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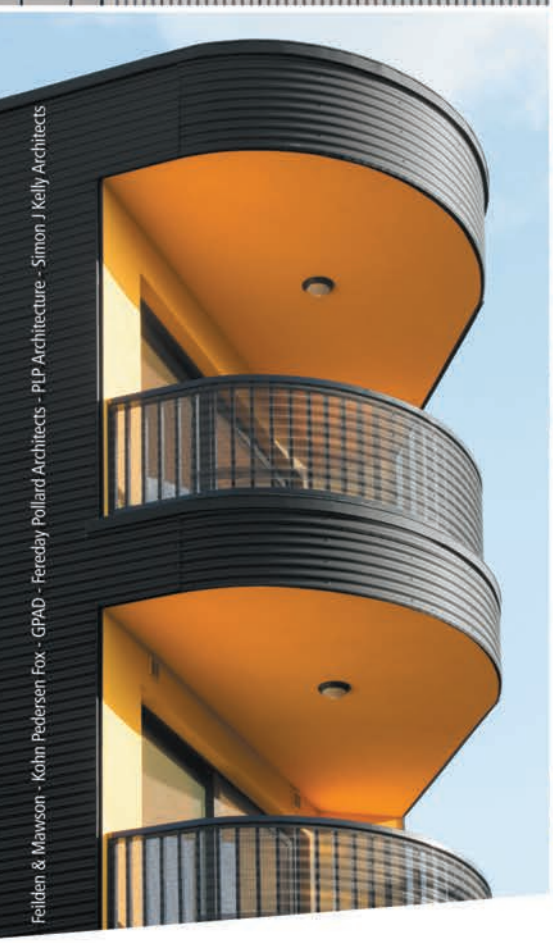

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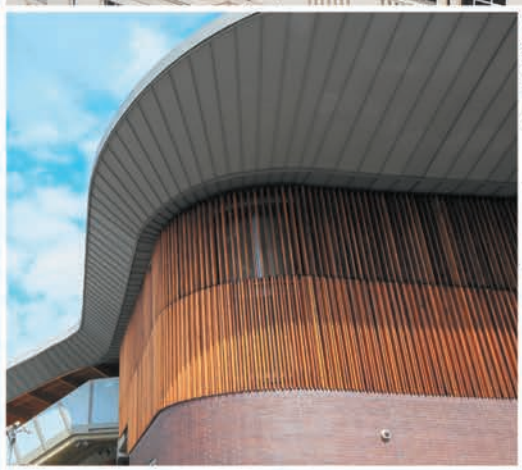

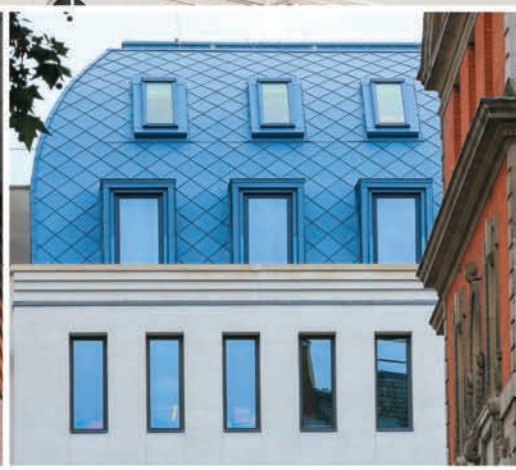

VMBUILDINGSOLUTIONS

02.19

Building envelope supplement

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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 old saying goes that you shouldn't judge a book by its cover, and this is certainly true for magazines, which probably contain a much wider range of subjects than you might gather from their cover. The state of our current public debate reveals the dangers of simply looking at the surface for meaning, and not digging deeper behind what the headlines are shouting. In a world where the empty vessels are currently making more sound than ever, the quieter, more considered voices may not get the airtime they deserve.

However in this supplement we celebrate the facades and the frontages, and the techniques which designers can use to create deft illusions of solidity or softness which help a project work in its setting. An example is the stunning but subtle new Maggie's Centre for the oldest hospital in the UK, Barts in the City of London. Steven Holl Architects created a "vessel within a vessel within a vessel" whose opaque glass facade provides an innate sense of protection to cancer patients, while providing a gentle contrast with its historic surroundings.

On the other hand, the project to provide several storeys of residential accommodation on top of a music college in densely-packed Southwark, south London takes a bolder approach to creating a statement. It also uses the facade to make a clear contrast between the two contrasting use classes provided in this unusual scheme – with the college particularly innovative having musical notation picked out in white brick relief.

Architects across the world spend a huge amount of effort making the exteriors of their buildings reach beyond the rudimentary needs of protecting them from the elements, to provide a distinctive presence which communicates their role to users, but also the wider context. Harnessing the potential of materials to assist in this is one thing, but providing an aesthetic balance that links old and new (for example Kengo Kuma's stunning Dundee V&A) is where the design of envelopes can really provide lasting value.

While the exterior may never be able to deliver the relative level of effectiveness to a client that say the interior of Fosters' famously modest-looking Bloomberg in London can, the exterior is what the building gives to the wider world. Judging buildings by their covers may be as unwise as judging books, or people, but they give a very good insight into the level of care and craft which they have been created. Bearing this in mind, it makes it even more critical that a focus on the outside is not undermined by compromises within.

Enjoy the supplement!

James Parker
Editor

ON THE COVER...
Steven Holl Architects' latest addition to the Maggie's Cancer Centres portfolio enhances the UK's oldest hospital with its translucent facade.

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

TRANSPORT

Terracotta clads HS2 cube

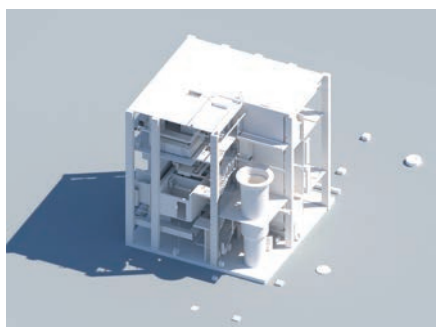
HS2 have released a proposal for the replacement London Underground substation and vent shaft at Euston, designed by architects Weston Williamson + Partners, with 'The Shard' architect William Matthews.

The four-storey cube will contain a substation for London Underground and UK Power Networks, as well as a vent shaft for the Northern line.

Clad using more than 13,000 glazed ivory white terracotta tiles, the design draws inspiration from historic London Underground stations nearby such as Great Portland Street, and will help to reflect light into the surrounding streets.

A pattern of perforated tiles will allow air into the building and help provide variation to the facade. The use of tiles also echoes the tradition of cladding the back of tall buildings with glazed white tiles to bringing light into courtyards and confined spaces.

HS2's London programme director, Rob Carr said, "HS2 will transform Euston, the new vent shaft will be one of the first things we build, and it's important we get it right."



Weston Williamson + Partners managing partner, Philip Breese said, "It will be an important building in the reconfiguration of the public spaces around the station."

"The imaginative cladding design has been developed to respond to the technical requirements of the structure and its position in an existing and part emerging townscape. The use of faience tiles aims to bring a human scale, reflect light and allow the shaft to breathe."

This will be the first major structure to be built as part of the transformation of the station ahead of the arrival of high-speed services due in 2026.

COMPETITION

Leicester practice commended for research pod

Multi-disciplinary design practice rg+p has received international acclaim for its design for a mobile research station to monitor the effects of global warming in the Arctic.

The practice's Leicester office entered the concept for the 'LAKA: Architecture that Reacts' competition to devise an innovative solution to a social or environmental issue; as well as a reTh!nking competition.

David Morgan, architectural assistant at rg+p, explains the concept for the 'Arctic Seed': "Inspired by the technology and forces of nature, our proposal consisted of a lightweight, prefabricated and inhabitable pod as a prototype for exploration and scientific research."

Containing equipment and supplies the station, launched from a support vessel, can gather data from a range of sites, in advanced and otherwise difficult-to-access locations, "without leaving detrimental impressions in landscapes," concluded David. The firm's design gained an honourable mention from the judges in both competitions; the 'LAKA: Architecture that Reacts' competition attracted 130 entries from 30 countries.

The firm has also received an Incentive Award for a concept to regenerate a former tobacco factory in Riga, Latvia.

CULTURAL

Concepts released for Diller Scofidio + Renfro's London Centre For Music

The Barbican, London Symphony Orchestra and Guildhall School of Music & Drama have released the first concept designs for their project to create a "world class" Centre for Music in London.

The concept designs, developed by lead architects Diller Scofidio + Renfro, show a landmark new building on the current Museum of London site.

Alongside creating an outstanding new building, the designs propose reimagining and transforming the layout and public realm of the current Museum of London site, creating open, welcoming and traffic free public spaces, while also linking to the Barbican Estate's Highwalk network.

Elizabeth Diller, founding partner at Diller Scofidio + Renfro, said: "We want to unlock the urban potential of the Centre for Music's site at the southern tip of the Barbican by reclaiming the roundabout for the public realm, where the isolating effects of the car are keenly felt today." She continued: "A vital public space seamlessly connects to the foyer and extends a welcome to everyone, with or without a performance ticket."

"The foyer would be abuzz day and night, filled with activity and glimpses into the inner life of the Hall. We imagine a concert hall for the 21st century that embraces both a bespoke and a loose fit approach: tailored for exceptional symphonic sound, yet agile enough to accommodate creative work across disciplines and genres."

Images courtesy of Diller Scofidio and Renfro

The proposed Centre for Music site sits on a key cultural axis in the capital, linking north from Tate Modern, the Millennium Bridge and St Paul's Cathedral, as well as between two major new stations.

The realisation of Diller Scofidio + Renfro's concept designs would create an "iconic new gateway to the City of London's emerging Culture Mile," said the architects, "drawing visitors into an area that is set to be transformed over the next decade and beyond through new transport hubs, outdoor programming, and major enhancements to streets and wider public realm that link the area's existing and planned world-class cultural destinations."

