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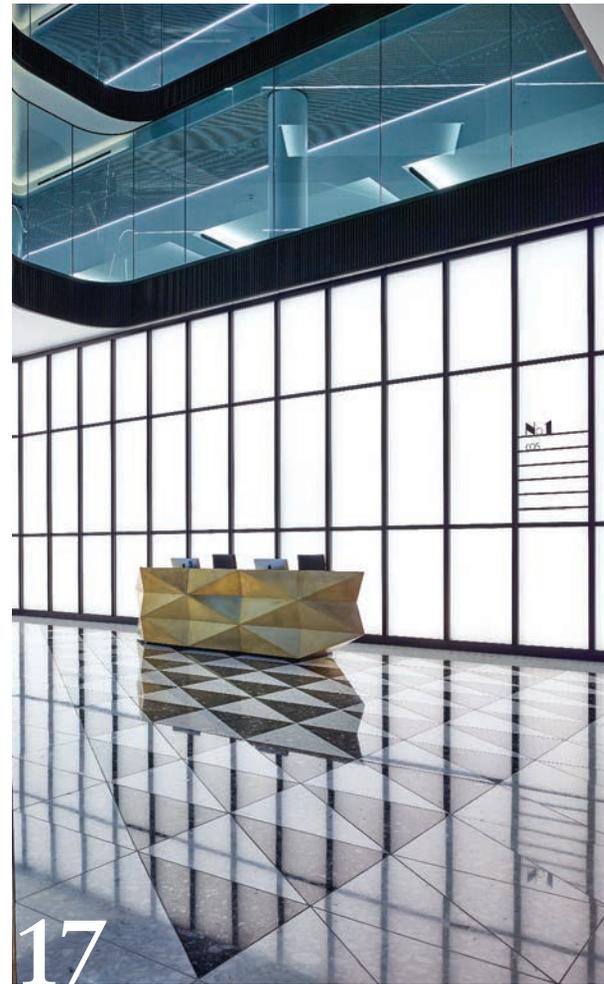
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Annual subscription costs just £48 for 12 issues, including post and packing. Phone 01435 863500 for details. Individual copies of the publication are available at £5 each inc p & p. All rights reserved

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FROM THE EDITOR



Glass-clad, steel-framed towers have been flavour of the month for major urban centres, and their Central Business Districts, for the past few decades. The ultimate symbol of corporate strength, their glittering facades maximise space, light and construction efficiencies. However New York's mayor has them in his sights, believing them to be part of an energy-inefficient past which he is trying to make a concerted move away from.

Bill De Blasio, making a stand against President Trump's long-established climate change scepticism, has announced that he will be stopping the construction of more glass towers in the city, based on their CO₂ emissions. However the 'takeaway' from what he actually said is somewhat opaque: "We are going to introduce legislation to ban glass and steel skyscrapers that have contributed so much to global warming. They have no place in our city, or in our earth anymore."

The Mayor then caveated with: "If a company wants to build a big skyscraper, they can use all the glass, if they do all the things needed to reduce the emissions." The overall emphasis is clearer than some facades in New York may in future be though – that buildings that are purely "monuments to themselves," i.e. which do not consider energy use in every facet, will "no longer be allowed in New York City."

He has added further clarification, that rather than ban glass buildings, the energy code for building will be tightened. So it may be a case of the devil (for climate change activists), being in the detail. The stats on New York do perhaps bear out that glass buildings bear the lion's share of the city's carbon footprint. This may be more due to the sheer floor area they represent than intrinsic energy-take of glass buildings, but it's a truism that glass buildings absorb huge amounts of heat and need commensurate cooling. Half of NYC's CO₂ emissions comes from two per cent of the built environment – large glass skyscrapers.

Driven by the global alarm on climate change, and a seemingly new sense of purpose on halting it before effects are irreversible, The Green New Deal is major new driver in building specification, its goal to achieve net zero emissions by 2030 making the UK's 2050 target look somewhat lukewarm. Harking back with nostalgic weight to Roosevelt's New Deal, it is this initiative which is underpinning De Blasio's resolve to make major interventions to stop the built environment being such a large part of the problem in the future. If the goal is to be hit, there's going to need to be some serious self-examination across the building industry.

Spacious interiors can be achieved without having complete transparency, but architects will still want to explore the possibilities offered by all-glass facades. Brick and concrete buildings are of course not the panacea – the large numbers of such heritage buildings in New York have been contributing proportionally large amounts of CO₂ for decades. Whatever the case, architects working in the city, are likely to find the way to erecting glass towers is considerably more obstacle-strewn than it has been in the past.

James Parker
Editor

**ON THE COVER...**

1 New Oxford Street is an office regeneration that considerably enhances the original Art Deco and Art Moderne architecture, including adding a glass atrium

For the full report on this project, go to page 17
Cover image © Timothy Soar – Orms

COMMENT

The fledgling market for bird-safe glass

Birds colliding with glass on building facades is one of the leading causes of avian mortality across the globe, however despite this fact it's an issue that has often flown under the radar in the UK. Here Leo Pyrah of Pilkington discusses how specifying the right glazing can minimise this problem

Colliding with glass doors and windows, while embarrassing, rarely causes people lasting harm. Unfortunately it's a rather different story for birds, which often fly headlong into glazing in residential and commercial buildings because they simply don't realise it's there.

Given that these collisions kill millions of birds each year, it's clear that avian protection is a challenging – but vital – conservation issue for architects and specifiers to address.

As glass continues to make up more and more of the external building envelope, it is highly likely that the number of birds affected by this issue will increase in the years ahead. Taking a closer look at the glazing specified would therefore be crucial in tackling the deadly impact buildings have on avian populations.

Bird safety: A growing regulatory issue

The problem of birds striking buildings is, thankfully, beginning to attract the proper level of attention in our increasingly ethically conscious society.

Building Regulations and guidelines focused on bird-protection for new builds and major renovation projects have become increasingly common, particularly across the US and Canada, where it is estimated that up to 600 million birds a year die from colliding with windows.

The US Congress recently reintroduced the Bird-Safe Buildings Act (2017), which stipulates, among other things, that at least 90 per cent of the exposed facade material on new public buildings (up to 40 ft – the primary bird-collision zone) should either be made up of glass employing bird-safe elements, or not be made of glass at all.

Despite the UK lagging behind from a regulatory perspective, it's highly likely that similar regulations will begin to make their way across the Atlantic in the near future, meaning it's worth being prepared. Indeed, recent revisions to Building Standard 8560 –



Bird-safe Building Regulations – and whether major commercial developments adhere to them – are becoming an increasingly hot topic in the media

governing the design of buildings incorporating safe work at height – specifically reference bird protection measures as a design factor; is this an indicator of events to come?

Bird-friendly glass is taking flight

The main reason that birds fly into windows is that they will often fly towards objects reflected in the glass – unaware that what they see is merely a reflection.



While efforts to fix this have been made by adding visible shapes or decoration (such as a printed dot pattern) to windows in order to alert birds, this can naturally interfere with glazing's effectiveness as a window, and a building's wider aesthetic appeal.

Specialised bird-friendly glass fixes this issue by using a ultra-violet (UV) enhanced patterned coating to break up the reflectivity of the glass surface. Because many birds see the world through UV rays of varying wavelengths – virtually invisible to the human eye – the coating creates a barrier for birds to avoid, with limited effect on the window's visibility for humans.

In terms of the pattern itself, research has found that birds will not fly through spaces less than two inches high and four inches wide. This led to the creation of the popular '2x4 rule' where the patterns applied to the glass are spaced no wider than these dimensions, often resembling a spider's web.

Some bird-safe glazing products on the market, while effective, may still reduce the transmission of natural light through glass and potentially affect views from inside the building – obviously a key consideration for architects and specifiers to bear in mind for building users.

However, these effects are being minimised as the fledgling bird-safe glass market takes flight and the technology continues to advance. We're already seeing the trade-off between specifying bird-friendly glass and overall glazing functionality lessen, as bird-safe coatings are increasingly used alongside other glazing technologies (such as solar control), for a multi-functional solution that combines the best of both worlds.

Opportunities for architects

Making buildings safer for our avian friends – for example by designing windows in recesses to block light and reflections – is critically important. However, it could also previously be costly, difficult, and require a degree of compromise. This combined with a lack of awareness and UK-applicable Building Regulations, means that bird-friendly buildings have traditionally been a rarity in this country.

However, bird-safe Building Regulations – and whether major commercial developments adhere to them – are becoming an increasingly hot topic in the media. For example, conservation groups branded the Minnesota Vikings' glass-plated stadium a 'death trap' for birds in 2017, which made national news headlines both in the US and abroad. Due to this, it is likely that environmentally conscious customers may begin to ask about how their development can be made more bird-friendly ahead of time.

As the technology behind bird-friendly glazing products continues to advance, we're likely to see it used increasingly frequently throughout the built environment.

This in turn presents a tremendous opportunity for architects to specify bird-friendly glass as a simple, cost-efficient means of making buildings more environmentally friendly without impacting building aesthetics, performance, and overall end-user experience.

Leo Pyrah is product manager at Pilkington UK



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COMMENT



Natural light for natural learning

Jens Christoffersen of Velux looks at why natural light is so important in learning environments, and discusses various design interventions for increasing it



Merlet College, The Netherlands, by Ector Hoogstad Architects © Arjen Schmitz

A common antidote to the ‘winter blues’ is often a break in a warmer, sunnier climate, preferably with white sandy beaches and clear blue waters. The reinvigorating effect of natural light and warmth can also be felt on a smaller scale, and in a wide range of environments, from homes and offices to public buildings, schools and universities. It is perhaps no surprise then, that when a recent study looked at how the physical design of educational buildings affects student performance, one of the significant individual parameters found was lighting.

