

Glass & translucent materials

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May 2014

Throwing new light on
station design

Riverlight development,
Nine Elms on the South Bank

Scottish Crime Campus

Plus information on fire security,
working with aluminium and
comment from the Glass &
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Cover image: Abstract glass office building @ Jason Cox/Shutterstock.com



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Publisher
Simon Reed

Editor
Sarah Johnson

Assistant Editors
Gabrielle Vinyard
gabrielle@netmagmedia.eu
Rebecca Wicks

**Editorial &
Production Assistants**
Roseanne Field
Mikey Pooley

Contributors
Ray Philpott
Michael Willoughby

Sales Director
Lesley Mayo

Advertisement Manager
Anthony Parker
anthony@netmagmedia.eu

Sales Executives
Sue Benson
Shelley Collyer
Suzanne Easter
Steve Smith

**Circulation/Reader
Enquiry Service**
Jane Spice



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

**Advertising &
Administration**
t 01435 863500
f 01435 863897
info@netmagmedia.eu
www.architectsdatafile.co.uk

Press Releases
editorial@netmagmedia.eu

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Editor's letter

Welcome to this special Glass & Translucent Materials supplement to Architects' Datafile of which I am thrilled to be the editor. It marks a personal step for me from a long-established PR and editorial background in the buildings and construction industry to the 'other side of the fence' in an editor's role.



It is also a pleasure to be joining the netMAGmedia team in the launch of a supplement dedicated to glass, glass composites and translucent materials. Due to advancement in technologies, these materials are increasingly being used in both exterior and interior architecture and internal decoration. As the scope they give architects to create innovative structures that maximise light and thermal performance grows, they are redefining the landscape of our towns and cities in striking ways, while also blending sympathetically with traditional building materials.

I am therefore delighted to bring you this supplement, which sets out to examine many of the new technologies and the key disciplines that architects need to consider when specifying these products for both commercial and residential applications.

We include features from experts in their field, who discuss the latest issues alongside advancements in technology; plus we have added a topical mix of industry news and comment. In particular, I hope you enjoy our exclusively written project features that demonstrate the extent to which glass and translucent materials are successfully being used.

These include an in-depth look at the state-of-the-art, Scottish government-funded, 12,600 sq m new Scottish Crime Campus by Ryder Architecture, whose function defines its spectacular architecture. Plus a report by Michael Willoughby on the challenges faced by Rogers Stirk Harbour + Partners when injecting light into the Riverlight residential development, which forms part of the Nine Elms on the South Bank rejuvenation.

In addition, roving reporter for netMAGmedia, Ray Philpott, speaks to some of the key people involved in the design of contemporary railway architecture in order to determine whether the use of glass and translucent materials is merely a passing phase or an emerging trend that will make our railway journeys a more enjoyable and 'light-filled' experience for decades to come.

Sarah Johnson

COMMENT

CE marking for glass is anything but clear



The Construction Products Directive (CPD) in 1989 was replaced by the Construction Products Regulation (CPR). The CPR was officially published in the Official Journal of the European Union on 4 April 2011 and came into full force on 1 July 2013. This meant that any 'construction product' that was covered by a 'harmonised European Norm (hEN)' was required to be CE marked in accordance with the CPR. How has the change been implemented by the glass and glazing industry? Brian Waldron, glass consultant, GGF Member and chairman of the GGF Standards Committee explains

What does this mean for a manufacturer already CE marking? According to the European Commission this was covered by Article 66 Transitional provisions:

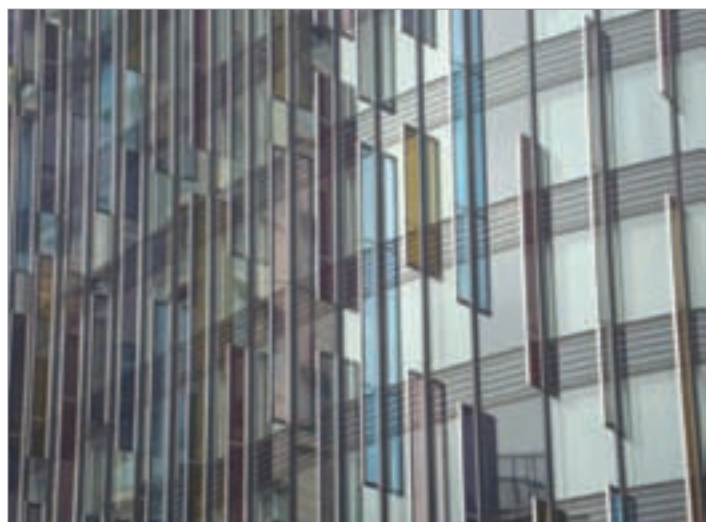
1. Construction products which have been placed on the market in accordance with Directive 89/106/EEC before 1 July 2013 shall be deemed to comply with this Regulation.
2. Manufacturers may draw up a declaration of performance on the basis of a certificate of conformity or a declaration of conformity, which has been issued before 1 July 2013 in accordance with Directive 89/106/EEC.

This appears to be very easy. The Declaration of Performance (DoP) is detailed in Article 6 and Annex III of the CPR. Unlike the Declaration of Conformity (DoC), which was a simple list, the DoP has a strict format that is set down in Annex III. There is also a requirement to detail all of the notified bodies involved irrespective of the system(s) of Assessment and Verification of Constancy of Performance (AVOCP) assigned to the product.

Using the model DoP from Annex III will mean a lot of work for the manufacturer to produce the new DoP based on their existing DoC. Determination of notified bodies for specific essential characteristics could be very complex; in the case of glass and glazing products the following are examples: airborne sound reduction, light transmittance/reflectance, solar energy characteristics etc.

How does the manufacturer disseminate the DoP? Under the CPD, as far as the glass and glazing industry was concerned, there was a widespread use of websites etc. However, the CPR under Article 7 #3 did not allow this. There was a requirement for the conditions to be established by means of a 'delegated act' that was to be prepared by the European Commission, European Parliament and the Member states. This piece of legislation has now been passed.

Outstanding actions? At present the Commission is discussing changes, via Delegated Acts¹, to Annex III and V. These may not be passed until the European parliament is reformed following the European Parliamentary elections this month, i.e. September 2014. These changes may cover how the AVCOP is presented and the presentation of information relating



to notified bodies.

Changes to hENs? The published hENs for the glass and glazing industry were all prepared under the CPD. They will all require to be revised to align up with the CPR. New standards being prepared are being drafted in line with the CPR. The major changes will relate to Annex ZA and the roles of manufacturers and notified bodies.

More information can be obtained from the Glass and Glazing Federation CE Marking microsite:

www.ggf.org.uk/ce-marking

¹ Delegated Act: Commission Delegated Regulation (EU) No 157/2014

Chilean architect Smiljan Radic to design Serpentine Galleries Pavilion 2014

26 June - 19 October 2014, Serpentine Gallery

External indicative CGI of the Serpentine Galleries Pavilion 2014 (top left), Smiljan Radic (top right) and internal indicative CGI (bottom)



© 2014 Smiljan Radic Studio

multi-purpose social space with a café sited inside, the Pavilion will entice visitors to enter and interact with it in different ways throughout its four-month tenure in the park. On selected Friday nights, between July and September, the Pavilion will become the stage for the Serpentine's Park Nights series, sponsored by COS: eight site-specific events bring together art, poetry, music, film, literature and theory and include three new commissions by emerging artists Lina Lapelyte, Hannah Perry and Heather Phillipson. Serpentine Pavilion 2014 launches during the London Festival of Architecture 2014.

Smiljan Radic has completed the majority of his structures in Chile. His commissions range from public buildings, such as the Civic Neighbourhoods, Concepción, Museo Chileno de Arte Precolombino, Santiago, Restaurant Mestizo, Santiago, and the Vik Winery, Millahue, and domestic buildings, such as Copper House 2, Talca, Pite House, Papudo, and the House for the Poem of the Right Angle, Vilches, to small and seemingly fragile buildings, such as the Extension to Charcoal Burner's House, Santa Rosa, The Wardrobe and the Mattress, Tokyo, Japan, and The Bus Stop Commission, Kumbbranch, Austria.

Considerate of social conditions, environments and materials, Smiljan Radic moves freely across boundaries with his work, avoiding any specific categorisation within one field of architecture. This versatility enables him to respond to the demands of each setting, whether spatial constraints of an urban site or extreme challenges presented by a remote rural setting, mountainous terrain or the rocky coastline of his native Chile.

Smiljan Radic, designer of the fourteenth Serpentine Pavilion, said: "The Serpentine 2014 Pavilion is part of the history of small romantic constructions seen in parks or large gardens, the so-called follies, which were hugely



Portrait by Hisao Suzuki

popular from the end of the 16th century to the start of the 19th. Externally, the visitor will see a fragile shell suspended on large quarry stones. This shell – white, translucent and made of fibre-glass – will house an interior organised around an empty patio, from where the natural setting will appear lower, giving the sensation that the entire volume is floating. At night, thanks to the semi-transparency of the shell, the amber tinted light will attract the attention of passers-by, like lamps attracting moths."

Julia Peyton-Jones, director, and Hans Ulrich Obrist, co-director, Serpentine Galleries, said: "We are thrilled that Smiljan Radic has designed the Pavilion this year. We have been intrigued by his work ever since our first encounter with him at the Venice Architecture Biennale 2011. Radic is a key protagonist of an amazing architectural explosion in Chile. While enigmatically archaic, in the tradition of romantic follies, Radic's designs for the Pavilion also look excitingly futuristic, appearing like an alien space pod that has come to rest on a Neolithic site. We cannot wait to see his Pavilion installed on the Serpentine Gallery's lawn this summer."

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Radic is the fourteenth architect to accept the invitation to design a temporary Pavilion outside the entrance to the Serpentine Gallery in Kensington Gardens. The commission is one of the most anticipated events in the cultural calendar, and has become one of London's leading summer attractions since launching in 2000.

Occupying a footprint of 350 sq m on the lawn of the Serpentine Gallery, plans depict a semi-translucent, cylindrical structure, designed to resemble a shell, resting on large quarry stones.

Radic's Pavilion has its roots in his earlier work, particularly The Castle of the Selfish Giant, inspired by the Oscar Wilde story, and the Restaurant Mestizo, part of which is supported by large boulders. Design as a flexible,



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Glass rotunda at Tate Britain

Well designed and expertly installed structural glass within a heritage building can provide some truly beautiful results. Glass will enhance rather than obscure the original architecture of the building, giving a result that is structurally sound and meets all the demands of modern building requirements.

