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Glass and translucent materials supplement

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FROM THE EDITOR

indow glass has come a long way since early broad sheet glass was little more than a poorly transparent material. Over the centuries different methods of glass manufacture emerged but it wasn't until the invention of laminated glass at the beginning of the 1900s that much larger window panes were being safely glazed without dividing bars.

Early technology and techniques for better quality, strengthened and economically produced glass systems gave glass new impetus in building construction and architects were quick to utilise glass in the early skyscrapers. For example, Chicago's 14-floor Reliance Building constructed in the 1890s featured large plate glass windows. And even earlier, south London's cast-iron and plate glass Crystal Palace of 1851 was a major innovation in its time. However, a glimpse into the future of glass technology in architecture had already be seen in architect Peter Ellis' 1864, five-story Oriel Chambers building in Liverpool which featured a metal framed glass curtain wall.

These pioneering structures are just a few examples of the forerunners of today's new age of challenging structural glass buildings that continue to symbolise innovation and modernity. Increasingly, tall glass buildings continue to dominate the skylines of our cities and cutting edge projects around the world utilise light and glass filled spaces in striking new, renovation and heritage projects.

In this supplement, structural glass designers and engineers Eckersley O'Callaghan also take a retrospective look at glass with reference to Charles Schridde's 1960s futuristic 'House of the Future' illustrations. They point out that some have already been realised, if not superseded, by advancements in curved glass, interlayer technology, high performance coatings, solar control and more. Ian Langham, the firm's associate director, also poses the question, what next? He refers to dynamic glass, hi-strength thin glass and other transparent materials that could transform our not too distant future.

The project features in this supplement are exemplars of challenging structural glass design and engineering feats: 27 Linden Gardens once a neglected Victorian building is now a desirable townhouse conversion of apartments transformed by glass. The new HQ for the EU Council in Brussels, the Europa Building is an innovative egg-shaped structure of predominantly glass and translucent materials. Plus, an eight-storey glass lift in a London mansion is likely to be the tallest self-supporting annealed glass structure in the world.

In this supplement we also hear from experts about some of the glass materials and new technologies being developed that will enable architects and engineers to turn their visions into reality and which are sustainable and eco drivers for the future too.

Sarah Johnson Editor



ON THE COVER – EUROPA BUILDING, BRUSSELS

For more information, go to page 11

© Philippe SAMYN and PARTNERS architects & engineers, LEAD and DESIGN PARTNER. With Studio Valle Progettazioni architects, Buro Happold engineers **OMA'S MOMENT OF REFLECTION**

New multi-purpose Dubai cultural venue with a glass and mirror facade



Concrete, a new venue in Alserkal Avenue, Dubai, has been finished with a mix of polycarbonate cladding, as well as concrete, glass and mirror components.

Located in Dubai's Al Qouz industrial area, Alserkal Avenue was founded in 2007 with the aim of promoting cultural initiatives in the region and has since become Dubai's most important art hub, with 25 galleries and art spaces.

Concrete, designed by OMA, is a 1,250 m² former warehouse that addresses the district's "growing need for a centrally located public space which can host a diverse programme of events." It provides a

multi-purpose venue to accommodate exhibitions, performances, lectures and fashion shows.

The building's services were consolidated at one end, allowing the entrance and event spaces to be situated closer to The Yard – the district's main outdoor public square.

The original front facade of the warehouse has been replaced with polycarbonate cladding and full height operable doors. When the doors are open, the interior space blends seamlessly with the courtyard. The building's connection to its exterior is reinforced by the translucent polycarbonate, which brings generous amounts of daylight into the interior.

The rest of the original facade has been maintained and sprayed in a customised mix of concrete with glass and mirror elements. The rough texture of the concrete plus the reflections from the glass and mirror make the venue stand out in its location.

The building also features two linear skylights, positioned above four pivoting and sliding internal walls, which can allow either thin blades or full daylight into the space, depending on the configuration.



BIRTHDAY CELEBRATIONS

GGF celebrates a "special year"

This year sees the Glass and Glazing Federation (GGF) celebrate its 40th anniversary. The GGF (interim CEO Brian Baker pictured below) has several special events planned through the year including a Life begins at 40 party in the GGF Members Lounge at The FIT Show (23-25 May, NEC), a celebratory Members Day on 22 September and the G17 Awards on 17 November. The awards will also feature a special 40th Anniversary Award. As well as these events, the industry's trade body is introducing a raft of new initiatives to help its members' businesses. These include:

- A political strategy group, designed to ensure all forthcoming policies and laws – brought about by circumstances such as Brexit and incoming Government schemes – that affect companies in the industry are covered.
- A 'systems house' group which will be represented along with frame manufacturers on the GGF Board to ensure the full industry supply chain is considered at board level and in future strategies.
- The GGF 'Member Get Member' scheme is increasing the discount on the recommending members' 2018 subscription from 10 per cent to 40 per cent.
- Digital marketing workshops will be held across the GGF regions.
- A new GGF trade website will be launched fully in September, with a soft launch in July.
- A new commemorative logo and souvenirs to celebrate the anniversary will be issued to all GGF members.





SageGlass wins green prize

SageGlass, manufactured by the Saint-Gobain group, scooped the Gaia Award for the most innovative green construction product at The Big 5 2016's Middle East ceremony, celebrating sustainability.

The awards honour companies in the construction industry whose products and services demonstrate a reduction of construction's impact on the built environment. The product was selected as the winner by a panel of industry experts headed by Dr. Alaa K. Ashmawy, professor of Civil Engineering and Dean of the School of Engineering at the American University in Dubai (AUD).

SageGlass won the innovation award for its smart tintable glass solution, intelligent solar control glazing developed to offer an environmentally friendly and energyefficient alternative to blinds or shades.

By blocking sunlight on hot days, SageGlass is claimed to "dramatically reduce energy demand and the need for SageGlass won the innovation award for its smart tintable glass solution. It's an intelligent solar control glazing solution

heating ventilation and air conditioning."

Discussing the reasons behind SageGlass' award, Big 5 event director Josine Heijmans said: "With the UAE's and region's focus on delivering sustainability in construction it was paramount to choose sustainability as a key theme in this year's Big 5. Visitors to The Big 5 are constantly looking for innovative products that are environmentally friendly and the Gaia Awards helps us uncover these products and technologies and share them with the construction and design industry."

LINKING FUTURE AND PAST

Historic Swansea art gallery brought into 21st century



The Grade II-listed Glynn Vivian Art Gallery in Swansea has been modernised with an extension by architects Powell Dobson that uses low-profile structural glazing to help link the buildings.

The project involved adding a new gallery, community and education rooms, a lecture theatre and screening room, conservation studios and collection stores to the existing gallery – a neoclassical brick and stone building completed in 1909. The works also created a new street level entrance, welcoming visitors with a much larger and brighter reception space.

When adding a modern extension to a historic building, creating a sensitive link between the two is an important consideration. In creating the extension, the designers were keen to preserve the impressive symmetry of the original facade, which meant creating a sense of physical separation between the extension and gallery.

At the same time, the two elements needed to be well connected internally, with free flowing circulation between the two. The solution was to enclose the linking part of the extension, set back from the building's facades, in glazing.

This link means that the two elements are connected on three levels, making the building feel unified to visitors while also allowing the historic facade to be appreciated in isolation from outside.

The glazing also extends at ground level around the front of the extension, allowing light to flood into the new entrance area. The refurbished building features a glazed section of wall opening onto a garden across three floors, allowing light in and giving passers-by a glimpse of some of the artworks on display.

In total, 70 m² of glazing from Pilkington Glass was used. In order to maximise insulation of the newly created space and ensure high levels of structural strength, double glazed units featuring one pane of 12 mm toughened glass and another of 13.5 mm laminated glass were used.

The outer pane features a low-emissivity hard coating to reduce the amount of radiated heat lost from the building. The frameless glazing is supported by a series of laminated fins which have been created from 21.5 mm thick glass.