Why daylight?

Several studies have shown that daylight is not only good for children’s overall health and wellbeing, but that it can also significantly improve academic performance.

One such study was ‘Impact of Lighting on School Performance in European Classrooms,’ conducted by the Sorbonne University using SINPHONIE Study data. It covered 13 European countries with a total of 2,387 children participating, concluded that academic performance can increase by up to 15 per cent when students work in classrooms with larger windows – due both to increased daylight, and a better view to the outside world. The Clever Classrooms study conducted by the University of Salford, UK, concluded that good daylight helps to create a sense of physical and mental comfort, its benefits are more far-reaching than merely an aid to sight.

How to design with daylight

While daylight does need to be supplemented by ample, high quality artificial lighting when outside light levels are low, where possible we should aim to make daylight the main source of lighting in schools.

When windows or skylights face north, the daylight entering a space tends to be softer and more diffused, with subtle changes in light levels and colour texture throughout the day. With other orientations, sunlight enhances the overall brightness of interiors, with specific areas of concentrated light. The challenge of designing with daylight is particularly evident in deep-planned classrooms, where there is a considerable distance between windows and the back of the room. Here there is often a disparity in light levels – bright near the windows, and darker further back.

In situations where the shape or size of classrooms does not allow for adequate light levels throughout, and/or where the possibility of window space is limited, skylights are often the optimum solution. Where there is no direct access to the sky, light shafts are an effective alternative. A skylight typically provides more than twice the amount of daylight than a facade window of equal size.

Controlling excessive glare

Glare is created when areas that are too bright are located within the field of view, or when the contrast ratio is high. The recommended



While daylight does need to be supplemented by ample, high quality artificial lighting when outside light levels are low, where possible we should aim to make daylight the main source of lighting in schools

'luminance ratio' between visual task and near surroundings is a 1:10 within the field of view. (This ratio is an expression of the ratio between the luminance within the central vision and the peripheral vision of the surroundings.)

Glare caused by daylight differs from glare caused by electric light sources in terms of the size, complex luminance distribution, and acceptance of the users (e.g. people tend to be more tolerant of glare in a daylit environment).

The orientation of the windows can help control glare and contrast. Larger expanses of glazing could face north, allowing diffused daylight to penetrate throughout the day/year. The installation of opaque blinds can help to control daylight levels, as can permanent external shading.

Facade windows vs roof windows

Good daylight distribution across a room is best achieved by using several different daylight sources, like a combination of skylights and roof windows. For spaces where glazing will not allow enough daylight to penetrate, or where installation is not possible – such as large classrooms, lecture theatres or areas in the centre of a building – skylights are a great alternative. Operable skylights, strategically located, allow plenty of daylight during winter months, and provide fresh air year-round, improving indoor air quality and helping regulate temperature.

Building standards & light levels

Daylight performance in an interior space depends largely on the availability and properties of daylight at the building's location (i.e. the prevailing climatic conditions). The proposed European Daylight Standard (FprEN 17037) suggests changing the basis of daylight evaluations to 'daylight factor targets' based on the occurrence of outdoor illuminance levels from recorded climatic data.

The 'climate connectivity' of the proposal states that a space should achieve a target daylight level at work-plane height across a specified percentage of the relevant floor area for half of the daylight hours in the year. The target daylight level is based on interior illuminance higher or equal to 300 lux, corresponding to the requirement for lighting at workplaces.

The absolute light levels that are needed for a particular visual task will depend on the character of the task and the visual environment where it is performed. European Standard EN 12464-1: 'Light and lighting – Lighting of work places – Part 1: Indoor work places' provides information on the indoor light levels applicable for a school environment.

Generally, the following interior light levels are recommended:

- 100 lux where visual tasks are limited to movement and casual perception, e.g. circulation areas, corridors, etc
- 300 lux where visual tasks are fairly simple, e.g. classrooms, tutorial rooms, computer practice rooms. This should be the general minimum for all areas of school classrooms
- 500 lux where visual tasks are moderately difficult, and where colour judgment may be required, e.g. auditoriums, lecture halls, practical rooms and laboratories, libraries (reading areas), etc. In classrooms, this should be the level of light on the blackboard/whiteboard
- 750-1,000 lux where visual tasks are very difficult, requiring small details to be perceived.

Jens Christoffersen is senior researcher at Velux Daylight, Energy and Indoor Climate Centre



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**BUILDING
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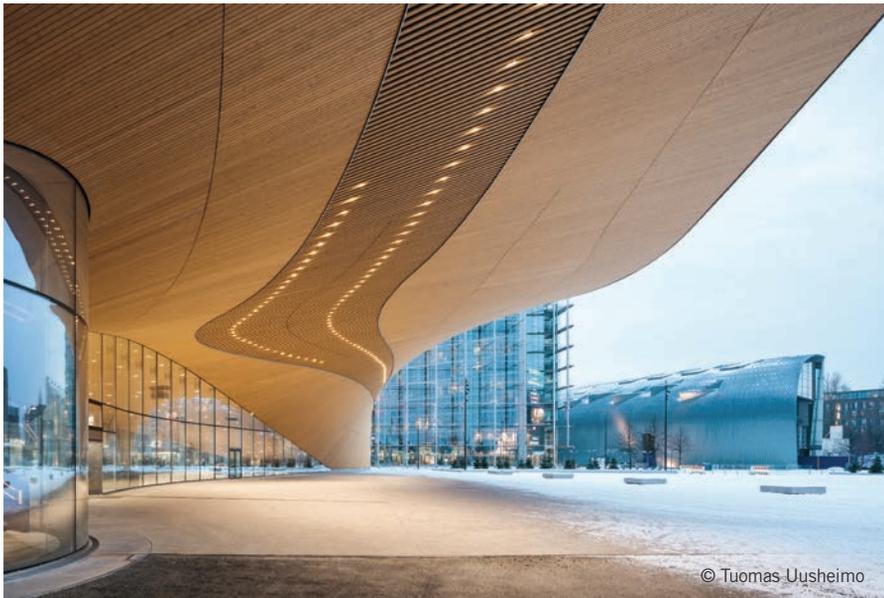
Building a cultural bridge

Jack Wooler spoke to Antti Nousjoki of ALA architects about how Finland's biggest library combines an inviting 'bridge' structure with shifting timber and glass facades

The new Oodi Library in Helsinki is a modern take on the building typology, offering residents and visitors a host of publicly accessible functions over its three floors. Named after the Finnish word for 'ode,' the 17,250 m² building includes amenities such as a restaurant and cinema on its ground floor, 3D printing machines and games rooms on its second, and a traditional library reading space on its third, nicknamed 'book heaven' by the team behind the project.

The building was in part commissioned to celebrate the centenary of Finnish independence in 2017. While the main structure was built in time for the celebrations, this completion target was deemed too optimistic, and the library was instead fully opened a year later on 5 December 2018, a day before the country's 101st birthday.

Now open to the public, the building displays a fluid geometry of curved, shifting lines. The design of the €98m project features



an innovative steel bridge which houses its second floor, holds the third floor up, and allows the ground floor to be column-free.

The library is owned, developed and operated by the city of Helsinki, and is part of the city's almost 40-strong network of library facilities. Not intended to be the administrative core or focused on the traditional storage of books – with the city's collection already existing in other buildings and available through online booking – the vision was to create a publicly open and contemporary centrepiece for the area, concentrating more on the amenities offered.

To fulfil this vision, ALA Architects were hired through a rigorous 548-entrant open design competition, which was anonymous up until the end of the project's second phase. The architect's design now having been realised, the building responds to local calls for a new public space, providing visitors, residents and commuters alike a place to meet and relax.

