

Avermann Betonfertigteiletechnik GmbH & Co. KG, 49078 Osnabrück, Germany

Start of production of a pallet circulation plant for floor slabs and double walls at BWH Holdorf in Germany

The entrepreneur family Husmann from Diepholz has been running the concrete plant BWS Beton-Werk Sulingen GmbH & Co KG, based in Sulingen, Germany, for some 20 years now. On account of the good order situation and the equally good forecast for the coming years, the company decided to erect a further production facility for the manufacture of double walls and precast slabs with in-situ topping. After checking various locations, the choice fell on the municipality of Holdorf. On account of its easy access to the German motorway network, Holdorf's location on the A1 motorway offers optimum logistic conditions.

The concept was specified with all detailed requirements in autumn 2014 and quotations were obtained from various plant manufacturers. In January 2015 the Avermann Company was awarded the contract for the delivery of the pallet circulation plant together with its project partner RIB SAA Software Engineering, which supplied the process and circulation controller with control system.

The reinforcement plant with robot system was ordered from the Austrian company EVG and the mixing plant from Haarup of Denmark.

The new pallet circulation plant supplied by Avermann was handed over to BWH Beton-Werk Holdorf GmbH & Co. KG for use in late September 2016.

Planning/building phase

Bau-Team Husmann GmbH had already begun in 2014 to consider expanding the existing production at another location. To increase the capacity, the location in Holdorf was selected and developed. Apart from the double walls and precast slabs with in-situ topping, the existing location, BWS Beton-Werk Sulingen GmbH & Co KG, also produces steel reinforced concrete stairs, precast balconies and steel reinforced concrete jamb walls. The plan is to manufacture prestressed hollow-core slabs at the new location in Holdorf in addition to precast slabs with in-situ topping and double walls. The start of production of the prestressed hollow-core slabs is slated for February 2017.

The plant was built on a "greenfield" site. Bau-Team Husmann and other subcontractors commenced with the construction work, including the necessary earthworks, foundations, hall construction, etc., in the

autumn of 2015, allowing the installation of the plants to begin in late May 2016. The commissioning of the circulation plant took place in September 2016. 36 pallets with precast slabs with in-situ topping were produced just three days after the start of production, which was only possible through several weeks of training of the new employees in advance at the existing location in Sulingen.

Description of the production equipment

The plant is designed for a maximum production per shift of 45 pallets measuring 12.5 x 3.3 m. The maximum payload per pallet is 130 kN.

A standard double wall was defined with a thickness of up to 400 mm; pallets with such double walls are each stored in one compartment of the curing chamber. Beyond that, however, custom elements up to 550 mm in thickness can also be produced with the plant and stored in the curing chamber. In this case each one occupies two compartments at the same time.

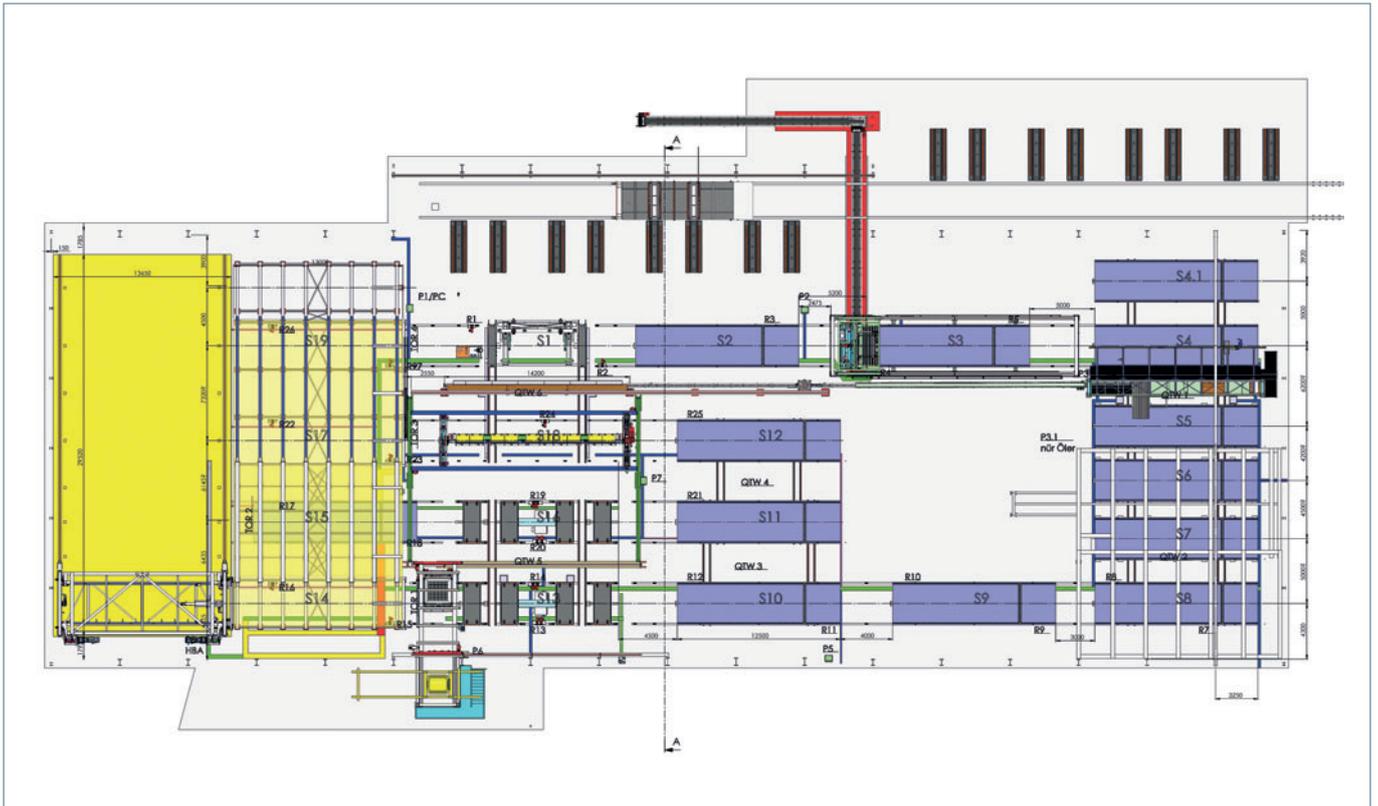
Expandability of production at a later date by the retrofitting of additional pallets is technically possible, but is not planned at present.

