EDGETECH's advances in insulating glass manufacture

As is well-exemplified in EDGETECH's Super Spacer® system for flexible spacers, the levers used by insulating glass processors and manufacturers can greatly impact efficiency and product quality – especially within today's volatile environment.

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As a product Warm Edge insulating glass comes as conspicuously mature, in technical terms, for a market that's characterised by low margins and a shortage of skilled workers. Here, to the mix -and besides rising material costs- we might add cheap imports as well as current supply bottlenecks.
It was the Scandinavian countries that first pioneered triple glazing, with the rest of Europe following suit. In Switzerland and Austria high-quality, energy-saving windows have now become more or less

the norm. According to current information provided by the industry associations, around three quarters of window units in new residential and non-residential buildings are designed with triple glazing in Germany too. A similar proportion is represented by thermally optimised spacers, which prevent the formation of thermal shortcuts at those edges of insulating glass through which valuable energy is lost. In sum, those decides in favour of a warm edge with a passive house certificate -whether as processor, architect, builder or building owner- are effectively opting for a mature, future-proof product - also because it has become mostly unnecessary to compare PSI values at the third digit after the decimal point. These products all make a significant contribution towards low U-values, which also means reduced heating and cooling costs as well as an improved indoor climate. Besides, condensation and mould formation at the edge of the glass have both become practically non-existent.

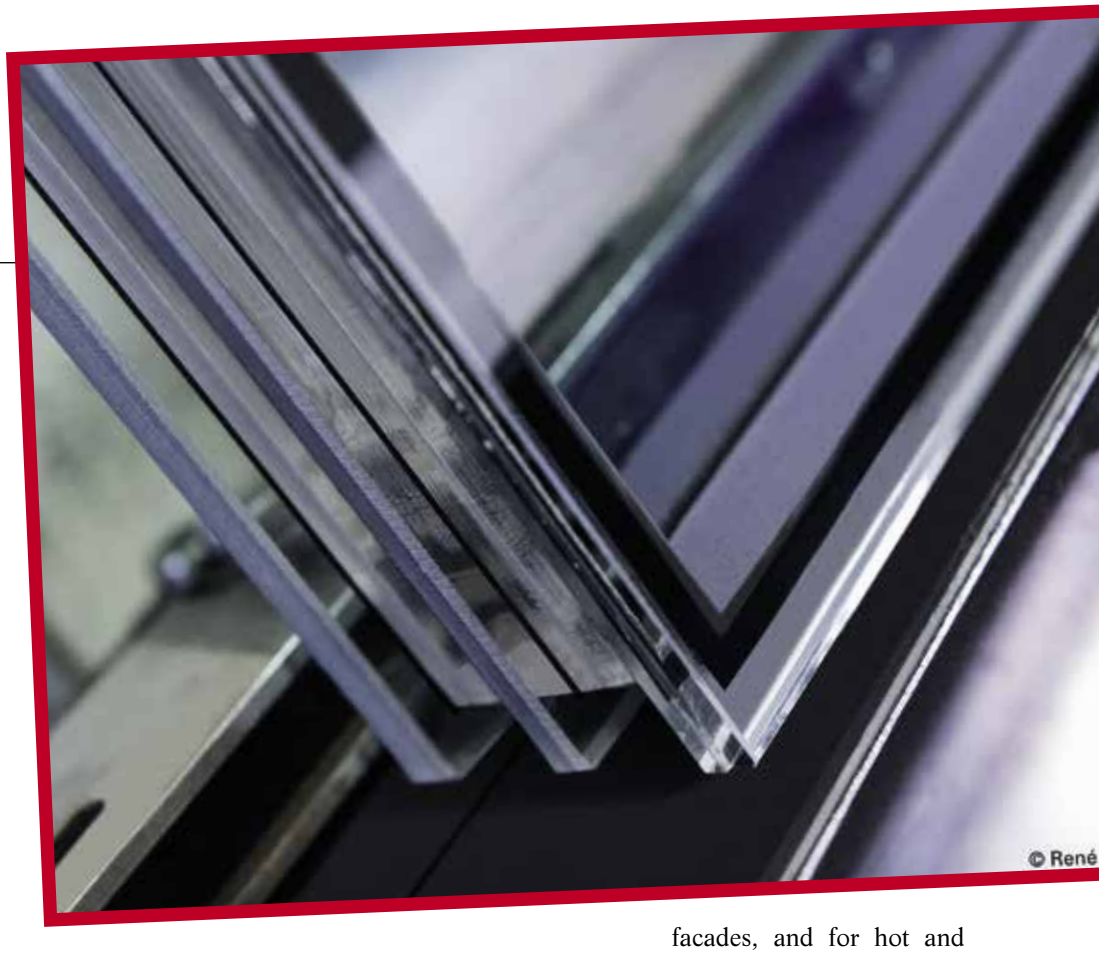
LEVER 1: EDGE SEAL STRUCTURE

The old adage “the whole is more than the sum of its parts” certainly applies to the edge seal. The spacer and its desiccant capacity, in combination with the primary seal and the secondary sealant, jointly represent an essential element in ensuring water vapour and gas impermeability as well as energy performance of the insulating glass unit throughout its product life, which is widely believed to span 25 years at least.