One remaining site

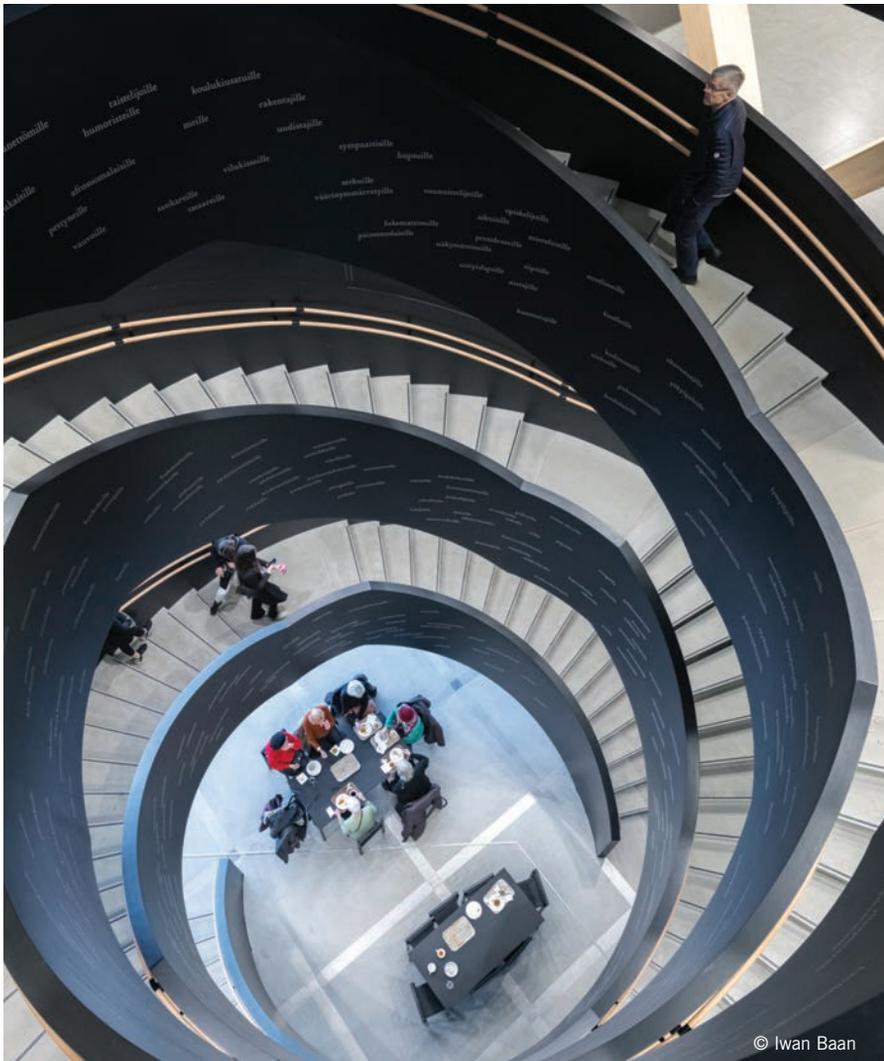
The site that was chosen is in the centre of Helsinki, just across the road from the stone-clad columns of The Parliament House, and surrounded by multiple large scale cultural attractions such as the Helsinki Music Centre and the Museum of Contemporary Art.

Sitting in the most densely urbanised area of the city, the library is surrounded by office space to the north, the main railway and metro stations to the south, the city park to the east, and urban areas to the west, including the aforementioned cultural and political buildings.

Formerly a rail depot, the transport functions on the site were moved further away from the centre, and it was left as empty brownfield land. Inaccessible and undeveloped, according to the project architects it was the last site left available in the 'heart' of downtown Helsinki.

The area around the site is fairly densely planned, and mostly comprises 6-8 storey office and commercial developments, which residents have reportedly begun to tire of. "Being the final block of the masterplan for the area, there was public pressure to not turn this into another headquarters, but instead to create a public space for the citizens," says Antti Nousjoki, principal at ALA.

"Alongside this new public building, a large square was planned facing the Houses of Parliament, creating a centre for public and civic institutions, so this was the final piece of that puzzle."





The ground floor has very little vertical structure, and is column free both inside and out

A fluid exterior

When facing the library’s large glass entrance, timber cladding appears to grow out of the ground from either side of the glazing, stretching over the second floor and above visitors’ heads to a cantilevered balcony. Above this warping timber-clad wall sits the porous box of the third floor.

Antti explores why this fluid shape was chosen: “We had to follow the existing masterplan, which dictated how the volume sits in relation to the other buildings in the area. We tried to leave the geometry of the surrounding cityscape somewhat behind us, however.”

He continues: “What we needed to do then was to break out of that box as much as we legally could, so the building twists out of the given box shape and cantilevers out of the given footprint, without touching the ground outside the masterplan limit.”

Taking a step back from this glazed entranceway and out from underneath the shade of the balcony, visitors can take a look at the whole building from its western side. From this angle, each of the library’s three levels are visually defined thanks to the varying material palette – the open glass elements of the bottom floor, the timber-clad middle floor, and the expansive glazing of the rectilinear box on the third floor, the proportions of all of which shift with the building’s flowing shape.

The middle volume was one of the more complex elements, not just because of the significant process of getting the fire and weatherproofing of the light finished birch wood cladding approved, but also due to the interesting structural properties of the steel framing underneath. Antti explains: “The second floor acts as a kind of double arched bridge, with the third floor built up on top of this. Because of this, the ground floor has very little vertical structure, and is column free, both inside and out.”

Looking above the bridge and the glazed structure atop it, the roof is supported by steel columns and beams, and within the beams are timber infill elements. Utilising steel across the roof, the accumulation of its intended patina is already visible, the ‘wear and tear’ upon which “makes it look even more beautiful,” says the architect.

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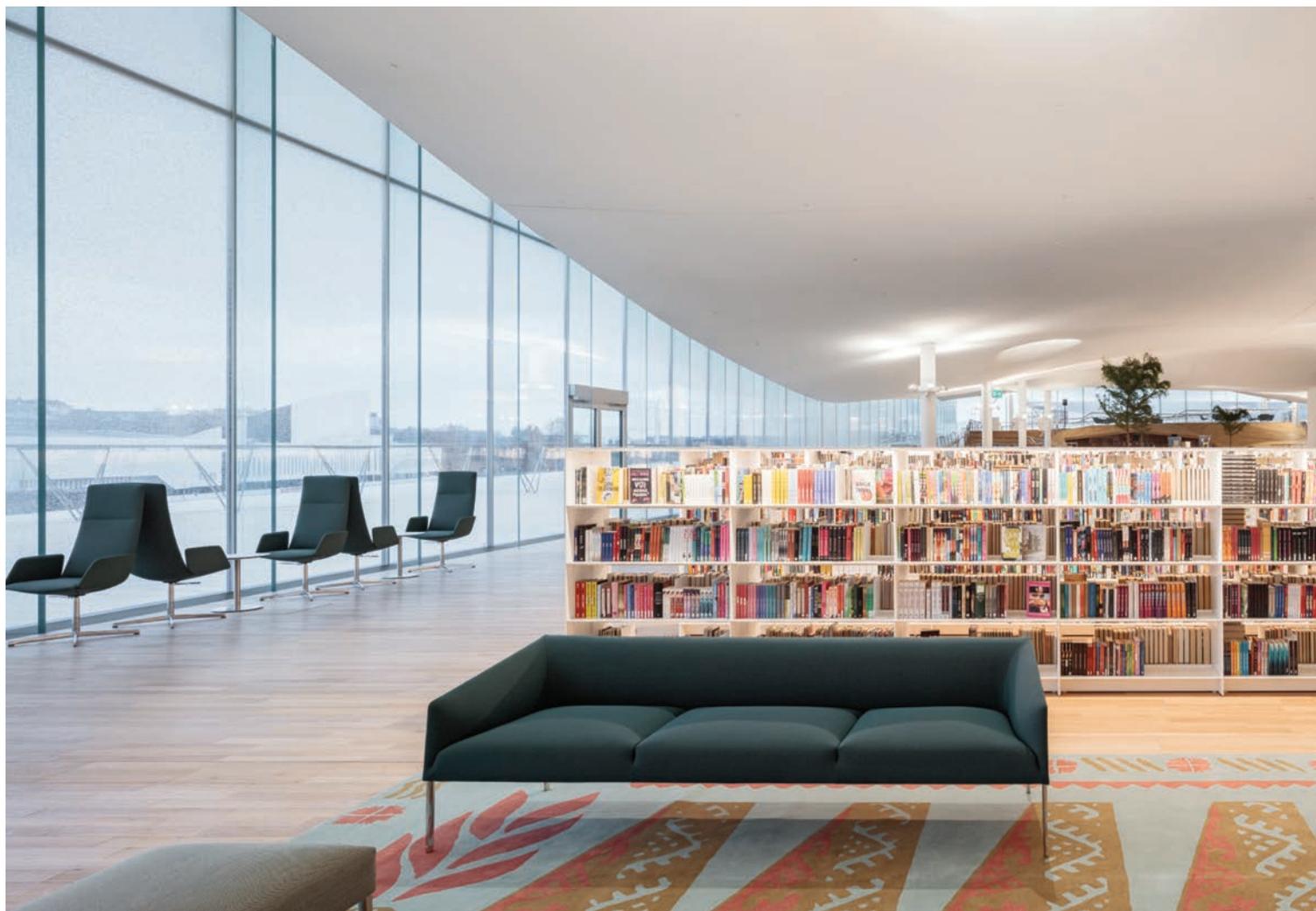
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White glass

Thanks to the envelope's large areas of transparency, the interiors allow a significant amount of daylight. On the entranceway, this is mitigated somewhat by shading from the large balcony canopy.

The building's copious glazing is formed of multiple large insulated panels of differing sizes, with the often harsh Finnish climate necessitating high U-values. The lateral wind loads and parts of the horizontal wind loads are taken by these glass columns, and were part of the fulfilment to the building's intended 150 year lifespan. The building has been engineered to endure the maximum potential number of snowstorms likely during that period, with the weather expected to get more extreme each year.

"The glass wall detailing is "quite interesting," explains the architect, "because the walls are not of equal height – it is out of proportion a little bit, something you might

see in typhoon zones," which in part explains why the panels needed to be shaped around a shifting geometry.

As the building is airtight, there was no need for point fixing of these glass panels. Instead the fixing has been integrated in the flooring's detail, and glued in.

In order to restrain the high level of solar gain on the top floor, the architects used software to generate a gradient pattern from totally transparent to an almost solid colour at different points across the facade, which was then printed onto the glass panels.

"That print has a big effect on how white the building is from the outside – not black like typical glass buildings," says Nousjoki. He adds: "Because of this light control, the curtains are rarely used."

Above the third floor, the surrounding daylighting is also complemented by circular skylights which 'puncture' through the roofs



'BOOK HEAVEN'

The top floor delivers typical library functions in untypical surroundings

at carefully chosen intervals. Unlike on the other two floors, here the building's timber volume incorporates a small band of gaps between the cladding, providing more restricted daylight to the second floor.

