of elongated 'T's, weighing 12 tonnes.

The corbelled brickwork soffit provided the ideal junction to conceal vertical, slightly stepped 10 mm mastic joints between the T-shaped units. The same exercise was repeated above on levels 5 and 6, but this time reverting to T-shaped units two storeys high. At the top of this elevation are a series of set-back mansard dormers with reconstituted stone wings and white glazed terracotta facings on precast. The corbelled T-shaped units were cast using void formers to reduce weight.

Finnan details how the envelope itself was constructed behind the panels: "The brick faced precast elements are ground bearing and sit one on top of another. The panels are restrained back to the concrete frame which provides lateral support to the facade.

"Once the panels are sealed they provide a fully waterproofed layer to the building. The windows were fixed to the rear of the precast panels, along with the insulation and fire stopping. Plasterboard is fixed to an independent light gauge steel stud work that sits on the edge of the concrete frame."

Challenges

Despite the wealth of knowledge among the project team, the build presented a variety of challenges, including its sensitive location, which were alleviated by the offsite panelling system.

The entire 4,500 m^2 brick facade facing Cartwright Gardens, as well as many of the other facades, were manufactured offsite as composite precast concrete brick faced panels. This was principally implemented to offer construction programme efficiencies and advantages, including a robust schedule, and guaranteed quality assurance with the panels constructed in factory conditions. In addition there would be a reduction in safety-critical activities with a reduced number of operatives working at height, and a reduced disturbance to neighbouring residents and businesses due to an omission of the perimeter scaffold.

Describing the benefits that the mixed-process offered the scheme, Finnan asserts: "The prefabrication allowed the design team to develop stepped brick details that make reference to the detailing of traditional load bearing masonry.

"The depth of the facade also allows it to be constructed from large load bearing units, which require fewer movement joints than contemporary site laid brick cladding."

He continued: "This delivers a building akin to traditional masonry, while minimising the amount of on-site labour. This reduced the programme and cost of the facade by approximately a third."

What is interesting about the off-site method is how the techniques and refinement of the technology has allowed us to do something quite crafted, such as the steps and the reveals, in what is actually a monolithic way

Gavin Finnan, associate director at Maccreanor Lavington

To meet the tight installation schedule, three gangs were used, each with its own tower crane. When it came to finishing work, access was non-existent, so three teams of abseilers were taken on to do the work. Despite the access issues, the project opened on time and the building was soon fully occupied.

Raising the standard

Starting on site in June 2014, the project reached completion in September 2016. It was later shortlisted for the Brick Development Association's 2017 Brick Awards, receiving a Highly Commended award in the Worldwide category.

The project team achieved a high score under the Considerate Constructors Scheme, and took responsibility for the life cycle of impact materials, sourcing from suppliers with strong environmental credentials, along with the use of offsite construction helping to vastly reduce construction waste. In addition, the project achieved BREEAM Excellent.

According to commentators, the development has significantly raised the standard of student accommodation in London, demonstrating how well-crafted and innovatively manufactured precast cladding can be used to create some of the most considered building facades in the UK.

The reason for the critical acclaim is clear; this redevelopment is a substantial, high quality achievement, with meticulous detailing and richness in form. It's no wonder that, among University of London residences, Garden Halls has seen the largest number of students reapply for the same accommodation. ■

FRONT ELEVATIONS
A buff coloured water-struck Petersen brick was the key cladding material, used for the front elevations facing Cartwright Gardens

BUILDING PROJECTS

TEMPLEMAN LIBRARY
UNIVERSITY OF KENT

Extended study

The design of a new extension to a university library in Kent both acts as a counterpoint to the pre-existing 1960s brutalist building, and achieves unification between old and new. Sébastien Reed reports

The original masterplan for the University of Kent, whose Templeman Library on the main Canterbury campus recently underwent a major extension, was drawn by Boer-born British architect Lord Holford in 1964. The design's brutalist style, typical of the era, was forward-looking, but its limitations in the face of fast-growing student numbers led to it undergoing a variety of extensions.

The first phase of the library's construction, completed in 1965, delivered a building with an envelope constructed almost entirely of brick, with heavy brick piers and concrete extrusions at mid-level where the first floor meets the second. An extension to the east wing in 1975 joined the original central and west blocks, and in 1996 a small cubic brick block was plugged into the end of the east wing, which both aesthetically and in terms of performance left a lot to be desired.

Twenty years on, and Templeman Library has received another, more holistic makeover. London-based Penoyre & Prasad were selected to develop the library space to better accommodate the current and future activity, which this kind of building needs to be effective. Suzi Winstanley, partner at Penoyre & Prasad and project leader of the extension and renovation, told *ADF* that there were challenges to overcome in not only creating a place not only well adapted to current needs, but also one that could be adapted over time.

Competition & design brief

The University of Kent held a competition in 2012 to design the project. Winstanley comments on the benefits of competitions: "They allow the architect to come up with

a concept that is strong, that sticks through the rest of the project".

There were a plethora of underlying issues associated with the building's outdated pre-existing concrete construction. The cold-bridging of spalling concrete leading to damp had been aggravated further by poor ventilation, dark central spaces, narrow staircases, and a lack of level access, plus inadequate furnishings and furniture, were just some of the problems which the university was keen to solve.

In terms of the site and location, the objective was "to pick up on the existing masterplan and create another new contemporary wing to the library," says Winstanley. An important guiding principle for the architects was that the extension needed to be something that could be "woven into the old building," so it was "respectful and sympathetic to the old, but also tried to lift and rejuvenate it." She continues: "We wanted to create a counterpoint to the existing heaviness of the brutalist building."