Recently Ion Glass were responsible for the magnificent curved glass balustrade flanking the rotunda staircase at the heart of newly refurbished Tate Britain.

In 2010 the first phase of construction began to transform the oldest part of the building, the entrance, rotunda and galleries in the south east quadrant, to create new spaces for education, displays and social activities. Works included the refurbishment of The Whistler Restaurant, the creation of the Djanogly Café and the transformation of the Members Room. The circular balcony of the rotunda's domed atrium, which had been closed to visitors since the 1920s was part of the £45 million refurbishment, with the

whole redevelopment opened to much acclaim last November.

Ion Glass provided Tate Britain with an intricate curved glass balustrade to the new spiral staircase that forms the centre piece of the development. At the heart of the rotunda, the balustrade features decorative opaque glass infill panels made from laminated back painted glass with a sandblasted effect. The project was especially complex, with an inner and outer skin of decorative opaque glass on either side of the spiral staircase.

Each pair of panels had to fit accurately around the curve of the spiral and also to sit perfectly around each individual step. The glass is suspended between polished stainless steel uprights with a 5mm clearance between the stone-work of the steps and the handrail above.

"The job was definitely a challenge," said Ion Glass MD Peter Hazeldean. "Not only was it exceptionally high profile, but timings were critical with a grand opening on 18 November. The glass is always the last element to be

fitted as the measurements can't be taken until the other building works are complete, giving us a limited time frame to carry out the work.

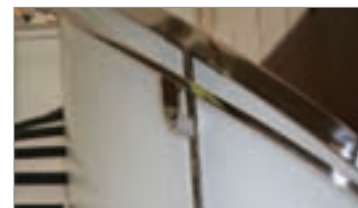
"We carried out detailed laser surveys to provide precise measurements which accounted for nuances in the metalwork as well as the differing radii of the inner and outer panels of each section.

"The whole process was double-checked, taking laser measurements from all angles to ensure the radius of each curved section of glass was accurately recorded and the results transferred direct to the drawings.

"Each infill at the Tate was curved, making traditional MDF templating impossible but this was such a complex installation we created templates in 5mm glass to ensure the accuracy of the final result. Any discrepancies when the glass templates were fitted on site were immediately recorded on the drawings.

"The laser measurement system ensures accurate manufacture of the finished glass product and is also significantly quicker than traditional templating – on a less complex job it would be possible to proceed direct to manufacture, helping to avoid delays to the finished project."

Peter Hazeldean continued: "It was certainly a tense time when the sandblasted panels were delivered on-site, only days before the opening date. Fortunately, every single panel fitted perfectly. We were delighted with the finished result – the staircase is a real testament to the timeless beauty of glass in a national heritage building."



The achievement was described by the architect as 'remarkable' while Penelope Curtis, director of Tate Britain said the renovations "reassert and enhance the original grandeur and logic of the galleries."

Without doubt the rotunda staircase has become in itself a work of art in one of the nation's most renowned art galleries.

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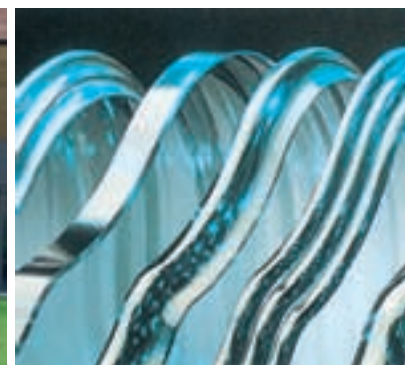
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GLASSTEC 2014, DUSSELDORF, GERMANY

'Glasstec 2014 will feature a range of solutions whereby the glass industry is seeking to master future challenges in this segment'

Lightweight glazing units for architectural purposes

Set against the background of rising requirements on the energy performance of buildings, there is currently an ongoing trend toward thermal triple glazing. Although this technology is highly efficient, the glass industry is now working on lighter alternatives to counteract the heavy weights that are involved

Improving the energy performance of windows and facades continues to be one of the central challenges in modern architecture. As well as optimising frame sections, a major role is played by the efficiency of the thermal glass that is used for this purpose. Thermal double glazing has been proving its worth for several decades now. By applying highly efficient functional coatings and using thermally optimised warm edge spacer systems, the relevant Ug value of a glazing unit – so crucial for thermal insulation performance – has been reduced to 1.0 W/m²K with argon-filled glazing. Moreover, a low-emissivity coat is added on the indoor side of a unit, so that the latest products now have values as low as 0.9 W/m²K.

Thermal triple glazing is now state-of-the-art

Yet thermal double glazing still cannot achieve the same excellent insulating effect as thermal triple glazing, where the relevant values are now as low as 0.5 W/m²K. This type of glass has the best level of performance and is currently state-of-the-art in traditional thermal glass applications. Its excellent insulating effect has led to an increased use of triple glazing in

buildings, as it can best satisfy today's rising requirements on energy performance. Germany, in particular, has seen substantial growth in this segment. Within just four years the market share has increased from about 10 per cent to over 60, and the trend is rising. At the same time there is a tendency towards bigger glazing units.

Heavy-weight glass can cause problems

However, there is a snag in this trend towards large panels and triple glazing. If the glass is too heavy, glaziers can easily come to the limits of their strength. Thermal glass with a triple-glazing structure and the usual thickness of 4mm is about one third heavier than double glazing. As a result, the weight of a glass panel 1m² in size increases from 20 to 30kg, and a panel that weighs several hundred kilograms can often only be installed with the help of technical equipment. This leads to a substantial rise in installation costs. Moreover, heavy glass panels make it necessary to develop new handling solutions for the manufacturing process, while also driving up the cost of transport.

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glasstec 2014 well on track

Exhibitor registration numbers on par with prior year, despite ambivalent economic situation in the sector

Once again glasstec will live up to its role as the leading international trade fair for the glass industry in 2014. The number of exhibitor registrations is on par with those of the previous event in 2012. Last time, 1,175 companies representing glass engineering, glass manufacturing and glass crafts participated, 66 per cent of which came to Düsseldorf from outside Germany.

"We're delighted by the great response to glasstec 2014, especially with the economic situation in the flat-glass sector and partially even in the mechanical-engineering sector being rather tense at the moment. The fact that businesses continue to count on glasstec, particularly in challenging

times, underscores the event's extraordinary significance," said Hans Werner Reinhard, deputy managing director of Messe Düsseldorf.

The future of glass in coming years: glass technology live

In addition to the uniquely varied exhibitor presentations, the special show glass technology live (gtl) helps to bolster glasstec's status of industry trendsetter. Organised by Prof. Stefan Behling and his team at the Institute for Building Construction at the University of Stuttgart, it shows products about to emerge in coming years

– usually including highlights from the various fields of application and always with a focus on architecture. For example, one of the eye-catchers from the 2012 Facade and Construction theme was a window integrated into glazing without any visible framing.

In 2014, the highlighted themes at this special show, which covers about 2,500 sq m, will fall under the rubric Intelligent Glass and include the areas Intelligent Building Envelopes, Façade + Energy (Solar), Innovations in Glass, and Glass Design + Interior.

Consequently, some of the innovative exhibits awaiting visitors will represent segments such as light directing, translucent glazing, composite elements in facades, glass and OLEDs as well as light and thin glass for architecture and displays.

**21 - 24 October 2014
Düsseldorf, Germany**

Weight reduction through thin glass

Thin glass technology is in fact ready for series production now. As regards the relevant values of heat insulation, total energy transmittance and light transmission, thin thermal glass has the same values as conventional triple glazing and even exceeds those values. The Saint-Gobain Isolierglas-Center in Germany, for instance, has produced 3mm triple glazing units for quite a while now – since 2008. The two function glass units made by this company, SGIC Climatop N Light and SGIC Climatop Lux Light, are 25 per cent lighter than standard thermal glass. Thanks to their low emission coatings, they reach Ug values between 0.8 W/m²K and 0.5 W/m²K, depending on the model.

Sensible alternative, but not suitable everywhere

Triple glazing with thin panels is a sensible alternative to conventional structures, but not a pat answer to all weight issues, as it is not suitable for all thermal glass applications. This applies both to ultra-large panels and for applications where the law specifies greater minimal thicknesses, e.g. for fall protection purposes.

Glasstec 2014 will feature a range of solutions whereby the glass industry is seeking to master future challenges in this segment of highly insulating thermal multiple glazing. The leading global trade fair for the glass industry will be held in Düsseldorf from 21 to 24 October. As well as presenting a wide range of constructional glass, the international trade fair will provide a comprehensive overview of the latest production and finishing technologies as well as the entire spectrum of glass applications.

Visit the ADF website www.architectsdatafile.co.uk and enter ref: 55553 for more information.



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COMMENT

Exploiting the capabilities of fire-resistant glass

By Mike Wood, Pilkington UK Ltd

One of the most significant themes in today's building designs is the extensive use of glass, not only by area but also in the range of glass function. The story of architecture is inextricably linked to glass technology from Scheerbart's vision in 1914 of the all-glass building through the flowering of the international school led by van der Rohe to the advances from the 1970s of the high tech style.

Not only has this been a question of larger glass panes with higher quality and lower cost due to the efficient high

output capability of the Pilkington, now global, float process. There have been tremendous developments in coatings, leading to sophisticated light and energy selective coatings which provide the most subtle of tints with high performance solar gain and energy efficiency. Such innovations have allowed the creation of inspirational buildings, making the most of glass adaptability to maximise functionality and natural lighting without losing interior comfort, while exploiting the distinctive eye-catching aesthetics that only the durable crystal qualities of glass provide.

