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New plant concept for the production of semi-finished products in Austria

The Mischek Group, which also includes Mischek Systembau GmbH, can look back on many years of tradition: since its beginnings in 1946, the company has developed from a building company into a building services provider and property developer for both partners and end customers. In addition to acting as a general contractor, Mischek also takes responsibility for project development, planning and project management. The independent realisation of numerous projects by property developers based within the company underlines its confidence in its own competence. On top of that, Mischek works with a self-developed prefabricated element system, the Mischek system building method. This system makes inexpensive and, at the same time, individual construction possible. Thanks to its many possibilities for use, it is suitable for all types of properties. The main advantages in its use are the shortened construction time due to prefabrication, a significantly higher degree of drying out and also the thin wall thicknesses of the system, which allow larger floor areas to be achieved in each apartment.

Mischek Systembau GmbH already operates two pallet circulation plants, built in 1970 and 1996. Both circulating plants produce solid walls and ceilings. The main area of use for these concrete elements is the construction multi-storey residential buildings in Vienna.

Strabag, as the parent company of Mischek Systembau GmbH and also the largest general contractor in the building sector, had decided to expand the product range in the field of precast elements and to erect a production plant for semi-finished products at the Gerasdorf site in Austria. Prilhofer Consulting from Germany was commissioned with the conception and accompanying coordination of the plant technology. The planning and construction

of the production hall were carried out by Strabag's own subsidiaries. This made it possible to complete the project in just 11 months from the issue of plant orders to the start of production.

The plant was housed in a newly-erected twin-aisle hall next to the existing building complex. It was possible to install the demoulding area in an empty hall that had previously housed a mesh welding plant. The investment costs for the buildings were therefore also lowered.

Plant concept

The production plant differs from the well-known concepts often described in the trade press. The following newly-conceived

areas are added to the familiar separate demoulding areas for the double wall and precast slab with in-situ topping products:

- A rework area, which is separated from the circulation and positioned after the automatic reinforcement station on the same level, making fast pallet transfer possible.
- Separate areas for the concreting and turning of the double wall, so as not to affect pallet transport
- The plant has been implemented as a double-line plant in the area between the formwork robot and the concreting and compaction station in order to achieve optimisation of the plant performance and the hourly output rate.

A demoulding robot provides for further improvement. It saves two employees. The reinforcement is produced by an insertion robot. The pallet size in the plant is 3.5 x 14.0 m (useful area).

Machines and production sequence

Formwork removal, cleaning and placement

Each pallet is brought out of the element removal area to the demoulding robot first of all. The demoulding robot first scans the position of the formwork using a laser. After that it begins with the removal of the formwork. To do this, the robot must first deactivate the magnets in the formwork; the formwork sections can then be taken up and placed on the formwork conveyor belt. The empty pallet is subsequently cleaned automatically and is then available for a new cycle. The formwork robot, which is



Picture of the double wall turning area



Picture of the double-line pallet guidance in the reinforcement robot area

supported by a storage robot and is stretched across two workstations, places the formwork on the pallet in accordance with CAD data.

Manual workstations after placement of the formwork

Once the formwork robot is finished with the placement of the formwork, the pallet is moved out of the robot area to the manual working stations, where built-in components and additional formwork elements are placed in position. The pallets are moved into and out of this area automatically; the areas are secured by light barriers. This ensures that the employees can concentrate entirely on their tasks and do not have to initiate any pallet movements. There are two parallel stations; the employees can therefore work without interruptions.



The formwork robot station

Automatic reinforcement station

Once work at the manual workstations is completed, the pallets are moved automatically to the reinforcement station. This is equipped with a placement robot, which inserts the longitudinal and transversal reinforcement and the lattice girders into the formwork. The lattice girder processing section is equipped with a three-point welding unit in which the offcuts are welded together with new lattice girders. This reduces lattice girder waste and allows unmanned operation of the reinforcing plant. The intervention of an employee is required only to change the reinforcement coils and to fill up the lattice girders and the spacers. These tasks are carried out by an employee from the subsequent rework station.

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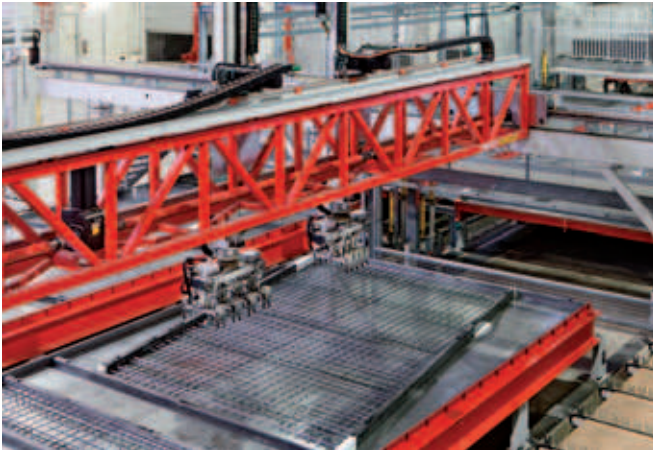
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Rework station after reinforcement installation

The number and complexity of built-in elements in the double wall and precast slab with in-situ topping products is growing continually. Therefore, this has been taken into account in the new production plant and the two rework stations have been designed to make fast pallet transfer possible. To this end, a dedicated area has been created at the same level into which only those pallets requiring rework are moved. Pallets with products that require no rework are moved directly to the concreting station.



Reinforcement installation by the reinforcement robot



The concreting station

Concreting and compaction

The concrete is brought from the existing mixing plant to the concrete distributor via a bucket track. The distributor can pour the concrete automatically into the formwork at two stations. The concrete is subsequently compacted by shaking stations.

Turning station, manufacture of double walls

The turning station is implemented as a vacuum turning station. The elements are turned using a vacuum frame. The station is designed such that the demoulding of the pallet with the first shell and turning can take place without affecting the circulation.

Hardening chamber

The hardening chamber has a capacity of 72 pallets. It is fed by a floor-running storage and retrieval machine. The average hardening time is ten hours.

Demoulding area

As has already been described, the demoulding area is housed in one of the existing halls adjoining the main building. There are separate demoulding areas for precast slabs with in-situ topping and for double walls. The advantage of this is that the product mix has very little influence on the pallet throughput in this area.

Summary

The production plant has been planned in accordance with the latest plant technology. The machine and robot technology are



state of the art, especially where the formwork removal by a demoulding robot is concerned. The use of these technologies enables better hourly output rates to be achieved than was previously possible.

FURTHER INFORMATION

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