The designs propose reimagining and transforming the layout and public realm of the current Museum of London site, creating open, welcoming and traffic-free public spaces

The next phase of work on the project is expected to take approximately a year to complete.


© Nic Lehoux

EDUCATION/RESEARCH

Engineering faculty in metal and glass

The new CoorsTek Centre at the Colorado School of Mines, designed by Bohlin Cywinski Jackson in association with Anderson Mason Dale Architects, is now complete.

The new centre is an education and research facility dedicated to connecting students, faculty, researchers, and industry professionals. Located in Golden, Colorado, the four-storey building is said to be a "significant milestone in a multigenerational partnership" between the school, regarded as the world's leading institution for mineral and mining engineering, the Coors family, and CoorsTek, a leader in technical ceramics manufacturing.

The building's design employs massing and materiality to connect to the site's historic context and the surrounding landscape, said the architects. The metal and glass facade is vertically punctuated by service cores clad in dark masonry, "which help to anchor the building's entrances." Floating horizontal masonry panels made of the signature pale brick used extensively throughout the campus add visual interest and "introduce a forward-looking aesthetic utilising the historical palette."

The north west facade, which fronts the campus green, consists of full-height glazing at Level 1, and vertical glass panels and metal fins at Levels 2 and 3 that float above and modulate, as influenced by the building's interior programme.

The need for general classroom space "provided an opportunity to draw students and faculty of all disciplines through the building." Media-intensive 'Active Learning' rooms are flexible and can be rearranged for group work and discussions as curriculum dictates. Outside, a lively promenade with panoramic visual connections to the campus green incorporates seating and collaborative work areas of various scales, "offering opportunities for both planned and chance encounters." These spaces "emulate tech workplaces to create an open, dynamic environment that will prepare students for post-college work life," said the designers.

They added: "CoorsTek's complex programmatic requirements, contrasted by the general classroom spaces on the main level, define the building's organisational logic." While Level 1 is made available to the entire campus, Levels 2 and 3 contain dedicated teaching and research laboratories, and faculty and graduate student offices. Additional lab spaces with specific lighting, sound, or vibration requirements are tucked below grade.

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COMMENT

Composite cladding solutions

Dr Amin Emami from 3A Composites looks at why aluminium composite materials are popular with architects for rainscreen cladding, and at the robustness of testing regimes in the UK post-Grenfell

Aluminium composite panels (ACP) or alternatively aluminium composite material (ACM), are flat panels consisting of two thin coil-coated aluminium sheets bonded to a non-aluminium core. These cores can be of combustible, fire retardant or non-combustible material. ACMs are often used to clad the external facades and soffits of buildings, as well as insulation and signage.

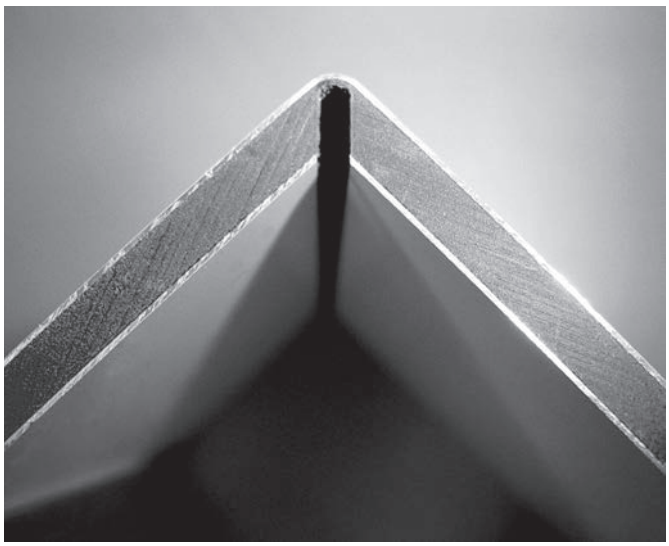
ACMs are classified as lightweight materials. This is an important advantage when it comes to handling in both workshops and installation, as well as reducing transportation weight.

In comparison with other metal-based building materials, panels created using this sandwich construction and manufacturing process are exceptionally smooth and flat, qualities which make them of particular interest to architects. Another major advantage of the process is that the thin metal outer layers can be 'coil coated' in a wide range of precisely reproducible coatings/lacquers.

As well as being lightweight, flat, and durable, the material also offers a wide selection of surface finishes. This makes for easy manual bending to create freeform and three-dimensional shapes and geometry, by using special routing and folding techniques.

What are the different types of ACM?

It is essential to distinguish between different aluminium composite materials. According to MHCLG (Ministry of Housing,



Experience has shown that material considerations alone are not capable of evaluating fire behaviour sufficiently

Communities and Local Government), ACM can be divided into three main categories:

- Category 1: Calorific potential ≤3 MJ/kg => limited combustibility core
- Category 2: Calorific potential > 3 MJ/kg and ≤35 MJ / kg => fire retardant core
- Category 3: Calorific potential > 35 MJ/kg => unmodified polyethylene core

The individual classification is derived from the differing reaction to fire of the materials. An ACM with a polyethylene core can significantly contribute to fire propagation and the side effects of fire (e.g. smoke production). A mineral-filled polymer core fulfils significantly more stringent fire requirements. Most responsible ACM manufacturers do not advocate polyethylene cored ACMs for architectural applications, and many countries prohibit the use of polyethylene cored ACMs in facade specification, especially for high-rise buildings.

Key considerations for rainscreen facades

Load bearing is not the only issue which plays an important role in rainscreen facades – building physics and fire protection must be looked at in detail. In recent years, the focus on fire protection has grown steadily in different countries. Various rules (building standards) have been established for fire safety in buildings. These standards specify which materials are permitted in the construction of a building and which materials may be used for the interior and exterior cladding of walls and ceilings.

The aim of these standards is to ensure safe evacuation of people from the building in case of fire, but these safety codes present a major challenge. Fire behaviour is tested according to different criteria and test methods in each country, and the disparities between the individual member states mean that evaluating a product's fire behaviour is very complicated.

Harmonised classifications in regard to reaction to fire were laid down in BS EN 13501-1 in order to resolve such ambiguities and to put an end to certain national reservations. Harmonisation should ultimately lead to all country-specific classification systems being replaced by EU regulations. The European classification standards include a much wider range of classes and combinations than some national classifications.

In addition to fire behaviour, the side effects of fire such as smoke production/development and burning droplets are taken into consideration, and divided into classes for the first time. The BS EN 13501-1 standard not only requires testing of individual materials for fire behaviour, but also system tests (small sections of facades). The aim of these tests is to aid evaluating the different materials in conjunction with each other.

Experience has shown that material considerations alone are not capable of evaluating fire behaviour sufficiently, but that the system, and interaction between various materials, plays a significant role. Combatting the chimney effect for fire spread is one key measure in reducing the spread of fire. In order to understand this better, it is important to analyse the chimney effect which is due to the ventilation gap present.

Some European countries are in the process of introducing large-scale fire tests as additional means of testing for critical systems. In the UK, BS 8414 is currently an important test, offering an accredited way of assessing how facade materials interact with each other. According to the requirement of BR135, one of the most significant criteria is that during the test, the temperature at level 2 (about seven metres) must not exceed 600°C within 15 minutes.

Testing post-Grenfell

Since the terrible Grenfell Tower tragedy, numerous tests have been conducted, both in and outside the UK. When introduced, these test series were very valuable and useful; however, the real usefulness of many of the experiments can be questioned. For many test series or system combinations, clear and unambiguous results proving compliance with the (BS 8414) test method are already available.

Tests have shown that ACM A2 fire performance in combination with non-combustible insulation is entirely safe. 3A Composites carried out its own BS8414 test series with the BRE in Watford in 2016, and this has led to the positive results being taken into consideration in the MHCLG test series.

3A Composites' experience with numerous different international large-scale fire tests and the results of the MHCLG test have shown that an ACM with mineral filled core (A2 version) in combination with non-combustible insulation can be judged entirely safe. The individual components – both the facade panels and the insulation – make no special contribution to the spread of fire. Even an ACM with mineral filled polymer core in combination with non-combustible insulation provides adequate safety. Practical examples confirm our experiences and recommendations.

3A Composites recommends A2 in conjunction with non-combustible insulation for high-rise buildings in order to ensure safety. Mineral filled polymer core can also be recommended in conjunction with non-combustible insulation for non high-rise buildings. These material combinations prevent fire spreading for a sufficient length of time until the fire-fighting operations begin. For all combinations, it is important that fire barriers are used in compliance with current regulations.