The curing chamber area consists of four racks with 13 compartments each and two racks with 7 compartments each. The curing chambers are individually insulated and can be heated to different temperatures. The feeding of the curing chamber by a storage and retrieval machine is process-optimised.

Following the fully automatic removal from storage – this area is accordingly secured by means of fences and gates as well as by light barriers/muting system – the pallets with the hardened con-



Exterior view of the new concrete plant at the Holdorf location.



Layout of the circulation plant



AVERMANN 

Your projects – our machines

www.avermann.com

since 1946



circulation plant • shuttering • tilting tables • vibrating lines • pallets • special machines

AVERMANN Betonfertigteiletechnik GmbH & Co. KG
 Lengericher Landstr. 35 • 49078 Osnabrück/Germany
 Phone: +49 5405 505-0 • Fax: +49 5405 6441 • info@avermann.de



Circulation plant – concreting/compaction area, turning and lifting station



Storage and retrieval machine for feeding the curing chamber

crete elements are transported to a lifting/tilting station. Where the elements are demoulded and lifted off the pallets. The double walls are transported by a spreader bar and the overhead crane to the stacking place, while the floor slabs are lifted off the pallet by a crane with a special removal device and transported to the stacking place.

The depalletised concrete elements are stored in the hall until the transport stack has been fully formed. Removal for storage in the outdoor area takes place later. This is done using a special run-off truck for longitudinal and transverse transport, so that a stack of ele-

ments is transported to the outside on suitable frames. The concrete elements are brought directly to the outdoor storage area by a 25-tonne fork lift truck.

After the precast elements have been lifted off, the empty pallets are transported by means of friction wheels and fixed rollers to the next station. Here, a fully automatically driven QRP device takes care of the picking up of the plastic transverse shuttering, the cleaning of the pallet, the plotting of the concrete contours, the oiling of the pallets under the plastic transverse shuttering and the placement of the plastic transverse shuttering on the pallet. The residual debris accumulated during the cleaning of the pallets is transported by a conveyor belt system into a waste skip outside.

Located immediately behind the QRP device is the manual shuttering station with a workplace system. The longitudinal shuttering and the built-in components are placed on the pallet at this station. The pallets are now moved by a cross-transfer device to the oiling station area and the subsequent fully automatic EVG reinforcement robot. The transverse and longitudinal reinforcements as well as lattice girders are automatically placed in position by the reinforcement robot here.

The reinforcement station is followed by the concreting station. The concrete distributor in a bridge design is equipped with an additional fixture for the transverse movement of the bucket for transferring the concrete and to the washing station. The concrete distributor discharges the concrete via 10 slides.

The concrete is compacted by the first Avermann vibrating compactor under the concreting station for floor slabs and the first half-shell of a double wall. These pallets are transported directly from the concreting and compaction station into storage. Along the way the floor slabs pass through the lowered roughening rakes in order to prepare the interior concrete surface for an optimum in-situ concrete connection. The second vibrating compactor is located under the tilting table machine for the low-noise compaction of the complete double wall. The finished double wall is transported for hardening from the adjacent second vibrating compactor on a track of



Special crane for lifting out the floor slabs



Outdoor area: Run-off truck and storage yard



QRP device

RIB SAA
Smart Production
in Precast Concrete
Plants



Whenever
Man and Machine work
Hand in Hand





Fully automatic reinforcement plant with robot system from EVG



Concrete distributor in bridge design



Vibrating compactors under the concreting station and the tilting table machine

its own. A tilting table machine is required for the production of a complete double wall.