Applications

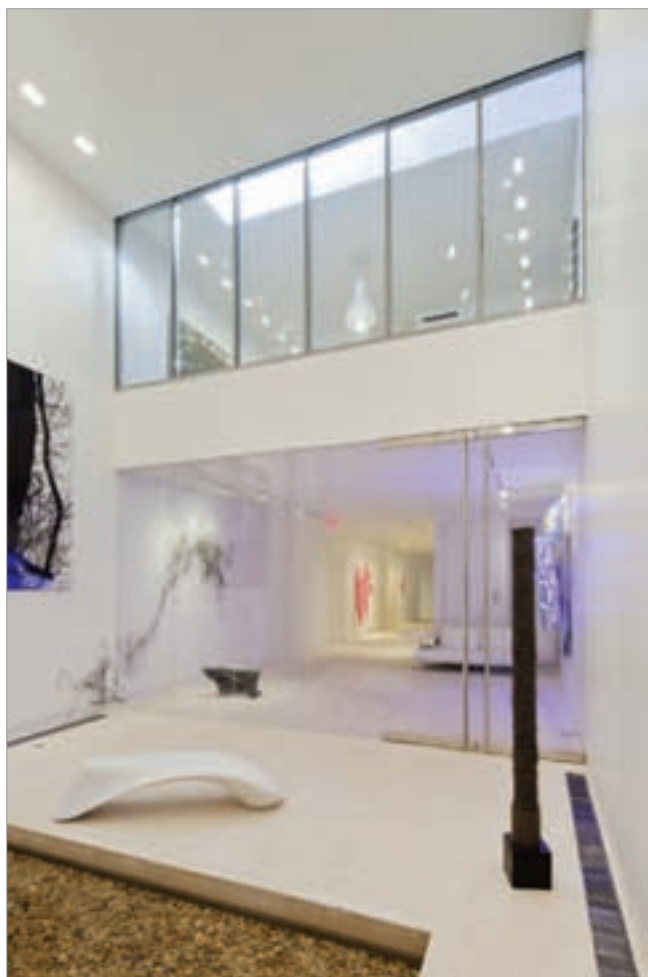
Developments towards the substantially all-glass building would not have been possible without advances in fire-resistant glass. All structures require built-in protection to limit fire movement, prevent collapse and safeguard occupants against the effects of fire. A number of fire-resistant glazing technologies are now available. Products fall into two distinct classes: either integrity (i.e. a physical barrier against fire and flames) or insulation (i.e. providing a physical and heat barrier against fire, determined in standard tests by measurements of surface temperatures on the non-fire side, which must be less than a rise of 140°C over a standard test period, e.g. 30, 60, 90 or 120 minutes). Designers should not limit their aspirations for fear of being unable to provide effective transparent barriers against fire.

Common applications of fire-resistant glass include vision panels in fire doors as well as full-size glass doors (even including sliding door elements), transparent floor-to-ceiling walls, ceiling, floor and roof constructions, corridor partitions and atria glazing. Fire-resistant glass facades can also be used to protect against fire movement by break-out through glazed panels. Latest developments even include tremendously resilient blast-resistant constructions combined with fire-resistance.

The intumescent interlayer insulation with integrity glass types (e.g. Pilkington Pyrostop) also provide inherently good sound damping, which can be further increased with special acoustic formulations. That, in combination with extraordinarily good insulation against the heat of a fire, has allowed the development of integrally loaded fire-resistant glass floors, now well established and tested for use as whole areas or as inserted floor panels.

Reducing risk

Developments in fire-resistant glass have not only included special technologies and continual refinements to expand scope of application. Standard glass is a material that is inherently weak



in fire and prone to early failure and so special steps have to be taken to make glass sufficiently resistant against fire. The reliability and dependability of the fire-resistant glass technology must be robust: whenever a product is tested a successful result should be expected with a high degree of confidence every time. Consistent, reliable performance is essential in case of fire.

But that is not so with some types of fire-resistant glass. Modified toughened glass types in particular have fallen under a shadow because they can be sensitive to uneven thermal stress. They can fail, unpredictably, well before the allotted end of standard tests, with complete collapse of the glass panes. That weakness is well known in specialist glass and testing circles.

A new toughened glass

The weakness of modified toughened glass in fire has been recognised, at the same time registering the expressed need of designers and engineers for a functional basic integrity glass for the early stages of fire. Several R&D years have been spent in perfecting new types of modified toughened fire-resistant glass, which effectively sets a new performance benchmark for this type.

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The new Crossrail station being built at Canary Wharf is bathed in light, thanks to its ETFE-clad roof

‘Do light-embracing materials influence architectural style, or does design dictate the use of the materials?’



Throwing new light on station design

Intelligent use of glass and translucent products is helping to shape contemporary railway architecture, writes Ray Philpott

The reborn, luminous masterpieces of St Pancras International and London King's Cross stations are high-profile symbols of the railway renaissance that's gripping Britain.

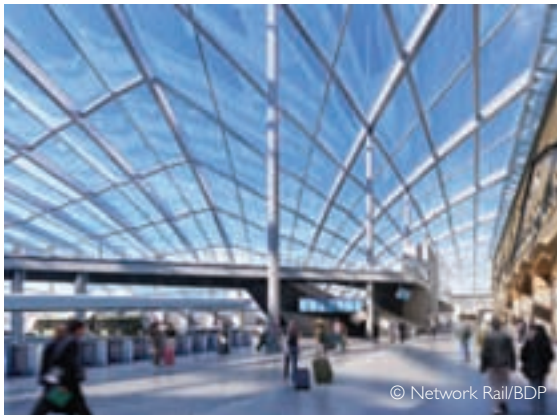
More of us are travelling by train than at any time since the 1920s and the renewed interest in this once neglected transport mode is reflected in its increasingly reinvigorated architecture.

As the shop windows of the rail network, many stations are being built, rebuilt and modernised but with aesthetics in mind, not just practicalities.

Whether highly styled or simple in scope, many new and revitalised stations have been designed to maximise light. That's thanks to the use of translucent and transparent materials – primarily glass, ETFE and polycarbonate – ensuring today's railway buildings are bright and user-friendly.

Arguably, these materials strongly influence modern railway architecture, driving distinct 'approaches' to station design. From heroic, big-city spaces to medium-sized marvels; from small, iconic gems to simple but pleasant travel portals.

But do light-embracing materials influence architectural style, or does design dictate the use of the materials?



© Network Rail/BDP

Clearly an epic

Manchester Victoria station is being transformed into a fine example of the heroic station. Architects at BDP are transforming the leaky, unloved, shabby looking 19th century ‘Cinderella’ station – once voted the ‘worst in Britain’ – into a fitting gateway for the city.

Built in 1844, its grade II listed Victorian buildings are being sympathetically restored and the whole station will be bathed in light thanks to BDP’s vast, all-encompassing, gracefully flowing steel and ETFE roof. Covering some 10,000 sq m, it’s one of the biggest in the country.

The practice’s stunning, award-winning design brings this key interchange into the 21st century, just as it breathed new life into Manchester Piccadilly, the city’s other great station, in 2002.

BDP Director Peter Jenkins attributes the undoubted impact of the new-look Victoria to using ETFE. “Creating a large, transparent roof was great for passengers but a huge challenge,” he says.

“The shape of the roof responds to the geometries of the building. You get these amazing twists in shape because it flows from about 5m high above the rail lines on one side and flows



© BDP/David Barbour



© Network Rail/BDP

up to a height of 18m and merges into historic buildings. There’s no doubt the lines and curves really add drama.”

BDP gained experience with ETFE at Piccadilly and it was the material of choice for Victoria. Jenkins says: “The flexibility of ETFE is a huge part of making the roof work. Each of the 400 panels are uniquely shaped, and this could only be achieved through 3D modelling software and Building Information Modelling (BIM) techniques. It liberates the architectural thought process. I’d say it would be extremely challenging – if not impossible – to achieve this in glass.”

ETFE brings other massive advantages. It is self-cleaning, it won’t shatter if there’s an explosion and doesn’t combust or drip if there’s a fire. Being inert, it doesn’t degrade or discolour and its lightness means less steel is needed for support.

Jenkins adds: “In other parts of the station we used clear polycarbonate panels, for smaller platform canopies outside the roof for example. Modern polycarbonate looks like glass, doesn’t discolour and is used a lot in refurbished heritage roofs.”

Commenting on modern station design, he says: “For me the creation of Grimshaw’s Waterloo International station in the early 90s really marked a return to grand design in this sector. Now I see two styles emerging. One with more angular planes forming smaller stations and then the grand, heroic structures of larger buildings. There was always a difference in style between the two scales and that’s still true today.”

Continued overleaf...

The new roof of Manchester Victoria Station (above left and right) has benefitted from BDP’s earlier experience with Manchester Piccadilly Station (below)

‘I’d say it would be extremely challenging – if not impossible – to achieve this in glass’

Peter Jenkins, director, BDP

'A sweeping, concave all-glass frontage that greets and envelops travellers'



Merseyside marvels

Although working on a slightly smaller scale, architects at Jefferson Sheard thought big for the striking bus-rail interchange at Liverpool South Parkway in Garston. A sweeping, concave, all-glass frontage that greets and envelops travellers is constructed from a frameless, bolt-fixed, glass system on steel supports.

Managing Director Tom Rhys Jones, says: "We're proud of our award-winning design and its great looks, but it's ultimately practical. Liverpool South Parkway comprises two railway stations – one for Merseyrail's metro and the other on the mainline to London – joined together with a bus station at the front."

The shape of the building, completed in 2011, is designed to encompass various uses at various levels under one roof.

Rhys Jones adds: "The roof's curvilinear form reduces the impact of the changes in level, creating the feeling of one continuous building, enhanced through the use of full-height, transparent glazing systems and semi-opaque glass panels that

shape and define the concourse and circulation areas."

Railway stations really benefit from the use of clear and translucent materials, he says. "Increased natural light provides improved perception of safety while better visibility between spaces assists orientation and deters crime. It also reduces the carbon footprint. As the majority of railway concourse and platform areas are unheated, a reduced need for artificial lighting offers great energy savings. Glass and ETFE lend themselves to this and I see continued use of these materials. ETFE will gain in popularity because it is cost-effective and lightweight, which brings structural savings."

On some platforms and the footbridge the architects also used Kalwal, a translucent composite material that allows light to reach the passengers while blocking out views of surrounding industrial buildings.

Stations don't have to be huge to achieve impact, Rhys Jones argues. "The very attractive-looking St Helen's Central station in Merseyside is a very ambitious use of glass in a small space."

Continued on page 18...



Top glass designs: the mighty sweep of Liverpool South Parkway (above left and top right) is impressive. St Helen's Station (right and far right) is compact, but iconic

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© Pilkington United Kingdom Ltd

‘ETFE will gain in popularity because it is cost-effective and lightweight, which brings structural savings’

Tom Rhys Jones, managing director, Jefferson Sheard



Small, but perfectly formed

In Chelsea, architect Nigel Horrell of Dawson Horrell Architects also believes small can be beautiful. As assistant project architect on the Jubilee Line Extension in the 1990s, he worked with the late, great Roland Paoletti, the driving force behind 11 dramatic, award-winning stations, each designed by a separate architect and cleverly utilising glass.

