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From digital prototype to concrete element

The situation and demand for concrete products is very good in the concrete block industry. Many manufacturers are working at the upper limit of their production capacity. Therefore, there is little incentive to make changes. Only limited resources are available for new developments. In this environment, however, a trend is developing towards individual and versatile stone systems. Planners and architects no longer consider the various cast stones to be isolated from each other. Concrete slabs are enhanced or combined with façades and design elements in the same design and with the same feel (see report in CPI 02/2018).

Standardised/uniform data and common shared knowledge

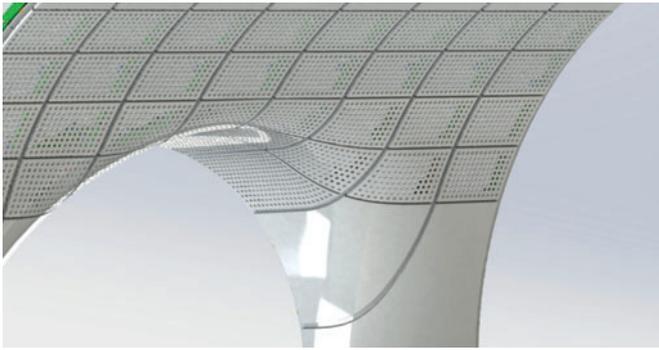
In connection with this, Wasa creates a virtual 3D scale model for each new stone project as a comprehensive service. The CAD model data can also be provided by the customer and

integrated seamlessly into the CAD planning tool from Wasa. In particular through the networking of standardised data, relationships can be displayed on the screen in a short time and tested in virtual environments. Many questions are clarified directly on the 3D model on the tablet or on the monitor. This way of working results in a new quality of communication and language barriers can be reduced and broken down faster.

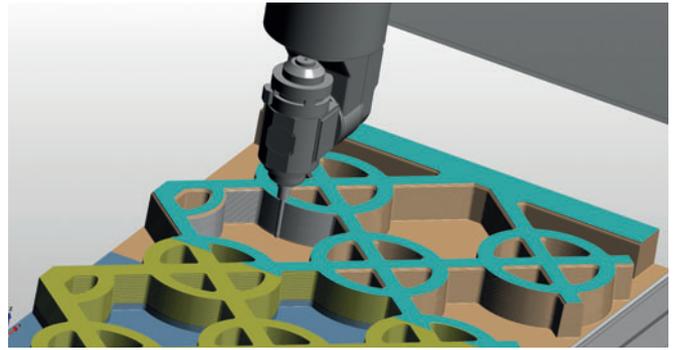
The Lindner Group has operated successfully on the market for more than 50 years as a full-range supplier for interior finishing, façades and insulation technology. The company was founded in 1965 by Hans Lindner as a small installation company for acoustic structures. Today the family-owned company employs a good 7,100 people worldwide at production facilities and subsidiaries in more than 20 countries. Core products such as ceilings, walls, floors and high-quality façade components are produced at the headquarters in Arnstorf, Lower Bavaria.



The suspended façade panels are made from glass fibre reinforced concrete using the pressure spraying method.



View from the BIM 3D total model: the basis of BIM is the virtual model, which is uploaded with all data from the construction planning, construction implementation and facility management. Following completion of the building and objects, the data collected is used for management and maintenance. The BIM project thereby remains active and continues to be fed with data.



One of Wasa's permanent core competences is the visualisation and creation of 3D models. Using the data from the assembly, working plans are created and milling machines are controlled for the manufacture of models.



Wasa uses a CNC 5-axis portal milling machine to manufacture the models.



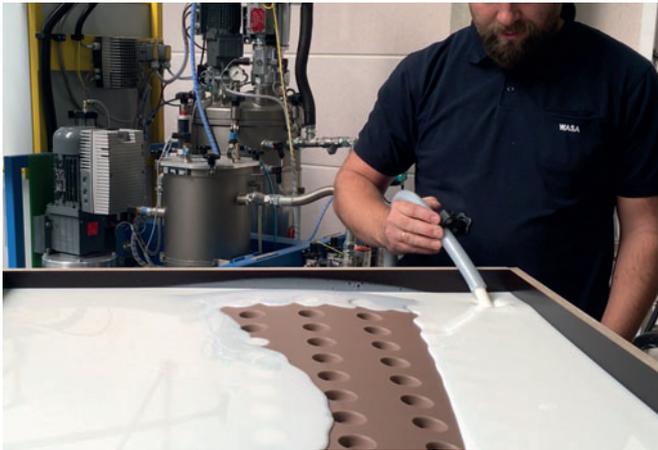
The surfaces of the models are smoothed following the CNC machining. The models are given a micro-fine coating for a smooth and closed surface.