Interiors

On the street level, the ground floor has been designed as an extension of the nearby open space, with the intention of it becoming an integral part of the city's public sphere. As there is a lot of visual as well as audible noise around this area, the more group-oriented functions are located on this floor, including the restaurant, along with an acoustically insulated space for the National Audiovisual Institute's cinema. Both of these can be seen from the street level exterior.

Heading inside from the main entrance, visitors first encounter the checkout and returns functions, with a restaurant and the main staircase to their left, and to the right an information desk to guide them around the three levels. Next to the information desk are the escalators and drop-in computers, and there are also lifts on both

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sides of the ground floor.

On this floor, the interior palette is based on whites, greys and black, and the ceiling is a continued part of the building's timber bridge arched over it, and as such is clad in finished spruce.

Going up what the architect describes as a “dramatic double staircase, almost like a drill bit going through the solid middle floor,” visitors are led to the middle layer, a more closed, modular volume of individual rooms and specific functions that require certain conditions such as acoustic isolation, or in the case of the urban workshop spaces provided, specific air control and ventilation systems.

“Such functions of a contemporary public library don't do well in open spaces, and are not that comfortable in a changing daylight condition,” says Antti. “As such, the middle floor is a collection of the programme that would have been compromised on the other levels.” These functions include reservable group rooms, recording studios, games rooms, 3D printers, learning spaces and workstations, all intended to provide valuable but free amenities to the public.

With this closed volume necessitating daylighting be kept to a minimum, LEDs have instead been used to offer controlled lighting, as the ever-changing sunlight can be troublesome when working with screens, and some working environments require differing levels of light that cannot be guaranteed from daylighting alone.

Finally, back to the spiral staircase and up to the top floor – which like the first is more open – is where ‘book heaven’ is found, delivering a more traditional library function. While it is connected visually to the city centre through the extensive glazing, the glass simultaneously separates the floor from the noise of street level thanks to its high insulation performance.

Here are the usual racks of books, along with an event space and ‘story room.’ Surrounding this area is the continued theme of timber, covering all the flooring, including embedded and raised sections, as well as trilateral panels connecting them wherever timber stairs are not, creating a shifting space that mimics the building's exterior.

Using the same spruce material as on the floor below was not suitable here however, because it's a relatively soft wood. Instead, the architects specified an imported oak to offer durability against

the effects of numerous daily visitors.

The ceiling here helps to aid the expansive glazing surrounding it to emphasise the sense of bringing the outdoors in, with a fluid curvature that ebbs and flows as the roof does.

Antti provides further detail: “There's constantly a slight mood change of going from a taller to a lower space. The acoustics imperceptibly change every metre because of this movement, and visually you can't see the whole ceiling anywhere from within the floor, so as your vantage point shifts the geometry of the ceiling changes when new curves are exposed.”

Challenges & reactions

Overall, the reception has reportedly been “overwhelmingly positive,” with the building reaching the 1 million visitormark in just over three months – particularly impressive in a city of around 600,000 people.

Antti reflects on some of the key challenges that led to this success: “For us, the most challenging part was to win the competition, especially the second phase. Otherwise, the wood cladding of the twisting cantilevered west facade was probably the main challenge, production-wise.

“Our office has good experience of taking a 3D model and turning it into production drawings however, and so we were able to produce the final documents that went directly into the CNC machines, straight from our office into the logger.”

He muses further on architects' changing role: “There has been a lot of talk in our industry about how architects have become distanced from the construction process, but I would strongly argue against that. At least from our office's point of view, it's an almost historical level of involvement when you consider that we designed the building and its shape, and were then able to turn that shape into a set of production data that went directly into the milling machines.”

Though the project was stuck slightly behind schedule, making the last six months of work “pretty frantic,” the building had to be, and was, completed and opened during the centenary year, which Antti in part dedicates to this level of involvement.

He concluded: “That was both fun and exciting, and also made me proud of our young data team, who are really displaying how architects can be more involved in the contemporary world of digitalised construction.” ■

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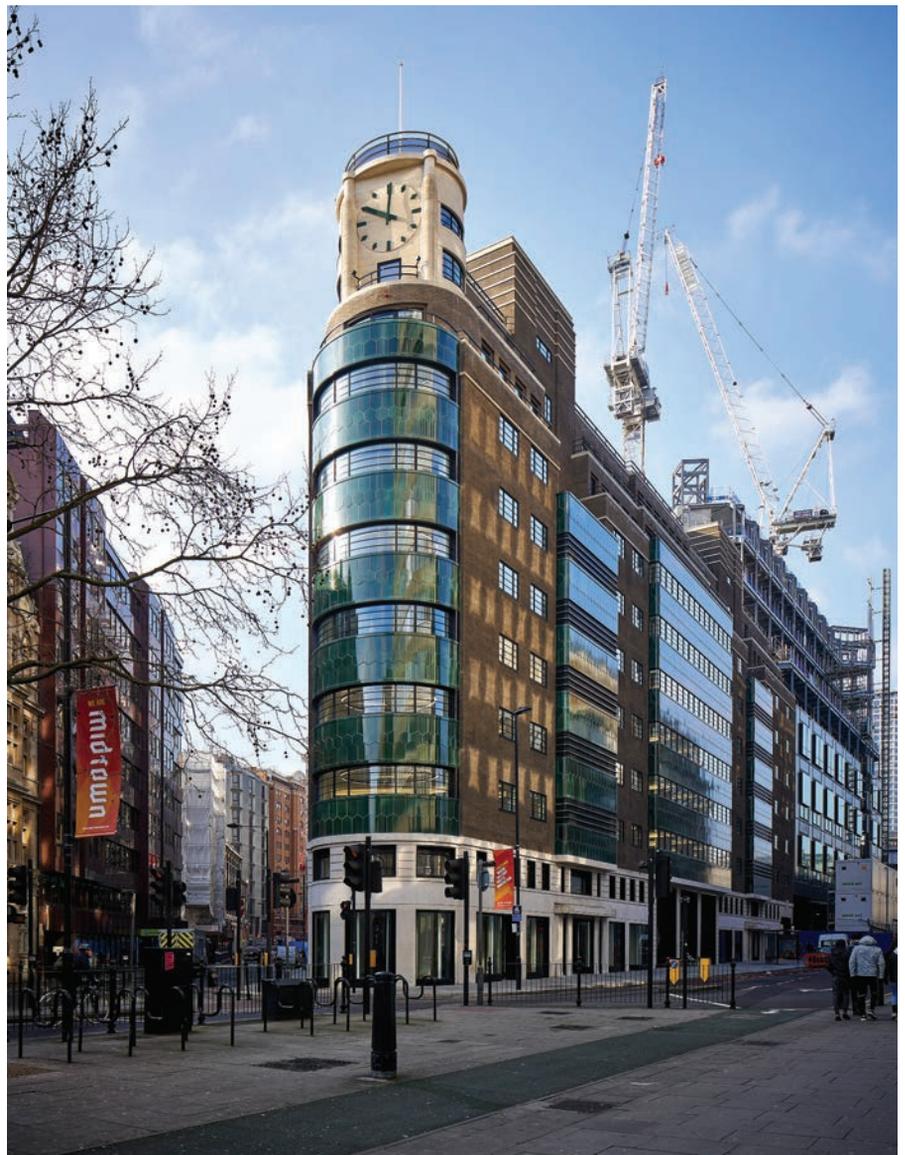
A funnel of light

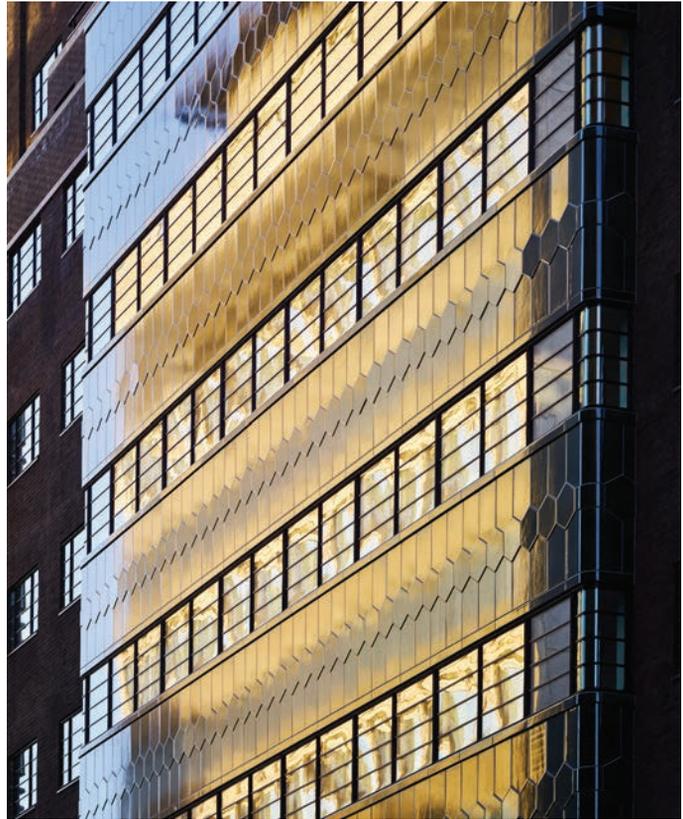
A central London office regeneration sees a melange of Art Deco and Art Moderne reinstated and illuminated from within through a glass funnel. Sébastien Reed reports

The prow clock tower at No 1 New Oxford Street has long been a familiar feature of London's 'midtown' streetscape. Designed by English-born, Swiss and French educated architect and planner Henry Philip Cart De Lafontaine as an 'ultra-modern building of imposing appearance' that exhibits a melange of Art Deco and Art Moderne styles, Commonwealth House – the building's original name – was completed in 1939. Based on these design merits, the building had long been noted as a positive contributor to the local area's cultural value.