His Jubilee Line highlights are Canada Water – a relatively small circular building inspired by classic 1920s underground stations – and the impressive elliptical glass entrance to Canary Wharf tube station.

Horrell has also designed his own compact classics. Imperial Wharf is a smart-looking station built in 2009 for the London Overground network in South West London and features a distinctive green-hued, low-E glass lift tower. “The original idea of using the low-E glass was to keep the lift shaft cool, but then we decided to turn its natural greenish colour into a design feature,” he explains.

At South East London’s Deptford station, a jumble of unloved, dark old buildings was replaced with his attractive, bright, modern design in 2012. It cleverly exploits a glass and steel structure enabling people to ‘see through’ the station to marvel at the historic 1836 brick viaduct and unique carriage ramp behind it, part of London’s oldest railway architecture.

Deptford uses inch-thick glass in pretty much the largest sized plates you can get and features six large ETFE spans in the roof enabling a lighter steel framework to be used.

Horrell says: “Glass is great for urban stations. The transparency creates a sense of security – there are no dark corners for people to hide behind. The glass you can use is dependent on the design, strength and quality of the steel. Huge advances in computer design have redefined architecture by enabling us to create smarter steelwork and more flexible and sophisticated



Imperial Wharf Station (top), ETFE roof at Deptford Station (above) and (right) a frontal view of the building

© Fereday Pollard

'We've entered a new golden age of railway design... to my mind, each station is unique and has to be designed that way'

Nigel Horrell, director,
Dawson Horell Architects



use of glass. It's opened up exciting architectural possibilities for railway buildings, even smaller ones.

"Railway stations are big spaces and they need light. In this respect ETFE is useful because it can cover much greater spans than glass."

He adds: "We've entered a new golden age of railway design, with architects involved more and given some design freedom by competing railway companies. To my mind, each station is unique and has to be designed that way."

Julian Ross, author of the book *Railway Stations: Planning, Design, and Management*, has a different view: "In today's railway, stations increasingly play a major role. Big, high-profile stations like King's Cross have become splendid commercial emporia because people are willing to pay for them. There's also room for bespoke architecture in some middle-sized stations linked to commercial development or regeneration.

"However, most stations have to be practical and offer value for money. Glass and translucent materials are ideal for them because they're cost-effective and help deliver important practical criteria – great visibility, security and a bright and welcoming ambience.

Ross adds: "Such buildings will necessarily adopt simpler,

more modular forms but this does not exclude good design – all of Network Rail's stations have architectural input, and aren't just put together by an engineer."

As examples, he cites the new station designs destined for the outer ends of Crossrail, which are due to be up and running in 2018. "At the eastern end, Abbey Wood station will boast a long, glazed frontage, while west of London, initial proposals for Hayes & Harlington station show a modular building that has glazed sites providing superb visibility."

Continued overleaf...

© Bennetts Associates



Crossrail's Abbey Wood Station in South East London (top) and how the line's Hayes & Harlington Station might look on the western section



© Hufton + Crow

Grand design: the luminescent western extension of King's Cross Station symbolises a new confidence in the railway



© Sally Ann Norman

Light as art

At the other extreme, however, glass and translucent materials are taking the passenger experience to an altogether higher level – as larger-than-life artworks.

As part of a £7 million makeover, concrete-roofed Sunderland station now has a 140m long 'light wall' running along the length of a long-disused platform. Composed of hundreds of individually lit glass bricks, it's effectively a giant

video screen featuring silhouetted 'passengers' moving along it. When a train pulls in and leaves, the figures disappear.

At Crossrail's planned Paddington station concourse, passengers gazing upwards will see clouds dreamily drift across its glass roof, their type and mood changing with the conditions outside – a 120m-long piece of art!

Who says the romance of rail is dead?

'Glass and translucent materials are taking the passenger experience to an altogether higher level...'



© Crossrail Ltd



© Crossrail Ltd

Wow factor: Sunderland Station's light wall (above). Crossrail's Canary Wharf Station (far left) and an impression of the glass canopy artwork for Paddington Crossrail

Redefining the riverside

Nine Elms on the South Bank's transformation of up to 3km of the Thames riverside with striking, modern architecture showcases glass. Michael Willoughby reports on the Riverside development

'The modelling of the facade creates an interplay of light and shade, yet the solid and recessed, clear glazing panels are constructed from standard components'

Gianmaria Givanni,
project architect for Rogers
Stirk Harbour (RSHP)

London is a city of huge inequality, with vast income differences between north and south, east and west and, even, sometimes between postcodes. Take, for instance, Canary Wharf in Tower Hamlets, or World's End at the 'bottom' of the King's Road.

But the River Thames provides another linear channel of wealth. And during the 80s and 90s, on the site of former docks and wharves, the 'yuppie flats' sprung up, obstinately gazing out to the river and blocking its view. Much of the water is bordered by the Thames River Path (owned by the National Trust). But those taking the nearest parallel road often don't realise the river flows so near.

So when the project team led by Graham Stirk with Gianmaria Givanni as project architect, came to designing a riverfront scheme for the grand new quarter known as Nine Elms, surrounding the deco hulk of Battersea Power Station, he was determined to make sure that these mistakes weren't repeated.

"We wanted to create maximum permeability through the

site," says the Rogers Stirk Harbour (RSHP) expert. "This was triangular and almost 190m deep, so we looked carefully at massing options.

"If we had developed it with the typical approach to the riverside, that would have thrown the river walk into shadow and there would have been no view of the water from the wider Nine Elm site."

Instead, RSHP created a series of perpendicular blocks allowing everyone to get a view of the Thames, residents and public alike. These 'step down' from the eastern boundary of the site, from 20 storeys to 12, with the lower blocks being longer and the taller being shorter. The blocks have tapered ends, being almost prowed, like the ships on the river, so as to maximise exposure to sunlight and views up and down.

"The ends of the buildings create a serrated and perforated edge to Nine Elms," says Givanni, "and are arranged in north-south orientation. This allows direct sunlight to the river walk as well as the public and communal spaces in between the buildings."

Place: London, UK
Date: 2009 - summer 2016
Client: St James' Group
Cost: £200 million
Gross Internal Area: 2 hectares
Architect: Rogers Stirk Harbour + Partners
Executive Architect: EPR
Structural Engineer: Ramboll
Services Engineer: Hoare Lea
Planning Consultants and Environmental Service Co-ordination: TP Bennett
Landscape Architect: Gillespies LLP
Townscape Consultant: Montagu Evans



© 2014 Rogers Stirk
Harbour + Partners LLP

The structure itself is formed of a concrete and steel frame. This Schueco system provided the designers with plenty of flexibility to accommodate a wide range of apartment types required by the developer.

“The 6.4m gridded frame gave us a flexible language with the ability to create a uniform and systematic facade,” says the architect.

Riverlight is layered in three bands: the lowest level accommodates the non residential uses such as a gym and an art gallery, cafe and restaurants. The second band is given over to a variety of apartment types which vary from studios to three-bedroom apartments. And the top is made up of penthouses which have larger floor-to-ceiling heights.

Glass has a major part to play in the story, with the facade system being fitted with glazed, sliding doors and solid panels fixed floor-to-floor between concrete slabs. The upper penthouse level has more clear glazing due to the angle of the roof and the 4.5m floor-to-floor height – versus 3m in the other flats.

Meanwhile, Riverlight’s lift cores are housed in clear glass towers so as to provide an amazing view of the river while passengers await the lift. Once inside the partially-glazed cars, they are treated to a panoramic view over London.

“We think everyone is entitled to this,” says Givanni, “The lifts allow everyone to experience the best views from the site.”

Perhaps most interesting are the simple glass balconies which, like expensive spectacles, have metal fixtures minimised.

With all the glass, it was important to introduce opaque panels in order to achieve the thermal performance of the building. Some are therefore black back painted with an insulated layer behind. Meanwhile, the solid areas are high-pressure compact laminate panels arranged as slats – drawing upon inspiration from the net drying houses in Hastings, says the architect, as an attempt to connect to the industrial past of the area, with its warehouses and wharves.

All in all, says Givanni, the glazed cladding was key – being simple and standardised, helping developer, St. James, meet its budgets, yet remaining varied and interesting.

“The components are simply fitted together, but with great articulation – the modelling of the facade creates an interplay of light and shade, yet the solid and recessed, clear glazing panels are constructed from standard components.”

And while the development is one of RSHP’s newest projects, the exposed exoskeleton draws upon the ‘The celebration of construction,’ the practice pioneered back in the 1970s.

“The project is going back to first principles, the salient elements of the buildings’ structure are expressed and inform the articulation of the building,” says Givanni.

The first phase of the project will be inhabited by the summer after two and a half years’ development.



*'The new building
had to create an
environment that
facilitated and
encouraged
communication
and more
collaborative
working'*

The light filled atrium of the
new Scottish Crime Campus
near Glasgow

Photography Keith Hunter. Copyright of the Scottish Government





Making connections

A light-filled atrium designed by Ryder Architecture is central to the Scottish Crime Campus' bespoke facility

When the Scottish government commissioned the Scottish Crime Campus, the driving purpose was to create a secure campus, which would enable closer and more joined up working between the Specialist Crime Division of Police Scotland and its partner agencies. The new building had to create an environment that facilitated and encouraged communication and more collaborative working. To help achieve this, Ryder Architecture's design placed an atrium at the centre of the 12,600 sq m building. This light filled heart of the campus gives stunning views across the Campsie Hills, as well as being infused with the daylight streaming down through the translucent patterned ETFE roof.

Continued overleaf...



'The design of the building references genetic structures and imagery associated with identity'



Photography Keith Hunter. Copyright of the Scottish Government



Photography Keith Hunter. Copyright of the Scottish Government

The Scottish Crime Campus at Gartcosh, near Glasgow, is a unique £75 million Scottish government-funded, state-of-the-art facility, providing high quality office accommodation, forensic laboratories and support facilities for over 1,100 staff. Delivered on time and on budget, the campus is a bespoke building that allows, for the first time, law enforcement agencies working to both devolved and UK legislation to operate under the same roof in a purpose-built facility.

The function of the building defines its architecture; the design creates a practical yet distinguished building that will encourage partners to work together collaboratively and creatively. A strong design ethos was established based on technologies used in crime detection, with DNA and chromosome biology being selected as main themes. Adopting a geometry informed by the immediate context, programme and chromosome form, the design of the building references genetic structures and imagery associated with identity; it emphasises uniqueness and, at the same time, common bonds.