The Lindner Group is the executive contractor in one of the largest railway projects in Europe. Crossrail, a new rail network with a total length of 118 km, is being built in London to relieve the current infrastructure. Crossrail requires the construction of eight new underground stations. For the current construction section - Bond Street station - the Lindner Group is supplying the suspended façade panels made of glass fibre reinforced concrete. Wasa was commissioned by Lindner to supply casting moulds for the more than 86 basic types with different geometries.

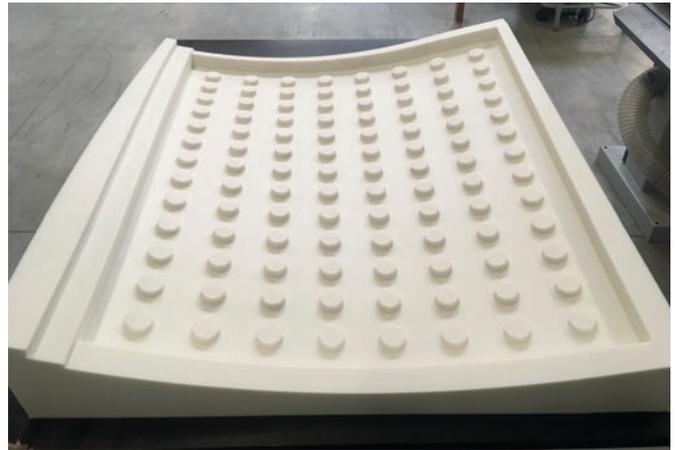
The raw data for the categorised components were made available to Wasa in a data cloud. On the basis of the standardised project data Wasa developed complex casting

moulds for the manufacture of the concrete caststones. The digital assemblies from Wasa are linked to the 3D model on which, for example, the virtual testing of the capability of the façade elements to be demoulded can be carried out.

With such a complex project as Crossrail, target/actual enquiries regarding the individual construction advances are of essential importance. The current Bond Street construction section and subsequent mounting location of the concrete panels was measured with 3D laser scanning technology. The BIM building model is uploaded with the measurement data from the stock-taking. A simulation quickly shows changes of size and collision points of individual concrete panels. Changes are synchronised through the networking of the cat-



Manufacture of the Wasa precast moulds with computer-controlled plant technology. The Wasa Pur polyurethane system employed was developed especially for large, free-standing moulds.



Wasa polyurethane precast moulds in Shore A65 have proven themselves to be particularly suitable for three-dimensional structural elements.

egorised structural elements with the BIM building model. The common synchronised database prevents information or changes from being lost in the communication chain between the trades involved and errors are effectively recognised and eliminated during the planning phase.

The suspended façade panels are made from glass fibre reinforced concrete using the pressure spraying method. The liquid concrete mixture is sprayed into the mould with a gun. Small glass fibres are mixed into the liquid concrete in the spraying process. The requirements for the architectural concrete are a particularly smooth surface with the highest fair-faced concrete class (SB4).

In addition to the geometric visualisation, there are further advantages in linking all the project participants:

- 1.) Planners/architects design concrete elements and place them in virtual environments. For example, "Open Data" templates or 3D building models can be used.
- 2.) Manufacturers of concrete products and elements are in contact with planners/architects and are at the same time the direct line to Wasa. All information runs together at this point with the question: what is possible and how is it to be implemented?
- 3.) Forwarding of the 3D models to Wasa. On the basis of the raw data, Wasa develops the moulds and tools for the manufacture of the concrete elements. All 3D data are linked to form an assembly.
- 4.) Working plans are created and further interfaces such as CNC milling machines for the manufacture of models and tools are controlled from the assembly.

Significant added values in the use of modern methods in the project planning and the workflow described are a considerably reduced error rate, saving of resources, cost reduction

and safety. The scenario described merely represents an initial sequence for the exchange of data and benefits of common knowledge and what is already possible today. ■

FURTHER INFORMATION



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