We wanted to weave a language of lightness into the existing brutalist building

There were two further practical focal points for Penoyre & Prasad's response. Firstly, Winstanley says, "They really needed more space." The original building was designed for 6,000 students – a fraction of the 15,000 students currently using the hilltop campus.

Secondly, it was crucial to support the fast-changing habits of library-dwelling students. Winstanley says that the architects had noticed an evolution occurring during a 2017 project for Portsmouth University: "Libraries' use is widening, not only are they storing books and media, they are also becoming the place where students work

INVERSION
Precast fins provide shading and also invert the forms of brick 'buttresses' to the existing building

ABOVE RIGHT
The concrete fins are a counterpoint to existing brick

PROJECT FACTFILE: TEMPLEMAN LIBRARY

Location: Canterbury, Kent
Construction cost: £20.1m
Client: University of Kent
Architect: Penoyre & Prasad
Structural engineer: Price & Myers
Main contractor: Kier
Services Engineer: Max Fordham

Precast concrete fins: Decomo
Curtain walling: Kawneer
Anodised panels: Locker Group
Roofing: Nord Bitumi
Waterproofing: Icopal
Lifts: ELA Group
Ironmongery: Laidlaw
Internal Doors & Screens: Leaderflush Shapland
Flooring: Kingspan, Flowcrete, Forbo

together and researchers find a place to concentrate."

Penoyre & Prasad employed a range of approaches to stakeholder consultation to gauge how students used the library, and design spaces that supported a variety of study methods, including use of tablet devices, as well as being adaptable to future changes.

Exteriors

"We could have extended upwards, at the front; or the back of the existing library," says Winstanley. The decision to extend to the west, she explains, was influenced by both the original Holford masterplan that envisaged new wings east and west, crucially as a logical place to build whilst the library building was in active use throughout construction.

She adds: "The original masterplan had a really long, thin building, so there was something interesting about echoing that. Then [the western end] was the most logical place to be able to build it while everything else is occupied, and do a kind of phasing sequence."

The clearest visual expression of the new extension is its precast concrete fins, thrusting vertically up and slatted across the glazed facade. The intention was to graphically invert the language of the original building. Winstanley explains: "The brutalist building has brick buttresses that widen at the ground. We referenced the form but inverted it and lifted it off the ground.

The upturning and inverting of the existing building's weight, as a result of the suspended concrete fins tapering towards their base, provides a balance to the overall building and unifies it. To this end, Winstanley notes the importance of the precast concrete fins being one piece rather than divided into smaller fragments. "The single pre-cast piece provides clarity and simplicity. Importantly, it was straightforward and rapid to construct."

The issues of unclear and un-level access were solved by providing a raised outdoor terrace, which signals the location of the main entrance. Frameless glazing complemented the facade, and the cutting back of floors from the envelope of the original 1960s core building provided more space for light to enter between levels. The old loading bay was also renovated to create a grand new entrance, and the north-south route through the new extension ensures the building doesn't block the easy flow of movement around the campus.

Wide strands of bronze anodised mesh run down the building's facade between the concrete fins. Winstanley explains the specification choice here: "We wanted something that would work as an alternative to the timber [of the original building window frames], that would still feel right." The warm tones of the bronze also counterpoint the more austere brick and concrete, balancing the aesthetic and giving it a contemporary edge. The particular shade of bronze used, which Winstanley says "worked well with the original building palette" matched the American walnut used for windows and interior furnishings.

In addition to the extension, the renovation of the original building saw new curtain walling replace the glazing set between the brick piers. This serves to "weave the language of the new library extension into the existing building to create a cohesive whole," says the project leader, as well as reducing the number of horizontal contours imposed by the former abundance of windowsills that could hinder the overall aesthetic.

Interiors

Given the extended periods that students were spending in the library, it had to be a comfortable space to study in. Double-height spaces are continued from Holford's original 1960s design in the extension, giving ample natural light and space for students studying.

The deep-plan character of much of the building meant that natural ventilation, on its own, wasn't feasible. The solution was a mixed mode ventilation system achieved through the use of manually openable sash windows, which not only help students engage with control of their environmental comfort, they also provide better airflow than tilt-turn windows. Out-of-reach windows are mechanically assisted by actuators which open the windows automatically when CO_2 levels get too high, and there is additional mechanical ventilation.

When it comes to library acoustics, Winstanley advocates a mix: "You want some areas to be really noisy, some areas to be kind of social, and some areas to be really, really quiet." She adds that robust envelope design is key: "As a result of the envelope being acoustically good, you don't get lots of noise from outside, and you don't get lots of noise leaking from one floor to the other." Acoustic soffit boards on the ceilings are shaped to reiterate the pattern introduced by the diagonal in situ concrete coffered soffit located at

the top level of the building.

An adhered layer of insulation backing the precast concrete fins contribute to the building's thermal performance, and mitigate the cold-bridging the existing building had suffered from. It is expected to be awarded a BREEAM Very Good rating.

A series of measures were taken to appropriately illuminate the spaces in a way that gives a sense of comfort to the users: "We tried to provide a slightly more layered feeling with lighting, which is why we've got task lighting, freestanding lighting, and background as well as accent lighting." Hand-operated blinds help give students a sense of ownership, says the architect, while higher automated blinds, plus the concrete fins and non-glare glass moderate harsh direct sunlight.

The bronze anodised mesh veils double up as both a sunshade and a discrete security measure to prevent theft of books and media.

Good results

The result is a coherent building internally and externally. A set of interior spaces are combined to clearly support students' comfort and needs, through the meticulous control of aspects of air flow, light, heat, and sound and how they penetrate into and around the building. The architects' emphasis on open space has been realised to the extent that where double-height spaces aren't present, they are at least in sight.

Viewed from the outside, four different eras of construction are knitted together almost seamlessly to produce a cohesive whole. The materials and form of the additions respect the building's original brutalist intent while re-balancing it and bringing it into the present day.

