Betoglass GmbH, Oberhausen, Germany

Concrete and glass composite – Construction material for brilliant façades

From the beginning of its history, concrete has been used in combination with other materials. Betoglass GmbH from Oberhausen in Germany has developed yet another extremely promising variant. Using a patented process, a glass plate is bonded to the concrete element at the works. This produces façades which are reliably protected against the weather and which offer great design possibilities previously unknown. The Betoglass façade elements are produced in the precast component works on existing plants using known processes. This process offers architects a wide range of façade variants from cost-effective to extravagant solutions. And precast concrete components works are now able to use these structural components to give a significant boost to their value-added chain.

According to Betoglass's inventor, H. Peter Böe, the actual innovation consists of a special polytransmitter which provides a secure bond between the glass plate and the concrete element. The elements are produced at the works in the usual way. The glass plate is coated with the polytransmitter and then simply laid in the formwork with the protective film. All the other step in the concreting process are carried out in the usual way. The glass plate is retained by adhesion between the concrete and the glass which has been coated with the transmitter and no visible fasteners such as screws are involved. The bonding together of two tried-and-tested materials results in an extremely versatile and resistant composite. However, Peter Böe often highlights the psychological advantages of using this material compared to glass. "Glass is aesthetically attractive but extremely fragile. So, many people ask first whether the façades are easily broken. The answer is that combining glass and concrete results in a monolithic structure which is difficult to destroy."

The reliability of the system has been confirmed by the numerous approvals which have been granted by the boards of surveyors. The prefabricated façade is both an architectural and structural element of the carcass – thus adding turnkey capability to carcass construction. Numerous designs are possible in terms of the size, shape, colour and structure of the glass plate.

Elegant corridors inside the administration building of Swiss Re Germany AG in Munich, Germany

Because Betoglass is combined monolithically with the load-bearing structure, the concrete is securely protected from the weather and even graffiti can be easily removed. Betoglass can only be destroyed by the application of extreme force. The bond between the glass and concrete structure is retained even when damaged – there are no glass splinters and protection against the weather is maintained. Both the construction and the repair of Betoglass in the event of damage are regulated by the DIBT (German Institute of Construction Technology). The procedure consists of removing all residues with a compressed-air chisel, applying a special mortar using the "floating-buttering method" and then sticking on a new glass plate while being careful not to leave any cavities.

The structure of the Betoglass façade appears as follows:

- Internal, precast steel-reinforced concrete shell as a load-bearing structure in the form of a wall, support or beam
- Predominantly permeable film and enclosed thermal insulation layer
- The facing which is the part of the steel-reinforced sandwich structure carries the Betoglass
- Transmitter which acts as the bond between the Betoglass and the concrete facing
- Vapour-pressure equalisation via certain permeable joint-sealing tapes
- The steel-reinforced facing concrete is protected from the weather and mechanical damage by the Betoglass panel with a coloured enamel coating on the inside ▶

From ugly duckling ...

... to beautiful swan. Successful refurbishment with Betoglass

The facade can alternatively be prepared without the film but with a 2 cm ventilation layer. In this case, the vapour pressure equalisation is achieved by ventilation openings in the window lintels.

Anyone standing in front of a Betoglass façade for the first time will no doubt be thinking "great, but must be incredibly expensive". Peter Böe emphatically refutes this. "Glass can be manufactured on an industrial scale economically and producing the composite elements at the works is extremely simple. This is a product for mass production. The quality of workmanship in the precast component works is also significantly improved since the precisely cut glass plates provide the exact format for the elements as a whole as well as the formwork. The fact that the facades are made at the works makes sure that the bond is 100% sound and free of cavities. The profit margin for the works is also increased by the attractiveness of the product and the ease of manufacture."

Formwork with coated glass panel and reinforcement in place

Another question with which Peter Böe is often confronted relates to the joints. This also has a simple answer since the joints are determined by the shape and size of the concrete element. Large surfaces are produced almost without any joints. This property is even more impressive when the system is used for internal applications. Whether it is a bathroom, kitchen, entrance hall or floor, the large format glass surfaces represent an aesthetically pleasing and cost-effective alternative to tiles, which are traditionally used. ▶

New sparkle, and not only for prestige projects: residential buildings, upgraded with Betoglass façades

Installation of a monolithic element – façade and load-bearing structure as a single unit

It took around six years for Peter Böe's system to be granted approval by the Institute of Construction Technology. The tests on the moisture permeability of the back were particularly elaborate and lengthy. He was therefore delighted about the fact that reputable architects have taken to his invention so quickly. The first place where large areas of Betoglass were used is the Federal Garden Exhibition at Gelsenkirken in Germany in 1997. The façades have been used aesthetically to great effect. Examples of this are the Hamburg gate, inside the administration building of the Swiss RE Germany AG (both by Architekturbüro Bothe-Richter-Teherani) and on the Herlitz building in Berlin (Architects Deubzner and König). Peter Böe also sees other future applications apart from façades. "I also see great opportunities in civil engineering and construction engineering. We are currently testing the coating on sewer pipes. The glass coating can provide long-term protection to concrete structures such as bridges etc." Marketing of the patents is in full swing and Betoglass is already available in all the European countries, China and the USA.

■

Dispatch of one finished element

Further information:

BETOGLASS™

Betoglass Deutschland GmbH
Heiderhöfen 23
46049 Oberhausen, GERMANY
Tel.: ++49 (0) 2 08 80 33 11
Fax: ++49 (0) 2 08 85 24 79
E-Mail: betoglass@cityweb.de
Internet: www.betoglass.com