The scheme occupies the prominent nose of a tight corner junction where High Holborn meets New Oxford Street – “the gateway to the west-end”, says John McRae, director of Orms, the practice that led the refurbishment and extension to the building. Orms were approached after being recommended to client Nuveen Real Estate (formerly TH Real Estate) by office agency Bluebook on the basis of their considerable accrual of experience renovating commercial buildings, which include recent projects such as Medius House, Forum St Paul's, and 160 Old Street.

“The building had been held in various investment vehicles over the last 30 years – all managed by the Nuveen Real Estate team during that time – and more recently in a joint venture with British Airways Pension Fund,” explains McRae. As some of the office floors were becoming vacant, the architect's first contact with the project was focused around how best to renovate a single typical floor of the building, in addition to repositioning the office entrance. McRae continues: “The ambition of the client was always to do a full refurb job, however the rental profile of the





HEXAGONAL LEGACY

The project enabled the original architect Henry Philip Cart De Lafontaine's rejected specification for green hexagonal tiles to be fulfilled

building had never been sufficient to support one."

Later, circumstances changed. The impending arrival of Crossrail triggered an increase of occupier demand and a hike in rental prices across central London – to the extent that a comprehensive refurbishment of Commonwealth House could be more seriously envisioned.

Plan & provision

"We did the single floor study and then we were asked to do a feasibility exercise to examine the opportunities, should the entire building become vacant," explains McRae. Over time, what was first intended to be a low-key interior renovation morphed into a brief to refurbish a large portion of the building.

The perimeter of the building remains unchanged from its original footprint resembling a right-angle triangle, which occupies the tight corner – much like New York City's Flatiron Building. In elevation, No 1 extends to 10 stories with an additional roof garden fitted with lift access. From basement upwards, the programme houses a cycle facility with storage and changing rooms, the ground floor is composed predominantly of retail

spaces, in addition to the new full height office entrance and reception area on New Oxford Street. The first floor and upwards are devoted entirely to office space.

Everything from ground-floor up to level six slab was retained from the original building: "What we did was remove level seven and level eight, then we rebuilt them to a larger footprint and added an extension to level nine," says McRae, allowing for precious commercial floorspace to be added to the scheme.

Prior to the refurbishment, a light well cascading down onto an external courtyard housing lavatory facilities was situated at the heart of the building's plan. Taking advantage of the existing form, with every further level heading upwards, Orms' design gradually expands each floor further into the space on the eastern side, sculpting a full height, glazed "light-funnel" atrium into the scheme. A bank of four lifts and bridge decks were installed at the western side of the space, which extend the entire elevation of the scheme from ground floor to roof garden.

In terms of structure, core samples of the concrete were taken to validate the loadings of the original building. The test results showed that the quality of the concrete was

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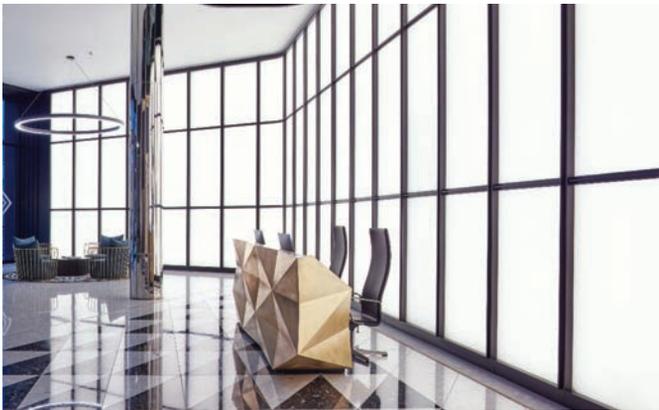
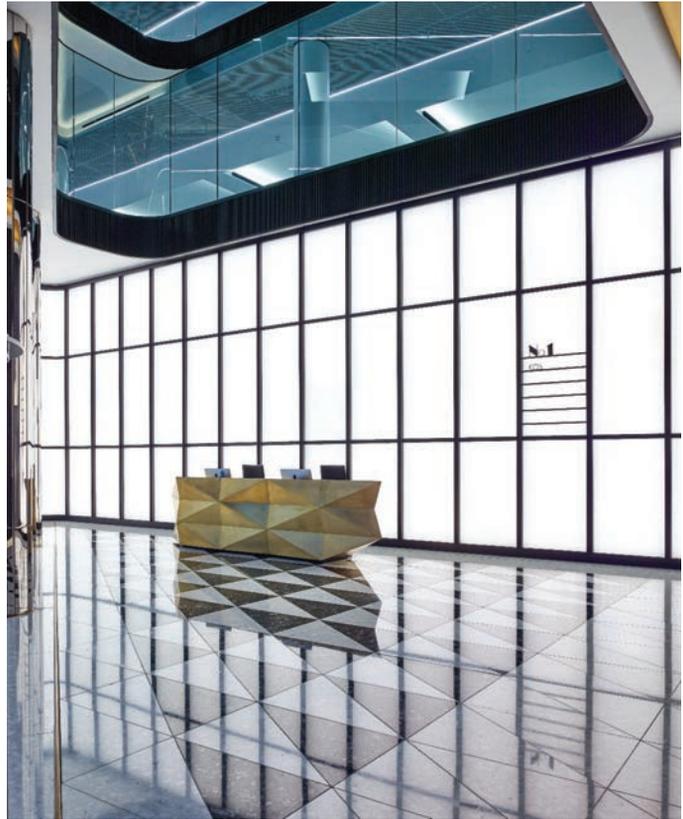
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The significant use of black trims and horizontal features was inspired by the Art Moderne movement

by no means optimal, precipitating some structural challenges given the plans to extend the building upwards and expand usable floorspace inside. The removal of the 7th and 8th floor slabs and roof slab allowed for the construction of new steel floors, including an additional floor and new roof terrace.

The partial infill of the atrium was achieved with a new steel frame inserted into the courtyard, along with new reinforced concrete lift cores. The retained concrete beams and columns to the lower levels were strengthened using steel stiffening plates and angles. This required temporary propping throughout the lower floors and added further complexity to the construction.

In light of the added floors, the architects also had to develop a solution to sensitively make the extension look like an integral part of the building. McRae comments: “Part of what we did was tinting the whole facade from the first floor to the eighth, to make it look like an original composition.” In addition, new stonework was carefully added to complement the chromatic alterations.

What became apparent as the architects studied the original marketing brochures of

the building was that the elevation facing New Oxford Street was designed to be more Art Deco inspired, while the High Holborn elevation seemed to draw influence from the Art Moderne aesthetic. In addition to these stylistic references specified in Lafontaine’s original designs, the architects uncovered proposals for hexagonal glazed green tiles to clad the building.

The tiles were not permitted by Sir Giles Gilbert Scott, the architect advising the Crown, who perceived them to be too innovative at the time. Breathing Lafontaine’s legacy back into the building, Orms reinstated the tile design using pyrolave tiles – volcanic stone extracted from a lake in France and hand glazed to produce the chosen emerald colour. Portland stone skirts the building’s ground floor level facade below the tinted brickwork cladding above, acting as a canvas for further bands of hexagonal emerald tiles decorating the facade towering over New Oxford Street.

Glasswork

As with any commercial office space, ensuring that interior spaces are sufficiently illuminated was key to the project. This is achieved in practice through the new glazed atrium, which allows natural light to fill the

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building's interiors, as well as providing an inspiring entrance to users as they approach the reception. "Laminated safety glass was used for the atrium and towards the nose of the building the atrium's corners are curved, allowing the softness of art-deco and art-modern to be played out," says McRae.

Given the combination of No 1's busy urban location and the wellness requirements of offices, the architects had to design sensitively to shield users from noise, as McRae remarks: "The upper floors have been fitted with new glazing that we specified on the basis of their U-values and acoustics due to the heavily trafficked roads below." The ground floor retail units are installed with a series of single-glazed panels with curved edges; "we wanted to reinstate the Art Deco style in the shop fronts," says McRae.

Upon examining photographs of Commonwealth House from the 1930s, the architects discovered that the iconic nose of the building originally featured single-glazed curved panes on each floor, which were later replaced by faceted glass in the 1960s. Following Orms' refurbishment, the glass was again substituted for double-glazed curved panels.

"Because the glass is curved, the two panes have two different radii. There's a great deal of complexity in making sure that each pane fits within the other," explains McRae. In order to achieve the horizontal aesthetic of Delafontaine's 1930s design, spacer bars were fitted within the cavity of the double glazed units, and cosmetic bars were fitted to the outside of the glass to replicate the horizontal window divisions.

In the central bay of the New Oxford Street entrance, "there are extremely tight glass corners of around 250 mm – one of the tightest that you can achieve with double glazing," according to McRae. Through trial and error, Spanish curved glass specialist Cricursa were able to produce the desired curvature, but not without slight distortion of the glass. In discussion with the planners, it was made clear that the curved corners from the original design had to be retained so the architects had to run with the distorted effect on the glazed corners.