Penoyre & Prasad has resolved the challenge, as client representative, John Sotillo, director of information services at the University of Kent confirms. "The Templeman library was the most impressive building on campus when the university was established in the 1960s, and it is fitting that as the university celebrates its 50th anniversary we should have transformed the library. The 21st century updated and refreshed Templeman Library has moved very significantly with the times to become an impressive, modern building, containing services and facilities that are equally modern, impressive and important to its current and prospective users." ■

Tackling local issues for airtightness compliance

As Building Regulations have imposed ever-tougher energy performance criteria on the building envelope, the significance of localised areas of reduced insulation or thermal bridging leading to air leakage has become even more crucial. A. Proctor Group reports

The energy consumed by buildings accounts for a significant proportion of the UK's total energy consumption. Around 45 per cent of UK CO_2 emissions come from the built environment, (27 per cent from domestic dwellings and 18 per cent from non-domestic), and therefore Building Regulations relating to energy performance continue to play a major role in helping to achieve our targets for improvement.

Controlling air leakage

Air leakage through cracks, gaps, holes and improperly sealed elements such as doors and windows can cause a significant reduction in the performance of even thermally insulated envelopes. As thermal insulation requirements increase, industry consensus suggests that discrepancies between 'as built' and 'as designed' performance can be largely attributable to uncontrolled air leakage. Architects are increasingly turning to air barrier membranes as an essential part of the design process for achieving the most effective means of controlling and reducing air leaks.

A misconception when it comes to airtightness is that well-sealed buildings mean uncomfortable, 'stuffy' indoor environments; this is largely an effect of poor ventilation rather than airtightness. Buildings with very low rates of air leakage require correspondingly higher levels of ventilation as part of a balanced, holistic design approach. A common misunderstanding is that this increased ventilation will undermine efforts to reduce air leakage and hamper overall efficiency. It's important to bear in mind that ventilation is controllable, and therefore can be accounted for within the overall design, whereas uncontrolled air leakage is not.

Managing air flow

Unmanaged or uncontrolled air flow will act as a carrier for moist air, drawing it from outside to in, or pulling it from inside to out, into walls, ceilings, and roofs. The impact of uncontrolled moist air movement can have a long-term detrimental effect on the durability and life of the building.

In terms of the energy efficiency of a building, uncontrolled air flow will almost certainly have a major impact. Initial heat load calculations for heating and cooling equipment will usually make an allowance for a level of natural infiltration or uncontrolled air flow. The higher the infiltration rate, the lower the energy efficiency of the building. Efficiency levels can be affected by both natural and mechanical air movements. The forces of wind and stack effects will lead to a level of air filtration and subsequent efficiency loss. Sealing the shell of the building and any un-designed holes can reduce the impact of wind and stack effects.

Building Regulations compliance

Key guidance related to airtightness compliance is outlined in the Building Regulations Approved Document Part L1A Conservation of fuel and power in new dwellings and Part L2A Conservation of fuel and power in new buildings other than dwellings. A typical approach might aim at reducing the rate of air leakage and increasing the thermal insulation, both of which will contribute to lowering the building's CO_2 emission rate, however, the implications of each approach can be substantially different.

Air leakage is measured in $m^3/m^2/hr$ – the quantity of air moving through the building fabric (m^3), for a given building floor area (m^2), over a given time period (hr). The measurement method commonly used is

Architects are increasingly turning to air barrier membranes as an essential part of the design process

The impact of uncontrolled moist air movement can have a long-term detrimental effect on the durability and life of the building

either pressurising or depressurising the building, and measuring the airflow required to maintain the test pressure (in the UK this pressure is 50 Pascals). Building Regulations require the level of air leakage to be no greater than 10m^3/m^2/hr (7m^3/m^2/hr in Scotland), and in most cases achieving this presents little difficulty.

Although Building Regulations provide a framework to exceed minimum airtightness levels (via dwelling emission rate DER in Standard Assessment Procedure SAP, and BER building emission rate in SBEM) substantial benefits can be realised in exceeding the minimum base requirement.

For example, if we consider the 'notional dwelling' used within the SAP calculation, and vary the levels of thermal insulation (in terms of U-values) and air leakage, these benefits become clear. By varying the U-value from 0.15 to 0.05, with an air leakage rate of 7, the DER will drop by 6.7 per cent, but achieving this reduction in U-value will require almost three times the thickness of insulation. By contrast, retaining the 0.15 U-value, but dropping the air leakage rate from 7 to 1 will achieve a similar improvement in DER, but with little or no corresponding increase in thickness, allowing a reduction in building footprint, or an increase in internal space, reducing build costs considerably.

Achieving airtightness by design

The two main ways to achieve airtightness in the building envelope are internally or externally.

Traditional use of internal air barriers can be more complex and costly to install, due to the need to accommodate building services such as electrical, lighting, heating and drainage systems. An internal air barrier is only as good as its installation. If all the service penetrations are not adequately sealed, performance will be compromised.

External air barrier systems allow for an almost penetration-free airtight layer, which can be installed faster and more robustly. This offers an effective but simple system comprising self-adhesive vapour permeable air barrier membrane, which provides effective secondary weather protection while preventing trapped moisture and air leakage. Far simpler than internal options an external air barrier system will maintain the envelope's integrity, with less building services and structural penetrations to be sealed, and less room for error.

Small but essential elements of envelope design

Andy Stolworthy of SFS explains why the choice of roofing and cladding fasteners, as well as the rainscreen support system itself, is fundamental to the long term performance of a building envelope

Despite being relatively small elements within a project, the choice of fasteners, brackets and rails to secure the building envelope is critical to delivering a high quality, long term result.