Dr Amin Emami is head of technical department & technology centre at 3A Composites

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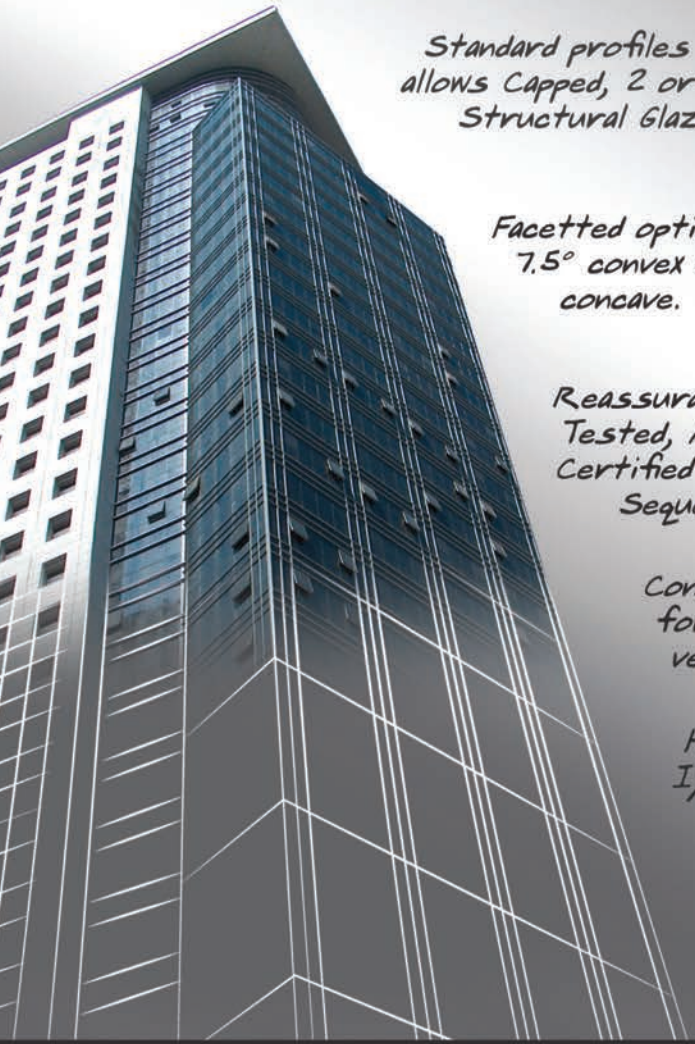

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COMMENT

Sounding out the benefits

Ed Peltor of Rockwool UK says that considerations of the benefits of insulation go well beyond thermal performance to acoustics and fire, when looking the whole building envelope

It's time to look for more from insulation than just thermal performance. Acoustics and, of course, fire safety, or, more accurately, a product's Reaction to Fire rating, are factors that have to be taken into consideration.

Noise disturbance is fast becoming a major issue in today's increasingly congested urban environments. Road, rail and air traffic, public works and associated street noise are all contributing to the heightened intrusion of external sound into working, hospitality, public and residential properties. Sound insulation is important in reducing this impact.

In our own report, 'Good Growth, Quiet Buildings', we highlighted why noise mitigation should be incorporated into the design process of any development to support good health and well-being. Factoring in noise from the outset of a project can be the most cost-effective route to ensuring a high standard of acoustic performance and can be as simple as selecting an insulation material that delivers on both thermal needs and sounds absorption.

A recent new-build project for the Crowne Plaza and Holiday Inn Express at London Heathrow Terminal 4 is a useful example. Connected via a convenient air bridge to Terminal 4, this project comprises a combined total of 750 rooms. Minimising external noise from the UK's busiest airport, where the average number of air transport movements reached a noisy 1,295 per day in 2017, was a major consideration. By utilising insulation with strong acoustic properties and a complementary facade system on the development, the hotel was able to meet its target of a significant Rw 58dB sound reduction.

External ambient noise can also be a major headache for schools, causing distraction, disruption and, at worse, impacting negatively on the academic performance of students. Stone wool insulation has helped the National Autistic Society Anderson School and Enterprise Campus, a new-build, autism-specific facility in Chigwell, Essex, address this priority issue to create a calm, productive and quiet learning environment for all students.

At the outset, project designers and specifiers, RMA Architects, recognised the role that effective sound insulation could play in helping to meet this objective for the school. The school's contemporary, low level design features extensive areas of flat

CROWNE PLAZA & HOLIDAY INN EXPRESS AT LONDON HEATHROW TERMINAL 4
By utilising insulation with strong acoustic performance the design minimised the external noise from one of the UK's busiest airports

roofing which could prove susceptible to noise ingress from heavy rainfall. At the same time, they required an efficient thermal solution that would meet the project's low energy credentials and a robust durable waterproofing system, that would safeguard the building from defect for many years to come.

Fire safety

Beyond sound, fire safety is an especially important issue and is in focus more than ever before. In terms of specifying an insulation material, it is key to understand what is combustible and what is non-combustible. Firstly, considering reaction to fire, there is the distinction between what is combustible, non-combustible and of limited combustibility. Here, we should recognise the classifications given within the Euroclass system applicable under CE Marking rules.

To be classified to the Euroclass system, products must undergo testing for a range of factors including: ignitability, flame spread, heat release, smoke production and propensity for producing flaming droplets/particles. The Euroclass system is accepted by all European Union States (and is mandatory where there is a Harmonised Product Standard). It includes seven classification levels, from A1 to F, plus one rating (NPD), that sits alongside but outside these ratings.

UK Building Regulations (England & Wales) define classifications, under the Euroclass system, as A1 non-combustible and A2 Limited Combustibility, offering "no significant contribution to fire growth". Products achieving a rating of B-F are deemed to be combustible.

Euroclass EN13501-01 / Reaction to Fire (RtF)

England & Wales Definitions	Euroclass RtF	
Non-Combustible	A1	
Limited-Combustibility	A2	
	B	COMBUSTIBLE
	C	
	D	
	E	
	F	
No Performance Determined	NPD	

Euroclasses

- ✔ Ignitability
- ✔ Flame spread
- ✔ Total heat release
- ✔ Emission of toxic smoke
- ✔ Character changes e.g. melting, dripping, charring

Source: www.mima.info/info-centre 'MIMA Building Safety Guide – Insulated Facades'

Other terms typically used by the industry to describe product performance, such as, fire safe, fire proof, fire retardant or flame proof do not necessarily define that the product is non-combustible.

Manufacturers of CE-marked construction products in the UK are legally obligated to declare an RtF rating, so HVAC consultants and contractors can find out the combustibility rating of their chosen HVAC insulation in the product's Declaration of Performance (DoP) certificate.

The RtF rating is not to be confused with Class 0, a product performance classification which simply measures flame spread. Class 0 is not a measure of a product's combustibility. In fact, many insulation products will be able to achieve Class 0 but have an RtF of C, or worse.

Much has been written about the use of various types of insulation on the building envelope, particularly the facade, but the specification and use of materials in other areas is also under the spotlight. We believe that the best way to ensure public safety is to require that only non-combustible insulation be used throughout the building envelope. Why would any specifier take the risk of adding combustible materials to a building? It simply doesn't make sense.

NATIONAL AUTISTIC SOCIETY – ANDERSON SCHOOL AND ENTERPRISE CAMPUS
Stone wool insulation has helped an autism-specific facility in Essex create a calm, productive and quiet learning environment
Image © William Eckersley

A clear example of the need to consider the whole building envelope is the recent roof fire at the flagship Primark store in Belfast. The fire is reported to have taken three days to fully put out, and resulted in one of Belfast's Iconic buildings being destroyed, but the effects have the fire have been felt on a much wider scale. Reports indicate that footfall was reduced by some 49 per cent into the Castle Court shopping area where the store was located, 14 local businesses have closed since the fire, and Belfast city centre is reported to be losing revenue in the region of £3m per month.

We are an industry going through unprecedented change from top to bottom – the insurance industry, clients and architects, many of whom are identified and highlighted in the Hackitt Review as having key roles going forward, are focused on risk – risk to lives and, indeed, livelihoods.

In short, the conversation is changing. Insurers, property owners, businesses large and small as well as specifiers are re-assessing the risk presented by fire at all levels and choosing the 'lower risk' approach of specifying non-combustible solutions around the building envelope and on the building services within.

Ed Peltor is commercial director at Rockwool UK


TWO AND THREE BEDROOM APARTMENTS
THE MUSIC BOX
237 UNION STREET

BUILDING
PROJECTS

THE MUSIC BOX
SOUTHWARK, LONDON

Living in harmony

Combining a contemporary music college with a mix of residential accommodation, The Music Box is a new landmark for Southwark. Trevor Morriss, principal architect, explains to Jack Wooler how uses were carefully integrated to create a unique hybrid

Connecting a new 'cultural corridor' between Southwark tube station and Tate Modern, The Music Box by SPPARC Architects is a distinctive and unusual new addition to its central London location. The building is home to both a music college and, above it, accommodation for 55 apartments.

The architects worked collaboratively with the dual clients, developer Taylor Wimpey Central London and the London College of Creative Media (LCCM). SPPARC were approached after the clients visited one of the practice's nearby buildings in Southwark. There was already what SPPARC say was a "fairly frustrated" planning consent for the site, for a building significantly smaller than the Music Box, and the architects were brought in to find a new approach.

After a complete reappraisal of the site, and how it worked within the urban grain, the architects identified a way to give it new life, blending the cultural and residential offerings into a new landmark for the area.

Core strength

It was a key part of the brief that these separate elements be physically distinct, identified easily from the surrounding south London streets. As such, the finished structure splits these two typologies into a distribution of a third at lower levels for the college, and two-thirds at upper levels for residential apartments.

The base third, covering the first four floors of the Music Box, houses the private higher education college, LCCM. Rehearsal and performance spaces are located predominantly at the front of the building, along with a ground floor cafe, basement bar and music venue. The College's new home can accommodate 550 students, taking undergraduate degrees in subjects such as music performance and production, creative and professional writing, and music management.

The college portion has been constructed with distinct, horizontal, musically inspired masonry, around a porous design feature of cut-out glazing. This cut-out feature, sitting in the centre of the facade, allows a glimpse into the daily life of the college for those walking along the street, displaying the rehearsal and performance spaces. It also creates a dramatic entrance to both the college and the apartments.

The higher thirds, with a triangular corner cantilevered over the entranceway, house the residential component. Enamel-finished fins run down between the floor to ceiling glazing on each level, creating a verticality to contrast and separate the two portions.

This residential component provides 41 high-end flats, along with affordable housing, sold to Wandle Housing Association, with seven homes for affordable rent, and seven for shared ownership. All of the private housing units have already been sold, and the affordable housing is fully occupied.

With three different elements on the site, the music college, the market rent residential apartments, and the affordable residential portion, Trevor Morriss, principal at SPPARC, says it was "certainly a challenge" to implement an efficient floor space.

"The building's design had to accommodate the high level of activity in the site," he says. "The design of the core in the middle enabled this, as well as allowing for a very well balanced glass-to-core ratio, perfect for the residential uses."

