

Edgetech Super Spacer® “masters the art of the curve”

Seamless integration within automated insulating glass production processes

Some 2,790 square metres of insulating glass was cold-bent on-site for the glass façade of the T-Mobile Arena in Las Vegas and mounted within the aluminium frames. The cold-bending process together with the highly automated production of the IG units ensured that the largest project of this type ever implemented in the USA was ultimately also an economic success.

Automated, economical insulating glass production from a lot size of 1 upwards

JE Berkowitz, that claims to be the leading manufacturer of architectural glass in North America, and Edgetech / Quanex have already successfully collaborated in the completion of many projects; in Europe, for example, the curved glass roof measuring more than 12,500 square metres that spans the historical Moscow commercial court of Gostiny Dvor. "In addition to large glass surfaces, organic curves and dynamic shapes constitute an ongoing theme in architecture," according to Joachim Stoss, Managing Director of Edgetech Europe GmbH, Heinsberg-based. "Lot size 1 constitutes the rule for some projects more often than the exception. Manufacturers such as JE Berkowitz can only attain the necessary levels of flexibility and cost-effectiveness through production that is largely automated. Producing curved glass alternating with flat glass panes is very simple using Super Spacer® spacers. We are obviously very proud that our products are favoured by JE Berkowitz for the production of insulating glass."

Modern production must offer maximum versatility, i.e. the combination of as many glass types and formats as possible, in addition to all the necessary sealants and spacers, whilst also being easy to handle. Flexible spacers such as Super Spacer®, which is applied directly from a reel and already have the desiccant integrated within them, save, compared to rigid spacers, on process steps such as the cutting into shape of the glass, bending and filling of it with desiccant. However, they don't just reduce the unit costs through their automated insulating glass production. The extremely precise application of the edge seal with robots also ensures that the quality and appearance are right. During the pressing, the acrylate pressure-sensitive adhesive placed on the side of the spacer holds the glass and spacers together. Narrow tolerances and the parallelism of even large panes of glass are guaranteed. The low sightline ensures that Super Spacer® spacers are not located in the visible area, even narrow frame profiles and lower glass edge rebates can be realised. Moreover, the primary polyisobutylene seal is applied in a concealed manner and, it is also virtually impossible for it to migrate from the edge seal onto the pane of glass over the years.

A model example of teamwork

JE Berkowitz was also in demand at the T-Mobile Arena in Las Vegas by offering the greatest possible production efficiency and creativity to find the right solution. "Desert diamond" is what the stadium experts of the Kansas-based architecture firm Populous call the multifunctional area with a maximum capacity of 20,000 spectators that was officially opened in 2016, and which ultimately cost US \$ 375 million to construct. "The dynamic design tells a cohesive story about Las Vegas and all its contrasting influences", according to a Populous press release. To the west you can see the Mojave desert and the Spring Mountains and the Las Vegas Boulevard which pulsates day and night. An expansive, elliptically shaped glass façade, spanning some 800 square metres, is covered with a translucent LED fabric for video shows, and complemented by a sleek exterior of undulating bands of metal that evoke the colour and sedimentary layering of the desert.

As is so often the case, it was also a long process from the design of T-Mobile Arena's glass façade to its cost-efficient, technical implementation. Teamwork over a period of several months with all the technical specialists involved from the architect to the façade builder Crown Corr, the glass supplier Guardian, the glass processor, J.E. Berkowitz (JEB), extending to the sealing specialist, Dow Corning, and the supplier of the spacer system, Edgetech / Quanex, was of crucial importance in ensuring the success of the project.

Insulating glass is cold bent directly on-site

The bowl shape of the façade results in countless glass bending radii and edge dimensions, and by contrast with flat panes of glass, the compressive strength, tensile strength and bending strength values are unknown for the curved panes. Due to the fact the glass curvature also has an influence on the bending strength and thus also the climatic stresses upon the insulating glass, minimal bending radii, maximum bending angles and the necessary installation tolerances were precisely calculated and tested in advance. This represented a monumental task in view of the approx. 2,500 trapezoidal insulating glass units, which were ultimately cold bent directly on site. The coating, structure, size and, above all, the thickness of the glass as well as the elasticity of the edge seals were the essential product parameters which had to be optimised. The decision in favour of cold-bent glass was based almost exclusively on economic considerations. Hot bending processes require an individual, custom-made shape for each pane of glass, cold glass is exclusively bent mechanically and, in the case of the T-Mobile Arena, pressed into a plain, anodised aluminium frame.

"Cold glass is surprisingly flexible and extremely elastic until the breaking point is reached," explains Christoph Rubel, a technology expert at Edgetech. "Glass cannot be plastically deformed in a cold state, but it does not have any shape memory, by contrast with thermally bent glass, that solidifies in one shape after cooling." A simple rule of thumb describes the relationship between glass

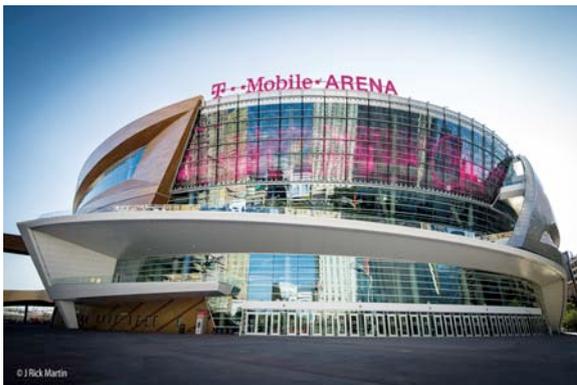
thickness and the radius: if the glass is 6 millimetres thick, it can be approximately bent up to 1,500 times the radius of 9 metres before it breaks.

Naturally, the mechanical forces with which the curved insulating glass units are held in the frame also have a permanent effect on the edge seal. In addition to the use of the correct sealing material, the spacer is assigned the greatest importance when it comes to hermetically sealing the space between the panes of glass over a period of decades. "By contrast with rigid spacers, flexible spacers cannot form kinks or ridges that might impair their leak tightness after they have been bent," explains Rubel. In addition to the economic aspects, this functional feature proved to be the main reason to use Super Spacer[®] for the glass façade of the T-Mobile Arena. An additional advantage was to be found in the excellent insulation properties of the Super Spacer[®] Warm Edge System, which contributes towards the thermal behaviour of the entire building that was constructed in accordance with the LEED Gold standard.

About Edgetech Europe GmbH

Edgetech's Super Spacer[®] flexible foam-based spacer systems act as energy-efficient warm edge spacers in insulating glass windows. They significantly reduce energy loss to the outside, largely prevent condensation and also contribute to the lifespan of a window.

Edgetech Europe GmbH, located in Heinsberg Germany, is a fully-owned subsidiary of Quanex Building Products Corporation, a leading global provider of energy-efficient components such as window and door profile systems, flexible insulating-glass spacers, edge seals for photovoltaic modules, wooden floors and ceiling profiles, as well as window and door grilles, with its head offices in Houston, Texas. Based on turnover Edgetech/Quanex is the world's largest manufacturer of spacers. Edgetech Europe GmbH is a sales location for the markets in continental Europe and one of the three worldwide Edgetech production plants, with a total of 450 employees and 16 extruders. You can obtain additional information about the Super Spacer[®] systems and the Warm Edge Technology of Edgetech here: www.superspacer.com.



More than 2,700 square metres of insulating glass were cold-bent and mounted on site within the T-Mobile Arena in Las Vegas.

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