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"Invisible" structural glass launched

Although glass may normally be perceived as essentially 'invisible', one manufacturer has explored the potential to remove glare and reflections to produce truly invisible structural glazing.

In its campaign, Guardian Glass is highlighting what it describes as the "numerous possibilities that are now open to architects" using Guardian Clarity anti-reflective glass in exterior building applications.

Guardian Glass commented: "While the use of anti-reflective glass for interior design and glass displays is becoming even more common, we wanted to highlight it is now possible to effectively use anti-reflective glass for building and facade applications too. When glass continues to be a physical barrier, but is no longer an optical one, imagine the world of design opportunities this would represent for architects. Reflections and glare can now be minimised, creating invisible glazing without spoiling an otherwise perfect view." The company, based in Michigan, has designed Guardian Clarity to reduce reflection from 8 per cent to "around 0.7 per cent compared to standard glass," as well as "increasing light transmission for a viewing experience that is virtually distortion free."

Andras Kovacs, product manager at Guardian Glass commented: "The need to make structural glazing virtually invisible can now be met. Architects can create transparent, crystal clear views through the glass, including curved facades." He continued: "Imagine the world's skyscrapers without reflections in the glazing. It would definitely have a powerful effect on the aesthetics of cities, and how each building is perceived and experienced."

The company said that with glass facade aesthetics being "a complex matter that involves changing levels of internal and external reflection and colours in different light conditions, Guardian Clarity glass "gives architects more freedom to create buildings that stand out – by increasing





visibility into or from the building, or by creating an invisible canvas to bring the interior to the fore."

The campaign has been launched to show architects the varied possible applications of invisible glass. For more information and to order a free sample visit www.guardian-possibilities.com

TRAINING

GGF Training rebrands to Helix Training

HELIXTRAINING

As part of fulfilling the branding strategy of the recently formed Helix Group, the organisation has rebranded GGF Training to Helix Training.

The newly named company will deliver the same service as before, aiming to add more benefits and new features for companies in the glass and glazing industry.

The Helix Group was formed in 2016 by the GGF to harness the resources and talents of all the GGF's subsidiary companies. Along with FENSA, GGFi, Borough IT, RISA and BFRC, Helix Training will add to the collective services the Helix Group offers to the industry.

Jon Vanstone, Helix Group CEO commented on the introduction of the new branding replacing GGF Training: "We are incredibly proud of what GGF Training achieved since it was launched at the end of 2013.

From the development of a successful MTC (Minimal Technical Competency) program to an ambitious and continually evolving syllabus of industry training, there is a lot of potential for future opportunity. We believe that with the support of Helix Group, Helix Training will be able to reach this potential, having a greater impact on the broader home improvement market." While there are exciting and innovative changes happening

within the group, Helix Training is still run by the same trusted team behind GGF Training, and will continue to deliver their services with the same passion, drive and level of excellence as before.

As part of the training portfolio, 2017 sees the addition of a number of business courses offered in conjunction with the Building Merchants Federation (BMF). These courses are in addition to the existing training offered by Helix Training: Fire Resistant Glazing and Manual Handling, delivered in partnership with the GGF and Pristine Condition respectively.

Brian Baker, GGF chief executive (interim) commented: "We are delighted to see the formation of Helix Training. To ensure the training needs of GGF Members are still served, the GGF has set up a Training division within its technical department, headed up by Sarah Herbert who was part of the GGF Training team since its formation in 2013. Both the GGF Training department and Helix Training will work together to deliver the best training courses for the GGF Membership."

COMMENT



Glass of the future – a retrospective

Ian Langham from engineering consultant Eckersley O'Callaghan discusses how futuristic 1960s visions of glass buildings have now become reality, and reflects on glass developments present and possibly future

T's often interesting to reflect on the past to see where we thought technology and material advances would take us in the future. Some ideas were realised within 20 years and others still look to be dreams of the future.

Take the 1960s sci-fi futuristic imaginings – freed from technical constraints, authors' imaginations ran riot and projected visions of our wants and desires. During a time inspired by the rapid and audacious achievements of the Space Age, it was only natural to speculate about what was coming next.

Recently, I stumbled across a series of 1960s advertisement illustrations by Charles Schridde for Motorola. The theme was 'House of the Future' with transparent structures and glass enclosures featuring prominently, typical of many other sci-fi futuristic musings of this era. This led me to wonder how far-fetched some of these ideas were.

It's perhaps no coincidence that around this time the possibilities for glass on buildings advanced significantly through the revolutionary float glass process developed by Pilkington. This meant that large volumes of high-quality glass could be produced for the baby boomer generation. This innovation must have stimulated great inspiration for what the future might hold for glass technologies – but has there been a revolution on the same scale since?

There are two illustrations in the 'House of the Future' series which offer retrospective reference. The first shows a luxury apartment overlooking a city below, shown from the outside through large, curved glass panels of approximately 6 metres height and 3 metres width.

With today's fabrication capabilities in large format and curved glazing, this vision of the future is now a reality. In fact, Schridde could have been more ambitious – some manufacturers can now fabricate curved panels up to 18 metres tall. Thanks to current interlayer technologies such as SentryGlas, the mullions could also be omitted with the glass spanning without additional supports.

Today's interests in challenging transparent envelope geometries are inspired by advances in curved glass processing and progression in computational design. Doubly-curved panels can be manufactured with high optical quality, either using hot bending over moulds or the more recently developed cold bending that allows flat glass to be 'pushed' into shape and then mechanically restrained either by the interlayer during lamination, or clamping on site.



Sky Pool, planned for Embassy Gardens development, London ©Ballymore

The other Schridde illustration shows a futuristic glass enclosure, possibly a lakeside outhouse, that evokes the greenhouses of old, such as The Crystal Palace. As an enclosure, it has parallels to Apple 5th Avenue Cube in New York (2011), which Eckersley O'Callaghan engineered to utilise glass as both structure and facade.

I am drawn to the image's depiction of shading. It acknowledges a human need for comfort but probably not the issue of energy consumption, there may have been less consideration for solar gain and its associated sustainability impact in the 1960s.

Since then, high performance coatings and other glass treatments, including solar control and low-e, have developed considerably, in

We may discover that our wants and desires are close to fruition, or they may even ignite an idea with a manufacturer to make them possible

lan Langham

part in response to ever stringent requirements in energy codes. The big challenge is how to overcome the contradiction of better light transmittance and reducing the solar gain. Today's standard technology offers more reflective, darker glass than was envisaged but is catching up to make clearer views possible.

Looking to tomorrow, current developments in dynamic glass (which change in light transmittance and g-value) are promising innovations, especially for warmer climates. There are different approaches. For example, Merck liquid crystal modules and intelligent glass facades that are linked to the building management system could become more common as their costs reduce.

If Schridde were to produce a set of images today, what would our imaginings of the future be? I wonder how much today's glass developments would feature?

Areas of inspiration could include high-strength, thin glass. It was originally developed in the 1960s for the automotive industry, without great success, but has been revitalised by the smart phone industry. It is yet to be fully utilised within architecture, but can be useful where weight-saving is important. With rising sea levels around the world, will weight considerations become important for floating houses as they are for ships today? Corning's latest incarnation of this fusion technology, Willow Glass, offers glass as thin as 0.1 mm, and could facilitate transparent, durable and lightweight fabrics for building envelopes in place of today's traditional textile and plastic materials.

Although glass sizes have increased dramatically, they are still limited by transport logistics and local site constraints. More intelligent methods of joining panels present another frontier to be explored. Over the last 10 years we have realised increasingly transparent structural glass systems by incorporating fittings within the glass build-up. The holy grail is for all the connections to be transparent. Advances in transparent silicones and adhesives have potential, as does welding of glass seams together. Other transparent materials like PMMA (acrylic) could come to prominence owing to the ability for large panels with invisible joints, although their use is currently hampered by fire resistance and limited solar gain performance.