After a complete reappraisal of the site, the architects identified a way to give it new life, blending the cultural and residential offerings into a new landmark for the area

This core cuts across the college and residential elements, and is arranged over a basement area. Housing the vast majority of plant here, the architects freed up space on top of the building for roof terraces and green roofing. As well as the plant, a venue space and bar for the college has been integrated in the basement, which Morriss describes as a key part of the building's "heart and soul."

A visual definition

On the building's lower exterior, a frequent use of glass has been complemented predominantly by brick. Rather than directly emulating the brick materiality seen in many of the surrounding buildings, the architects chose a white, glazed brick. While the continued use of brick references the local vernacular, the way it's employed also provides a major contribution to the building's unique character.

Because the base of the building is substantial, however, the architects were concerned that a solid brick wall besides the open glass studios could seem overpowering. Instead, long slot windows were integrated n this element of the facade, in order to break down the scale of the building, and to give it what the architects term a "horizontal hierarchy."

Morriss explains further: "We used a Flemish bond in the brickwork, which is a very traditional bond of masonry. We did it, however, with an over-inflated brick." He continues: "The bond normally alternates between a full brick, and then a cut brick, and so on. Instead of cut bricks though, we used a full brick, and then a double-sized, larger one."

Beyond using scaled-up Flemish bonds to reduce the visual scale, and provide a less imposing structure, the architects created a relief in the brick facade to display a subtle musical theme. "To reflect the internal music college, we've actually used the brick bond to create musical notes," says Morris.

This pattern, protruding from the white-faced brickwork on the lower portion of this building, is in fact the guitar notation for 'White Room' by late 60s power trio Cream.

Morriss explains the genesis of this idea: "We've got a very talented architect in the studio, who in a former life was a successful musician. He meticulously planned the brick-work to depict the key notes of the song's riff.

On the upper floors, the residential portion has been designed to have a different outward form, and is very much vertical in its appearance, where the base is horizontal.

This verticality is manifested largely in the fins which run beside the glazing. They are of textured enamel on a steel backing, with the steel backing creating the vertical spine.

Referencing piano keys, the fins provide more than just aesthetics however. Through their vertical junctions, the fins channel fresh air into the apartments. With the homes' ventilation requirements fully provided for, opening windows were consequently unnecessary in the residential portion. This allows for floor to ceiling glazing throughout the apartments.

Additionally, the angle of the fins provides privacy from the outside world, and changes the building's appearance when it is viewed from different sides. Head on, the building appears to be transparent, but from the side, the building looks like a solid cube.

Going for gold

With visual definition between functions being fundamental in the design of the Music Box, it was important that these elements be blended effectively. While this was in part achieved through materiality, Trevor tells *ADF* that applying the Golden Ratio was key in combining the separate functions.

"The reason that the Golden Ratio comes out as an identity is because we didn't want the architecture to challenge the creativity that was going on inside the building," says Morriss.

"We were hugely immersed, engaged and interested in the internal functions. It doesn't often come around that you are able to design a contemporary music college, with this being only one of two in Europe. That challenge was a fantastic opportunity for us. What we didn't want to do was have the architecture overpower that."

As a well-known mathematical proportion, the Golden Ratio has been used throughout history, not just in architecture, but music and even in the human body itself. This 'perfect' ratio is defined as when the ratio of two quantities is the same as the ratio of their sum to the larger of the two quantities – essentially, the proportion between two-thirds and one-third.

"We wanted to bring this concept into the building. Music is a very pure form of art, so we wanted the architecture to be in a very pure form itself," details Morriss. "This idea also worked perfectly to allow us to create a building with two sections."

He adds: "It's definitely a building of two halves, but you can recognise that the base of the building has a different function to the top of the building, and that's manifested through architecture."

Internal composition

The architects put a substantial focus on creating privacy for the residents, while retaining a visible entrance into the college. When walking along Union Street, people can easily recognise it as a college, while more discreet entrances (one for the market rent apartments, one for affordable housing) are placed alongside for residents, their exterior continuing the musical notation pattern from the facade above.

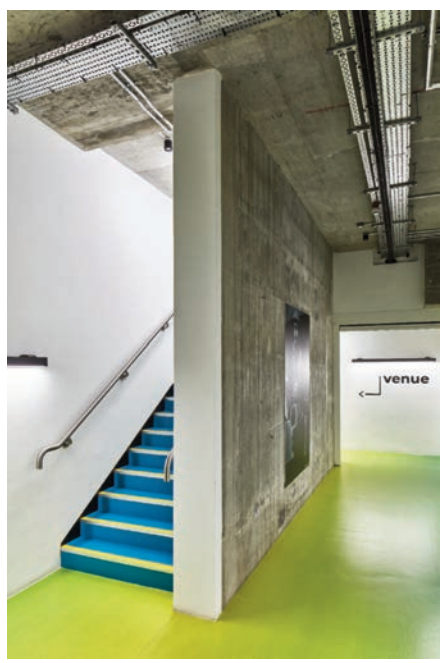
Internally, the architect says there's a "warmth" that is carried throughout the design. The flooring and doors are of timber, and the interior design is clean and modern throughout the corridors and apartments. Leading into the homes, the musical theme has been continued, with the doors made from lacquered white wood, again referring to piano keys.

Full floor-to-ceiling glazing extends throughout the apartments, with daylighting maximised in the dual aspect units. In order to prevent the single aspect units from suffering by comparison, the architects ensured that none faced north.

On the residential portion of The Music Box, the glass fins that extend from the top of the building to the top of the college, as well as providing the apartments with fresh air, allow for the level of glazing to be maximised. This provides significant extra daylighting, and gives residents uninterrupted views of the London skyline.

Inside the college, the full height glazing has been continued, flooding the rehearsal spaces and study areas with an abundance of

FACING PAGE
The Golden Ratio was used as a key design driver for achieving the right balance between the college and residential elements



Architecture is full of challenges and puzzles, it's how you respond to a brief, and how you put those puzzles together

Trevor Morriss, principal at SPPARC

PROJECT FACTFILE

Client/developer: Taylor Wimpey Central London
Architect: SPPARC
Structural engineer: Pell Frischmann
Planning: Deloitte Real Estate
Landscape architect: SPPARC
Conservation/townscape: Richard Coleman City Designer
MEP: SVM

natural daylight. The aesthetic aspects of the residential's interior are contrasted by the interior of the music college however, which, while still clean and elegant, takes on more of an industrial feel, with pipes and lighting often left exposed.

Acoustic separation

As well as the necessary visual separation, it was also vital that the different sections be acoustically separate. With two vastly different uses, both capable of producing a lot of noise, alongside the inevitable vibrations from the nearby railway, this was understandably a priority for the architects.

According to Trevor Morriss, this challenge wasn't just about the residents not hearing the college's students, but also the other way around: "If you think about what's happening within the college, yes they are generating music, but they're also recording as well, so they don't want any sonic disturbance from the outside."

To achieve this, the architects created 'music pods' which separated the rooms from the main structure. Achieved in collaboration with acoustic engineers The Equus Partnership, the architects have provided the necessary barrier to block sound travel, and meet the acoustic requirements of both sections, so neither use was compromised.

A brighter future

Alongside its many other positive qualities, not least the realisation of the design challenge of delivering two different typologies in one building, The Music Box has strong green credentials. It achieved a BREEAM excellent rating, thanks to green roofing, strong thermal performance with low U-values, and a combined heat and power system which serves both the college and the residential portion.

"Its very clean and green," explains Morriss, adding: "That isn't something that's just bolted on, it's something which has been installed in concept from day one."

This aspect of arriving early at key decisions appears to have been a common theme throughout the project. Rather than a block of flats 'bolted on' to a music college, from the outset SPPARC looked to create a building which is a careful combination of elements, bringing them together with a harmony and a sense of fun that belies the challenges of the brief.

However, this is par for the course, says Morriss: "Architecture is full of challenges and puzzles, it's how you respond to a brief, how you put those puzzles together.

"Architecture should be joyful, however; it doesn't need to be austere. It can have a real playfulness and delight to it, and that's really what we were trying to achieve with this building."

The project architect concludes on how The Music Box has contributed to this end: "For a site which before was not contributing at all to the street, now we actually have a building which is alive with creative energy. That's a rare and beautiful thing to have been involved in." ■

BUILDING PROJECTS

MAGGIE'S BARTS LONDON

A vital force

Steven Holl Architects' Maggie's Cancer Centre at London's oldest hospital is wrapped in a translucent facade, which takes historic musical design cues to enliven its interior and exterior. Sébastien Reed reports

St. Bartholomew's hospital ('Barts') in the City of London was founded in 1123 by Anglo-Norman priest and monk, Rahere, giving the site for Maggie's Centres' most recent architectural foray a deep as well as challenging historical dimension. Steven Holl Architects were approached by Maggie's – a charity devoted to providing free practical, emotional and social support to people affected both directly and indirectly by cancer – to lead the design for a contrasting new extension to James Gibbs' 1740 hospital building.

"One of the reasons we were selected was that we've done a lot of new contemporary buildings as extensions to historic buildings," says project architect Chris McVoy. Steven Holl Architects boast a rich portfolio featuring progressive yet highly sensitive additions to heritage buildings, such as Nelson Atkins Museum of Art in Kansas City, Higgins Hall Insertion for the Pratt Institute in New York City, and the Reid Building at the Glasgow School of Art.

As with all Maggie's Centres, the core aim was constructing a place of refuge where cancer patients can escape from the typical clinical and institutional atmosphere of a hospital. McVoy explains: "The idea is for you to be able to get up and make a cup of tea on your own without anyone's help. It's a kind of respite."

He adds: "It has much more to do with how it feels and performs, than technical requirements. It's about how the building performs for the users. The architect's role is to use the site as best as possible." What has emerged from the collaboration is a brave and forward-thinking design which combines an innovative application of materials to house sector-leading facilities, all the while sensitively threading in thoughtful historical references to London's medieval past.