The campus comprises four connected elements which form a U-shape around a central atrium space running on a north-south axis. The idea was developed for a series of buildings, whose ground plan was based on the legs of a chromosome, arranged around a common space sitting above the exposed geology of the site, which formed a base, internally embodying and enclosing secure spaces.

Continued overleaf...



Photography Keith Hunter. Copyright of the Scottish Government

The ground plan is based on the legs of a chromosome with the four connected elements centring around the atrium; inset images

Smaller images show areas of the interior

‘Vertical orientation of the façade breaks up the horizontal massing, providing rhythm and variety’

The pattern on the facade and vertical orientation inspired by DNA sequence art and other identification methods

Opposite: Bridges were inspired by DNA chain connections



Photography Keith Hunter. Copyright of the Scottish Government



Photography Keith Hunter. Copyright of the Scottish Government

The primary circulation is at the centre of the building, the atrium, at the point where the two chromatid shapes would touch. Connecting bridge elements through the atrium were also initially inspired by DNA chain connections. These concepts were the starting point for iterative processes whereby design options were tested in terms of accessibility, legibility, internal ambiance, environmental performance and structural expression, which ultimately permitted a solution with some depth and purpose.

Many of the functions carried out within the building are concerned with identity and identification. The façade and building concept take some of the visual references associated with the process of identification and abstracts them to give the building itself, as well as the working environment, a clearly recognisable identity. Vertical orientation of the façade breaks up the horizontal massing, providing rhythm and variety, and was inspired by various visual references, including DNA sequence art, barcode band artworks and fingerprint dermal ridges. These visual references generated a theme which was repeated through the landscape design, façades and finishes within the atrium and throughout the building.

A limited number of standardised bands of solid masonry are repeated in sequences around the façade in arrangements which reference the male and female chromosome sequences. These waves are more dense at closed elements of the façade (stair cores, private areas) and provide contrast at large glazing areas. These further contribute to the dynamic, flowing appearance of the building.

Overall the walls of the building have relatively low percentage glazing to solid elements. Solid elements are higher to maximise the insulation potential of the building. Conversely, all internal areas have a high percentage window to the external wall when viewed from the inside. This is to maximise the available views out and daylighting potential.

The distinct role of each wing is in contrast to the collective space of the atrium which it embraces as the agora or meeting

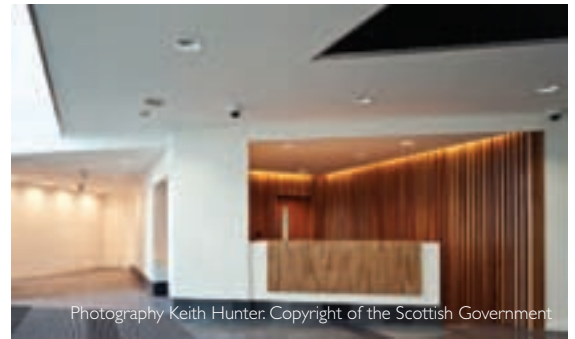
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place – where ideas are shared. All agencies use the atrium space, making it the social core of the building, the place where employees meet, interact and circulate. This interaction encourages the dissemination of ideas and helps create a sense of community.

The atrium is aligned to offer the best open views of the Campsie Hills to the North, with the western wing being redirected to create an open appearance, capturing north light. Its design fosters a clear inside outside connection, with glazing taken down to the lower floor of the space, opening up the view, and helping to prevent the building from feeling too insular. This is further enhanced by the use of similar materials either side of the atrium glazing. Compact floor plans minimise external wall area to reduce heat loss through the façade and high floor to ceiling height encourages natural daylight penetration from the outside and atrium.

Research into potential roofing materials resulted in the selection of ethylene tetra fluoroethylene (ETFE) as an alternative to glass in the atrium roof. ETFE is a transparent, durable material unaffected by atmospheric pollution and UV light. The material does not harden, yellow, or deteriorate over time. The supplier chosen was Vector-Foiltec, a specialist in the material whose projects include the Eden Project and Heathrow Terminal 5. The ETFE was formed into 3-layered, inflated cushions providing 29 roof panels, totalling 1,196 sq m. The membrane and its supporting structure were aligned to enhance the dynamic geometry of the building and atrium. Moreover, the lightness of the cushions enabled the creation of a roof that combined an inspirational, soaring elegance with practical characteristics such as the ability to dissipate loads, absorb stresses and accommodate building movement.

The pillows also had the advantage of being acoustically transparent and as a consequence do not reflect internally generated noise back to the occupants. The atrium's internal environment is therefore considerably more comfortable than if an acoustically reflective material had been used, a key advantage for an area focussed on encouraging conversation and communication.

The DNA and chromosome patterning that was the recurring theme in the design of the façade and building concept



Photography Keith Hunter. Copyright of the Scottish Government

was carried across to the atrium roofing. In a project top secret at the time, the cushions were to be printed with a bespoke pattern, created between the design team and the manufacturer, but at first there were problems. Initial runs of the model made the ETFE roof entirely opaque, so it was necessary to take into account the densities of the translucent and clear materials on the barcode.

Vector-Foiltech verified that the shading coefficient was actually achievable with the ink densities needed for the coatings and were able to reproduce different optical densities and patterns on the same roll, rather than using a variety of different patterns to meet the requirements. This required close collaboration with Vector-Foiltech's factory in Bremen and the printer and the architects from Ryder, to ensure that the balance was perfect.

The print pattern not only had to meet the design's aesthetic requirements, it also had to meet tough solar gain and thermal requirements, 0,400 G-value and 1,96 U-value, respectively.

The Scottish Crime Campus is a unique project in Scotland. Not only is it the Scottish government's largest single investment in as-built support facilities, but it is also an exemplar of design led programmes as embedded in the National Architectural Policy – creating places, first life, then spaces, then buildings.

The printed ETFE atrium roof with design based on DNA patterning

Opposite: View towards the Campsie Hills through large expanse of glazing in the atrium

Client: Scottish government
Client advisor: Jeremy Smart Associates
Lead consultant and fit-out architect: BMJ Architects
Design champion and shell and core architect: Ryder Architecture
Project manager: Sweett Group
Cost consultants: Thomas & Adamson
Services engineer: Wallace Whittle: TUV
Structural engineers: Arup
Landscape architects: Ian White Associates
ETFE cushions: Vector-Foiltec
Principal contractors: C1 - Sir Robert McAlpine, C2 - Graham Construction, C3 - Balfour Beatty

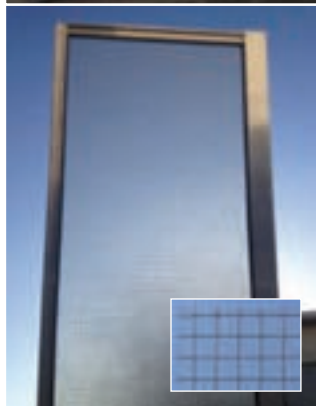
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about translucency

Paul Jackson, technical director at Rodeca, explains how translucent polycarbonate panels have evolved to be a viable alternative to glass

Recent advanced testing and developments in thermoplastic engineering are now positioning translucent polycarbonate panels as a serious, if previously overlooked, competitor to glass, more than 40 years after they were pioneered.

The young upstarts give glass and GRP an Olympic run for their money in terms of aesthetics, multiple performance levels, speed of installation, and not least cost, for new build and refurbishment projects in the industrial, commercial, retail, education, healthcare, and sports and leisure sectors.

Most recently, they have achieved Class B in non-fragility tests conducted by the BRE. But interestingly, these tests were carried out to ACR (M) 001:2011(1) for assessing the non-fragility of profiled panelled and large-element roofing assemblies.

This emphasis on roofing reflects a trend in mainland Europe to use translucent polycarbonate panels for roofing applications,

including domestic projects, for pitches and radiuses as low as 5° and 3m respectively, in addition to the façade treatments (rainscreens and curtain walling) they are better known for.

Roofing applications range from curved and flat roof lights and canopies, through northern lights and gable roofs, to roof lights for corrugated sheet applications – all elements that introduce natural daylight, and the energy savings associated with that, into large or small interiors or exterior covered spaces.

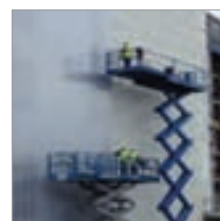
Although the test was specific for roofing applications it could also be used as reassurance on projects where as a façade, roof access is possible to the face of the panels, such as northern lights or any high-level access areas.

Polycarbonate is now considered a roofing material due to the improved thermal performance of the panels, which can be manufactured with U-values as low as 0.85 W/m²K.

As such, they can allow natural daylight into a building

Continued overleaf..

'The young upstarts give glass and GRP an Olympic run for their money in terms of aesthetics, multiple performance levels, speed of installation, and not least cost'



The tongue and groove coupling of a polycarbonate panel proves an exemplar of modern and lean construction methods



'The benefits of natural daylight on the human condition are well documented in terms of well-being, improved performance and reduced absenteeism in schools, offices and factories'

without compromising its thermal integrity. Panels with U-values as low as $0.36 \text{ W/m}^2\text{K}$, compared to double glazing at $2.8 \text{ W/m}^2\text{K}$ and single glazing at $5.8 \text{ W/m}^2\text{K}$, are capable of reducing energy losses by up to 80 per cent.

The benefits of natural daylight on the human condition are well documented in terms of wellbeing, improved performance and reduced absenteeism in schools, offices and factories, but this has often been at the risk of solar gain.

Polycarbonate panels are extruded with UV protection, providing warranties up to 20 years, on both the external and internal face for double-sided walls or open screens. Pigmentation can also be added to reduce solar gain without blocking natural daylight and negate the need for a separate film over the panel.

As well as being 200 times tougher than glass, polycarbonate panels can be over half as light (m^2 of double-glazed 4mm glass + spacer bar + sealant at a total 22kg V a 60mm polycarbonate panel system of 8kg/m^2), reducing the requirement and associated costs for large sections of additional steel to enable the building to bear the weight. This light weight also helps transportation.

Other developments in translucent polycarbonate panels are increased spanning capabilities.

The tongue and groove coupling of a polycarbonate panel proves an exemplar of modern and lean construction methods, with large-scale building widths of up to 500mm enabling facades of more than 200m long to be erected and panel heights of up to 25m to be mounted in one piece.