In the same way that past authors readily offered their visions of the tomorrow, it is important that designers reflect and actively shape our future. We need to continue engaging with suppliers and specialists – we may discover that our wants and desires are close to fruition, or they may even ignite an idea with a manufacturer to make them possible. This dialogue is one of the ingredients which will help our industry to innovate. Who knows? In doing so, the future may not be so far away.

Ian Langham is associate director at Eckersley O'Callaghan





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EUROPA BUILDING BRUSSELS

Lantern for Europe

A glowing egg wrapped in a transparent glass screen forms the centrepiece of the new headquarters of the EU Council in Brussels, but this innovative building is about much more than showy architectural bravura. Stephen Cousins reports

hoever emerges victorious in the UK's general election this June, they will shortly afterwards find themselves in the Europa building, the new headquarters for the Council of the EU in Brussels, where the bulk of Brexit negotiations will play out

The controversial project, previously criticised by David Cameron for its inflated $\pounds 300m+$ budget, features a bulging eggshaped structure that will glow at night like a lantern, wrapped in a huge glass atrium with a patchwork of over 3,000 reclaimed timber window frames.

The design was developed – by Belgian architecture studio Samyn and Partners, Italian architects Studio Valle and British structural engineers Buro Happold – to symbolise everything positive about Europe: unity, transparency and diversity. At its heart is a huge room with kaleidoscopic rainbow carpets and ceiling tiles, designed by Belgian artist Georges Meurant, where EU leaders will hold summit meetings.

At first glance, the building might appear excessive or flamboyant, but its design was a logical response to the constraints of the brief, says Philippe Samyn, director of Samyn & Partners: "The project is not the consequence of a wish to be original, or an act of bravura. It had to be eye catching but not at the expense of unnecessary materials,

The building's design was developed to symbolise everything positive about Europe: unity, transparency and diversity







and its shape was fundamentally generated by the constraints of the programme."

A different Europe

The Europa building began its journey in more stable times, before David Cameron first mooted the idea of an EU referendum, when the Greek economy was still booming and there were few concerns about migration across Europe's borders.

The 53,815 m² project was needed to increase capacity for members of the European Council and the Council of the European Union, after 10 new member states joined in 2004. It will be used for summits and over 6,000 meetings a year, attended by hundreds of Ministers, diplomats and interpreters.

The scheme involves the renovation and extension of the existing Europa building, an L-shaped block designed by Swiss architect Michel Polak as a high-end apartment complex, completed in 1927. The building was later commandeered by the Nazis as a headquarters then, after the second world war, it was purchased by the Belgian government and converted for use as offices.

The egg-shaped lantern fills the void in the L-shaped plan and is self supporting. Due to constraints imposed by the Metro and trains that run underneath the site, the steel structure of the atrium facade is designed to be lightweight and bear the weight of both the outer patchwork of windows and the atrium roof. The structure comprises a number of large trusses and acts as a bridge.

Other constraints imposed by the site include a heritage listing on the original building's facades, entrances and the central ground floor, which limited further interventions. The new headquarters is adjacent to its old home, the Justus Lipsius built in The 'onion' strategy forms part of a deep-rooted environmental approach that responded to the EU Council's desire to see sustainability displayed in many aspects of the architectural and technical design

the 1980s, and connects to it by two footbridges.

The lantern is symmetrical in plan and includes 11 occupied floors that vary in size depending on the specific requirements of each programme. The largest conference space, on level five/six, mid-way up the structure, can accommodate 250 people. Two smaller conference rooms are located at levels three/four and seven/eight. There is a cafeteria on the ground floor, a press room, on level one/two. There are several dining rooms, the largest is on level 11 with capacity for 50 people.

Samyn comments: "When we analysed the number of square metres needed for each floor of the building and saw that it increased gradually, from the bottom to the middle, then decreased again towards the roof. That was the genesis of the idea for the lantern shape. The circular form is ideal for meeting rooms, where people gather to talk, and preferable to a rectangular space that sets up a hierarchy." The floors are stretched slightly into ellipses, rather than perfect circles, due to site constraints.

Harmonious patchwork

The transparent atrium facade wraps around the entire northeast corner of the site and incorporates some 3,750 recycled oak window frames, sourced from renovation or demolition sites across Europe, including a castle in the UK and a farm in Italy. This "harmonious patchwork" is based on a special algorithm developed to match units of different sizes together to form the overall design.

A second layer of glazing, located 2.7 metres behind the windows, cuts the impact of noise from the adjacent road, and boosts thermal insulation as part of an 'onion' strategy for energy performance.

The facade comprises four separate layers: the atrium facade has an outer and an inner single glazed layer, the lantern has





ALL IMAGES

© Philippe Samyn and Partners – architects & engineers and lead design partner (with Studio Valle Progettazioni architects, Buro Happold engineers)

an outer laminated glass layer and internal layer of solid insulated wall.

"Multiplying the number of envelopes made it simpler to achieve interior temperature targets and was cheaper to construct than a single highly-insulated facade," says Samyn.

The 'onion' strategy forms part of a deeprooted environmental approach that responded to the EU Council's desire to see sustainability displayed in many aspects of the architectural and technical design.

Samyn has some strong views on environmental assessment ratings: "Commercial sustainability ratings, like BREEAM and LEED, are quite crude instruments created for developers and people who want to say they are sustainable." He adds: "We are dealing with a serious architectural building, not a showcase for developers, so we go much further."

According to the architect, sustainable thinking should always begin with a focus on "reasonable drawing", and designing with common sense and normal proportions in mind, rather than resorting to "absurd" architectural gestures, like large overhangs or twisting forms.

An emphasis on the use of natural materi-

The facade features ultra-clear glass windows, with a very high Color Rendering Index to maximise daylight levels – this is coupled with high levels of external shading to minimise solar gain

als includes exposed oak wood floors, in the main meeting rooms, the foyers and all office spaces. Meeting room floors are partially covered with a multicoloured natural wool carpet, needed for acoustic reasons; finishes on the walls and ceilings are made of woollen textile felt.

The facade features ultra-clear glass windows, with a very high Color Rendering Index to maximise daylight levels. This is coupled with high levels of external shading to minimise solar gain. A total 374 lowenergy LED luminaires are installed to light the curved surface of the 'egg' at dawn and dusk.

Renewable technologies include rainwaterflushing toilets and a photovoltaic "umbrella" on the roof that will provide about six per cent of the total power requirement, as well as create a naturally ventilated and sheltered external space.

Six percent might sound low for a PV installation, but Samyn says it was tough to achieve given the building's high energy demand from equipment and computers, which he compares to a high tech factory. The PV array covers both the modern and the historical parts of the building and symbolises the link between the present, the past and the future.

Europa divided

The new EU headquarters was originally scheduled for completion in 2012, but a series of delays, related to the project schedule and wider political issues, pushed back the opening to January of this year.

Initial surveys had failed to reveal the extent of asbestos in the existing building, which had a knock-on effect on removal work. A decision was made to retain much more of the building than the listing required, resulting in a redesign and additional time.

The effective start of the construction was

delayed initially by the discovery of oil pollution in the ground and by an appeal made by one of the participants in the tender for the construction of the building.

In addition, the Lisbon Treaty entered into force in December 2009, during Europa's design and construction, resulting in programme modifications, such as new security measures, adaptations and building permits. As a result, costs increased over the development period, from the original estimate of €240m to over €320m.

The increasing budget drew scorn from David Cameron, who in 2011 expressed his "immense frustration" at the amount to be spent. "You do wonder whether these institutions actually get what every country is having to go through as we cut budgets and try to make our finances add up," he said in a press conference.

However, Samyn contends that the final cost is typical of many equivalent corporate HQ buildings of this type. The argument over costs seems almost trivial, given the scale of the Brexit 'divorce bill' is estimated to be as much as \pounds 50bn and the Europa building will prove a vital arena, over the coming two years, as politicians wrangle over the final agreement.