The various spacer technologies on the market can be roughly broken down into two categories, which entail considerable differences where the insulating glass manufacture is concerned. These are rigid hollow profiles filled with desiccant before being assembled to form spacer frames as well as flexible systems that already contain a desiccant. Flexible thermoplastic spacers made of Polyisobutylene are extruded onto the glass pane from a barrel while still hot. Spacers made of silicone structural foam come prefabricated from the roll and are also applied automatically along the glass edge. Therefore, when using flexible spacers the production steps of cutting, bending and assembling as well as desiccant filling and separate butyl application outside the insulating glass line all get eliminated.

Spacers must be resistant to wind and climate loads, UV radiation, temperature as well as mechanical stress whilst forming a permanent bond with the respective sealants, such as Polyurethanes, hot-melt butyl or silicone. Gas must neither be left to escape from the interior nor moisture allowed within the insulating glass by penetrating the edge seal. Last but not least, the edge seal is likewise responsible for ensuring the structural integrity of glass constructions in the facade. The Super Spacer® structural silicone foam is engineered to render the edge seal flexible, thereby ‘cushioning’ pressure upon it while significantly reducing any risk of glass breakage. Less stress in the edge seal results in improved seal tightness, together with durability of the glass units. As compared with rigid spacers, full or partial offsetting of loads acting upon the edge seal is an advantage especially claimed by such desiccant integrated pre-formed flexible spacers as Edgetech Super Spacer® TriSeal™.

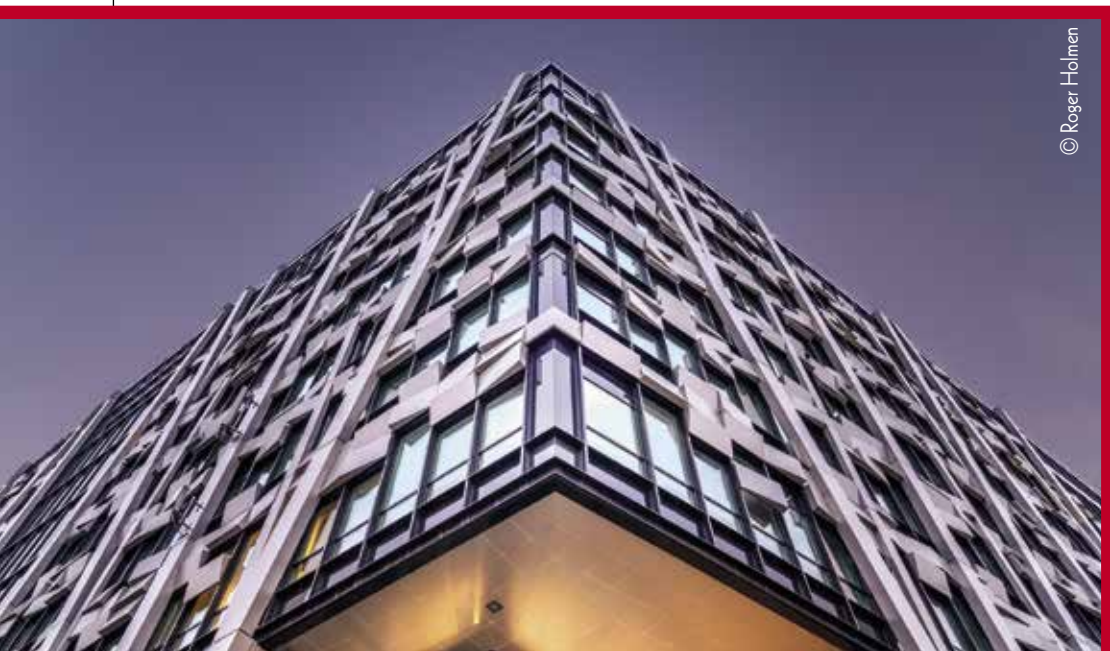
Material properties are proven by the manufacturer by way of corresponding tests. Edgetech/Quanex, for instance, has tested shear load capacity. An insulating glass unit measured at circa 6 x 3 metres in width and 6 mm in thickness was bonded solely by means of the integrated primary, high-



strength acrylic adhesive. The unit was lifted onto a supported glass lite using vacuum cups with the spacer conceding not even a single millimetre during the 30-minute test phase. The additional adhesive layer was demonstrated to have reduced stress upon the primary PIB seal, which consequently functioned exclusively as a water vapour and gas barrier to the secondary seal.
In the so-called Dade Country Hurricane Test (US-based), the units withstood wind speeds of 350 km/h where a positive wind pressure was present as well as almost 400 km/h where a suction effect was evident. Despite not ending in unit failure, the test was nonetheless stopped given that the test stand was unable to produce higher wind loads.