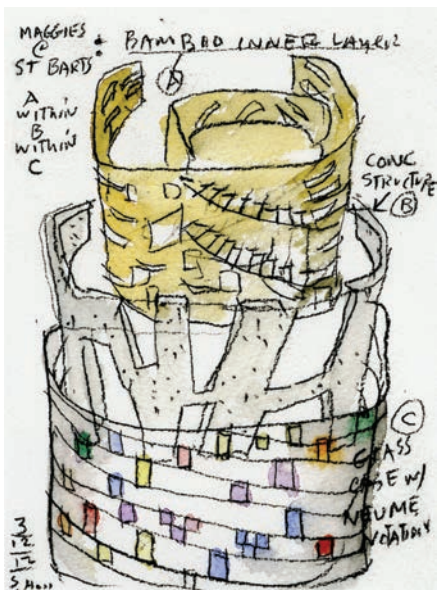
Plan & provision

Maggie's Barts is more vertically organised than other Maggie's Centres – and is spread over three floors. This was due to the denser urban location that the scheme was to occupy. It replaces a 1960s brick structure and sits adjacent to a 17th century stone building, housing the Great Hall and the historic Hogarth staircase.

The scheme was first envisioned by the architects as "a vessel within a vessel – within a vessel." The structural frame is composed of concrete, while an inner bamboo layer and outer Okalux light-diffusing glass layer cocoon the interior spaces, and present a gentle aesthetic both internally and externally. Housed within these 'vessels' are, on the ground floor, two entrances at either side of the scheme adjacent to James Gibbs' stone building, which in turn provide access to an open plan kitchen and lounge area, covering almost the entire footprint of the building. "The heart is the kitchen, and the kitchen table," comments McVoy – the space benefits greatly from its double height. A separate counselling room is located on this floor, along with several seating areas and a secluded 'pause area' for users needing greater privacy.

A bamboo staircase runs around the periphery. The first floor accommodates further seating areas, a library, and two more separate counselling rooms, where patients can receive advice and consultation from specially-trained staff.

VESSELS
The scheme was first envisioned by Steven Holl as "a vessel within a vessel – within a vessel"
Watercolour by Steven Holl



Ascending via the stair to the third floor, the user meets another open plan area serving as a yoga, Tai Chi, and event space. This opens onto a roof terrace featuring flowering trees, meeting the charity's requirement for a garden on this tight infill site. "From there you can look out over trees and historic buildings – you feel like you're in a British village, not in London," says McVoy.

McVoy notes that the planning process was long and drawn-out, with the planners requiring that the building link to the site's heritage buildings, including the Great Hall located inside the adjacent original stone building. Accordingly, each floor provides direct access to its neighbours. In addition, new toilets in the basement of the centre and a new lift also provide the Great Hall with functional amenity as part of the planning agreement.

Neume inspiration

Regarding the design intent for the building's exterior, Steven Holl uses the term "complementary contrast" to the creation of an authentically new piece of architecture that also doesn't overwhelm the pre-existing buildings it adjoins. McVoy adds: "In order to be complementary, you don't have to fit into the exact historical style. We don't build in thick stone now, so why should we add in stone details that are just a few inches thick?"

In this spirit, the new building was to have "a translucent glass skin that would be full of light, and soft, in contrast to the heavy stone facades of the surrounding historical buildings," comments McVoy. The curved corners of the new centre were also designed in homage to the stone corner quoins of the original Gibbs buildings.

The outer layer of the facade is composed primarily of matte white glass, arranged into 90 cm horizontal bands designed to resemble a musical stave. Its surfaces are etched both inside and out to produce a soft white membrane decorated with coloured glass fragments representing the 'neume' system of notation used in 13th century medieval music. The word neume has its etymological roots in the Greek word

'pnevma', meaning 'vital force,' which also spoke to the designers. As they put it in their statement: "It suggests a 'breath of life' that fills oneself with inspiration like a stream of air, the blowing of the wind." The concrete structure beneath the glass "branches like a hand."

The ancient notation was also chosen by the architects for the facade to allude to the parallels between both the temporal and spatial effects of music and architecture. "Music engulfs you, it surrounds you," says Holl, "and it has in it the quality of time. And, architecture surrounds you in the same sense. And as you move through, it has a sense of time." He continues: "I think there's something very similar about these two arts, and what's interesting to me is when music inspires architecture."

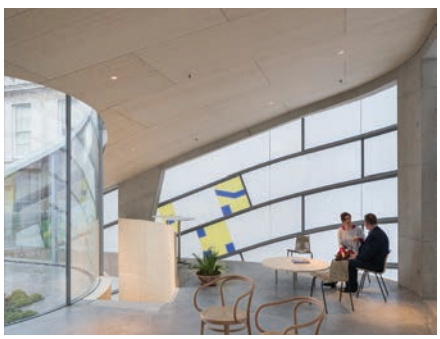
When quizzed on how the building fits stylistically into the architects' portfolio, McVoy echoes these thoughts, crediting light, along with time, as the primary creative inspirations for Steven Holl Architects' buildings. In the context of Barts, the three-floor elevation and semi-translucent skin enable these themes to manifest fully. As the user moves into the building and ascends from the kitchen area, "each level unfolds in a different way."

McVoy emphasises how the elements of light and time work together at Maggie's Barts. As day turns to night, the coloured glass elements slowly become more vivid from the building's exterior as lighting glows from inside, while during the day coloured light is filtered through the building envelope and projected into its spaces. The complementary 'neume' colours were hand-selected by Steven Holl based on a set of studies.

The building's shape as well the material specified for the facade placed limitations on where the colour could be applied. Okalux glass is manufactured with short lengths of straw-like fibres in the material, and due to its physical properties colour could be applied only to flat surfaces. Some of the glass is both sloping and curving, "like a J-shaped hockey stick." The architects discovered these parts could

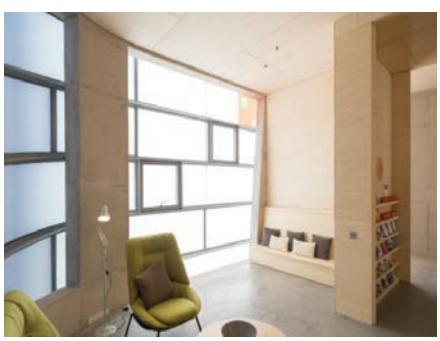
The new building would have "a translucent glass skin that would be full of light, and soft, in contrast to the heavy stone facades of the surrounding historical buildings"

All photographs © Iwan Baan



PROJECT FACTFILE

Building area: 607 m²
Architect: Steven Holl Architects
Associate architects: JM Architects
Structural engineers: Arup
Glass consultant: Arup
Glass manufacturer: Okalux



not be tempered, as McVoy notes: "You can't heat-strengthen it because it would crack, so it's laminated for safety."

In collaboration with Okalux, the architects experimented with various means of getting the colour into the glass, which concluded with a method consisting of placing film between two layers of the material. "We loved that because the colour at the edges of the film begins to blur because of the 'straws'; the blur changes depending on the angle you're looking at it," remarks McVoy. "We worked very hard to develop that with them."

The centre also benefits from the insulating properties of the glass, which helped the building meet its energy goals. There are also two patches of clear glass on the centre's facade; one at the James Gibbs Square entrance, which appears to lift the 'musical stave' from underneath as it slopes upwards around the envelope, and one on the roof – looking onto the roof terrace.

Boundless light

Openable windows are dotted around the building at regular intervals, allowing patients and staff to manually ventilate spaces, and space-saving sliding doors have been installed. In addition, staff and patients can slide the rooftop door open to let the outside in, and are free to move the seating and tables if needed. All of these features give users just that little bit more agency in contrast to the neighbouring hospital, where furniture is fixed, rooms usually have closed doors, and windows cannot be opened by users.

Diffusing through the glass skin comes "boundless, glowing light," comments McVoy, with the bamboo "giving a warmness that complements the concrete" on the interior, conjuring an overall calm feel for users. Another key feature for user wellness is how acoustics are controlled in the design of the building's atrium, meaning that even when the centre is at maximum capacity, users can still easily hear the person they're talking to, while also feeling enveloped in comforting background sound.

Laura Lee, chief executive of Maggie's tells *ADF* about the effect of the charity's newest building: "Our visitors always comment on how uplifting the centre is from the moment you walk in. The light and different areas and floors give people the option of sitting with other visitors at places like the kitchen table, or on the rooftop, or sitting alone in one of the armchairs to read or take a moment to reflect."

Summing up the utility of the facade design, Lee says: "The soft grey frosted glass blends into the surrounding buildings, but the modern design allows the centre to be recognisable enough for people who are looking to visit." It's this sensitivity to both the site context and intended users which makes Stephen Holl Architects' building a worthy, and appropriately distinctive, addition to the much-praised collection of Maggie's Centres. ■

Design for total envelope safety

James Gooder of SFS Fall Protection Systems explains what specifiers need to consider when designing for safe working at height

The ability to be able to design-in safety gives assurance to those tasked with maintaining the building envelope. This includes gutter clearing and air conditioning unit, plant or machinery maintenance, as well as the installation or maintenance of solar or photovoltaic panels and green roofs. But every application is different, so it is important to understand the key specification questions and tailor the approach for each project.

Within the area of 'fall protection systems', specifiers will have options for horizontal, vertical and overhead lifeline systems. This enables designers to provide reliable fall protection throughout the building's lifespan for anyone who needs to ascend the structure, stay safe while working at height – typically on a roof – and then descend safely.

The most commonly requirement is a horizontal lifeline (HLL). This typically comprises top fixed shock-absorbing posts anchored to the outer roof skin, joined through a series of components to create a system using 8 mm wire cable. While some systems can be installed directly to the building structure by utilising in-line shock absorbers in place of shock absorbing posts, solutions that attach securely to the outer skin offer significant benefits.

