Edgetech
A SUBSIDIARY OF Quanex

Super Spacer® - an essential dimension of sustainable building.

The flexible warm edge can be found in two of BIG's most recent projects

Renowned Danish architect Bjarke Ingels Group (BIG) believes there is no single answer to what sustainable buildings of the future will look like. The eye-catching new BIG headquarters in the port of Copenhagen is largely made of CO_2-reduced concrete, though the group chose cross-laminated timber when designing Skypark Business Centre at Luxembourg Airport. At first glance this may seem contradictory, yet the two buildings share some common qualities - high standards of sustainability, resource conservation and energy efficiency, and both feature insulating glazing with Super Spacer® spacers.

Pure brutalism at BIG headquarters in Nordhavn, Copenhagen

Copenhagen has completely overhauled the former harbour area of Nordhavn, transforming it into a sustainable urban district - a connected area for 40,000 people and a testing ground for cutting-edge green technologies.

When BIG presented plans for its new headquarters at the top of Sundmolenpier in Nordhavn, they were initially rejected by the city council. Decision makers considered the proposed 27-metre-high concrete tower too unactractive for the green showcase city, which aims to be carbon neutral by 2050.

At first glance, the neo-brutalist aesthetic - marked here by massive exposed concrete beams - appears to honor an environamentally high-impact material rather than sustainable design. With no plaster or cladding, the structure highlights the pure contrast of concrete supports and floor-to-ceiling glass. From roof to pier, each story ends in a diagonal balcony connected by a circular staircase, offering unique views of the Öresund. Yet, closer inspection reveals the high performance components making this a sustainable construction project.

High performance double glazing combines thermal insulation, solar control and light transmission

Eiler Thomsen Alufacader manufactured the mullion-transom glass façade from extruded raw aluminium. Glaseksperten A/S supplied approximately 500 units, up to 2.8 metres high, for the floor-to-ceiling triple glazing, as well as a three-metre high glass sliding door and glass fire doors.

The U value of the façade is 0.18 W/(m^2K), the Ug value of the glazing is 0.6 and the Uw value of the windows is 0.8 W/(m^2K). The Pilkington Suncool 70/40 used in the insulating glass units is a high performance coated glass that combines excellent thermal insulation with solar control and high light transmittance - important properties for the low light Scandinavian winters and long sunny summer days.

The glazing experts chose Edgetech's Super Spacer® T-Spacer™ Premium Plus as the project's warm edge spacer. Marketing Manager Louise Præstholm comments, 'The Super Spacer is very efficient in production due to its flexible, metal-free composition, which simplifies installation and reduces the need for manual labour. Its structural flexibility also allows for an extremely precise fit, reducing the stress on the glass. Super Spacer also contributes to the energy efficiency and durability of the end product by improving thermal performance and minimising condensation'.

70 per cent of the concrete is made with a reduced CO_2 content

After the building application was rejected, BIG entered into discussions to explain the sustainability concept in detail. In order to achieve the best possible lifecycle carbon footprint as part of the DGNB Gold certification, around 70 per cent

of the concrete used for Sundmolenpier was carbon-reduced. Since 2017, when the initial plans for the new headquarters were drawn up, the team had been in dialogue with Danish cement manufacturer Aalborg Portland, which was researching a CO_2-reduced cement. The resulting material, now marketed as FUTURECEM®, produces up to 30 per cent less CO_2 emissions than conventional Portland cement, as 35 per cent of the energy-intensive clinker is replaced with limestone and calcined clay.

FUTURECEM® is more viscous than less sustainable alternatives, meaning special production and formwork procedures had to be developed in collaboration with the shell manufacturer LM Byg A/S and the concrete supplier Unicon to enable the walls to be cast in-situ. The beams, which are approximately 3.6 metres high and 20 metres long, are a sandwich construction of 500 millimetres of load-bearing reinforced concrete, 350 millimetres of insulation and 100 millimetres of fair-faced concrete.

But why concrete and not timber? The location's harsh, salty environment is tough on any material, but the BIG team felt that challenges of corrosion and moisture would have been much more difficult to solve with a timber structure. In addition, the building had to accommodate materials from the surrounding port buildings.

BIG headquarters is heated and cooled solely by concrete core activation and passive ventilation, taking full advantage of FUTURECEM®'s heat storage capacity to regulate temperature. Energy piles are used as a heat source and the heat pump is supplied with electricity from the building's own photovoltaic system.

There are reasons beyond aesthetics for leaving surfaces untreated. Over the years, exposed concrete can reabsorb climate-damaging CO_2 through carbonation. The carbon dioxide reacts with the calcium hydroxide in the concrete to form calcium carbonate, or limestone. This effect also has a small impact on the ecological balance.