ABOVE AND BELOW © colours: Georges Meurant

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HERBERT CRESCENT LIFT KNIGHTSBRIDGE, LONDON

A great glass elevator

An eight-storey glass lift in an opulent Knightsbridge residence has taken glass engineering and construction to ambitious new heights. Steve Menary investigates

harlie and the Great Glass Elevator is a renowned novel and the centrepiece of Roald Dahl's fiction which has been brought to life in a new six-storey mansion in Knightsbridge, central London.

A glass lift is at the heart of the project extending eight storeys from the basement to a roof terrace that has created what's thought to be a world-first in a residential property.

"We think that this project took glass engineering and construction to new heights, literally and figuratively, and it is likely to be the tallest self-supporting annealed glass structure in the world," says Gennady Vasilchenko-Malishev from engineering consultants Malishev Engineers.

According to the Bath-based consultant, the first stacked load-bearing glass walls began to emerge in the 1990s, such as the Glass Cube Reading Room at the Arab Urban Development Institute in Riyadh, Saudi Arabia, which was designed by Dewhurst Macfarlane & Partners.

Malishev took on and developed the principle of vertically stacked load-bearing glass further at the Boltons Place residential development in London, which was completed in 2006 and included a 20-metre high structure.

For the Knightsbridge project, these principles would be extended even further.

"From the early design meetings the architects wanted a 'wow' effect from this central feature in the house which would

For all of the design and construction team, producing such a groundbreaking scheme was to prove a challenging task

combine minimal design and maximum transparency," says Malishev.

For all members of the design and construction team, producing such a ground-breaking scheme was to prove a challenging task. The scheme features an array of consultants and contractors with experience in high-end residential projects, including Tim Flynn Architects producing the design, Malishev working on the glazing for the lift and Walter Lilly brought on board as main contractor.

The building originally comprised four bedsits, which were bought by the client so that the property could be reverted back to a single Toblerone-shaped residence but all this consolidation has proved a long process.

Work has only just been completed but

first started in August 2011 with the reconfiguration of the internal space to create an area for the lift. This also necessitated a major excavation project. The construction team dug down more than 25 metres and installed secant piling walls as a four-storey house was extended to eight levels.

"We certainly pushed the boundaries," says Steve Edwards, contracts manager for Walter Lilly. He goes on to explain: "It was quite a challenge to get a piling rig in to dig down to that depth and we required a structural rig to lift the piling rig in."

The basement work alone took around 11 months to complete and the centrepiece glass lift was two years in construction.

Finding a specialist sub-contractor willing to take on the lift element was difficult due to the challenging work. Many sub-contractors were simply afraid of this contract and refused to tender altogether, regardless of the costs

169 STEPS

The lift is surrounded by a 169-step spiral staircase. At the top floor, this staircase leads to a glass retractable roof, which opens out onto a roof terrace with views of Knightsbridge

Malishev adds: "Many sub-contractors were simply afraid of this contract and refused to tender altogether, regardless of the costs."

Only two companies were willing to put in bids. Axis Elevators won out, with the glass supplied by UK Glass. Installation of the glass began in March 2015 and the panels were lifted up using hoists and an overhead gantry then down through the oculus of the openable roof light.

A hydraulic ram lift was used as a working platform to facilitate the process of installation. Despite very tight working space, no glass panels were damaged during the installation process. The last panel of glass was installed on 29 March 2016 and the lift was finally commissioned in January 2017.

The glass structure comprises a curved laminated glass cylinder in diameter with a cantilevered steel staircase wrapped around the outside. The enclosure size of the lift has been restricted to 1.4 metres, which was dictated by a very tight floor plate arrangement.

There is also an external door and an internal lift door, which are both glass. Due to the circular structure, this was also a challenge. Edwards says: "It's about the tightest radius you can get. All the glass pivots so you can clean the glass."

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There are three sheets of curved glass for the exterior of the lift shaft on each floor. "It's a parallelogram, and the glass is tied in at intermediate levels," explains Edwards.

The glass shaft of the lift is split at each floor level with a helical steel handrail, which acts as the splice joint between the top and bottom glass panels as well as providing lateral restraint.

The top of the lift shaft is capped by static and openable semi-static roof lights and on each landing-level for the lift.

Malishev explains: "A series of high precision rollers and rails were used on inner and outer perimeter rings to support the sliding roof light. The roof light is comprised of a crescent shaped walk-on double glazed units, spanning one metre between the inner and outer perimeter ring support."

The sliding floor unit moves using a spur pinion gear with planetary-type motor and supporting V-shaped wheels and the selfsupporting glass cylinder sitting on top. Malishev adds: "This makes this mechanism truly unique in this kind of application. We were responsible for specifying the system and worked closely with the system manufacturer to advise our steel and glass fabricator with best available options as well as tolerances required."

The exterior of the lift features bronze cladding. This was produced by Paul Dennis Metal Works, which like the rest of the project team has experience working on high-end projects in central London, including new gates at Kensington Palace.

In Knightsbridge, every piece of cladding was hand-made but this package could not be commissioned until the structure of the lift was completed. Once the lift was complete, the bronze cladding was applied to clad the stainless-steel H section profile on the exterior of the lift.

The lift goes below the basement level as the ram has to be situated beneath the lowest floor and is surrounded by a 169step spiral staircase. At the top floor, this staircase leads to a glass retractable roof, which opens out onto a roof terrace with views of Knightsbridge including the nearby Harrods department store.

The glazed lift is a centrepiece in a house distinguished by up-market decor. There are British stone floors which were installed by Stone Interiors in most parts of the residence. Swaledale, Angelsey, Eskett, Salterwath and Swaledale stone was used and sourced from Chelsea-based supplier Britannicus Stone.

In the dining room, the floor is a combination of Swaledale with an Anglesey stone border by Britannicus Stone, while the kitchen features an oblong of Swaledale stone framed by American black walnut, and the master bathroom features the exquisite and rare Ball Eye Blue stone, which has been hand carved by Stone Interiors.

There is also a working fireplace and raw silk wallpaper supplied by Tatiana Tafur, but glass is a recurring motif.

Peter Layton from Bermondsey-based specialist London Glassblowing also worked on the decor to produce a collection of glass vessels installed in the dining room on the ground floor.

"We have a Connaught Hotel Art Deco inspired bar and bathrooms with bevelled glass," explains TFA's Brian Wade, who sourced designed and installed all the soft furnishings.

The scheme also features hand-made glass chandeliers. On the first floor, a glass chandelier created by Baroncelli has been christened 'Storm Cloud'.

German designer Eva Menz crafted another glass chandelier christened 'Up in the Clouds', which is made from handblown Polish glass leaves and conches. This glass element also features real leaves collected from nearby Hyde Park by the family. Before the leaves were added to the chandelier however, they were dipped in 14 carat gold.

While an overall value has not been disclosed, \pounds 1.9m has been spent on fixtures and fittings alone.

In September 2016, the project featured on the UK Channel 4 series *Millionaires' Mansions*, which has now also aired in Australia and New Zealand.

For all this opulence, Brian Wade says that the house is not intended as a status symbol. In March 2017, the clients, a family of five, finally move into the property. Mr Wade adds: "The client lives in London and their children go to school locally, so the home will be lived in and enjoyed. Often the shame of these projects is that you do all this work and they are only lived in two or three months of the year, but that will not be the case here."

While Knightsbridge has seen a proliferation of mansions created by digging out basements, none can surely match this with a glass elevator that really does help the project fly.

PROJECT DETAILS

Project: Private residence, Herbert Crescent, Knightsbridge, London Client: Not disclosed Value: Not disclosed Architect: Tim Flynn Architects **Consulting engineers: Malishev Engineers** Structural engineer: Michael **Barclay Partnership** Quantity surveyor: Deacon and Jones LLP Main Contractor: Walter Lilly Joinery: John Spencer Joinery and Halstock Lift: Axis Elevators Glass: UK Glass

The lift goes below the basement level as the ram has to be situated beneath the lowest floor and is surrounded by a 169-step spiral staircase

27 LINDEN GARDENS NOTTING HILL, LONDON

Victorian townhouse is a glass act

A neglected, empty building in west London is being converted into luxury apartments, thanks in no small way to the clever use of glass. Jess Unwin finds out more

Glass and its ability to help create the light, airy and open-plan living spaces that define the aspirations of contemporary residential architecture has transformed what was once a neglected Victorian townhouse into a 21st-century des res.