Original Equipment Manufacturers (OEMs) in the roofing and cladding sector may well be shaping how buildings are designed, built and refurbished, but their innovation is only possible with the right fastening technology. Understanding the interplay between the desired roofing and cladding systems and their attachment to the structure is, therefore, vital in delivering a high level of client satisfaction.

Every type of roofing and cladding panel will have recommended fasteners for attaching it to the structure. These recommendations will be based on the design of the panel and its aesthetic intention, the type of building structure, the envelope's thermal and weathertightness properties, and the extent to which the facade will transfer wind loads, impact loads, snow loads and its own self-weight back to the structural framework.

With so many factors at play, ensuring that the fasteners are fit for purpose requires ongoing R&D investment by manufacturers and rigorous testing.

Material & colour choices

The primary consideration in fastener specification is the type of metal or other materials used in its manufacture. Austenitic stainless steel fasteners have long been known to offer enhanced resistance to corrosion, compared to coated carbon steel, but many specifiers and clients are now upgrading the specification further by choosing A4 (316 grade) stainless steel – rather than the widely accepted A2 (304 grade).

A4 stainless steel fasteners offer better corrosion resistance and durability, making them more suitable for more aggressive environments like coastal areas, and they can offer longer warranties.

In many applications, the fasteners will require colour matching to deliver on the aesthetic vision. The way the colour is applied, however, will impact on the building's long term visual appeal, which is why the recommendation for all SFS A4 and A2 fasteners is powder coating. In our experience, the powder coating process delivers a uniform, high quality, decorative and robust finish which is less prone to fading, with excellent weathering resistance and colour stability.

A system approach for rainscreen

All types of rainscreen cladding share the need for a robust and reliable support system to attach panels to the structure. The design of brackets and rails that form these support systems impacts on the performance of the building envelope and ease of installation – and the correct type of fasteners must be part of the system, otherwise the whole facade is compromised.

Rainscreen support systems are mainly manufactured using aluminium which offers low weight, high strength, excellent corrosion resistance and ease of recycling. Specified correctly, these systems simplify the complexity of a facade and address the multiple technical challenges that current applications present. These include managing the thermal differences between the materials being combined, the dead and dynamic loads, plus expansion and contraction of the facade.

Historically rainscreen support components and fasteners have been specified and sourced separately. Considering these products in isolation is, however, not consistent with today's more joined-up thinking – driven by BIM – in which clients expect greater assurances about the long

All types of rainscreen cladding share the need for a robust and reliable support system for fixing panels to the structure

RECOMMENDED
Every type of roofing and cladding panel has recommended fasteners to attach it to the structure

Having clear visibility on the technical data at the design and specification stage to use in BIM is crucial too

term expectations of their buildings.

Taking a complete system approach to rainscreen support provides greater and more readily available technical insight and data, reducing the risk of incorrect specification or product substitution.

Speeding up the specification process through electronic data

Having clear visibility on the technical data at the design and specification stage to use in BIM is crucial too and this exists in different forms:

1. BIM structured product data
Structured product data sheets for BIM are available for fasteners which present product information in plain language with simple questions and answers allowing integration into a greater system element, be that data or 3D geometry. They standardise data to enable the comparison and selection of products based on value and life cycle benefits rather than just price.

2. BIM objects
For rainscreen support systems, specifiers can benefit from equally comprehensive information in the form of BIM objects. These allow for the creation of digital representations of the intended layout together with detailed technical information, accreditations and other background data to provide a relevant information-rich support specification.

3. Bespoke software solutions
Unique software solutions provide project-specific cladding solutions to meet precise requirements. After submitting information online, specifiers receive electronic data such as project-specific bracket and rail spacings, guide pricing per m² and a prefilled NBS specification document, with an option to access thermal calculations based on the unique wall build-up configuration.
Higher quality fastening systems and new technology to aid the design and specification of the building envelope is a positive step forward. Switching to more advanced solutions often requires small additional capital expenditure, but significant savings in operational expenditure can be achieved.

Andy Stolworthy is director of product and market development at SFS

A solid future for rainscreen

Andy Noble of CD (UK), the distributor of Corian in the UK and Ireland, investigates a relatively new solution for ventilated facades which offers fascinating possibilities

Meeting a set of challenging demands for the building envelope, from aesthetics to thermal efficiency, and straightforward installation to enduring performance, solid-surface rainscreen cladding has been seen on a number of high-profile and award-winning projects recently. Naturally, safety is also a vital issue – and an area in which expertise, testing and multiple, relevant certification makes such products a reliable option.

A rainscreen facade must perform several key functions. As well as protecting the structure from the elements it can help to manage interior temperature and comfort by circulating air through a cavity, and reflecting or absorbing solar gains. A ventilated facade also allows a building to breathe, and helps to minimise and drain away moisture that can be a problem in any season. Also, temperature and pressure differentials can be managed in a way that maintains thermal stability and reduces the need for mechanical heating or cooling systems.

A genuinely high-performing material will perform in all climates and regions, be resistant to chemicals in pollution, graffiti or other damage, while also being easy to clean and even discreetly repairable. In addition a homogenous and non-porous surface means stains cannot penetrate as well as the material being through-coloured.

Fire resistance is obviously also essential. For example, Corian has passed the demanding EN 13501-1 norm (including the SBI test) for panel dimensions typical to facade applications. Sustainability may also be a key consideration. Solid surface is renewable and re-useable, in most cases, and industry leaders such as DuPont have achieved zero waste to landfill during manufacture.

Visually, a structure's skin must be sympathetic not only to the architectural vision, but also to its surroundings. Solid surface can gives a dynamic first impression, or enable a building to blend subtly within its setting. Few materials offer the creative freedom, in this regard, that a premium quality solid surface does. Via CNC technology and through a network of highly skilled fabricators, it is possible to add engraved patterns or raised 3D effects, while thermoforming and seamless joining can add curves or a distinctive sculptural quality to a design.