Skypark Business Centre South with powerful timber hybrid construction

The Skypark Business Centre South at Luxembourg's Findel Airport, also designed by the Bjarke Ingels Group, stands in stark contrast to the concrete minimalism of the BIG headquarters. While the underground areas of the low-energy building are mainly made of reinforced concrete, the 30.5-metre-high superstructure is one of the largest timber constructions in Europe. Instead of a single, elongated body, the building, which consists of two three-storey structures, meanders along the airfield over a length of 365 metres. The design not only optimises usable space, but the geometric zig-zag grid also creates separate, light-flooded courtyards for maximum daylighting. The upper structure is rotated 180 degrees, creating lush green roofs and terraces on three levels. The artificial biotopes provide space for flora and fauna, collect rainwater, reduce the building's cooling load and improve the microclimate and air quality.

Double-glazed façade to reduce heat, noise and glare

Skypark has been designed with a remarkably energy efficient double-glazed façade. The outer layer consists of a zigzag of transparent and opaque elements to provide noise and wind protection. The inner triple-glazed mullioned face provides additional thermal insulation, and the space between the façades is fitted with individually controllable blinds. The ground floor has a structural glazing look and acts as a light, transparent base for the upper floors. As with the rest of the building, the edges of the ground floor are rounded to allow uninterrupted panoramic views.

The storey-high, concave and convex curved insulating glass units for the corners of the glass façade were manufactured by the Münsterland-based glass processor Finiglas on behalf of the façade constructor Kyotec Luxembourg. Each corner consists of four panes measuring 2999 x 4861 millimetres with a radius of 7698 millimetres. Installation specialist

Heavydrive was on site with its VSG 1300 KR vacuum suction system and Konter 3000 counterweight system to install the curved units under an overhang of 2602 millimetres.

The required glass performance and a Ug value of less than 0.5 W/m²K could only be achieved with triple glazing and specific thermal and solar control coatings. The pane construction, using Guardian Ultra Clear as the base glass, consists of 13.52 millimetre laminated safety glass with various solar control coatings on the weather side, a thermal insulation coating on the 6 millimetres thick centre pane and a 17.52 millimetres laminated safety glass pane, partly with an acoustic interlayer.

‘The units are not inserted into a frame, but are fixed in the edge seal using the Siltal joint, which is common in the Benelux. The glass façade is actually designed as structural glazing, since the bonding is done through the edge seal and only the laminated safety glass pane on the interior side is mounted on the mullion,' says Mirko Heeringa, project manager at Finiglas.

Production and performance are some of the benefits Super Spacer® insulating glass spacers

Although Finiglas' production is designed for large formats, triple-glazed units are something special. Each of the more than 160 curved triple insulating glass units that Finiglas supplied to Luxembourg weighs more than 1300 kilograms. The requirements for reproducibility and handling were particularly high for this project. We had five individual panes, each weighing up to 600 kilograms, hanging from the crane for the assembly of the 130 units, which had to be precisely laminated and insulated. Given the weight and size of the panels, we adapted our processes accordingly. For example, we designed special tools and handling equipment," Heeringa continues.

Finiglas used the 16 mm Super Spacer® TriSeal™ Flex black’ from Edgetech/Quanex as a spacer. ‘The Flex has several advantages for us in insulating glass production,’ confirms Heeringa and continues: ’It is a little stronger than the Super Spacer products we normally use, so it always remains stable and precisely in position when the second and third panes are placed.’ Christoph Rubel, European Technical Manager at Edgetech Europe GmbH in Heinsberg, emphasises the properties of the Super Spacer® within the insulating glass unit: ‘Wind and climatic loads can work quite hard in a 16 millimetre gap between the panes. This is where a spacer made of structural silicone foam really comes into its own thanks to its flexibility and 100 per cent resilience. The elastic silicone material keeps the edge seal intact and thus guarantees the energy efficiency and durability of the insulating glazing.’

About Edgetech Europe GmbH, A Part of Something Bigger

Edgetech Europe GmbH, located in Heinsberg, Germany, is a fully owned subsidiary of Quanex Building Products Corporation, (NYSE: NX) a global, publicly traded manufacturing company primarily serving OEMs in the fenestration, cabinetry, solar, refrigeration and outdoor products markets. Edgetech Europe GmbH services markets in continental Europe with a total of 490 employees and 17 extruders. We are “**A Part of Something Bigger”** by improving the performance and aesthetics of end products through continuous innovation, helping customers achieve greater production efficiencies, and giving back to communities where we operate. Visit quanex.com for more information.

Edgetech Europe GmbH
Gladbacher Straße 23
52525 Heinsberg, Germany
Tel: +49 (0)2452.96491.0
info@edgetech-europe.com
SUPERSPACER.COM
QUANEX.COM