

High-tech production of precast concrete elements

TwinCAT helps eliminate “bottleneck” in production process



→ Presently, precision precast concrete elements for the construction industry are in very high demand. The company Katzenberger produces around 600,000 m² of precast floor slabs and 270,000 m² of double wall per year at their facility in Gerasdorf, Austria. Now the necessary wire mesh production can keep pace with this output without difficulty for Katzenberger – without requiring a four-shift operation. Modernization of the plant and a change-over to TwinCAT software have facilitated these increases in performance.

While originally intended for construction of basements, precast concrete components have also taken over as vital materials for the construction of apartments, houses and office buildings. “The double wall is a semi-prefabricated, reinforced concrete component, which is sealed with concrete on the construction site. The wall element consists of two wall shells made of reinforced concrete that are linked by lattice girders and can be ordered from us in any design,” explained Christoph Mostler, plant manager for Katzenberger Beton- und Fertigteilewerke GmbH in Gerasdorf near Vienna. There are limitless ways of designing the walls: be it with the dimensions, creating frames for windows or doors or for the planned electrical sockets. The reinforcement also varies, depending on the particular static requirements, so that the placement of each bar must be specified for the production plant.

Successful Cooperation

The company Filzmoser Maschinenbau located in upper Austria is recognized as a global specialist in manufacturing systems for

welded reinforcement elements. Franz Filzmoser sen. was already in the headlines during the early 1960s with the first lattice girder welder for the construction industry. Today, the company supplies high-tech machines and systems for concrete and precast element plants all over the world. Katzenberger and Filzmoser have been working successfully together for more than 20 years. This partnership was strengthened in 2006 when it was decided to modernize the existing reinforcement plant in Gerasdorf with the latest automation technology.

The production of the reinforcement elements is fully automated. “The basic material for the precast concrete component reinforcement consists of wire coils in rolls of approx. 2.5 tons in weight, from which the wire – with diameters ranging 6 to 16 mm – is unwound using uncoilers. In the adjoining rotor straightener and cutting machine, the unwound wire is straightened and individually cut to length. A lengthwise and crosswise shifting unit moves the wires into the correct position and spot welds them



H. Katzenberger Beton- und Fertigteilewerke GmbH produces mainly precast floor slabs and double walls in Gerasdorf.

Plant manager Christoph Mostler is pleased that the entire reinforcement plant can be overseen and operated from two Panel PCs.



The basic material used for the reinforcement is steel coils from which the wire is uncoiled. These are then straightened and cut to the required lengths in the Filzmoser plant.

In the double wall elements, the lattice girders function as main and transverse reinforcement between the two concrete slabs.

The reinforcement plant produces additional bars, which are needed for handling the wire mesh fully automatically.



together. In a further step, the lattice girders, which are a necessary kind of spacer for stabilizing the double wall, are prepared and cut by the machine and then welded together with the reinforcement module," Christoph Mostler described the process.

Operational reliability is of prime importance

"Originally, we used OS/9 and then OS/2 as operating systems in our plants. After these technologies ceased development, we changed over to Windows. Instead of one PLC with a higher-level computer for the visualization, we wanted everything centralized in one device, which led us to look to Beckhoff," recalled Bernhard Schwarzer, head of control technology at Filzmoser. Schwarzer became a vocal Beckhoff proponent and a major reason why his employer was one of the first in Austria to utilize products "made in Verl, Germany." "The Beckhoff control system is very flexible and develops faster than we could ourselves," he commented approvingly. He is particularly impressed with many TwinCAT features, including: the ability to handle large quantities



Christoph Mostler (left) and Bernhard Schwarzer (right) are very pleased with the outcome of upgrading the reinforcement plant.

of data, easy connection to a higher-level Windows computer and simple fault detection and correction using remote maintenance.

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Katzenberger manufactures precisely what their customers want. That means batch sizes of one – every time. The detailed instructions come from a CAD program and are transferred to the master computer. This sends the data to the machine where they are sorted, classified and converted so that, in the end, the wires are produced one by one until the required mesh structure takes shape. “This is an enormous logistical task in the plant as well. Nevertheless, it must be operationally reliable, flexible and flawlessly provide the required quality. We cannot afford delivery delays. Sometimes we only get the final plans on a Friday for an element, which is needed on the construction site on the following Monday,” explained Christoph Mostler regarding the production conditions.

The first and foremost demand for operational reliability led to a modernization of the existing reinforcement plant, which was around 10 years old. “The supply of replacement parts was no longer reliable and neither was the support for the old operating system. In addition, despite four-shift operation (i.e. round the clock), we had reached our maximum output,” Mostler revealed, being the reason for his decision to undertake a conversion campaign along with Filzmoser. In addition to the control system, two mechanical weak points in the plant – the infeed table and the wire reel case – were brought up to date.

The work of four PLCs handled by two PCs

In Gerasdorf there are now two Beckhoff Industrial PCs, including TwinCAT NC PTP, which fulfill the functionality of four PLCs, as well as two Control Panels handling visualization for the entire plant. “A PC controls the straightening and cutting of the wires as well as the welding plant and is responsible for the visualization and data preparation of the two machines. A second PC is responsible for cutting the lattice girders and welding them onto the mesh, including their transport to the normal circulation production – this PC also manages visualization and data preparation for these machines. Communication between the two PCs takes place via Ethernet, whereas the Lightbus system is used between the individual I/Os and the machine control system”, explained Bernhard Schwarzer. The time interval depends on the particular command. Serial communication with the welding control system and the control unit for

the 20 NC axes is based on a 2 ms task, while I/O control is based on a 10 ms task.

User-friendly panels

Data preparation was a further challenge that had to be met when changing to the new control system. “The entire plant is about 70 m long. The mesh is produced at the front, while the lattice girders are cut to length at the back. Afterwards, the two products have to be fitted together in the middle of the plant,” Bernhard Schwarzer revealed, something that gave the Filzmoser team a bit of a headache with regards to the programming.

But getting used to the new system was a painless process: The number of keys on the control console was reduced as some functions could be located on the touch screen and represented in software. In addition, the entire plant can now be seen from two points. “Previously, our staff had to walk a long way in order to keep an eye on the extensive wire mesh production. Now they can do this from two central points. Because, although the control system for the plant is split between two PCs, the whole plant can be seen and operated from the two control consoles,” explained Christoph Mostler.

Plant relaunch enables increase in capacity and remote maintenance

And there are two other things which the plant manager at Katzenberger is particularly pleased about since the commissioning of the modernized reinforcement plant: increase in capacity and remote maintenance. “Previously, this station produced a bottleneck which impeded the whole upstream and downstream production process. Nowadays, we can achieve almost the same production in a three-shift operation as we previously did in four.” A further significant benefit arises from the option of remote maintenance: “It is now no longer necessary for a technician from Filzmoser to be on site for any technical problems; he can monitor and solve almost everything online.”

→ Katzenberger www.katzenberger.com

→ Filzmoser www.filzmoser.com

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