Horizontal thinking

The process of designing an HLL system starts with understanding the requirements of the user and the need for roof access. This should be done by fall protection experts, consulting with the architect, building owner/client and main contractors to prioritise safe working methods within CDM.

The proposed design must consider the access point and method, the number of users per system, roof substrate/build-up, and method of fixing. Crucially, the design must take into consideration the hierarchy of fall protection. Restraint systems are the preferred option, and an arrest system should only be offered as a last resort. While all systems must be capable of arresting a fall under EN795:2012 'foreseeable misuse', it is best practice to keep staff in restraints to prevent any possibility of a fall occurring.

HLL systems have moved on from the ugly 'through fixed' rigid posts that had to be fastened back to structural steel through the roof build-up – often leading to weathering issues. System end loads would be significantly high and shock-absorbing elements could only be added 'in-line'.

Today's engineered solutions are fundamentally different, with no need for 'through fixed' posts. HLL posts can be fixed to the roof skin, whether it be a standing seam, a flat roof construction or corrugated sandwich panels. These systems accommodate the lighter weight substrates featuring thicker insulation, complementing materials advances without compromising structural integrity or user safety.

Built-in shock absorbing technology reduces deployment loads to the structure to under 6 kN. Designed to withstand stresses exerted by snow and ice build-up and resist corrosion, posts can minimise the forces that rivets or fasteners would be subjected to in the event of a fall. This spreads and dissipates the impact of multi-and single-user falls and prevents roof damage to the roof structure.

Corrosion resistance

Corrosion is one of the biggest threats to the integrity of any lifeline system. It has the potential to cause failure of the system when it is needed most, and can cause unsightly rust stains on roof sheets.

The application of protective surface coatings to carbon steel elements only provide temporary protection. Safety lines are exposed to the weather 365 days a year, 24/7 for life, and any loss of performance can be catastrophic in a safety line. That's why EN 795:2012 requires all components to be subjected to neutral salt spray tests in accordance with EN ISO 9227 for 48 hours+.

A combination of both A2 (grade 304) and A4 (grade 316) stainless steel is the best way to deliver peace of mind that the system will have a lifespan matching the building life.

James Gooder is business unit manager at SFS Fall Protection Systems

Systems accommodate the lighter weight substrates featuring thicker insulation, complementing materials advances without compromising structural integrity or user safety

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The fabric-first route to healthy interiors

As well as improving sustainability, PIR insulation can create interiors that excel in terms of comfort and wellbeing, as Jon Parsons of Recticel Insulation explains

The average UK household spends around £1,230 on fuel bills each year, which can be up to 50 per cent more than necessary due to the lack of energy-saving measures being implemented in the home. Poor insulation is a major contributor to domestic energy wastage. To help combat this, the construction industry is increasingly turning to PIR, rather than mineral fibre-based insulation.

There are numerous benefits associated with PIR insulation board. Its closed-cell structure means it doesn't absorb water, allowing the thermal performance and reliability of the panel to be retained over time. It's light and easy to transport, as well as being simple to install, helping save on-site labour costs.

Unlike fibrous insulation, which deteriorates over time when damp sets in, PIR insulation's structural strength enables a consistent performance that will last the lifetime of a building, negating costly repairs and maintaining its thermal performance. PIR insulation is also renowned for its flexible qualities, providing the ideal solution for a range of applications such as floors, walls, pitched and flat roofing.

Feel good factor

A draught-free, well-insulated building is crucial for controlling interior temperature differentials. This not only helps reduce heating costs, an evenly regulated living or working space enhances the year-round comfort for occupants. In a commercial building, a happy, healthy indoor environment is proven to reduce staff sickness, which in-turn leads to greater productivity. It was estimated staff absenteeism cost the UK economy £18bn in 2017, proving it really does pay to improve a building's thermal performance.

In terms of domestic properties, particularly multiple tenancies, the need to create a healthy indoor climate becomes greater. The standard of living in multi-storey housing developments can be severely reduced if the insulation is unable to absorb the increased noise, for example. Comfort and wellbeing issues aside, high-performance (PIR) insulation panels are essential for compliance with Part L1A of the Building Regulations 2013 in England and Part L1A of the Building Regulations 2014 in Wales.

With the Green Building Council estimating that by mid-century, 25 million UK homes will fall short of insulation standards, there is an urgent need to address energy inefficiency. This is heightened by the Government's pledge to reduce the country's UK greenhouse gas emissions to below 1990 levels by 2050.

Case study: Gerrards Cross

An example of the compelling energy efficiency credentials of PIR insulation was Mentmore Homes' construction of two energy-efficient, detached five-bedroom homes in Gerrards Cross, Buckinghamshire. The high-quality, traditionally constructed homes feature external walls built using brick/block cavity construction. Cavity wall is the UK's most common method of wall construction for residential dwellings. For Mentmore Homes, a significant challenge was to retain a standard-sized cavity while complying with the latest Building Regulations.

To maximise the thermal performance of the external walls without increasing the width of the 100 mm wide cavity, Mentmore Homes specified Eurowall+ full-fill insulation. Using this high-performance PIR insulation board enabled the developer to meet the thermal performance required to achieve regulatory compliance. A total of 500 m^2 of insulation boards were used in the wall construction of the two houses.

Jon Parsons is specification manager at Recticel Insulation

Unlike fibrous insulation, which deteriorates over time when damp sets in, PIR's structural strength enables consistent performance over the lifetime of a building

Making a solid decision

Andy Noble of CD (UK) looks at why architects should consider staying ahead of the curve by specifying solid surface facades for a highly contemporary look

MENAI SCIENCE PARK
The award-winning 'M-SParc' in Anglesey designed by FaulknerBrowns Architects is wrapped in a ribbon of Corian cladding

How do you create a contemporary and yet timelessly effective facade? From a wave-like ribbon wrapping a new science park in Wales to the undulating frontage of a mixed-use building in Poland and a curvaceously clad villa in the Netherlands, facades that have been formed with an advanced solid surface can enable bold and distinctive architecture to perform as designed.

Add both ease of installation and maintenance into the mix and a reliable solid facade solution (such as Corian) makes sense for the skin of modern buildings – as an innovative yet eminently practical choice.

From distinctive aesthetics to thermal efficiency, and from creative freedom to lasting performance, there are many reasons to consider a high quality solid surface as a facade finish. In terms of design versatility there are a range of advanced fabrication techniques at the architect's disposal. These range from CNC pattern cutting to integrated backlighting and 3D texturing. The ability of the material to be thermoformed into a wide range of different forms makes it a particularly attractive option for architects.

Curve appeal

Curves add an organic allure to the urban landscape and solid surface allows this look to be beautifully expressed via a ventilated facade. Each solid surface brand will have a different composition and ratio of key ingredients, and source for those ingredients, as well as a different manufacturing ethos – but working with a reliable, high quality material, gives the benefits of extraordinary flexibility combined with mechanical strength, and crucially, technical support, including answering key questions on certification and regulatory compliance. Combine the ability for seamless joining (or subtle shadow gaps) and an expansive, strong yet comparatively lightweight sheet can be transformed into either a monolithic effect or a complex interplay of shapes.

Extensive networks of approved, highly trained and skilled technicians understand how to get the most from the right material, fully appreciating tolerances and capabilities, without compromising on safety or reliability. Indeed, it is the creativity of large numbers of fabricators who have worked to solve a design challenge presented to them by architects,

WROCLAW ZOO
Afrykarium at Wroclaw Zoo, Poland
Image © ArC2 Fabryka Projektowa architects

which has pushed the boundaries of what a superior solid surface can achieve.

Climatic considerations

As a weather shield against wind, water, sun and ice, a solid surface rainscreen protects the structure from the elements while helping to manage interior temperature and comfort.

A well-planned facade can withstand all kinds of climate conditions, while resisting damage from graffiti or the chemicals in pollution. A genuinely high-performing material will offer all this resilience, while also being easy to clean (for example, with water driven systems at 200 bars, recommended annually) and even be discreetly renewable, if necessary.

Safety first

For facade materials, whether solid surface or otherwise, fire resistance is clearly an essential consideration. Various manufacturers will have applied for and been granted certification for many different tests, for everything from seismic suitability, to weatherability, longitudinal expansion, thermal conductivity, flexural strength and freeze/thaw cycles. When considering a specification, it is important to fully explore all of the comparative documentation available.

Smooth fit, sleek finish

Available in panellised systems that can be fabricated off-site, the right solid surface can help the construction process to run smoothly. Extra large panels can also facilitate both the design and the 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, overlap joints will not show any dark gaps between panels, and can appear as sleek and discreet as desired.

Andy Noble is sales director at CD (UK) – the UK/Ireland distributor of Corian

From distinctive aesthetics to thermal efficiency, and from creative freedom to lasting performance, there are many reasons to consider a high quality solid surface as a facade finish

Getting the balance right

Jon Sheaf of AluK discusses the considerations that must be taken into account when specifying curtain walling, alongside achieving the right aesthetic results

Over-engineer these elements and the curtain walling will be too costly, under-engineer them however, and it will lead to performance issues

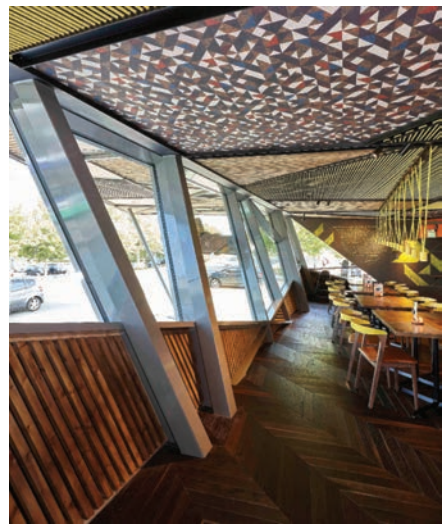
Once a glazed facade has been chosen as part of your building envelope, the first stage in drawing up the specification is to decide whether to use curtain walling or a punched hole window option.