Specifying the right surface allows for inventive design and application, demonstrating a material's ability to provide inspiring versatility. This also means it's compatible with either standard or bespoke installation systems including the option to include back lighting or projection.

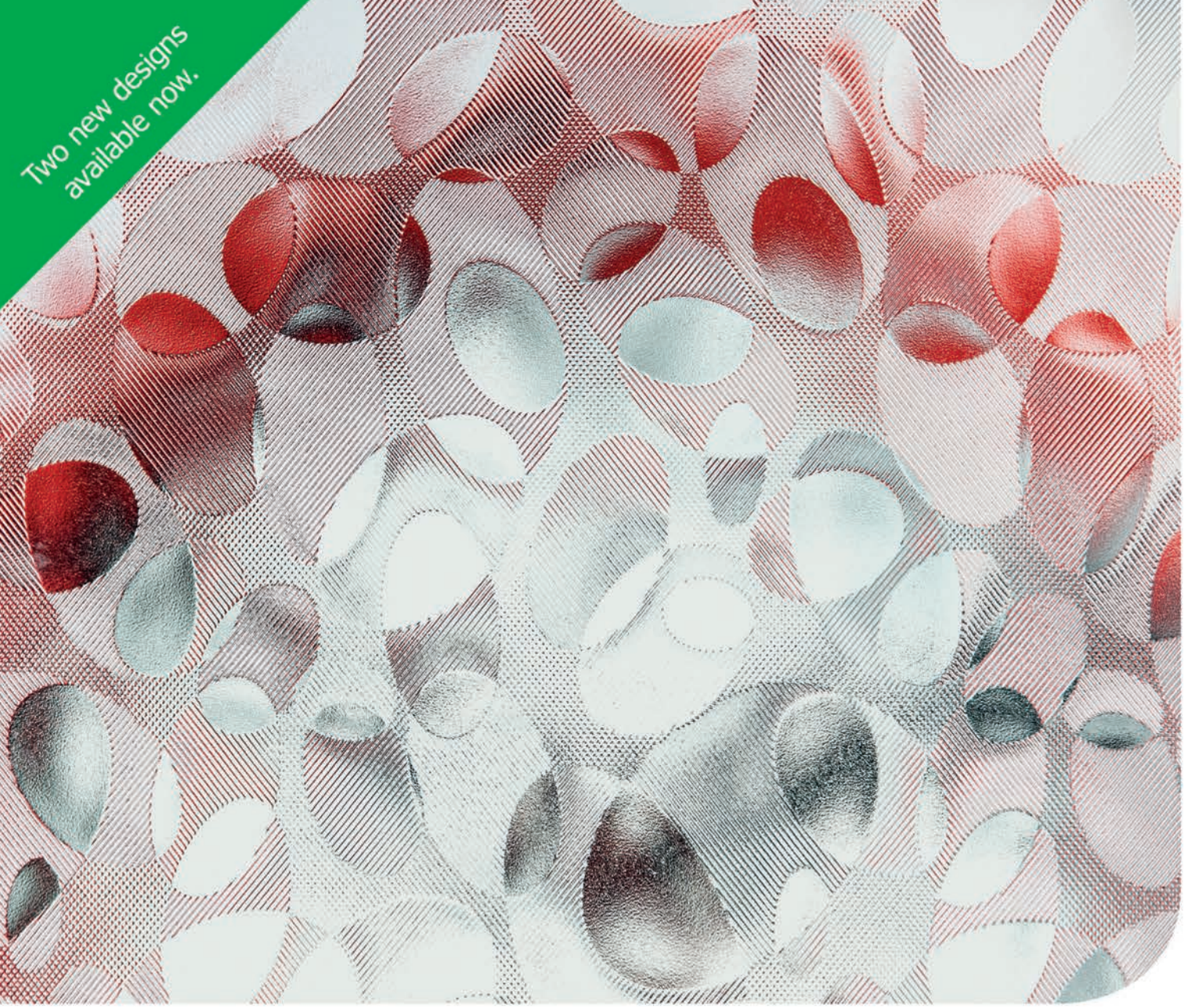
Extra-large panels (for example, Corian comes in sheets of up to 1,500 mm width) can also facilitate both the design and fitting process. Current mounting systems allow panel sizes of up to five metres in height, enabled by a substructure which can accommodate the movement due to thermal expansion. The weight capability of the mounting system and the necessary expansion gaps must be taken into account. Since colours run through the entire thickness of a high quality solid surface, the edges of panels are in the same colour as the rest of the sheet. Thus, revealed or overlap joints will not show any dark gaps between panels, and can be as discreet as desired.

The method usually employed to fit solid surface cladding is a mechanical fixing system based on an aluminium grid consisting of vertical profiles in a 'T' or 'L' shape, mounted on aluminium squares connected to the substrate. The panels are hung on the horizontal profile 'C' shape by the brackets (or clamps) with reverse 'C' shape, that are attached to the back of the panel with a specific undercut anchor.

There are now multiple high-profile installations internationally featuring exterior cladding in Corian. The latest UK example is the £10m NGS Macmillan Unit at the Chesterfield Royal by The Manser Practice, which will be featured in detail in the Design for Health & Social Care Supplement, to be published with the March issue of *ADF*.