Located in a tree-lined cul-de-sac within the Pembridge conservation area of west London's Notting Hill, the mid-terrace property that is 27 Linden Gardens had certainly seen better days when Fruition Properties and HUB Architects took it on.

The building, originally five storeys, was unoccupied after a period when its many rooms had been converted for multiple occupancy use, and was "in a condition of disrepair", according to HUB's Jennifer Creighton.

After planning approval, work began in November 2015 to convert the property into just four apartments. Fruition Properties' Ross Coathup, project and design manager, reveals the interior was "completely gutted" with the removal of everything, including the floors, to enable reconstruction and reconfiguration. However, from the outside, little has changed. Coathup is keen to point out: "One of the central principles of the development is the retention of the facade."

Fusing open-plan transparency with Victorian tradition

Creighton agrees and adds: "The design vision for number 27 is to create light and transparency within the existing Victorian facade that encompasses the new interconnected spaces and fuses with the traditional aspects of the building."

She continues: "Primarily, we wanted to facilitate the contemporary requirements of modern living standards – more open-plan, spatial requirements. We wanted to move away from the smaller, enclosed rooms that were traditional when the building was first designed to have lots of light and space. Glass and other reflective surfaces are among the things that can make that happen."

Using glass to partition spaces means that apartment one, a duplex spanning the lower ground and ground levels and apartment

PARTITIONING

Using glass to partition spaces means that apartments have a transparency that allows you to see right through from the front to the rear of the building

STEEL

Inserting a new steel framework to support the reconfiguration of the rear of the building at lower ground, ground and first floors, had ramifications for the use of glass

four, another duplex on the third and top floor, have a transparency that allows you to see right through from the front to the rear of the building.

Fire-safe glass challenge

However, that drive for transparency meant jumping an important safety hurdle in apartment one. Coathup explains: "To get our front-to-back transparency on the ground floor, we needed glass that would separate the main staircase from the adjoining living room, dining/kitchen space and the main entrance to the apartment.

"This needed to be fire-rated construction, which means the glass had to have insulating and integrity qualities to stop fire and radiation. That represented a challenge which required a relatively innovative answer: a frameless system of two fixed, glass walls and pivot doors that was as transparent as possible but still insulated and fire-rated."

Creighton takes up the story: "There are limited fire glazing systems that are appropriate for the domestic market. Other systems tended to have very heavy framing surrounding the screens and the door systems." After some time searching for a supplier of the right tried and tested product, and after a couple of potential solutions proved to not be what they were looking for, HUB and Fruition Properties eventually chose the Lunax system. "It ticked all the boxes," says Creighton.

The system, which was created by a Belgian company and is sold through dealers in the UK, uses Contraflam glass, a product that met the insulation and integrity requirements HUB and Fruition Properties were after.

Supplied by Saint-Gobain subsidiary company Vetrotech, the Contraflam glass offers from 30-120 minutes of integrity and insulation (EI30-EI120 classification). This refers to the amount of time it will protect against fire, smoke and hot gases, acting as a heat shield and keeping the non-fire side cool.

It comprises two or more sheets of toughened safety glass with the cavity between the sheets filled with a transparent intumescent gel interlayer that reacts chemically when exposed to fire and expands to further bolster the glass. It has been used at locations including the International

BESPOKE

All the internal glazing at Linden Gardens is bespoke, and the detail design was painstakingly developed by Fruition Properties, Hub Architects and fabricator Fineline Aluminium

Conference Centre in Edinburgh and Pioneer Point in London.

Coathup says: "At Linden Gardens, the glass fits into an aluminium channel frame but that frame is recessed into the ceiling and floor, so is concealed. Where it abuts the walls there are intumescent strips."

Bringing in more light – and disguising steelwork

Inserting a new steel framework to support the reconfiguration of the rear of the building at lower ground, ground and first floors, including the marginal repositioning of the existing light well, also had ramifications for the use of glass.

Creighton explains: "The light well is encased by a Fineline Aluminium glass sliding door and glass screen system, which has good insulation qualities and which is also vital to bringing extra light into apartment one. But we also wanted to disguise the steel behind the glass system. We achieved that by using back-painted glass panels which hid both the floor structure and structural vertical posts."

Coathup stresses that all the internal glazing at Linden Gardens is bespoke, and

The external facades, including window apertures, may have survived but all the sliding sash windows have been replaced with modern timber-framed and doubleglazed versions

the detail design was carefully and painstakingly developed between Fruition Properties, Hub Architects and the fabricator, Fineline Aluminium.

The external facades, including window apertures, may have survived but all the sliding sash windows have been replaced with modern, timber-framed and doubleglazed versions. "Same appearance but better thermal properties," says Coathup.

Making the light well larger, introducing more glazing and relocating it slightly closer to the back wall of the building all helps

would meet the aesthetic targets of the conversion. We've now put in a lift with glass doors to follow the theme of transparency."

Inserting new floors, says Coathup, was also a challenge. An easi-joist system spans steel beams, party and blockwork walls. Plywood decking was then laid over joists with acoustic, insulation and underfloor heating layers on top of that. Coathup explains: "It was a question of careful, sequential manoeuvres with quite a lot of temporary works."

Creighton adds: "The new floors were inserted at slightly different levels to maximise floor-to-ceiling heights. That had to be considered very carefully in relation to the facade's existing windows."

Coathup says lessons have been learned at Linden Gardens that will stand everyone in good stead for future work: "Beside the fire-rated glass work, we've learned how carefully you have to check drawings against glazing system installation to make sure everything fits together – coordination is the key and a 3D model of the structural elements certainly helped understanding

ABOVE AND RIGHT

The living wall within the light well spans the lower ground and ground levels

OPPOSITE

This can be enjoyed by people sitting in the space at the bottom of the light well

FACT BOX

- The area covered by the Pembridge conservation area was built during the three decades between 1840 and 1870
- Glass balustrading is used on some of the building's staircases
- Townhouse conversions like that at 27 Linden Gardens are relatively rare, mostly because the buildings often have multiple owners

One of the most striking features of the townhouse conversion is a living wall within the light well, which spans the lower ground and ground levels and is around 5 metres wide

bring in extra light. Elsewhere, a mechanical sliding roof light that sits above the central staircase from third to fourth floor has the same effect.

Overcoming and learning from the challenges

Fitting an appropriate lift system in this Victorian conversion was another of the project's challenges. Creighton says: "For access requirements it is beneficial to have level access...but we needed something that

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PROJECT DETAILS

Main contractor: Fruition Properties (construction arm Area 29) Project management: Fruition Properties Architects: HUB Architects & Designers Quantity surveyor: Fruition Properties (Area 29) M&E: IMS Ignite Maintenance Services Civil engineering consultant: EngineersHRW

Interior floor and wall tiling: Huds Tiling Services

Glass: Frameless fire-rated glass screens and pivot doors: Contraflam Glass and Lunax Porta pivot door: Supplied by Billericay Glass Company Slim frame glazing system to inner courtyard and balcony: **Fineline Aluminium** Glass balustrade to stair: Railing London Glazed screens to Flat 1 en-suite: Crystal Units Living wall: Scotscape **Kitchens:** Design: Roundhouse Appliances: Hahhenau **Bathrooms:** Brassware: Zuchetti

Basins: Catalano Baths: Clearwater Flooring: Hummingbird floors Wardrobes: Neatsmith Lift system: Kleemann Lifts Sliding roof light: Natralight

where steel components were going to be and what we had to conceal."

21st-century standards that give a building a new lease of life

One of the most striking features of the townhouse conversion is a living wall within the light well, which spans the lower ground and ground levels and is around 5 metres wide. This can be enjoyed by people sitting in the space at the bottom of the light well. Coathup says: "It creates its own micro eco-system and improves the air quality around that area. It looks pretty good too!"