As a general rule, curtain walling is required for large expanses of glazing over 3000 mm high or which span multiple floors. Also, if the design features curved on plan, faceted or raked details and if any external attachments are to be fixed to a glazed facade such as solar shading or signage, then curtain walling would always be preferred to windows.

Understanding the static considerations which dictate the specification of the mullion and transom back box sizes in curtain walling is essential, in order to end up with a facade which is both cost effective and meets the client's performance requirements for a building. Over-engineer these elements and the curtain walling will be too costly, under-engineer them however, and it will lead to performance issues. It can be a delicate balancing act and, for anything other than routine projects, I would always recommend getting advice from a specialist systems house in the first instance.

By definition, curtain walling is a system which supports no load other than its own weight and the environmental forces which act upon it. However, it is obviously required to control everything from heat and air flow to noise and solar gain, and to be strong, durable, cost effective, and of course to look good.

Aesthetically, stick curtain walling, which



is assembled and glazed onsite, offers the slimmest and most consistent sightlines once installed – typically 50 mm for both the mullion and transom. It also easily caters for staggered transom and mullion options if required.

When I deliver CPDs on the topic of curtain walling, I advise that having a complete curtain wall facade with as few interfaces as possible is the best route to optimising the water and air tightness, and avoiding the inevitable interface issues between trades or differing systems.

I also advise specifiers on how to optimise the system for structural performance, taking into account the factors, which can affect the choice of mullion or transom used. This covers whether the curtain walling is fixed inboard or outboard of the slab, the size of cell required, the wind load, and what the predicted building movement will be.

Whether the mullions sit in front of or between the slabs though, structural movements and differential deflections in multi-floor buildings can be largely accommodated by the use of either lateral (slotted holes) or dead load (round holes) in the bracketry. For the more slender glass sizes, a major consideration is 'racking'. This can be particularly problematic if the dead load of the whole system is not directly transferred to the ground. Any slab deflection and the consequential differential mullion movement must be assessed for racking.

Other factors to take into account in a curtain walling specification are the mullion and transom spans ('lx' value), the glass types and weights ('ly' value) and the glass pane centres, because all will have an effect on the required performance of the finished facade.

Without early exploration, the original design intent may need to be compromised to accommodate the issues above.

Drainage is always a key consideration as well of course. These days, most curtain walling systems are mullion drained rather than zone drained, with the transoms effectively acting as 'gutters' moving any water to the 'downpipe' mullions for it to drain through.

Increasingly, curtain walling is required to interface with other facade treatments such as cladding and brise soleil. It is essential to consider the strength of the curtain wall mullion nosing, because external items are generally fixed to that through the face of the system, but it is perfectly possible to attach solar shading, walkways, double skin facades and signage.

And of course, any product specified must comply with the curtain walling product standard BS EN 1380 and have been tested to the CWCT requirements for air permeability, water tightness and wind load resistance.

Even if you get the specification spot on though, the eventual success of a curtain-walling project can largely be down to the choice of sub-contractor.

In awarding the contract, consideration must be given to both cost and capability. Awarding a small project to a large, over resourced sub-contractor can prove just as problematic as awarding a large project to a sub-contractor who is too small to handle it.

Jon Sheaf is major projects manager at AluK

Increasingly, curtain walling is required to interface with other facade treatments such as cladding and brise soleil

Daylighting takes off at Heathrow

Curtainwall Engineers and Kalwall distributor Structura has recently completed a challenging but fascinating 'replace and refurbishment' project at Heathrow's T4. This in conjunction with Structural Engineers Webb Yates for a scheme designed by Pascall+Watson architects. The project proved so successful that main contractor Balfour Beatty named Structura as their 'Most Promising New Supplier 2018'.

Replacing ageing glass rooflights originally installed in the 1980's, 1750 square metres of Kalwall Skyroof cladding is being used above the Terminal's International Departure Lounge and check-in desks. Fully ASAID compliant with regards to blast performance, Kalwall improves the solar control and insulation to the space below. In this project, its inherent strength in a lightweight frame means the existing substrate could be adapted and reused - saving £7m in project costs and more than a year from the build programme. The whole retrofit was completed externally in 'engineering hours' using a bespoke moving scaffold, meaning there was no disruption to the inside of the building.

Kalwall offers complete line-of-sight protection, maintaining privacy for the security screening area and departure lounges while bathing the interior with diffused daylighting, regardless of the weather. Apart from providing the visual protection, its inherent strength and heavy-duty impact resistance make it ideal for secure locations such as this. It offers the highest protection in terms of wind-borne debris and resistance to impact, abrasion and point loads. Not only is it also safe to walk on but Kalwall achieves S:AA (BS 476 part three) and Broof(t4) to EN 13501 part five for external fire performance.

The exterior face is colour stable and includes a UV resistant, self-cleaning surface. This means that normal rainfall helps to keep the surface free of dust and dirt while at the same time retaining its original colour during the weathering process.

01233 501 504
www.structura-uk.com/kalwall

Protect Membranes used for pioneering offsite social housing scheme

Protect's reflective TF200 Thermo insulating breather membrane has been used throughout a six property social housing project in Banbury on all external walls, to provide enhanced thermal efficiency and deliver a low U-value, contributing to the environmental performance for the overall construction. Cherwell District Council (CDC) required a turnkey solution to provide high quality, affordable housing and turned to offsite construction specialist F1 Modular Limited to design and build the properties, developed on the former site of Banbury Ambulance Station.

Appointed via the LHC's New Housing and Associated Works (NH1) procurement framework, F1 Modular's design challenge comprised of manufacturing 26 ensuite rooms with shared facilities and two bedsit properties all contained within six shared houses. Working closely with CDC's in-house design team, F1 Modular built a series of modules using volumetric construction principles in strict factory controlled and weather-tight conditions.

Delivered on budget and requiring reduced time on site thanks to precision offsite manufacture, the modules were installed with Protect's BM TRADA certified, TF200 Thermo membrane fixed to the outer structure, providing not only low emissivity but also temporary protection against wind damage, weathering and water penetration, whilst also ensuring the passage of water vapour into the external cavity between the external masonry and the outer wall, significantly reducing the risk of condensation.

Protect's range of wall, ceiling and floor construction membranes together with its roofing underlays and accessories provides a comprehensive solution to the modular build sector. In particular, Protect construction membrane products with reflective technology help deliver thermal efficiency benefits to meet low target U-values and ensure compliance with relevant Building Regulations.

ABOVE
The social housing scheme at Banbury for Cherwell District Council features Protect construction membranes.

For details of how Protect products can be incorporated into modular builds, whether residential and commercial, please visit www.protectmembranes.com.

0161 905 5700
info@protectmembranes.com

Cladding creates a calming appearance

The new state-of-the-art 65 bed Cygnet Hospital mental health facility in Maidstone has been clad in Abet Laminati's MEG exterior grade laminate.

Purpose-built to meet the latest national specifications for improving mental health within a therapeutic environment, the hospital will provide an important and much-needed service for local patients.

800 square metres of exterior grade MEG cladding in a 754 Padouk Soft finish were installed by Rhino Exteriors across various elevations. MEG was chosen as it carries a BBA Agrément Certificate and, most importantly, F1 panels from 6mm and thicker are rated Class B-s1, d0. This makes them fully compliant for all non-residential applications and up to 18m high for residential schemes.

This scheme is a perfect example of high performance MEG in action where the need for high performance and durability is married up with low life-cycle costs and aesthetic design.

The range comprises 58 colours and 31 woodgrains together with 5 concrete and metal effect finishes. MEG is also able to incorporate Abet's digital printing technology. This means that almost any design, photograph or pattern can be reproduced in stunning detail to give architects and designers unparalleled freedom to create unusual and dramatic building facades.

MEG is a self-supporting high pressure laminate (HPL) for cladding the exterior of buildings, balconies and other applications. It features high resistance to temperature, climate shock, weathering, UV light and impact. Furthermore, its chemical resistant nature and closed structure do not allow paint in spray cans, various inks, emulsion paints, lipstick or pastel paints to penetrate into the decorative layer. This negates the need for any anti-graffiti treatment and makes the surface easy to clean. Samples and technical literature are available from Abet sample line.

020 7473 6915 uk.abetlaminati.com

FGS brings the spirit of creativity to glazed facade of iconic Speyside distillery

Creating the ideal glazed facade is always a challenge – but never more so than when it also has to accommodate large, unpredictable amounts of movement. This was the challenge faced by **Facade & Glazing Solutions UK Ltd. (FGS)** at The Macallan whisky distillery in Speyside. FGS was commissioned to design, manufacture and install a glass facade – which, as well as looking stunning, would accommodate the deflection of the building's striking timber and turf roof. The roof of the distillery is one of the most complicated timber structures in the world and was expected to provide up to a possible 60mm downward deflection and 38mm outward deflection, so FGS had to ensure that the main facade screen could accept this level of movement. FGS senior project manager, David Bennie said: "This was a fantastic project for FGS to be involved in. With a range of complex challenges to overcome – not least in creating a specification that would accommodate the large amount of deflection caused by the grass roof – having FGS' Contracting and Facade Design & Supply teams collaborate on the project ensured that every decision we made was supported with a wealth of technical expertise."