Andy Noble is sales director for CD (UK)

ABOVE
The NGS Macmillan Unit at Chesterfield Royal Hospital, designed by The Manser Practice, features a Corian facade



Pilkington **Cassini**™ Privacy level 5

CHOSEN FOR PRIVACY

Pilkington Texture Glass

Protecting privacy doesn't mean compromising on style or elegance. The Pilkington range of patterned glass allows maximum light in, yet keeps interiors discreet with a wide variety of traditional and contemporary patterns suitable for multiple applications. Our two new designs, Pilkington **Cassini**™ and Pilkington **Tribal**™, are inspired by the latest trends to further enhance a range that offers the optimum blend of form and function.

Because when you want glass you can trust, there can only be Pilkington.

To find out more, visit
www.pilkington.co.uk/textureglass

PILKINGTON

Evoking the natural beauty of fibre cement

EQUITONE
Fibre cement facade materials

Fibre cement mineral composite materials combine outstanding physical and aesthetic properties. For more than a century, the combination of mineral materials, water, air and heat has been transforming the exteriors of buildings around the world.

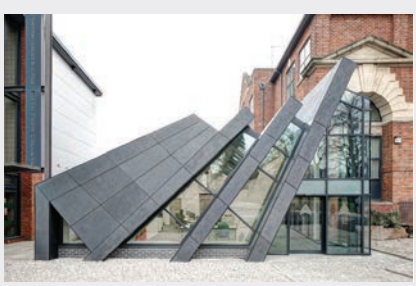
Due to the nature and range of the materials, fibre cement suits both modern and traditional schemes – from private commercial properties, to public centre facilities and is the ideal choice for both new builds and refurbishments.

Architect's choice

EQUITONE is a through-coloured facade material designed by and for architects. The material's versatility provides architects with the ability to bring inspirational designs to life.

Constructing beauty

EQUITONE materials can be cut and fabricated into a variety of shapes and sizes, enabling an architect to add intricate detail to the facade and create striking patterns in the exterior design. EQUITONE's fibre cement materials are available in a range of through colours, offering an extensive palette of subtle and inspiring shades in a variety of textures and finishes.



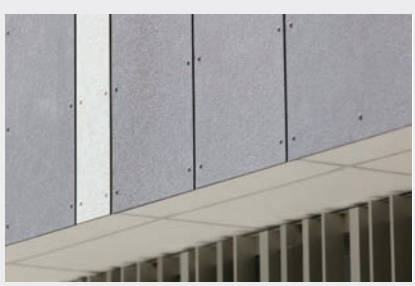
Project: Ashton Sixth Form College
Material: EQUITONE [tectiva]
Architect: GA Studio

Look and feel

Although the overall look is important, the texture can make a big difference to the finish of a building too. EQUITONE materials are available in a range of finishes such as EQUITONE [linea], which is a great tool for architects who want to play with texture, light and shadow. Its unique 3D shape with routed lines gives a striking final effect, particularly when cut into unusual shapes.

Project: Clerkenwell 'Smith' Pavilion
Material: EQUITONE [linea]
Architect: Studio Weave

EQUITONE's most recent addition to the range, EQUITONE [materia], accentuates the beauty of fibre cement. The material encompasses the characteristics of cement whereas the fibres render its surface textured yet velvety. The ever-changing atmosphere gives the material natural subtle shade variations.



Project: Augsburg Deuter Park
Material: EQUITONE [materia]
Architect: KEHRBAUMARCHITEKTEN AG

Key features

EQUITONE is a durable facade material which combines outstanding physical and aesthetic properties. It has a life expectancy of a least 50 years and once installed requires low maintenance.

Project: University of Yorke
Material: EQUITONE [natura]
Architect: BDP

In addition, EQUITONE meets the fire performance classification (A2-s1 d0), making it suitable for a variety of building types.

In practice

Commenting on the use of EQUITONE [tectiva] for a public-sector building Rushcliffe Arena, Ajay Chauhan, architect at CPMG said: "We're really pleased with the overall finish of the project. EQUITONE [tectiva] was the ideal choice– it gave the aesthetic appearance we hoped for, was within budget and is fantastic quality."

Project: Rushcliffe Arena
Material: EQUITONE [tectiva]
Architect: CPMG

For more information about EQUITONE, visit the website.

01283 722588
www.equitone.co.uk

Icynene Spray Foam insulation for new Baptist Church in Dumfries

Designers of a new community Baptist Church, nearing completion in Dumfries, turned to spray applied insulation specialists, Icynene to solve a complex insulation challenge.

The new Church is a 2000sqm, multi-purpose building designed by Glasgow based, McLean Architects and built in the Georgetown district of Dumfries in the Scottish Borders.

The building was conceived as a flexible-use community hub comprising worship, conference and youth facilities together a full specification games hall and multi-use games area.

For the games hall, McLean Architects designed an 18.00x 18.00msq 8.00m high structure comprising a 140mm thick internal leaf of concrete blockwork with an external steel frame, supporting fibre-cement rain-screen cladding.

Here, the placement of insulation between the blockwork and the cladding system proved problematic. Project Architect Kirsty Wilson explains. "The complex latticework of steel frame for the cladding made it extremely difficult to install conventional rigid board insulation. It would have been a hugely labour-intensive and expensive process and achieving the required air tightness standards would have been pretty much impossible"

Icynene expands 100-fold within seconds of application, sealing all gaps, service holes and hard to reach spaces.

Icynene was sprayed directly onto the blockwork and over the concealed sections of cladding framework.

Spray foam insulation

Specialist insulation contractors, JSJ Foam Insulation Ltd, who were brought in by main contractors Ashleigh Building of Dumfries, recommended Icynene, a high-performance spray foam insulation system which would be applied directly to the outer face of the blockwork, then covered by the cladding.

Icynene is a predominantly water blown insulation which is applied using a pressurised gun system. Foam is applied as a two-component mixture that comes together at the tip of a gun forming a foam that expands 100-fold within seconds of application, sealing all gaps, service holes and hard to reach spaces, virtually eliminating cold bridging and air leakage.