Experience has shown that this method reduces installation time and also contractors' dependence on scaffolding, with

many projects using only MEWPs, again reducing overall construction programmes. This speed of installation has recently been furthered by the introduction of pre-mitred corner units.

Another key aspect of the tongue and groove method is that the panels are retained rather than fixed, allowing efficient thermal expansion and contraction. The expansion coefficient for polycarbonate is $0.065\text{mm}/^\circ\text{C}$ per metre (generally, 3mm per metre per 50°C difference in temperature) — three times as high as the expansion coefficient of aluminium.

The now almost unlimited choice of RAL colours, and development of finishes and translucency levels, also means that polycarbonate panels are working their way out of the shadow of glass as a decorative material rather than just as a translucent wall.

Aesthetic options include colouring interior panels differently to exterior ones to give a 3D effect, colouring an individual panel differently through its own thickness, metallic-look pigmentations and fluorescent surfaces that glow at night, all of which can be backlit with LED or ambient lighting for additional effect.

All of these performance and aesthetic benefits can be achieved at around half the cost of similar façade treatments, with a typical curtain wall system costing around £350-£400/sq m compared to a single skin of 60mm polycarbonate panels achieving a higher thermal performance and costing around £150-£200.

It is transparent that the future looks bright for translucent polycarbonate panels.

AWARD

'Visionary concept' for sustainable science museum receives international recognition



A blueprint for a new Natural Science Museum in Berlin, created by a dynamic team of architectural designers from Lincoln, has been commended by a panel of international experts.

The ecological design produced by a staff and student team from the School of Architecture at the University of Lincoln, UK, put forward the case for a sustainable Natural Science Museum in the heart of Germany's capital, Berlin. Entitled Bio Mutation, and submitted as part of the Architecture Workshop in Rome (AWR) Awards, the proposal received an Honourable Mention and was named as the winner in the Visionary Concept category.

The team, which was led by Senior Lecturer Dr Francesco Proto and included four fifth-year architecture students, responded to the AWR's Berlin Competition: Natural City brief. Together they developed a design for a museum which would underpin principles of sustainability, engage with new technology, provide a thriving habitat for nature and engage visitors in an interactive learning experience.

The AWR organisation is the host of a number of international competitions in architecture, interior design, industrial design and urban planning, which challenge practising professionals and students alike to develop

forward-thinking portfolios.

Dr Francesco Proto said: "Berlin is a city with an extensive and eventful history, and is recognised as a vibrant metropolis in the heart of Europe, so it was very important for us to produce a proposal that respects and integrates with its immense culture.

"We therefore developed a blueprint for an iconic structure, which would create a powerful identity for both the Natural Science Museum and Berlin as a natural city. We designed a living eco-museum in a greenhouse habitat, with its shape and aesthetics inspired by the deconstruction of a butterfly cocoon as it adapts to an ever-changing environment. As such, the project addresses two main aims: to restore, protect and enhance a natural ecological public space, and to dramatically redesign the museum visitors' experience."

The team's proposal explores the changing relationship between culture and the natural environment, and traces the historical influence of nature over German civilisation.

Its design incorporates solar panels, lenticular structures that diffuse lighting and control temperature within an intelligent cocoon-like shell, and a rainwater collection system to water a vast array of flora and fauna inside the museum. The Bio-Mutation Science Museum would serve as an accessible public space and 'ecological corridor', enabling visitors to engage with nature while also providing museum facilities for research and exhibitions.

news bytes

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How frameless glass can give a new look to passive fire protection

Ian Cowley of Promat Securiglass examines how choosing the correct supplier can help you achieve the sort of fire-resistant frameless glazing solutions which characterise today's modern building designs

The harsh reality of today's construction world is that no one involved in specifying fire-resistant protection for buildings can afford to get it wrong. The consequences which can result from a defective or even inefficient fire-protection system do not bear thinking about, and this exerts an extra pressure on modern building specifiers as they work to turn today's evermore adventurous building designs into reality.

This pressure also comes to bear on the passive fire protection systems that are used on modern buildings, where every component – whether it is penetration sealant or fire protection board – must perform reliably and effectively. However, one such component – fire rated glazing – has recently undergone interesting developments which are now helping bring some very adventurous building designs to life.

What is fire-rated glazing?

People generally use the phrase 'fire-resistant glazing' to mean a glass that can survive standard fire tests, and so be used to stop flames and smoke progressing through a building. Although standard float glass has some ability in this area, proper fire-resistant glass normally has a wired, tempered or laminated construction and is able to withstand temperatures over 850°C. This normally earns the glass a fire rating of 60 minutes, 120 minutes etc, which indicates how long it is expected to withstand the effects of a fire.

For many years, fire-rated glazing has typically been used to create internal fire protection partitions. These often featured prominent timber or metal framing systems, which combine with the fire glass to create an overall glazing system. However, recent developments in fire glazing mean that butt-jointed fire glazing systems are now a proven and reliable option. They have become increasingly popular for the design possibilities they offer, and especially for their ability to allow huge amounts of light and air to enter today's modern building designs. A butt-jointed system which uses glass to create fire-rated walls can be extremely effective, provided that the system is properly specified and installed.

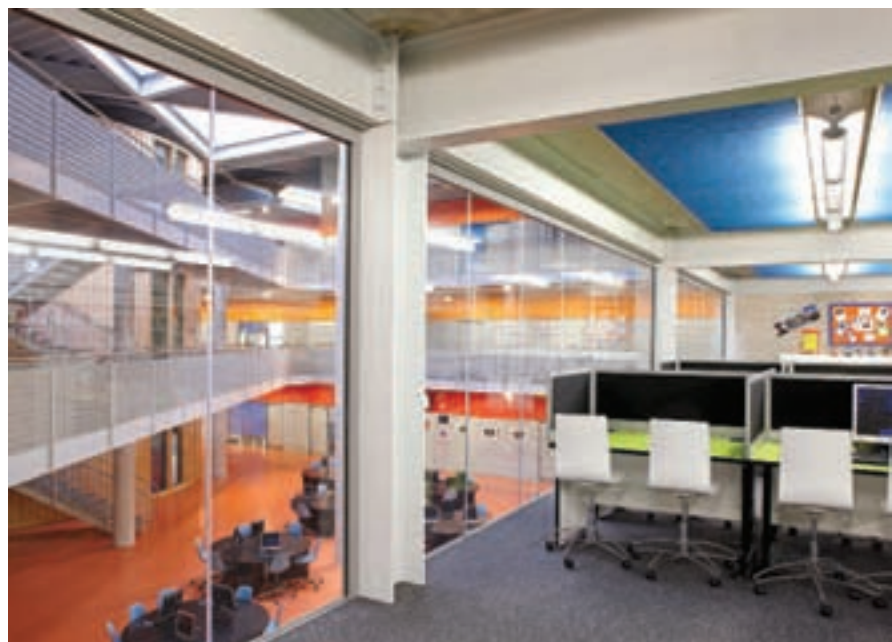
Where to start

Specifying and installing a system properly is not a simple task, so where do you start the process? The most important step is to work with an experienced fire glazing supplier. They will be able to offer the right sort of technical guidance you require, and the earlier you get them involved in your project, the greater their contribution can be. Invite them in at the initial design stages and their experience and specialist expertise can help you avoid problems at a later stage.

As you'd expect, fire glazing is surrounded by a wealth of rules and regulations that will have an impact on your project. A reputable fire-glazing provider can help you strike a balance between a glazing system that complies with all the necessary regulations, but which is still suited to your project and fit for purpose. The degree of customer service they offer is another

Continued overleaf..

'Fire rated glazing has recently undergone interesting developments which are now helping bring some very adventurous building designs to life'



Any fire-resistant glazing system should be backed by all the relevant certifications, but selecting one with a proven track record will give some valuable extra reassurance

'Fire glazing often forms part of a wider passive fire protection system which might involve dozens of other products'



The most important step in the process of specifying and installing an effective fire resistant glazing system is to work with an experienced supplier (above)

Fire glazing often forms part of a wider passive fire protection system which might involve such other products as fire protection boards, protective coatings or penetration seals (below)

key area to consider. If they are flexible in their approach, it can deliver practical benefits for the other parties involved, such as helping contractors out by scheduling material deliveries to site to coincide with the overall construction programme. They will also be able to contribute advice and guidance at the installation stage which will help avoid potential problems.

Made for the job

Naturally, you should be fully confident that the product you choose is really able to deliver the required levels of performance. Any glazing system should be backed by all the relevant approvals and certifications, but selecting one that has a proven track record will give some extra valuable reassurance. Once you've chosen the type of fire glazing system that's suitable for your project, there are still some other important considerations to be aware of. Fire glazing often forms part of a wider passive fire protection system which might involve dozens of other products such as fire protection boards, protective coatings or penetration seals, so it's a good idea to work with a manufacturer who can provide as many of those other components as possible. For example, a glass fire door which has minimal framework is an ideal partner for a butt-jointed glazing system, so sourcing both components from one manufacturer makes

good sense. It makes life easier, ensures compatibility between the various passive fire protection products and simplifies your route to a satisfactory end result.

Fire-resistant glazing has never offered as many building design possibilities as it does today. With careful consideration, and a reliable manufacturer to help you through the process, there is no reason why those possibilities cannot be translated into reality provided the design, specification and construction processes have been completed to the highest standard.



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Building in harmony with nature and the landscape

During the entire planning process for the Orchard Hotel, Nottingham, the architects were plagued by the feeling that it “is such a shame to have this wonderful landscape marred by a new building.” So they realised a hotel which is equally distinctive and respectfully integrated in the parkland campus of the University of Nottingham, with a particular role being played by the use of renewable energy and natural building materials such as facade ceramics supplied by AGROB BUCHTAL.


The Orchard Hotel is west of the city centre of Nottingham, between the East Midlands Conference Centre and the University Park Campus, nestled in an expansive park with gently rolling hills, old trees and abundant orchards. After winning the tender contest, one essential idea



during the draft concept at RHWL Architects in London was to integrate the 200-bed hotel as seamlessly as possible in the landscape. The planners therefore divided the construction volume into three building layers grouped loosely side by side, making it possible for the green areas inclined towards the east to flow through the hotel. The impression of openness and closeness to nature is achieved in particular by the central atrium: expansive glass facades as well as a glass roof spanned by a wave-like wooden construction. The expressive

gesture of this supporting structure made of larch marks the main entrance and simultaneously symbolises that the lobby and bar, restaurant and library are also open for passers-by coming from the adjacent conference centre to the campus.