Creighton points to another 'green' aspect of the conversion: "By bringing in more natural light to the lower parts of the building we don't have to use so much artificial lighting during the day."

And Coathup adds: "Effectively taking this Victorian townhouse to pieces and putting it back together again results in having to improve the insulation as well as the overall standards of construction. That includes the acoustic insulation between apartments. It brings a tired building up to current regulations."

As Creighton says, conversions like the one at Linden Gardens are a "good way to bring these buildings into the 21st century and give them a longer lease of life."

Contemporised Victorian: a style in demand

Conversions like this at 27 Linden Gardens are uncommon but, as Coathup says, "contemporised Victorian buildings are in demand." The clever use of glazing to create the transparency of apartments one and four contributes to asking prices of £3.5m and £2.5m respectively.

Apartment two, accommodated by a first floor mezzanine, and apartment three on the second floor have traditional partition walls. However, the quality of this luxury project suggests it won't be long before all four apartments are snapped up.

Future-proof buildings now

Jim Lowther assesses how we can future-proof a new generation of buildings through the specification of the latest rooflights and fire protection products

Specifying products for domestic and commercial building projects can be a daunting process, one which has to balance the demands of customers and end users, and support the practical and safety requirements demanded by the building.

Roof lights and glazing are an intrinsic part of this process and deliver tangible benefits like permitting natural light into buildings and providing ventilation and access. The latest raft of products to arrive on the market can support safety aspects and stringent fire regulations too.

Specified in a range of domestic and commercial applications rooflights can provide workable solutions where lighting is required, allowing architects to create naturally-lit rooms which have been proven to have a positive impact on the health and wellbeing of the building users. In addition to specification in new-build projects, rooflights can also be used in retrofit commissions and conservation rooflights are available to support listed building requirements and sympathetic restoration.

All this being said, it is often aesthetics and thermal efficiencies that are at the top of the list when selecting rooflights. Roof glazing and technological developments in recent years now give an unrivalled choice where style is not compromised over substance allowing performance and aesthetics to co-exist. And, whilst there is no legal requirement regarding glazing fragility, it is best practice to specify non fragile glass or polycarbonate.

It is important to consider the sustainability and environmental impact that buildings will be required to fulfil as part of future regulations. The Energy Performance of Buildings Directive, will require all new buildings to be at 'almost zero energy' by 2021 and the thermal efficiencies of rooflights will never have been more important.

In addition, rooflights can also aid egress from buildings should the need arise and can either be used as stand-alone access or can be coupled with a fire safety system. It is perhaps this area of the market where

most development has been made recently and which will future-proof buildings as a result of predicted changes to legislation next year.

Fire and smoke safety

In 2013 only minor amendments were made to Part B (Fire) Building Regulations rendering it virtually unchanged since its

AUTOMATIC OPENING VENTS

The latest AOVs provide enhanced connectivity and boast a powerful 24-volt electric motor

We should all remain committed to developing buildings which are sustainable and safe

last full revision in 2006. It is therefore expected across the industry that 2018 will see a revision to the regulations with regard to smoke ventilation systems in the next generation of buildings.

Intelligent smoke ventilation systems are the latest products to become available and are designed to detect heat or smoke within a building and aid the natural flow of smoke out whilst delivering enhanced safety for building occupants. The Automatic Opening Vent is a key element in this system and if not specified to the correct standard can have a detrimental impact on a full working system. The latest AOVs provide enhanced connectivity and boast a powerful 24-volt electric motor which effortlessly powers the arms which open the vent. These AOVs also deliver a 'future proofing' aspect as they already meet the necessary requirements surrounding the proposed changes to legislation and currently conform with Part L of Building Regulations and Part B which pertains to Fire safety.

When specifying such products, it is important to ensure that the entire product, not just isolated components, have been fully tested and certified to EN12101 – 2:2003, a legal requirement under the Construction Products Regulation 2013 and the European standard for smoke and heat control systems. It replaced BS7346:1991 as the UK's product standard for rendering, products which do not meet this new standard are unsuitable and unacceptable.

What does the future hold?

Whilst legislation regarding the exact specification and requirements is yet to be confirmed, it is clear that the AOV and an intelligent smoke ventilation system as a whole supports the widest possible expectations that may be enforced. By installing such products in buildings now – before the legislation is mandatory – architects are delivering tangible benefits to their clients by future proofing buildings.

Clearly, an awareness of current and future legislation plays an important part in product development and managing end user expectations by ensuring specification now will meet future safety criteria too.

As manufacturers it is important that we work with associated legislative bodies – including National Association of Rooflight Manufacturers (NARM) and Centre for Window and Cladding Technology (CWCT) – to develop products and systems that not only provide aesthetics for buildings but also support safety requirements protecting those that live, work, study or occupy those buildings in whatever way.

We all need to remain committed to developing buildings which are sustainable and safe.

Jim Lowther is sales director at Xtralite

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Don't break the chain

Phil Savage of Pilkington United Kingdom explores the use of structural glazing in modern building design and explains why the 'value chain' is integral to successfully fulfilling an architect's vision

Structural glazing is a common feature of architectural projects across the world. From the Shard and the Gherkin in London, to the Louvre in Paris or the skyscrapers that pepper the skyline of international cities such as Tokyo and New York, it has become an integral aspect of any cityscape.

Many people take the engineering strength behind these designs for granted. Buildings that are flooded with light are now seen as commonplace, yet it is the designers and creators of these buildings that endeavour to understand the technology and mechanics that underpin them.

With a knowledge and understanding of the full value chain – from design to installation – architects can ensure their vision becomes a reality.

More than aesthetics

Over the past 10 years we have seen continued investment in research and development across the construction industry, with both the building products and construction techniques used in the built environment having evolved significantly.

This is particularly relevant for the developments in structural glazing. Here, a once-niche technology that was used only in some of the most cutting-edge projects has now become a material used in buildings across the world, from commercial office blocks and shopping centres to universities and museums.

As architects continue to push boundaries and design light-filled spaces, the glass manufacturing industry has evolved to create and develop products that facilitate this.

Nowadays, architects can specify frameless, fixed-point glass systems that are based on steel tension structures that hold the panes in place. This means systems forming otherwise unsupported walls of glass can be created to a great height and incorporated into a design.

One project we have worked on recently which is a great example of this in action is a new high-rise court complex in Al Farwaniya, a suburb of Kuwait City.

Architecturally, the building is designed to reflect the strength and transparency of the Kuwait justice system and, appropriately, glazing plays a starring role. Here, the building's key design feature is a 20metre-wide sloping glass wall that rises above the main entrance of the building to a height of 70 metres.

This is made possible using toughened glass, which provides the strength of the structural glazing system. The addition of toughened laminated glass can also add further resistance against mechanical forces, such as high winds or blasts.

However it's not just the aesthetics of a building that the glass manufacturing industry is contributing to – performance is also benefitting.

With advancements in glass-coating technology architects are now able to specify a range of high-performance products into their designs. From insulating glass units (IGUs) that improve the energy performance of a building through solar control and low-e properties to those that can reduce noise pollution or provide enhanced security features. All of which can be incorporated into the structural glazing systems of a building.

The importance of installation

Once design and specification is complete, the final stage is installation. This is of paramount importance to the overall result and if structural glazing is installed incorrectly, not only will the building not look as it was intended, it will not perform to its full potential.

Structural glazing systems are designed to last decades, so it is vital that the installation is carried out by a fully trained professional team.

601 Massachusetts Avenue, Washington DC

Structural glazing is becoming increasingly popular in heritage building refurbishment

ART INSTALLATION Glynn Vivian Art Gallery, Swansea

The preferred route would be for the system manufacturer to work with an experienced installer network, accredited and supported by the manufacturer. This way, architects and specifiers have peace of mind that those working on the project not only have an in-depth knowledge of the exact systems they are working with, but they have also been trained in all elements of installation. This will include everything from on site safety to how structural glazing interacts with other products in the building facade.