LEVER 2: VARIABILITY AND FLEXIBILITY

The situation in many insulating glass companies in Europe is characterized by both series production and customised production mix as well as automation and manual activities, e.g. for handling and assembling panes and spacers. Moreover, the trend towards large panoramic window panes, as well as free-form and curved glazing, further increases the complexity of the variant production that's so typical of today's industry. Traditionally this meant that a large number of different spacer systems had to be kept in stock: from inexpensive stainless steel profiles to rigid hollow plastic profiles on one side and flexible spacers on the other – which goes to show the benefits of them all, especially in the field of automated production. Edgetech/Quanex has always embraced a "one for all" philosophy. Indeed, Super Spacer® flexible foam spacers are suitable for manual application in custom-made products, for automatic processing for edge sealing classic windows with and without internal or externally applied muntin- and glazing bars, for insulating glass units in structural glazing facades, and for hot and cold formed curved insulating glass sections. Not only. The structural foam is compatible with all common sealants, including hot melt butyl, Polyurethanes, silicone and polysulphide. Last but not least, insulating glass units that use Super Spacer® can be handled, packed and stored outdoors immediately after they have been processed, since the integrated desiccant dries the interpane cavities down very rapidly.
The additional price for Super Spacer® amounts to just a few cents per running metre. As such, Edgetech has recommended that any investment decision should factor in considerable potential savings elsewhere. Differences in energy consumption levels brought about by the various spacer technologies are also becoming increasingly important at this time of rising energy prices.



LEVER 3: AUTOMATION

Ever since the era of Henry Ford, the notion of "scale economies" has become second nature to us. Now we typically reduce our unit costs through greater output. However, according to this maxim, automation to increase efficiency is only worthwhile for larger production volumes. That said, digitisation is currently facilitating the exact opposite scenario for insulating glass production. We make use of economies of scope. Costs are reduced by optimising the production landscape as well as processes and infrastructure – all with a view to using these to manufacture related products right down to a batch size of 1. For SMEs, producing more quickly, more efficiently and in a more customised manner is also becoming decisive as a competitive advantage. In the best-case scenario, the insulating glass line cares little whether a trapezoidal pane follows one that's rectangular or whether a triple insulating glass unit follows a double one. The ERP system provides all the necessary information and takes care of digital organisation of the order processing, work preparation, material provision, handling and logistics. Theoretically this variety is unlimited, forcing us to reduce complexity as far as possible.

Again here, broken down in terms of our topic of spacers, flexible spacers offer great potential. Fewer machines and the elimination of space-consuming magazines for the provision of the different six-metre-long spacer profiles as well as the exlusion of handling steps all reduce the requirements of machinery, space, storage and personnel as compared to the processing of rigid spacers. Flexible spacers are applied directly in the insulating glass line. Super Spacer® can be applied in various widths via a double-head applicator without interruption and, above all, down to the last millimetre and with no hand touching the glass between the start section of the washing machine and the pick off section behind the sealing robot. Given that these are already factory-equipped with desiccant, barrier film and structural acrylic adhesive, they already support automated processes and ensure high levels of manufacturing precision and quality - especially for large-format triple-glazed insulating glass units.

ABOUT EDGETECH EUROPE GMBH

Edgetech's Super Spacer® flexible foam-based spacer systems act as energy-efficient warm edge spacers in insulating glass windows. Significantly reducing energy loss to the outside, they also largely prevent condensation whilst contributing to window lifetime. On average, more than 300 million metres are sold annually in over 90 countries worldwide.

Located in Heinsberg Germany, Edgetech Europe GmbH is a fully-owned subsidiary of Quanex Building Products Corporation - an industry-leading manufacturer of components sold to Original Equipment Manufacturers (OEMs) within the building products industry. Based in Houston, Texas, Quanex designs and manufactures energy-efficient fenestration products as well as kitchen and bath cabinet components. Regarding turnover, Edgetech/Quanex is the world's largest manufacturer of spacers. Edgetech Europe GmbH serves as sales location for the continental Europe markets and one of the three worldwide Edgetech production plants. It has a total of 480 employees and 17 extruders. For more information on Edgetech's Super Spacer® systems and Warm Edge Technology, check out www.superspacer.com.

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