Interior qualities

Internally, again No 1 nods to the Art Deco and Art Moderne periods. The architects used solus stone for the reception floors and fluted glass – essentially a profiled glass manufactured using original 1920s methods. "It gives a really lovely texture. Rather than being a smooth flat surface, it has a series of



concaves and shells."

Other interior materials include brass on the reception desk, and dark stained oak as references in keeping with the Art Deco period. The significant use of black for trims and horizontal features, were inspired more by the Art Moderne movement. "We were using findings from our research into the Moderne and Deco styles to create our new aesthetic," says McRae.

Maximising the building's sustainability potential was also a priority. Bicycle storage facilities, photovoltaic cells at the top of the building, and a localised air source unit on each floor in each corner of the building – meaning that air can be cooled locally when required, rather than centrally – are some of the features that contribute to No 1's BREEAM Excellent rating.

The attention to detail has already secured the client two key tenants; fashion retailer COS, whose relationship with the scheme began on a prelet basis before its completion, and technology brand Twitch. The office spaces are light and airy, with plenty of flexibility designed in as well as a range of outdoor spaces. Altogether they demonstrate Orms' sensitivity to the diversity of potential activities and brands that might set up shop at No 1. ■

FACING PAGE

The glazed atrium which works as a light funnel greets users as they enter

ABOVE

Office space is light, airy and flexible

Images © Timothy Soar

PROJECT FACTFILE

Architect: Orms

Client: Nuveen Real Estate

Size: 9,500 m²

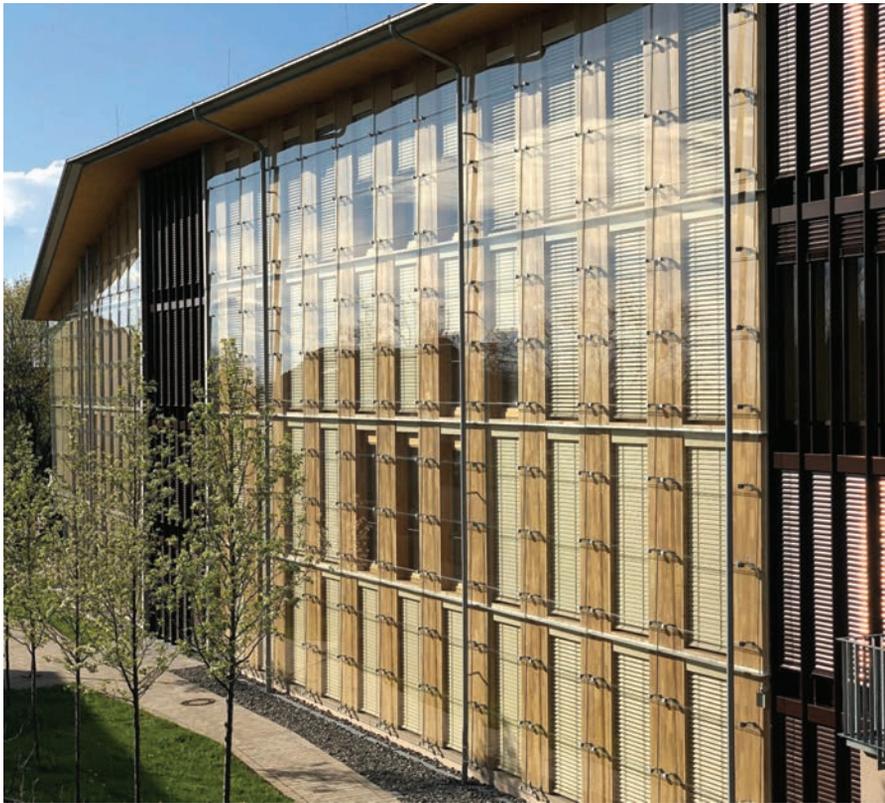
Planning consultant: DP9

Structural engineer: AKT II

Historic building consultant: Donald Insall

Simpler facade solutions

Simon Boocock of CRL Europe discusses how advances in installation technology are making glass facades easier and quicker to install without putting people at risk



CLIP DESIGN

Clip design systems are ideal to regenerate existing buildings, creating a modern impression with a highly durable and long-lasting finish

All-glass buildings are a common sight in urban areas, making a dramatic architectural statement. Glass is a popular facade choice for commercial and increasingly domestic buildings too, being chosen as much for its practical qualities as for the aesthetic advantages it offers.

In any building where a feeling of openness, plus brightness and views of the outside world are important, glass is likely to be the predominant material used for the exterior cladding. The reasons for this become clear as soon as the advantages of this material are analysed: glass combines light, transparency and appearance with practical features such as thermal insulation, solar control, acoustics, fire protection, safety and security. On top of this is the

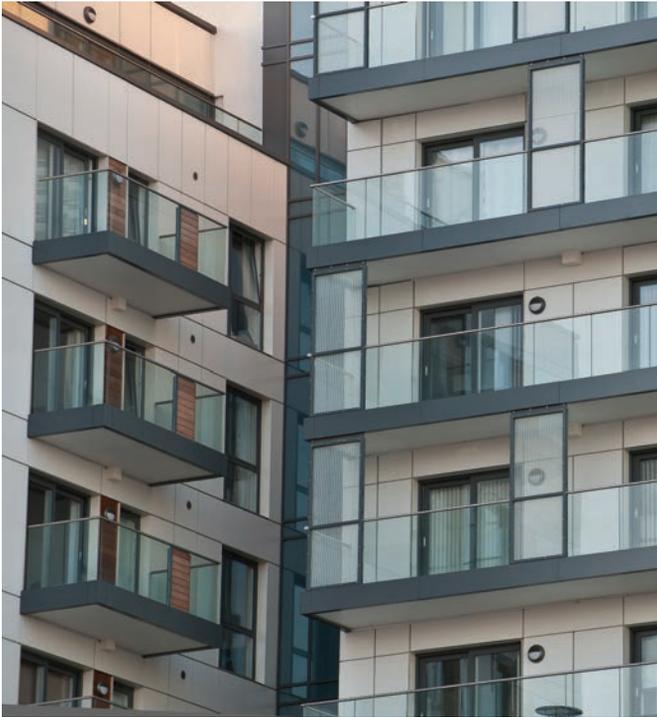
physical versatility of glass – it can work alongside virtually any other material and within any landscape.

While the results of specifying glass for building facades are visually and practically beneficial, installing glass to building exteriors is of course not without its challenges. The use of appropriate systems and solutions that ensure safety of the installers and end users while enabling a quick, seamless installation is vital. First of all, consider how the glass will be fitted: if it is to be fitted from the outside of the building, scaffolding will be required. This not only increases the installation time but it also adds costs to the project and makes the whole process somewhat trickier than if the facade can be installed from inside the building.

Wet fit systems are also time consuming and messy to fit, usually requiring cement to hold them firmly in place, while systems with vast amounts of architectural hardware not only remove some of the aesthetic benefits of the glass, but can also prove heavy, cumbersome and a chore to install, particularly when working at awkward angles or at a height. Luckily, advances in installation technology are making installation a lot easier, quicker and more straightforward, while not putting installer or user safety at risk.

One solution is to use a special clip design system that fixes the individual glass panels in place without the requirement for glass cut-outs, to create a protective and attractive envelope around the building which is very straightforward to install compared to conventional methods. Suitable for use on new builds or for regenerating an existing building, these create a modern impression with a highly durable and long-lasting finish, providing a breathable barrier that protects the original material of the building while still retaining its visibility.

Spider fittings and standoffs are alternative options for creating modern buildings with all the qualities of glass, yet make 'all-glass' walls installation easier, as



DRY GLAZE

A dry glaze system can be installed from the 'safe-side' of the balustrade, reducing significantly labour times while being a safe option for installers

While the results of specifying glass for building facades are visually and practically beneficial, installing glass to building exteriors is not without its challenges

they can usually be fastened directly to steel, concrete or wood – protecting the building against weather and air pollution while still enabling the original materials to be seen. This is a popular option for refurbishment projects as it helps create the high-end and contemporary look often seen on new structures such as airports and hotels.

Frameless glass is also in demand for use on balconies on high-rise buildings, becoming an increasingly popular option for apartment buildings as an attractive and functional solution. The same issues over installation apply here of course, making the need for systems that can be fitted safely and to time just as vital. Providing a fast and safe way to install glass balustrades, a dry-glazed system will eradicate the need for cement and scaffolding and can usually be installed from the 'safe side' or in other words internally, for added safety.

Such systems tap into the big trend for frameless glass on the exterior of buildings and result in an improved aesthetic with minimal fuss.

Simon Boocock is managing director at CRL Europe

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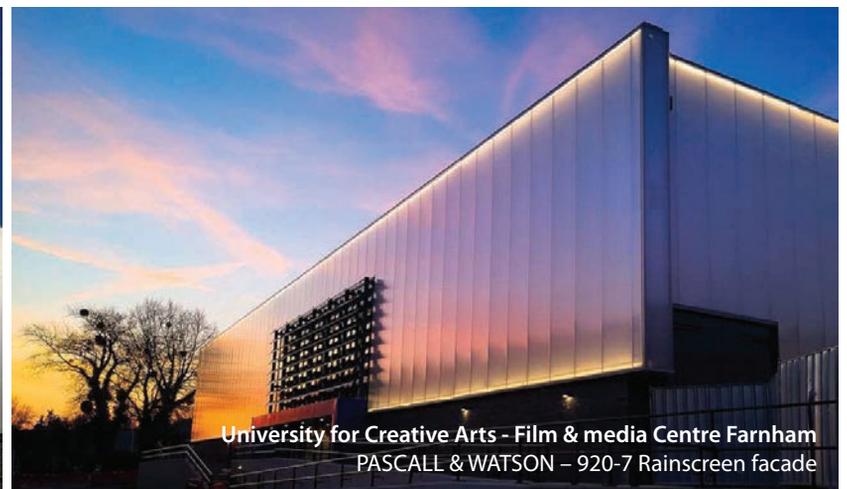
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Floating an idea

Architectural glass specialist OAG gives an insight for designers into the possibilities, as well as practical implications, of ‘oversize’ glass float runs

During the past two decades, feature glass entrances and double height ground and first floor facades have risen in popularity. Due to this increase, glass itself is becoming synonymous with some of London’s best-known landmarks and prestigious institutions.