It's also worth remembering that as the complexity of the design increases, the pool of talent that can install it becomes smaller. As the size and thickness of a pane increases, it becomes increasingly challenging for those working onsite. To overcome this, manufacturers can help to identify the team an architect needs around them.

Beyond the confines of commercial building design

While structural glazing has often been the domain of commercial construction, it is now used in projects ranging from highrise skyscrapers to domestic designs and everything in between.

Today, structural glazing is becoming increasingly popular in heritage building refurbishments, where its low-profile fittings mean it does not obstruct historical architectural features but is still able to give a new lease of life to a building. It can be used to seamlessly link old and new buildings, as well as helping to preserve older structures by providing an additional element of protection to the building envelope.

It is also widely specified across the retail sector, where it can provide uninterrupted glass walls and improve the customer's shopping experience, and in transport hubs where structural glazing is often used to create open, light and welcoming spaces for the public.

The benefits of structural glazing systems are clear, and by striking the right combination of design, manufacturer and installer, architects can maximise the true value of this building product and successfully see their vision come to life.

Phil Savage is commercial contracts sales manager at Pilkington United Kingdom, part of the NSG Group

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"the influence of an architect in the specifying of materials is huge, communicating with them is the key"

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The energy revolution underway in glass extensions

Christian Wiegel at Solurlux discusses glass as a construction material in the context of a research project on the development of 'energy self-sufficient' glass extensions

onstructions made of glass have their own special charm. As a trained architect and engineer, I am thinking first of all about architectural aesthetic appeal and I use the word architecture here to encompass the language of form, design and tectonics.

For more than 15 years the driving tension field of my work has been 'atmospheres, tectonics and energies. Glass as a construction material has an unexpectedly large influence on the energy characteristics of a building, while the climate of a particular location also plays its role. A building's facade which is made predominantly of glass can make a significant part of the solar radiation effective as useful energy in the building.

Admittedly, in the summer, solar energy may provide more heat than the user wishes and in the winter, a comparatively large proportion of the heating energy of the building is lost via the glass facade into the environment. During my professional career, I have prepared calculations and plans for many buildings to show how, over a course of a year, buildings can lose the least minimum energy through the facade. The perceptible comfort of the interior for the user is the key factor when building a glass extension.

Before the research project of the past three to four years could get fully underway there were a few things which had to be prepared and clarified including the installation of the research glass extension on the Solarlux site in 2013.

As transparent extensions are glass structures, research poses a great many interesting questions including: How much energy can be provided by the sun alone? How does the location affect it? How much energy do we need for heating in winter? What savings in heating energy for a residential house can extensions provide and how much energy does an extension itself need?

RESEARCH

Before the project could get fully underway there were a few things which had to be prepared and clarified, including the installation of the glass extension The topic and questions are exciting as they have to be looked at in a holistic manner. In my view, glass extensions offer the potential to make a silent contribution to the energy revolution. The tightened requirements on the overall energy balance of buildings due to the energy savings regulations and legislation on renewable energy etc, should be sufficient cause to consider utilising solar architecture.

The intention of my research work has been to develop a completely new glass extensions concept in which the majority of the heating energy required can be generated independently by the extension. The aim is also to increase the number of hours per day that can be spent in a maximum feel-good climate within the extension. This can be reached by the technological development of glass facades which, in the future, through using functional glass in facades, energy will be created and used immediately or saved in a seasonal store, depending on the temperature.

The main aim is to operate the glass extension solely self-sufficiently with regenerative energy and the secondary aim, dependent on location, is to also supply the house itself with the energy generated by the glass extension.

In our day-to-day existence, we all need to think about ways of saving energy. And governments need to play their part by setting new standards. In my opinion Europe is approaching the matter very intensively, and luckily others are gradually following. We have known for some time that glass extensions are a component of reliable solar architecture but now we are leading the way proactively as glass extensions can make a significant contribution to the environment. The energy saving potential of glass extensions is clear.

Christian Wiegel is research project manager, Solarlux

Blinding benefits

Integral blinds are not simply an open and shut case, explains Ian Short of Morley Glass & Glazing

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They deliver privacy and sun shading, without obscuring the view or preventing light from entering a room. Unlike traditional curtains and blinds, integral blinds never need cleaning, don't clutter the window sill and are low maintenance. They are securely fitted inside the sealed unit which prevents them from becoming dirty, dusty or damaged.

They can be fitted into new or retro-fitted into existing internal and external doors and windows of all materials – PVCu, timber and aluminium – including curtain walling. The maximum size of integral blinds is 2500 mm (w) x 2500 mm (h) and there's a choice of operating systems from manual and solar controlled to fully automated operating systems – depending on your specification, requirements and budget.

Manual, solar or automatic systems

For manual systems, the slat raising, lowering and tilting function is achieved using a securely attached cord fitted to a rotational magnetic transmission through the glass, thereby guaranteeing the insulating glass unit's hermetic seal. A primary consideration with regard to the use of cords is safety. The British Blind and Shutter Association (BBSA) provides guidelines for the manufacture of blinds that are child safe, so always check that your supplier conforms with these guidelines. For added safety, some systems also supply anti-ligature knobs, which are often specified in psychiatric and mental health units.

Other manually-operated systems use magnetic sliders to raise, lower and tilt the

Unlike traditional curtains and blinds, integral blinds never need cleaning, don't clutter the window sill and are low maintenance Venetian or pleated blinds. The cordless slider devices are often quite slimline in design so they can even be used on sliding and bi-fold doors.

Energy efficiency is a key issue and some systems are powered using rechargeable batteries that can be charged via a small external solar panel on the outer face of the

window. This also eliminates the need for, or cost of, an electrician, as the system isn't hard-wired into the mains – and saves on-going running costs.

A fully-automated system is hard-wired into the mains – and is most often used in high-end residential applications, as well as corporate office spaces. For added luxury, you can even synchronise the movements of groups of up to 12 blinds for simultaneous raising and lowering. Plus, with the growth of home automation systems, some manufacturers can integrate the automation of integral blind operation within these systems, using pre-wired control boxes, and making for a smooth problem-free installation.

Integral blind systems are available in a wide range of colours as well as a full range of glazing options including toughened, solar control, triple glazing, thermal insulation, noise reduction and fire resistance.

Integral blinds for fire-resistant glass units

Commercial buildings frequently feature internal doors, screens and windows that require fire resistant properties. These are often made from steel, steel-clad aluminium and fire resistant timber.

The design of fire resistant doors, windows and glazed partitions requires them to provide half-hour or one-hour protection in the event of a fire. They are also required to perform as normal windows and doors. Integral blinds can be fitted inside sealed units manufactured using specialist fire glass products thereby creating a practical and aesthetically pleasing product.

Thermal performance & quality control

Integral blinds combine the thermal control performance of an insulating glass unit (IGU) with the benefits of an integrated Venetian or pleated blind. You can manage sun shading, solar heat gain and light control within a single product. Designed for installation in frames in glazed facades, sealed units with integral blinds inside are also ideal in specialist applications in interior partitioning windows.

The manufacture of sealed units with integral blinds inside requires specialist equipment and skills to ensure a high quality finished product.

Ian Short is managing director at Morley Glass & Glazing

Kalwall[®] brings light and security to Gatwick Airport

Good lighting is always essential but sometimes a well-lit interior also needs to be discreet when viewed from outside. This is the case with the very long Pier 1 which runs alongside the baggage system and gates at Gatwick Airport's South Terminal Building. The two stringent requirements of privacy and security have been neatly solved using Kalwall®, with the added benefit of enhancing the long walkway by creating a pleasant interior ambience.