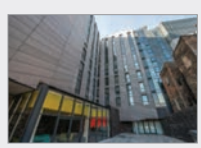
0844 892 2690 www.fgs-uk.co.uk

Senior brews up a storm for Thwaites

High performance aluminium curtain walling and doors have been used to create an eye-catching facade for the new head office and brewery facility for Thwaites. **Senior's** popular SF52 curtain walling has been used to create the attractive entrance to the new facility and to maximise the flow of natural light into the interior spaces. The sleek aluminium frame of Senior's SF52 system perfectly complements the attractive building envelope design, which comprises charred vertical timber, zinc cladding and natural stone, and helps to create a sense of symmetry across the front elevation.

www.seniorarchitectural.co.uk

Peace of mind for cladding specifiers



Cembrit has received approval from the British Board of Agrément for its cladding product range, providing peace of mind to specifiers who choose to use Cembrit's non-combustible fibre cement cladding boards on their projects. Cembrit Patina, Solid and Cover are all 'A2-s1, d0' fire rated fibre cement rainscreen cladding panels. They have been awarded certificate number 18/5600 for use as exterior non-load bearing, decorative external cladding on timber or metal vertical supports over timber frame, steel frame or masonry external walls for both new and existing buildings.

info@cembrit.co.uk

Nordic Blue Roofline

Ian Ritchie Architects' ingenious project for the Royal Academy of Music in a particularly challenging historic London location is defined by its roofline of Nordic Blue copper, a material that the architects have been exploring for over a decade.

Hidden behind the listed facade of the Royal Academy of Music's Edwardian premises and located within the Regent's Park conservation area, two distinct, outstanding performance spaces have been designed by Ian Ritchie Architects. Seamlessly integrated within the historic site, the project is expressed by facades and roofs clad in Nordic Blue pre-patinated copper from Aurubis.

Nordic Blue is a factory-applied patina developed with properties and colours based on the same brochantite mineralogy found in natural patinas all over the world. In marine climates, the natural copper patina contains some copper chloride giving it a blue-green colour, emulated with Nordic Blue. As well as the solid patina colours, other intensities of patina flecks revealing some of the dark oxidised background material create 'Living' surfaces.

Ian Ritchie said: "I grew up in Brighton and have always been fond of the copper roofs there, naturally patinated a turquoise blue by the sea air. Our interest in Nordic Blue copper goes back to 2004 and instigated research and development carried out by its manufacturers for a previous project. For the Royal Academy of Music project, Nordic Blue Living 1 provides just the right hue which will continue to develop naturally over time."

Despite the complexities of the constrained site into which the myriad of functions of a modern opera and musical theatre were to be introduced, the copper-clad project was unanimously granted planning permission and listed building consent at the first submission, fully supported by all officers, English Heritage and the St Marylebone Society.

Designed for both opera and musical theatre productions, The Susie Sainsbury Theatre sits at the heart of the Academy. Within the old concrete walls, the Theatre incorporates 40 per cent more seating than previously through the addition of a balcony,

as well as a larger orchestra pit, a stage wing and a fly tower. Above the Theatre, and acoustically isolated from all other buildings, the new 100-seat Recital Hall provides a further 230m^2 of space.

Creating a visual and physical link between the old and new buildings is the Recital Hall's new glazed lobby, which is primarily accessed from the main stairway and also by a glazed lift. The new light wells reveal the previously concealed Grade II rear facade, in which bricked-up windows have been reopened. Both of these beautifully finished, acoustically diverse spaces can be accessed independently and complete a suite of facilities for the Academy's ambitious student body and world-class teaching staff and for public performances.

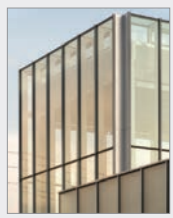
01875 812 144 www.nordiccopper.com

Crittall windows help keep youngsters safe

A state-of-the-art residential unit for vulnerable children and adolescents features **Crittall's** Fendor CleanVent security windows. The unit, at Prestwich, is a Mental Health Services facility for young people with significant mental health needs and who may pose a high risk to themselves and others. For this reason, windows in rooms to which patients have access must have an anti-ligature feature. The aluminium CleanVent windows specified complement this modern, non-institutional feel while satisfying the anti-ligature requirements, meeting the security level of the building as well as providing natural ventilation.

01914 170170 www.crittall-fendor.co.uk

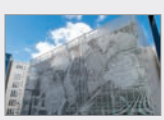
Continued growth for Exlabesa's ECW 50



Exlabesa Building Systems' ECW 50 curtain walling system continues to deliver on all levels with a 20 per cent year of year growth being achieved. The ECW 50 curtain walling system has all the hallmarks of an intelligently designed system that has been designed to add value to fabricators' and installers' businesses. The system is fabricated using high quality European components and is tested to CWCT and UNE EN 13830:2016 standards for weather resistance, safety in use, energy efficiency and heat retention.

sales@exlabesa.co.uk

Music history brought to life with RMIG



The Fab Four sang "Baby, you can drive my car..." , and they would probably love to drive it into the multi-storey car park in Hayes, England, where a facade created from **RMIG** ImagePerf brings to life the famous photo of screaming fans at a Beatles concert. Over 1,000 perforated sheets were manufactured and supplied by RMIG for the project. The technology used for RMIG ImagePerf made it possible for this iconic photograph to be reproduced using various hole sizes. The sheets were subsequently powder coated, making them weather resistant and ensuring that this amazing image will be enjoyed for many years to come.

01925 839610 www.city-emotion.com

Flush Tilt and Turn windows solution

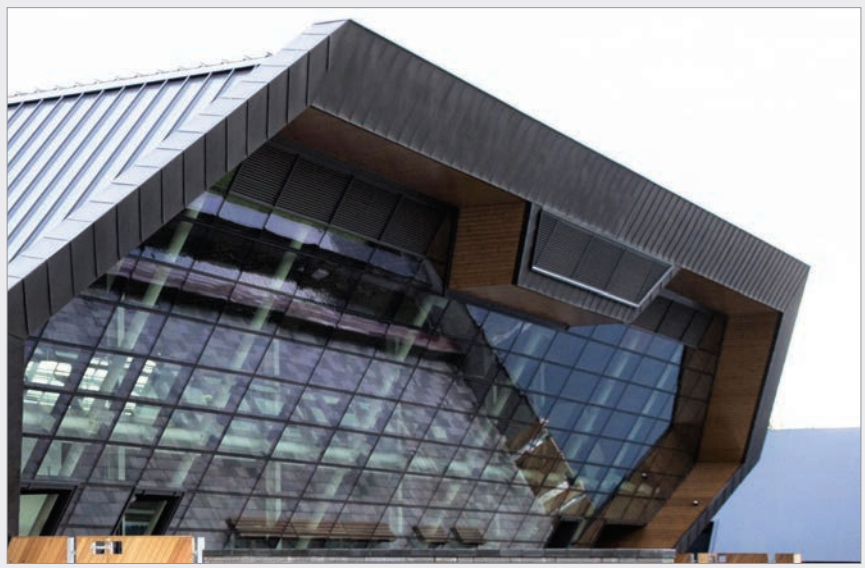
Profile 22 Flush Tilt and Turn windows were chosen for new residential and retail blocks and a community facility hub in Kirkholt, Rochdale. The project's architects had specified the Flush Tilt and Turn Window for the project because of its ability to deliver aluminium aesthetics but with a better price and performance. The Flush Tilt and Turn Window has a sash that is neatly positioned inside the frame of the window to create an elegant and sleek 'flush' appearance. It has a maximum opening size of 1450 x 2300mm and offers exceptional performance because it has an air permeability value of 600Pa, a water tightness value of 600 Pa and a wind resistance value of 2400Pa.

info@profile22.co.uk

Comar 6EFT - Curtain Walling

Due to demand from our Architectural and Fabricator clients, Comar Architectural Aluminium Systems are pleased to launch additional new mullions and transoms for their innovative Comar 6EFT Curtain Wall system, with the highest Ix and Iy values available on the market today. As Comar 6EFT has developed to be the specifier preferred system in the UK, demands for larger transom spans in excess of 3000mm and unsupported multi-storey mullions are a possibility. Where there are different glazed areas in the same envelope we have also extruded high span mullions and transoms in the most popular box sizes, which mean that the same box size can be used throughout the project to ensure that all fixing and plaster lines throughout the facade are continuous.

Today's design complexity, requirements for aesthetics and complex building shapes are key considerations. Aluminium offers the unique advantage of easily being extruded and manufactured into almost any custom shape with ease. With ever increasing focus on energy efficiency, designs must provide exceptional 'thermal' performance so thermal breaks are incorporated. These breaks provide a high level in the thermal insulation of the curtain walling. The science of curtain walls now means that aspects such as thermal expansion and contraction, building movement, water management and thermal efficiency for cost effective heating, cooling and the lighting of a building are in-built to the system and its design.



To provide a flexible approach to aluminium facade engineering Comar's 6EFT Curtain Walling System utilises Europe wide design and extrusion expertise with Comar's market leading supply, support and delivery. With its exceptional design flexibility, Comar 6EFT provides high performance solutions for both new build and refurbishment facades. It is a flexible standardised system that also supports bespoke solutions. Comar's 6EFT delivers capped curtain walling with a 50mm standardised sightline and includes options for:

- 4sided structural glazing which achieves a cutting-edge façade with no visible aluminium sight lines.
- 2sided structural glazing with horizontal or vertical capping, concealed vents where a feature and bespoke finish can be achieved through a variety of cover caps.
- Concealed vents all systems can include side or top hung opening vents
- Facetted glazing options for all systems are available in 7.5 o increments both convex and concave.

The system is pressure equalised and mullion drained ensuring water drains freely to the outside.

Comar 6EFT has undergone rigorous tests for the latest BS and EN standards at Taywood Engineering Ltd, with exceptional results.

Comar Architectural Aluminium Systems is the largest British, privately owned aluminium systems company in Europe. Comar designs, extrudes and distributes over 700 integrated profiles to a Nationwide approved fabricator network for use in aluminium curtain walling, window, door and ground floor treatment applications.

Comar: Designed for Performance, Backed by Delivery.

For further information please contact projects@parksidegroup.co.uk

020 8685 2318 www.comar-alu.co.uk

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