From over 13,000 m² of glass being installed at the Battersea Power Station redevelopment in phases two and three, to the 250 metre long facade at London Bridge station, new build and redevelopments alike are becoming accustomed to the increasing trend for stronger, larger higher performing glass types. For both domestic and multinational contractors sourcing, designing and installing oversize glass units is a challenge in itself.

Within the specialist glazier trade, handling and situating oversize glass is now a necessary part of firms’ repertoire, with demand ever-increasing. From 7 metre high glass fins on the recent Aviva Tower project, to 7.6 x 3 metre toughened panes at Warner Bros Head Office, Grays Inn Road, the bespoke and oversize nature of the glass specialists now have to handle makes them the authority on ‘Jumbo’ glass sheets, measuring 6000 mm x 3210 mm.

Sheets over this size are produced subject to the manufacturer initiating an oversize ‘glass float run’, usually only permitted three or four times a year.

However, as manufacturers plan oversize runs, they canvas the glass processors to gauge what the demand is. If there is sufficient demand, they will then carry out the scheduled run. Other factors such as strong buyer relations often also influence the outcome. Buyer relations are paramount for glass suppliers in approving float runs, as they must have unwavering confidence in the supplier’s ability to handle, install and properly care for the glass provided.

During a production run, when the glass sizes proposed are over and above standard jumbo size, often the actual make up of the DGUs (double glazed units) still needs to be determined. Glass specialists can engineer this throughout the design process –



finite calculations are prepared to suit the specification requirements.

A vast number of methodological deliberations must be taken into account, outside the ordinary construction compliance. On site logistics must be carefully thought over, especially when delivering oversized DGUs into a built-up area. Road closures lift options and weight must all be high up on your glazing specialist’s agenda. All this highlighting the importance of early involvement and logistical planning as well as well trained specialist on site operatives to carry the task, from delivery right through to installation.

When minimising risk, the worst-case scenario must always be the starting point for any method statement, outlining the most hazardous dangers first. For example, when contemplating safety within a glass lift plan, risks can be minimised when determining the makeup of the DGU itself. Laminated glass panes will not shatter, helping prevent an unsafe site environment as well as avoid delaying yourself and other contractors. Laminated DGUs only crack within the laminate and glass will be retained within a single pane. This demonstrates a risk that can

Within the specialist glazier trade, handling oversize glass is now a necessary part of firms’ repertoire with demand ever-increasing



Structural glazing specialists can advise on considerations and limitations of structural glass support structures and should be heavily integrated with your team during the design phase right through to handover

be eliminated not only in the logistics, but as early as the design phase.

For example, the DGU is likely to be made from glass sheets laminated together on both the outside and inside faces. The thickness of glass panes such as these is something that was determined through innovative design engineering. The glass thicknesses and DGUs will be prepared and specified to project-specific requirements before approaching the glass processors and seeking float run availability and subsequent time frames.

This would normally be tackled by appointing a glazing specialist early, so that the design and engineering process can be progressed. The advantage is you can plan well ahead and tie into an oversize float run at the first opportunity.

Load bearing on glass sheets needs to be high on the list of design considerations. Glass fins and support systems are becoming more common within glass feature entrances and facades. Structural glazing specialists can advise on considerations and limitations of structural glass support structures and should be heavily integrated with your team during the design phase right through to handover.

Glass ordered well in advance can be

stored and held in reserve – this is common practice for specialist glaziers and also allows a thorough product check of all units prior to install. This minimises the risks associated with availability and potential postponement of a float run through lack of demand. Glazing specialists also allow inspection by all involved parties to minimise any risk of wasted time and resource on busy, multi-contracted sites.

After the glass is received well ahead of time, specialists are able to observe and plan with the glass coating plants, who have distinct criteria for oversize coating runs. They are applied to certain surfaces of the glass to assist with solar and thermal control; in addition anti-reflection and self-cleaning coatings are becoming more common in today's market. Again, these coatings are run on cycles and require well thought out logistical planning and resource allocation to achieve the required finish.

The emphasis has to be on engaging with design process early, which permits a longer, more methodical lead into the oversize campaigns and coating runs. This allows all risks associated with the manufacture and installation of oversize glass to be managed and minimised.

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Daylighting fit for Kings

Recent redevelopment of the food court at Kings Mall Shopping centre, on a five-acre site in London's Hammersmith area, exposed up some interesting and complex challenges.

As part of the ongoing development, the new residential apartments above the shopping centre were being adversely affected by light pollution and lack of privacy from visitors looking through the food court atrium.

To solve this problem, owners and developers Schrodgers decided to install Kalwall translucent cladding around the whole of the atrium. This screened the external courtyard above, thereby mitigating the issues around privacy, while maintaining the maximum levels of interior daylight.

Installed in a Verti-Kal pattern, the Kalwall panels complement the industrial feel of the redevelopment and its hard concrete and stone surfaces, while providing several benefits for shoppers and residents alike.

This project perfectly illustrates the advantages of Kalwall over traditional glazing. Here it offers complete line-of-sight



protection, maintaining privacy for the residents and controlling light pollution, while bathing the interior with diffused daylighting, regardless of the weather. The panels are lightweight but very durable with excellent resistance to impact and scratching. They are also vandal resistant with good protection against windborne debris.

In addition, Kalwall's insulating properties mean that U-values down to 0.28 can be achieved while daylight is driven deeper into the interior space below, thereby reducing

energy costs for both artificial lighting and temperature control.

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

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Bringing light inside

Jade Cottee of IQ Glass Solutions discuss the different options available to maximise light with the use of internal glazing



Internal glazing systems can be used in interior designs to create versatile open and 'broken plan' living spaces

Light is the new luxury in many architectural and interior designs. Improving light within the home has been said to boost happiness, as natural daylight makes us feel more connected to the outdoors. It has often been the case than many homeowners think that the only way to achieve this is by removing the amount of vertical obstructions (walls) within their homes.

This is not the case; internal glazing systems can be used in interior designs to create versatile open and 'broken' plan living spaces. Whether it's frameless or framed glazing, light can still flow through into all the living spaces. Pocket door systems are often available with internal glazing systems as well as external, enabling homeowners to open up or close off certain rooms as and when they desire.

Steel glazing systems

Steel framed glazing is a growing design trend and many architects and

specifiers across the UK are looking to include these industrial, tactile systems within their architectural designs. Not only are these glazing products being used on the exterior of buildings, but they are also used within interior design to create a contemporary aesthetic for projects internally.

Steel framed glazing systems in interior design schemes are often seen as internal doors or steel screen partitions for broken plan living spaces that allow the natural light to continue to flow throughout each area. These steel glazing systems add an artisan style to the design of interior spaces, which helps to add character to the rooms.

Due to the robust strength of steel, internal steel glazing can be manufactured with exceptionally slim frames. This elegant design character can be used for fixed areas of glazing, internal doors and windows, for a cohesive design throughout living spaces.

Although steel achieves an authentic



Art Deco style, it does come with a price tag due to the process involved in making these systems. Many steel systems are manufactured bespoke to each order and require a lot of hands-on processes.

Aluminium glazing systems

There are many alternative options that achieve a similar aesthetic to the steel systems, such as aluminium systems with glazing bars that mimic the Bauhaus style. Aluminium systems often come with a broader choice of colours and configuration options, as they are easier to work with than steel systems.

Aluminium is a lightweight and versatile material that can be fabricated into a whole array of designs. Aluminium glazing systems can be easier to slide, push or open, as the material is slightly lighter than steel – which is ideal when you need to slide or fold several panes of glass.

Frameless glass systems

Within vibrant interior designs it is sometimes the case that ‘less is more.’ Therefore, frameless glazing systems can be the ideal solutions as they don’t offer any additional visual obstructions within the room, instead providing a sophisticated finish to the living space.

Frameless glazing systems come in a whole plethora of configurations as they are usually manufactured bespoke to the specific location. These single glazed systems can be installed as fixed glass walls that break up an open plan space, for an element of privacy. Frameless glass doors can be integrated within the design to further enhance the frameless appearance.

There are many frameless systems out there that help to maximise the light within the living spaces, especially frameless products that don’t interrupt views or natural light.

Frameless glass balustrades

Frameless glass balustrades can be used internally to provide a protective barrier for internal floor level changes while allowing light to continue to flow throughout the home. These glazing systems compliment the interior design as their frameless construction doesn’t obstruct views at eye level, and gives the illusion that the space is larger than it is as you can see beyond the glazing. There are many options for internal glazing, but the choice ultimately comes down to the aesthetic, location and budget limitations.