Kalwall offers complete line-of-sight protection, maintaining privacy for building occupants while bathing the interior with diffused daylighting regardless of the weather. It can also be manufactured for blast resistant applications such as in airports and other sensitive public environments, or to protect workers in areas at risk from explosions, such as in refineries or industrial complexes. Kalwall is also key to overcoming security concerns. Apart from providing visual protection, its inherent strength makes it ideal

for secure locations. With heavy duty impact resistance properties, access through wall or rooflights can be denied while fire and most chemicals will not affect its surface

Aesthetically, Kalwall will eliminate shadows and glare and the stark contrasts of light and shade. The system also enhances simplicity by doing away with the need for blinds, curtains or solar control. Even on cloudy days, the interior is flooded with natural daylight, which means less artificial lighting and, because Kalwall is highly insulating, energy costs are reduced. The standard Kalwall 70mm thick panel offers insulation up to 0.28W/m²K – equivalent to a cavity filled solid wall.

Apart from being specified for all types of new build project, Kalwall is increasingly used for the refurbishment of cladding or rooflights on aged buildings. Case studies and technical information are available from Structura UK Ltd please call or visit the website.

Structura UK is the exclusive distributor for Kalwall translucent daylight building systems for England, Wales and Northern Ireland and a leading supplier, fabricator and installer of glass curtain walling, rainscreens, glass atria, windows and other architectural glass building products.

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

Preserve and enhance

Since the original Conservation Rooflight® was designed by The Rooflight Company over 20 years ago, numerous imitations have appeared. However, the original the Conservation Rooflight® remains the most authentic in its class. Slim steel sections, a glazing bar, glazing clips and traditional

opening mechanisms are just some of the reasons why this rooflight should be the first choice for our Nation's much loved historic dwellings and landmark structures. For more information about the Conservation Rooflight[®], contact The Rooflight Company today.

info@therooflightcompany.co.uk

Commercial structural glazing specialists

Melayway Glass Associates Ltd is a specialist structural glazing and contracting business, based in Sunningdale, Surrey. It specialises and focuses its business on the design, supply and installation of a variety of bespoke glazed structures and solutions. Both its U.K.

And International specialist supply partners underline its attention to the importance of detail and exclusivity, combined with long term functionality. MGA's offering is completely unique to the construction industry. MGA's very experienced team are available to provide consultancy services in all aspects of structural glazing and facades.

info@melaywayglassassociates.com

More ground-breaking innovations...

The brief for The Grange, sat on a hill side near Penzance, was to construct a multi-level clear structure that opened up onto the landscaped hillside, which formed the family garden. Access to the garden with the largest seamless opening was the

challenge to be overcome. A corner opening frameless structure and new innovation in glass was required to achieve the clients dreams, **Glasspace** designers and structural engineers created a cantilevered glass corner solution incorporating Glasspace Infiniti Fineline sliding doors. You are invited to take a virtual tour of this structure at: https://s3-eu-west-1.amazonaws.com/grange/The+Grange+VT.html

info@glasspace.com

Architects Datafile website

The Architects Datafile (ADF) website is an online provider of past and present products and news items for the architect or specifier. architectsdatafile.co.uk is a one-stop source for all the latest press releases providing any visitor with access to information about products and services that they may require. From the website, you can find links to digital

issues that have live links to advertisers' sites, as well as daily email alerts to keep you as informed as possible.

www.architectsdatafile.co.uk

Sunsquare's opening roof light

The Aero Access is an electrically operated opening roof light that opens fully to provide access to your roof space while bringing abundant natural light and ventilation into the interior below. The hinged design incorporates an extruded and CNCmachined structure. Along with its functional

side, the BSI Kitemarked rooflight remains a classic, timeless design that outstrips the competition in terms of extreme wind loading, air permeability and weather tightness. Combined with a **Sunsquare** upstand, the Aero Electric provides U-values of 0.35 W/m²K.

01284 846596 www.sunsquare.co.uk

Senior brings light to new school

As the first new secondary school to be built in Cambridge for 40 years, the recently completed Trumpington Community College has been given a bright and modern design that features various aluminium windows, doors and curtain walling systems from

Senior Architectural Systems. Positioned around a central atrium that maximises the flow of natural light, the L shaped building features Senior's thermally efficient SCW+ and SF52 curtain walling, SPW 300 aluminium tilt and turn windows and SPW501 aluminium commercial doors.

info@seniorarchitectural.co.uk

On track for success: GLASSOLUTIONS employs unique system

A truly innovative approach to structural glazing installation has enabled industry-leading commercial glazing specialists **GLASSOLUTIONS** to overcome a series of stringent health and safety limitations on a high-profile commercial project in central London. Using a specially designed sliding track system, GLASSOLUTIONS was able to reduce the glass installation footprint for the site, safeguard the installation team from the risks associated with working at height, and advance the speed of the installation at One Bedford Avenue by a very considerable margin. Occupying a prominent corner of Tottenham Court Road, One Bedford Avenue is a multi-use development which combines commercial offices with retail units to create a versatile multi-use space. Designed by Stirling-nominated architects Bennett's Associates, One Bedford Avenue replaces two outdated office blocks with highly attractive and energy efficient spaces, with natural light on three sides and spectacular views at the upper levels. Working with project managers Mace, GLASSOLUTIONS delivered a semi-bespoke window system, with window profiles designed specifically for the project to meet the design intent.

01904 610077 monica@partners-group.co.uk

www.architectsdatafile.co.uk

Making the most of daylight

Our range of Flatglass rooflights are an aesthetically-pleasing and cost-effective way to bring extra daylight into both commercial and residential buildings. **Roofglaze's** Online Shop offers various stock sizes of Fixed and Hinged Flatglass rooflights, as well as the opportunity to

add Ritec ClearShield treatments to protect your purchase. We have also recently added some stock sizes of Walk-on and Sliding Flatglass rooflights, which provides a quick and easy way to buy these more complex units for your project.

01480 474 797 www.roofglaze.co.uk

Crittall acquires high security glazing

Crittall Holdings has announced the acquisition of the Trade and Assets of Fendor – a leading UK company with expertise in the provision of high security, ballistic and bombproof fenestration. The company is also a major supplier of windows used in custodial and mental health institutions and the

petrochemical industries. The acquisition creates Crittall Fendor that will complement the Essex-based Crittall Group of companies in a number of significant ways. It expands the range of products and markets served, and offers geographical benefits in assisting Crittall Windows with its North of England and Scottish operations.

01376 530800 www.crittall-windows.co.uk

Commercial Success For FrameXpress

The frameXpress Ltd portfolio is now recognised as a leading PVC-U brand thanks to the quality guarantees, choice and aesthetic benefits it adds to new build and renovation projects for the domestic and commercial sectors. Over 16 colour foils

with optional faux timber finish are available in the new Optima system which won G-16 Award - New Product of The Year. Also, the company's aluminium range offers a striking alternative for bifold doors with a combination of unique and attractive colour options that are BSI, Secured By Design and Constructionline accredited.

01952 581100 www.frameXpress.co.uk

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www.architectsdatafile.co.uk

Saint-Gobain Building Glass introduces its best performing conservatory roof glass

Saint-Gobain Building Glass has further enhanced its popular collection of conservatory roof glass, with the introduction of Azura+, setting new benchmarks for the lowest g-value in the SGG BIOCLEAN low maintenance self-cleaning range. More than a year's development has gone into incorporating the best solar performing low maintenance self-cleaning coating onto the popular Sapphire Blue tinted substrate, offering an 83 per cent heat reflection and 0.17 g-value, firmly placing the product at the top of Saint-Gobain's roof glass range. The high performance solar control coating of Azura+ is also complimented by SGG BIOCLEAN, a revolutionary low-maintenance self-cleaning function that uses both rain and natural light from the sun to efficiently combat dirt and grime. Saint-Gobain's roof glass range already includes the bronze tinted Solara and the blue tinted Azura, both with BIOCLEAN coating and, to streamline the range ahead of the launch of Azura+, the company's green tinted Aqua and virtually neutral Natura roof glass products have been rebranded to Aqua+ and Natura+ to reflect their parallel use of the solar control coating.

@SG_GlassExperts www.saint-gobain-glass.com

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