Unlike the glazed lobby, the two room tracts on either side appear to be more solid structures conveying a feeling of safety to guests. This effect is underlined by a natural stone base made of regional silicified sandstone which firmly “anchors” the building in the ground.




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Internal glass expands its role in building design and construction

Rebecca Clayton, technical sales executive, IQ Glass, discusses the use of technical and decorative glass solutions to interiors

Glass is no longer just a transparent building material used in external windows for natural light. It is of course still used for this, but glass and the general use of glazing has moved on from small box windows to a whole new level of construction.

Nowhere can this leap in glass use be seen as greatly as in the interior of a building. Glass is now used as simple, effective

structural glazing on balustrades, internal glass walls, stairs and floors. These clear and sleek applications immediately enhance the internal design of buildings, adding light, movement and transparency within the space.

Toughened glass panels are laminated together with clear, strengthening interlayers, such as PVBs, to provide structural glass units with the inherent strength required of these items.

Continued overleaf...

Heated glass for condensation removal (below), translucent glass for privacy (opposite top) and internal glazing screen (opposite bottom)





‘There is a glass solution that can provide an energy efficient, radiant heat source simply from the glass itself’

Due to the advancement and more widespread use of such internal structural glass elements, great effort has been expounded by the architectural glazing sectors to develop minimal, invisible supporting and fixing techniques for these clear glass items; thus providing the clear glass aesthetic that is so often sought after.

It is not just the use of glass that has evolved but also what that glass can actually do. For example, there is a glass solution that can provide an energy efficient, radiant heat source simply from the glass itself. This heated glass solution incorporates a transparent metal oxide coating to the internal of the glass unit, which, when an electrical charge is passed through the conductive element, produces a comfortable radiant heat.

It is used in balustrades, internal partitions and doors to provide a comfortable simple heat source to internal spaces.

Heated glass is also used for an entirely different and very effective purpose on internal pool and spa areas. The glass units are configured to a lower wattage output to create a warm surface on the glass where no condensation will form. It is the preferred method of condensation removal on more minimal or contemporary areas, removing the need for large duct work or unsightly air blowers to keep glass clear.

Privacy could be an issue when using large amounts of glass inside. But with the advance in electrical interlayers such as privacy glass, glass partitions and doors can switch from translucent to transparent and back again when needed. The LCD interlayer within the laminated glass panel effectively cuts all vision through a glass unit when ‘off’ but still allows upwards of 70 per cent light transmission through each glass panel.

This glass solution is great for internal areas where privacy needs are variable such as changing rooms, meeting rooms and pool or spa areas. The thin, laminated glass panels are frequently used in fixed panels or moving parts such as doors, with clever hinges and fixings to hide all cables and electrical connections.

More traditional privacy techniques are still used in internal glazing: solutions such as kiln formed glass and decorative and coloured interlayers are all used widely for obscuring vision through glass units to create privacy between internal spaces.

For a more modern twist on the traditional, PVB interlayers, as used in laminated glass units, can be printed like a sheet of paper with specifically chosen images or patterns before lamination, sealing a coloured image into the glass panel. You can go even wackier than that if warranted; laminating materials, mesh, metals and even feathers within a glass unit creates a starkly different appearance, which can be used on any application of internal glazing.

Whatever application, internal glazing now has the ability and capacity to be used widely and creatively throughout a build, producing some of the most impressive elements of a design or construction.

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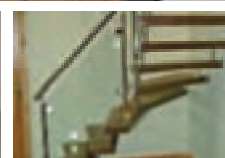
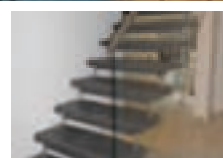
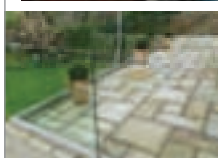


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Hybrid taking education to the next level

By Steve Wightman, director, Senior Architectural Systems



Despite the Building Schools for the Future programme being scrapped due to cuts in 2010, there is still a commitment on the part of the government to modernise the UK's education infrastructure.

This commitment is most notably witnessed in the Priority School Building (PSB) programme, a centrally-managed government initiative which intends to rebuild or refurbish 261 schools over the next five years, the first of which is set for completion this year, with all work delivered by the end of 2017.

While this is clearly good news for the education sector in the UK, it also comes as a significant boost to many product manufacturers operating in the glazed façades sector. The PSB programme will mean there is still going to be a robust demand for high performance fenestration solutions in schools, which will help architects achieve environmental requirements, thermal performance targets and, of course, aesthetic demands.

Perfectly positioned to assist specifiers in meeting these demands are timber aluminium composite hybrid systems – available as high quality window, door and curtain wall systems.

Hybrid systems are the perfect solution for specifiers thanks to their ability to combine the advantages of long life and low maintenance aluminium externally with all the aesthetic and performance benefits of responsibly sourced engineered timber internally.

The thermal efficiency of a building is a critical consideration and hybrid windows, doors and curtain wall systems are perfectly placed to offer the thermal efficiency of timber and the latest in glass technology to produce U-values well below the current and anticipated future Building Regulation requirements.

The low maintenance of a hybrid system provides the advantage of fully pre-treated engineered timber internally, so any possibility of warping or twisting is eliminated. The use of timber means specifiers and architects are now seeing the benefits of using high performance engineered timber profiles, which can be treated to withstand up to 10 years' of weathering without the need for recoating, ensuring that systems installed in high-traffic environments such as schools will last.

Some experts suggest that timber and aluminium hybrids are the lowest cost options when a 40-year life cycle analysis is undertaken against other materials and combinations, which also means these systems can be a more financially viable option for school environments.

In addition, these hybrid solutions offer excellent design flex-



ibility, with the ability to powder coat the external aluminium in any RAL colour, while the timber internally can be provided in a range of wood types and finishes. In addition, the unique cradle-to-cradle approach which many manufacturers take when it comes to the environment means that materials can often be safely recycled at the end of their life.

Not only is the internal timber of hybrid systems of benefit to the environment but it can also add a sense of warmth to surroundings, unlike UPVC alternatives. The homely feel promoted by the timber gives students, teachers and others inside educational buildings a more inspiring, natural setting in which to work, which can only assist in day-to-day learning and progression.

The stunning aesthetic and performance attributes of hybrid curtain wall and window systems are showcased in many school projects across the UK, with the systems providing copious amounts of natural light and ventilation for staff and students alike.

These systems can offer schools an aluminium external profile providing exceptional performance, long-life and low maintenance, with contrasting engineered timber internally to

provide an ideal combination of aesthetics, high insulation properties and strong environmental benefits.

Powder coated externally in a selected colour, and internally in pine with a clear lacquer for added protection, hybrid composite timber and aluminium systems can incorporate double glazed units comprising a laminated pane and a toughened pane for security and safety of the students. Meanwhile, exceptional acoustic and thermal performance can be provided by soft coat low-e units.

To help meet required BREEAM ratings, many school buildings incorporate sophisticated building management systems, which can include manually operated, hybrid, top opening vents within the curtain wall system, together with a high level of automated vent control. Actuators can be built into the hybrid frames to enable automatic operation of the top light windows without the use of handles for added safety.

Installing hybrid systems in buildings such as schools is now an aesthetic and environmental choice the specifier can make in confidence, knowing that the project in question will be protected with a stunning façade for years to come, which bodes well for the next generation of schools in this country.

‘Some experts suggest that timber and aluminium hybrids are the lowest cost options when a 40-year life cycle analysis is undertaken against other materials and combinations’



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Diffused daylighting complements clear glass at BMW's Wolverhampton showroom

Changing daylight

Architect Christopher Sykes examines how Structura engineers and constructs glass and translucent solutions for maximising the benefits of daylighting

Daylighting through the creative use of wall or roof glazing radically changes building envelope design and the ambience of interiors. It positively influences people, affects how they behave in their environment, changes their circadian rhythm and improves their well-being. In schools, for example, it is proved to have had an extraordinary calming effect and marked influence on pupil behaviour and learning.

Interestingly, daylight was 'rediscovered' by designers in the early part of the last century and this has resulted in glazing now being an essential component of contemporary architecture. This is in spite of Part L which, taken to extremes, means that no daylight at all should penetrate the building envelope. In other words, simply introducing conventional glass can create problems.

While keeping translucent surfaces clean is one problem, the most critical are solar control and energy efficiency. However, things have changed rapidly both in the way the daylight itself is distributed internally and how its performance and effect have been tamed through the use of translucent materials. The glazing industry has come up with a neat trick or two to save the day.

Insulating daylight

In the building industry, it is unusual to enjoy new technology which totally changes design and construction. This is why aerogel insulated glazing is having such a global impact. Aerogel, the world's best and lightest insulating solid, is now widely used by many manufacturers within different translucent cladding and rooflighting systems to increase the U-value of the glazing.

Continued overleaf...

'Things have changed rapidly both in the way the daylight itself is distributed internally and how its performance and effect have been tamed through the use of translucent materials'



‘Designers of sports and leisure facilities have been quick to recognise that this creates ideal playing conditions’

Sometimes called frozen smoke, hydrophobic aerogel is produced as particles, each of which consists of up to 95 per cent air, contained in a structure with pore sizes less than the mean free path of air molecules. This severely inhibits heat transfer through the glass or panel.

The reason this new insulation technology is so important is because architects and energy-conscious designers can now maximise large areas of daylighting while reducing energy loss and minimising solar glare. Importantly, it means that well insulated daylighting will reduce energy consumption of heating, air conditioning and artificial lighting. It means that roof lights can be more energy efficient than their predecessors. Also, when aerogel is introduced inside the panels of translucent cladding and roofing systems a U-value of up to 0.28 W/m²K is possible. This is as energy efficient as a solid wall.

Diffusing daylight

As we know, there are many problems with using large areas of conventional glass – glare, overheating, insulation and energy loss to name a few. This is why many architects have now adopted an innovative system which diffuses daylight and provides a different high performance solution. Not only does it reduce energy consumption, heating and air conditioning but carbon emissions are also reduced. In other words, over the building’s life cycle, the capital costs are offset by substantial savings in energy and the quantifiable improvements for occupants in personal wellbeing and performance.

This change is the development of translucent building systems in polycarbonate and fiberglass, which alter the impacting daylight and change it into what is often called ‘museum-quality’ light. This is then diffused evenly across the interior to create a quite different and extremely attractive

interior ambience.