Jade Cottee is marketing assistant at IQ Glass Solutions

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Achieving peace of mind

Sean Haynes of FireGlass UK discusses the importance of recent accreditation and certification systems when it comes to specifying the correct fire-rated glass



Insulated glass units (IGUs), including double glazed units, are individually sealed units which are made up of multiple panes of glass. The glass is separated by an air vacuum or gas filled gap; usually made up of two (double glazed) or three (triple glazed) panes. Energy efficient and insulated against both heat and noise, the sealed air vacuum or gas filled gap between each pane acts as an added layer of insulation.

These IGUs can be made up of different kinds of specialist glass. But, if fire-rated glass is to be used, units must be manufactured in accordance with the certification known as Attestation Level 1.

Attestation is a term that is used to indicate a type of certification which has processes of conformity, in order to demonstrate that certain requirements have been met.

In construction, and especially the glass industry, Attestation of Conformity (AoC) is a declaration of performance that confirms compliance with the relevant standards. The certification was introduced to harmonise performance information across the European Economic Area (EEA).

The level of conformity given is dependent on the nature of the product in question. Specialist safety glass products like fire-rated glass units are classed as a safety-critical product, and therefore must meet Level 1 standards. Attestation Level 1 (and 1+) have the most demanding requirements, whereas Level 4 is the least demanding and is given for less critical applications, like decorative glass.

The declaration of performance relates to essential characteristics of the manufactured or processed product and includes a declaration in relation to the inspection of the manufacturing facility, and continuous assessment and evaluation of factory production control. For fire-rated IGUs the accreditation of Attestation Level 1 confirms consistency of the product's performance. Manufactured products which meet these standards carry the mandatory CE marking – visual evidence which gives you peace of mind that you are using a product that is tested and monitored for performance and consistency.

Holding this accreditation confirms that fire-rated units are manufactured to the highest safety standards each and every time, to strict guidelines with certified consistency, allowing projects to meet Building Regulation standards – where applicable.

If fire-rated units have been installed and the performance certification has not been checked, Building Regulations inspectors can demand they are taken out unless evidence of correct certification can be provided. This can waste valuable project time and money.

Standards

Accreditation is important to companies that wish to maintain professionalism as it has a direct impact on public safety. It helps to determine if a company meets or exceeds minimum standards of quality and gives the consumer confidence in choosing a company that puts them first. Certification makes sure products and services meet standards, too. Within the construction industry, they help to make sure projects run smoothly and that quality products which meet Building Regulations are chosen and used.

Testing glass for certification

Fire resistance tests should always be carried out by independent test companies and comply with all relevant fire test standards. All fire-rated glass should be installed as per the test evidence, in terms

of the fire resistant glazing system used during the test (including sizing, frame and installation materials); only then will it provide the protection as per its official fire protection rating.

If the specified glass is installed into a different frame or installed with different materials (for example a different seal) then this will negate the protection and fire rating of the product; having access to the relevant test evidence when purchasing fire-rated glass is therefore fundamental. A FIRAS-certified company provides installation that demonstrates competency in the installation of such products and systems and then can provide a certificate of authentication.

Investing in the right supplier that has the same vision on safety, quality and service can make sure a project is completed to the best possible standards. If using a fire-resistant glass then it must only be used as part of a previously approved glazing system. There is no second chance with safety, make sure you get it right first time.

Sean Haynes is managing director of FireGlass UK



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Glazing Projects service gives essential project management support with one expert contact at AluFoldDirect, supporting you every step of the way, from initial discussions and specification, to creating achievable work schedules and ensuring accurate surveys. The Aluminium Glazing Projects team will co-ordinate a planned delivery strategy, with products arriving on site, right first time, on time, every time.

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Maximising daylight with Roofglaze



Roofglaze offers everything that you need to bring natural daylight into your home and living spaces. Their market-leading range of Flatglass rooflights can be used to illuminate and ventilate areas that would otherwise be dark and dingy.

They can also be used to access roof terraces or as walk-on units above basements and cellars. Roofglaze can provide you with Secured by Design compliant rooflights, as well as glass roof lanterns, polycarbonate domes and aluminium bi-fold doors for your next project. To discuss your requirements with the expert team at Roofglaze, send your enquiry to rgrestimating@roofglaze.co.uk

01480 474 797 www.roofglaze.co.uk

BRE approved rooflights



Hambleside Danelaw, the pioneering GRP rooflight manufacturer, has once again led the way with the completion of an Environmental Product Declaration (EPD), approved by the BRE, for its ZENON in-plane GRP rooflights.

The EPD recognises the sustainable benefits of Zenon and gives project designers a minimum of 1.5 points from the Material category in BREEAM rated projects. This achievement, the first from a rooflight manufacturer, are points that can offered in addition to the metal roof system. Specifying Zenon rooflights can also lead to contributions in other BREEAM categories including Health and Wellbeing and Energy.

01327 701 900 www.hambleside-danelaw.co.uk

Slim fire rated glazing solution



A new residential property built on Passivhaus principles in Devon, utilises Promat **SYSTEMGLAS®** Celare fire resistant glazing system from fire, thermal and acoustic solutions specialist **Promat UK**. The contemporary house, named "The Walled Garden" was designed by McLean Quinlan architects for its self-building owners.

The project was constructed by Goulden & Sons, who are a Promat-approved **SYSTEMGLAS®** installer. By choosing **SYSTEMGLAS®**, the architect and builder have been able to benefit from Promat UK's '360 degree wheel of assurance' for fire rated glazing systems.

0800 588 4444 www.promat-glass.co.uk

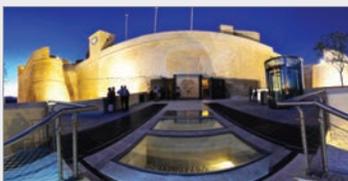
StoVentec Glass Rainscreen System chosen



The StoVentec Glass Rainscreen System supplied by **Sto UK** was chosen for a museum collections centre extension project in Edinburgh, thanks to its outstanding aesthetic properties and its durable nature. The black infused colour StoVentec Glass was installed on the new extension to the National Museums Collection Centre in Granton, Edinburgh. StoVentec Glass provides effective thermal insulation for the facade by creating a ventilated cavity which keeps the wall dry and allows it to breathe. It can also be used to create a highly attractive bespoke finish for each individual project, with panel sizes and shapes manufactured to fit specific design requirements.

01418 928000 www.sto.co.uk

Walk on structural glass floors & rooflights



Structural Glass Design is a specialist in manufacturing walk on glass floor panels and drive on glass floors and rooflights, and processing silicone sealed, structural double and triple glazed units. The

company design, manufacture and install walk on glass floors/rooflights and drive on glass floors/rooflights wherever your location. For more information please contact the company.

enquiries@structural-glass.com

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Fortiglaze – the future of fire-rated glazing



Due to recent events in the fire protection industry, it is more imperative than ever to make sure your supplier of fire rated products is an expert in their field. With ever-changing standards, rules and regulations, it's important you have an expert team behind you to help you navigate the world of fire-rated glazing.

Drawing on two decades of commercial expertise, and synonymous with quality and innovation throughout the sector, London-based OAG is fast-becoming one of the UK's most sought-after structural and fire-rated glazing specialists.

The firm's ever-growing client list includes market-leading main contractors such as Mace, SRM, Costain and more, with projects as prestigious as London Bridge Station, O2 Headquarters and Tate Modern.

Having supplied and installed fire-rated glazing for the past two decades, OAG wanted to develop a new fire solution, providing not only safety but aesthetically pleasing profiles. The aim was simple – to provide clients and architects with a product that gives both the end user and the supplier confidence, without compromising the architectural vision.

OAG looked into the testing and criteria needed to badge a fire rated system of their own, and in 2016 Fortiglaze was born.

OAG's first task was to understand the

protective aspects they would need to adhere to – fitting 60 minutes of fire safety within a minimally framed system.

To achieve this, they liaised closely with the International Fire Consultancy, who advised on the best materials needed to achieve a safe system, and how those could be used most effectively within their framing.

OAG wanted Fortiglaze to be versatile: offering 30, 60, 90 and 120-minute configurations. They provide both 'Integrity and Insulation' and 'Integrity-only' options. 'Fortiglaze Slim' versions offer minimal frames and maximal glazed areas, while standard models can be paired with heavier glass types and security options for additional protection.

OAG has carried out a number of personalised project-based tests on the resulting system. All testing is carried out according to BS 9999 Part 1 and 2 standards, and all products have also been tested to meet CE European standards. A range of premium quality Fortiglaze Smoke Doors are also available, offering smoke protection to BS 476: Part 31, Section 31.1.

OAG has a number of future tests in the pipeline, with its Slim systems pushing the boundaries of protection time, door sizes and finish options. These are currently assessed up to 3 metres, a feat rarely seen in fire-rated glazing.

To further highlight its experience and knowledge in this field OAG has completed the FIRAS accreditation, which provides evidence of its competence to install fire-rated systems safely and in-line with all relevant Building Regulations.

OAG fabricates Fortiglaze in its own factory, providing end-to-end quality control. The factory has streamlined the assembly process by creating a seamless 'fab and hang' system, capable of handling large scale orders.

OAG also wants its clients to have the most comprehensive understanding of the range as possible. To achieve this, the company developed the 'Interactive digital specification guide'. This allows users to not only spec the product and be provided with extensive product info and capabilities, but also be shown a real-life example of their product at the end of the user journey.

The company hopes this will allow clients to make sure they have the right system and aesthetic features for their project, and install them with confidence. It also offers fully-fledged maintenance contracts on all fire & non-fire rated products.

Fortiglaze is currently being used in several high-profile London-based projects, such as 22 Bishopsgate and 135 Bishopsgate.

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