Air leakage can cause up to 40 per cent of heat loss from a building and traditional forms of insulation are relatively inefficient in

The complex latticework of steel frame for the cladding made it extremely difficult to install conventional rigid board insulation.

sealing the box, as they cannot completely fill all voids or seal the interface between the insulation and the building structure. Nor can they cope with small structural movements which will often lead to air gaps, particularly in difficult to treat situations where access is poor and when voids are of complex geometry.

Jim Shearer of JSJ Foam Insulation takes up the story. "Icynene is nothing like the urethane foams of 20 years ago. Icynene uses water as the blowing agent so the reaction between the two components produces $C0_2$ which makes the foam expand."

He continued, "We sprayed Icynene directly onto the blockwork and over the concealed sections of cladding framework. We had free access to the existing scaffolding platforms so the spraying process was quick and straightforward. We had job done in under a week." Said Mr Shearer.

Open or closed cell composition

Spray foam insulation can be either open or closed cell in composition. Open cell is extremely vapour open and will allow moisture vapour to pass freely through it allowing the building to breathe naturally.

For the Dumfries Baptist Church project, Icynene MDC-200 HFO, a closed cell foam that uses Hydro-Flouro Olovine [HFO] as a blowing agent, was used. HFO is an environmentally friendly material which has a Global Warming Potential [GWP] of only two and an Ozone depletion rating of zero.

McLean Architects designed an 18.00 x 18.00msq 8.00m high sports hall structure comprising an internal leaf of concrete blockwork with an insulated external steel frame with fibre-cement rain-screen cladding.

Closed cell foams tend to be much less vapour permeable than open cell and are considerably more rigid and hard. They resist the passage of liquid water and are ideal for use in conjunction with the rain-screen cladding system specified. Closed cell foams also have a greater thermal resistance than open cell foams.

The 2000sqm, multi-purpose complex is due for completion in early 2018. Image courtesy of McLean Architects. Glasgow

Cost efficient solution

Icynene MDC-200 foam insulation was applied to the entire outer leaf of the games hall, an area of approximately 550sqm and to a thickness of 150mm. The work was completed over a four-day period.

According to Icynene, spray applied insulation is broadly comparable in cost to conventional fibre based and rigid board type insulation materials however, its speed of installation, minimal waste and its ability to perform in difficult to treat applications means spray foam can be an extremely cost-effective solution for a variety of projects up to and including those built to Passivhaus standards.

Construction of the Baptist Church buildings began in early 2017 and is scheduled for completion by Easter, 2018.

Icynene provides a 25-year warranty for all its insulation products and as well as carrying EST Approval, Icynene Foamlite is also BBA Certified.

For more information on Icynene Spray Applied Insulation products visit the website.

www.icynene.co.uk

Make Sure You're Seen in The Right Light

The need to produce energy-efficient buildings is a key consideration in today's sustainability-focussed construction sector.

Saving energy reduces the carbon footprint and makes a vital contribution in the drive for carbon-neutral buildings. It also saves money by reducing the running costs of the building.

When considering large buildings, particularly in the metal shed sector, the traditional targets of improved thermal performance and minimised air-leakage have now reached their optimum performance levels. Put simply, further increases in insulation levels now deliver limited benefit.

Specifiers and clients are becoming focussed on the significant contribution that can be obtained by designing natural daylight into buildings, and seeking the best rooflight solutions to deliver this free resource.

Depending on the type of lighting system installed, the cost of lighting a building can be more than ten times the cost of the heat saved by removing the rooflights. In many building designs, the cost of the lighting can be four times that of the heat losses when 'light to heat' balance has been considered. Even with low energy LED systems, this ratio can still be as high as three times. Accordingly, the daylighting plan is now becoming a principal consideration in the building envelope design and specification process.

The emphasis on this critical design aspect means that specifiers are now faced with a veritable haze of information and choices they can make on rooflight specifications.

Like every other component within the building envelope, rooflights must perform several functions:

- They must deliver good light transmission
- This must not create excessive solar gains
- They must deliver adequate heat retention
- They must provide a non-fragile roof assembly
- They must deliver a well-lit building with the right kind of light

Not all these requirements are complementary. It is important to strike the right balance for each building design, and understand that there is no single solution.

It is also important to understand that there are laws of physics that cannot be changed. In glazing and glass reinforced polyester rooflight systems, most of the heat energy from the sun is transmitted directly and in the visible spectrum. Plastics such as polycarbonate have more energy transmission in the infra-red regions and beyond. This means that it is simply not possible to deliver any system with an unachievable mix of high light and low solar transmission levels.

The same is true for specifications which adopt only some elements of a 'holistic package' design in isolation. In the right building, it is sometimes possible to use smaller areas of rooflights than would normally be considered adequate, but these may be designed and intended for use in conjunction with additional offsetting renewable energy sources. Even using rooflights that deliver exceptionally high light transmission levels, poor distribution - or inadequate areas of rooflighting - can create uneven and unsatisfactory levels of light balance within the building.

Similarly, whilst the improved thermal performance of rooflights can reduce heat loss, the inclusion of increasingly numerous 'clear' insulating layers or cells can be counter-productive. Each layer or cell adds an additional light reflective surface into the assembly. These cumulatively reduce the level of light transmitted into the building, potentially costing more than the small savings in heat retention.

There is no trade-off on non-fragility. It is about safety and saving lives, and no-one within the specification chain has the right to gamble with it. Rooflights can be made stronger by making the material thicker and more substantial, but in metal cladding systems, this can come at a cost. Installation fit and weatherproof sealing becomes harder to achieve, but innovative reinforcement methods are now available delivering high impact and tear resistance in lighter, thinner sheet formats.