The big difference to conventional glazing is that hot spots, together with glare and shadows, are eliminated and there is no need for internal blinds and curtains. Running costs are reduced because of the superior insulation together with less reliance on artificial lighting. Designers of sports and leisure facilities have been quick to recognise that this creates ideal playing conditions. It means that the traditional ‘black box’, windowless sports halls of yesterday have been transformed. It means that swimming pools too have become safer because glare on the water no longer inhibits the ability of life-guards to see swimmers below the water surface.

The lightness of the diffused panels means erection is less costly and, even with a steel substructure, far less cumbersome than glass. The panels have inherent rigidity and impact resistance, are largely self-cleaning and, because dirt is less obvious than on glass, frequency of maintenance is reduced.

Mixing daylight

All this new technology dramatically widens the palette of materials available for designers. It gives them the ability to change easily the ambience and performance of different rooms by mixing traditional clear glazing with enhanced solar protection with diffused lighting through translucent panels. It gives them control over the insulating U-value performance as well as aesthetics, life cycle performance and the all-important running costs.

This is particularly beneficial with the current growth in refurbishment of older properties, when many existing curtain walls and roof lights are having to be replaced and upgraded with a blend of architectural glazing and translucent building materials.

Aluminium windows and doors are experiencing a renaissance, according to Reynaers at Home



Aluminium frame systems are experiencing a boom in sales as a result of high performance without compromising aesthetics.

Architects have long-recognised that aluminium is a very stable material that minimises expansion and contraction with changes in the ambient temperature.

Reynaers at Home Head Hugh Moss said: "This makes aluminium an ideal choice for sliding patio doors and bi-fold doors, where uPVC and timber tend to warp and twist, making the doors hard to open and close. Aluminium is inherently strong, which also means that architects can design really

big windows and doors without having to worry about a bulky frame to provide support.

"Not only are aluminium frames typically narrower than uPVC or timber alternatives, but the windows and doors can also be made much bigger too. This maximises the glass area and gives the best possible view. According to our latest architects' survey, 40 per cent of respondents said that big windows was the main architectural feature that can really make a home come to life and aluminium can help to make that happen much more easily than other materials."

Robert Palmer, the managing director of Palmer

Market Research, said: "Aluminium is out-performing other materials for bi-fold doors by some margin – the sales of around 3,000 door sets in 2010 more than tripled to 10,000 in 2013 and is expected to triple again in the next five years – and these are conservative estimates."

For more information see the website www.reynaersathome.co.uk, email homeuk@reynaers.com or call 0121 421 9707

Stoneville's innovative Recycled Eco Glass

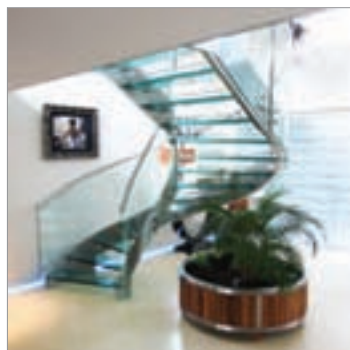


Stoneville Recycled Eco Glass is an innovative product distinguished by its aesthetic, technical and eco-friendly properties. Uniquely, it is made of 100 per cent recycled glass, with no resins. It has a wide variety of applications, including kitchen worktops, countertops, cladding, floors, spas, swimming pools, desk tops, vanity tops and splashbacks. It can be used as an eco-friendly alternative to marble, granite, standard glass, quartz and acrylic surfaces etc.

Unlike marble or granite, it is easy to maintain and does not suffer from colour or pattern variation. It is much more cost-effective than onyx, semi-precious stones and higher-end types of marble. Unlike acrylic and most other man-made materials, it is eco-friendly. Although it is made up of recycled glass, it does not look composite. It is also transparent and has a 3D effect due to fused shards of recycled glass. Stoneville has large stocks of slabs at its Brentford warehouse that it sells to fabricators or uses for in-house fabrication. Slab sizes in mm are 1240x2440 or 1440x3040. Standard thicknesses are 20mm and 30mm.

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Innovations in stairs and balustrades



Over the past decade the demand for a professionally designed home has been ever increasing. There has been a visible increase in property development across the UK and abroad from residential new builds to commercial refurbishments.

CANAL has recently helped complete the interior of a stunning home in Cheltenham with a very large helical stainless steel and glass feature staircase. CANAL fabricated the bespoke helical staircase metalwork and curved handrail at its manufacturing site in Nottingham, UK. Forming the clean lines and curved shape, the CANAL team produced the structure to be fully supported by only the base and the first floor landing with very little flex when in use.

CANAL will be opening a brand new London Showroom in May where you can visit and browse the latest innovations in stairs and balustrades. Contact the Architectural Sales Team for more information and to discuss your bespoke requirements today. Alternatively, visit the CANAL website for a full range of completed prestigious projects.

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ESG Solarchromic Climate Control glass



In 2014, **Essex Safety Glass** is renewing its focus and attention towards its Solarchromic Climate Control range of glass. By minimising solar heat gain during the summer and maximising it during the winter, Solarchromic glass maximises the efficiency of a buildings temperature control, in

turn keeping down energy costs. With its electronically controllable tint, the glass reduces a building's energy consumption, lowering its impact on the environment and making it an increasingly sought-after design feature. ESG Solarchromic™ is a bespoke made glass, meaning that any application and shape can be catered for, with sizes going up to 1350mm x 3300mm.

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Glazing solutions mix old and new



A stunning glazed atrium, glass bridges and curtain walling are bringing together a grade II listed building with a brand new biomedical centre of excellence on the site of the former Royal Eye Hospital in Manchester. The Advanced Facades division of Saint-Gobain Group company

GLASSOLUTIONS has won the £2.5 million glazing design contract for the Citylabs building. The 94,000 sq ft development will retain the heritage listed frontage while building new space to the rear, which has been designed to attract bio health companies to develop new products and services within BREEAM Excellent office, laboratory and networking space.

02476 547400 www.glassolutions.co.uk

Rehau's fire rated PVC-U solution chosen



Rehau's RAUFERNO fire rated PVC-U system has helped commercial fabricator Astraseal win a screen replacement contract for Whitefriars Housing Association in Coventry. The specification was to replace single glazed timber screens in 13 blocks of maisonettes with a low maintenance, thermally efficient PVC-U alternative. RAUFERNO was the only fire-rated PVC-U product which met this. The new screens are sited between communal stairwells and private balconies in the three storey blocks, enabling Whitefriars

to minimise the risk of fire spreading from the balconies into the shared areas and escape routes. 52 screens have been installed, measuring an average of 2.5m² each.

01989 762600 www.rehau.co.uk

GDL solution at Bermondsey Spa



GDL Air System's design team were given the opportunity to design and develop a completely bespoke privacy screening system to the external facade of the new apartment blocks at Bermondsey Spa for Willmott Dixon Housing Ltd. The spacious, newly built apartments offer a private outdoor terrace or balcony, and GDL's glazed privacy screening systems enhance the sense of space and light, maximising the views beyond.

The vertical glazed systems are designed to provide the necessary lighting requirements for the building as well as allowing high levels of privacy. The blades are also removable for ease of maintenance and repair.

sales@grille.co.uk www.grille.co.uk

FILANO DROPS joins Fila green line



Surface care specialist **Fila** has launched a dual-purpose glass cleaner and protector. FILANO DROPS is a no-rinse spray treatment that cleans without streaks. It also creates an invisible hydrophilic film, so water droplets slide off surfaces without leaving limescale marks. The solvent-free, non-acidic formula is ideal for shower enclosures and mirrors – as well as glass mosaics and glazed ceramics. It can also be

used to clean taps, steel trims and Perspex. FILANO DROPS is colourless and has a pleasant, fresh fragrance. It is available in a 500ml trigger bottle and is offered as part of Fila's Green Line; a range of high performance, water-based treatments developed for cleaning, maintenance and protection of natural surfaces.

01584 877286 www.filasolutions.com

Gunning's trench heating and tubular radiators



Gunning Heating Products now specialise in domestic trench heating delivered fully assembled for easy fitting. Trench heating is an ideal way to stop down draughts and condensation along glass areas. It is great for those hard to heat spaces and makes a heat curtain along the glass which also stops the warm air inside the room from escaping.

Gunning tubular radiators are compact low level heaters with a high output. They are suitable for conservatories and rooms where wall space is minimal, and they look good too. Although they are designed to be above ground they are also useful for under pews in churches, baths, beds, airing cupboards, wardrobes etc.

01268 545154 www.gunningheating.co.uk

WER A+ rating for Reynaers



Successfully achieving the new, top energy efficiency rating, **Reynaers** Concept System windows scored a Window Energy Rating (WER) A+ from the British Fenestration Rating Council (BFRC). Introduced by the BFRC the new A+ Window Energy Rating is the top band for window systems which have to achieve a

rating index of 10 or above to be awarded the A+ grade. The BFRC Rating method includes all of the relevant factors that contribute to the energy efficiency of a window system, including 'loss factors', such as U-value, as well as gain factors, such as solar heat gain. A thermally improved three-chamber system, Reynaers CS 77 HI utilises industry leading technology along with multiple chambers in order to achieve its high insulation levels.

Diffused daylighting gives Hope



Highly insulating Kalwall®, available from **Structura**, has been used for one of the most unusual non-secular buildings ever constructed; the Canadian Our Lady of Hope Mausoleum in Ancaster, Ontario. The dramatic break of the building occurs along its central concourse where the raised organically shaped roof floods the

interior with light. This is achieved by the design flexibility and daylighting performance of the Kalwall® translucent building system. This bathes the interior with natural diffused daylight while eliminating glare and shadows and creating a unique ambience. The Mausoleum demonstrates how the panels can be used in a completely different way with the proprietary Kalcurve® variation.

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- Suitable for use in wet room environments
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ESG is cementing its reputation as a market leader in the secure glass market. Always at the forefront of glass technology, ESG were the first company to have product certified to LPS1270 standards by the LPCB.

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- EN1063 Bullet resistant
- LPS1270 Intruder Resistant



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Pyrotech™ is one of the UK's most versatile Certifire approved glazing products. Up to 60 mins flame containment and the ability to be paired with any other ESG product means this range really does have a solution for any application.

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- EN12600 2002: Class 1 Rating
- One of the largest panel sizes (into steel frame) on the market