Finally, we come to the question of which kind of illumination is best for the building. High levels of light streaming through small openings in the roof - no matter how well diffused - inevitably deliver a mixture of glare and gloom. This is further worsened by increased shadows created within the building by both the fixtures & fittings, and the occupants. Achieving a good 'average' level of daylighting within a building is very different

PICTURED ABOVE
This is often claimed as '100 per cent diffusion'

PICTURED ABOVE
This is what the designer expects from 100 per cent diffusion

to delivering good uniformly distributed daylight. This avoids the need for additional and localised supplementary artificial lighting. Glare and gloom can be significantly reduced by higher levels of diffusion from the rooflight. GRP, by its very nature, spreads daylight omni-directionally within the building and can make a major contribution to internal illumination uniformity and comfort levels. But responsible specifiers must always recognise that diffusion alone cannot deliver the uniformity of lighting that is so often assumed or taken for granted.

There are great savings and positive contributions to be made by incorporating rooflights into a building envelope. With every specification element, it is important to understand the need to strike a meaningful balance between the performance options of the rooflight.

01327701900
www.hambleside-danelaw.co.uk

Richard Reeve to take Axim to new heights

TPG, The Parkside Group Limited is pleased to announce that Richard Reeve, Sales Director will be exclusively looking after one of its major divisions, Axim Architectural Hardware.

Richard has been with TPG for 15 years and is excited to take the leading hardware brand to even greater heights. Richard said, "Axim is one of the most trusted brands in the industry for reliability and quality. Axim celebrated 30 years of business last year and having worked throughout the industry I know that the Axim TC-8800 series of Concealed Transom Closers is well known for its superb long-term performance and as part of TPG, Axim, is backed up by market leading delivery to its European wide distributor and partner network."

Over the last 30 years Axim has extensively developed its product range to include all the hardware that top quality commercial doors require. Richard commented that "Everyone knows the top performer the Axim TC Series of Concealed Closers, however, I am not sure that everyone is aware of how extensive the Axim product range is. The Axim PR Series Panic Exit range is comprehensive, and the Axim Panic Exit Locking Handle is one of the most high-quality products I have seen which fits across the entire range."

The Axim branded product range includes Emergency and Panic Exit Devices that are certified to BS EN 179 and BS EN 1125, a range of handles including D-handles, Lever Handles, Pad Handles, Pull Handles and Tube Handles, Floor Springs which can take a door weight of up to 150Kg, Locks including Mortice, Dead Latch, Extension Flush Bolts for security slave doors.

The Axim TC-8800 Series of Concealed Transom Closer will fit most major manufacturers doors and has three different strengths. The TC 9900 is a universal closer which is ideal for repair and maintenance and where closers have failed, the TC9900 offers a fast solution without the need for costly repairs.

Richard continues "Axim is known very well in the aluminium door industry, however the Surface Mounted Door Closer, the Axim FC Series, offers a solution for both aluminium and timber doors, in fact it even comes as standard with fixings to suit both materials. This means that installers and distributors can minimise the closers they carry, and the Axim FC-1000 Series has been tested for Fire Rating to BS 476-22 1987."

Offering innovative solutions has been at the fore of Axim and launching new products such as the Axim ES-2100 Electric Strike a remote access product that offers installers a reduction in installation and maintenance time. The Axim LK-2100 Reversible Deadlatch offers a non-handed solution which means that installers and distributors can reduce their stock-holding by only stocking one Deadlatch instead of two.

Last year Axim had a face-lift with a new revamped logo, which joined the new website and Technical Literature which offers extensive technical, specification and installation information with speedy navigation to get you to the place you need to be.

Axim designs and supplies a comprehensive in-stock range of transom closers, panic exit devices, electric strikes, deadlatches, surface mounted door closers, floor-springs, flush-bolts, letter-plates, locks and handles through a pan-European distributor supply chain. For more information please contact Axim.

0208 685 9685
axim@parksidegroup.co.uk
www.axim.co.uk

Sought-after ISO:9001 accreditation for solar shading specialists Solinear

Louvre and solar shading specialists **Solinear** have achieved the highly-regarded ISO:9001 accreditation. Trading for seventeen years, the York firm has won the respect of architects and construction companies around the UK for its bespoke products and customer focused ethos. ISO recognition gives Solinear another valuable selling point. Designed to test an organisation's quality management systems, ISO:9001 accreditation marks out a business that provides consistent, high-quality products, is strongly focused on its customers, and is firmly committed to constant improvement. It's also one of the most respected accreditations in the world – in 2013, over one million ISO:9001 certificates were issued cross 187 countries. Since 2004, Solinear has been designing and manufacturing bespoke products that help regulate temperature and airflow in major commercial buildings. Creativity and flexibility in design are its key USPs. The company specialises in unique and unorthodox shapes, specifically tailored to architects' needs. With offices in York and Leicestershire, Solinear contributes to multimillion-pound projects in the education, health, retail, leisure, transport and other sectors.

01347 879046 www.solinear.co.uk

materials for architecture 2018

RETURNING TO **LONDON**
WITH EVEN MORE **INNOVATION**
WED 25 - THU 26 APRIL 2018
ILEC CONFERENCE CENTRE

CONFERENCE EXHIBITION CPD SEMINARS INNOVATION

DISCOVER THE CUTTING EDGE OF MATERIAL SPECIFICATION

materialsforarchitecture.com
#MfA2018
/materialsConfEx

REGISTER FREE AT **MATERIALSFORARCHITECTURE.COM**

INDUSTRY PARTNERS

ASBP The Alliance for Sustainable Building Products
Composites UK
Confederation of Timber Industries
The Institute of Concrete Technology
MATERIAL LAB
MPMA The Building Envelope Authority
Timber Trade Federation growing the use of wood
Wood for Good