A pallet with the hardened first shell of a double wall is prepared on a third production line. Here the pallet is taken up by the tilting table machine. After clamping the pallet and the concrete element, the turning process (by 180 degrees) takes place and the tilting table machine lowers the first shell into the freshly concreted second shell. Compaction then takes place and another double wall is finished. Once the tilting table machine has returned to its home position, the empty pallet on the third production line is lowered and is moved onwards by the cross transfer device and fixed rollers directly to the cleaning station.

At the end of the production sequence the storage and retrieval machine is called into action once more. According to the specified sequence plan, the freshly concreted pallets are placed in the curing chamber compartments to harden, while hardened floors and walls are taken to the demoulding area and first shells to the tilting table machine.

Plant controller from RIB SAA

The master computer as well as the circulation and process controller were completely supplied and put into operation by RIB SAA Software Engineering from Austria.

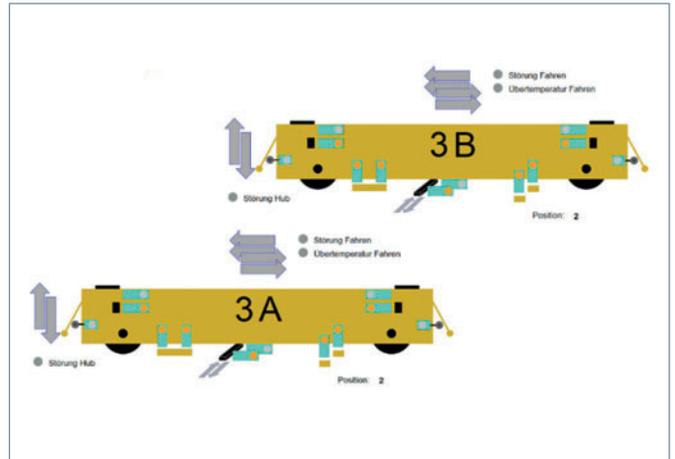
iTWO Smart Production – Manufacturing Execution System and control system

Since this plant features an impressive degree of automation, equipping it with professional control technology also represents an important prerequisite for successful operation.

iTWO MES, the control system from RIB SAA, was installed as a virtual machine in the customer's server room in order to increase the operational reliability and availability. The operating stations are set up on computers at suitable points in the network. Particular attention was also paid here to the data security of the industrial network in the hall, which was isolated from the rest via a special industrial router and only allows internal data packages and the SAA remote maintenance to pass. The master computer is equipped with all the usual functions for work preparation. The necessary production data for the QRP device, the reinforcement and lattice girder plant, the concrete distributor and the fully automatic ordering of concrete ensure that the right materials are available at the right time, that they are placed in the precise position on the pallet and that the use of material is optimised. All the connected machines feed back their operating status and/or any alarm states and other information messages online. Therefore, the complete operating data for this production plant can be recorded in the iTWO MES system. Analysis of the station times and alarm messages later on, including a retrospective check of the situation, enables the constant optimisation of



iTWO MES – monitor screen with production data overview



iTWO ICS – detailed technical control visualisation

the production steps and also provides the information for predictive maintenance.

The iTWO ICS PLC for the circulation plant controls the entire transport of the pallets and the concrete distributor. All movements in areas secured by fences, such as the QRP device, the reinforcement plant and the curing chamber, are automatically monitored and optimised by a safety PLC. The plant visualisation integrated in all iTWO ICS systems not only displays the logical plant sequences and enables simple manual operation; it also supports the rapid identification and efficient rectification of the causes of error in the rare case of a malfunction.

The iTWO ICS QRP controller needs virtually no interaction by the operator. The pallets are automatically communicated and produced one after the other in accordance with the production planning of the iTWO MES.

The high productivity and reliability of the plant can be ensured with this well-versed system of control technology. Maintenance, supported by the RIB SAA hotline, is thus simple, fast and secured for many years to come.

Conclusions and outlook

The demand for high-quality precast concrete elements in the most diverse implementations is expected to be very high in the coming years. The particular strength of the commissioned pallet circulation plant is its high flexibility.

BWH Beton-Werk Holdorf GmbH & Co KG thus has an extremely efficient plant at its disposal for the manufacture of floor slabs and double walls. ■

FURTHER INFORMATION



BWH Beton-Werk Holdorf GmbH & Co.KG
Steinbrüggen 7
49451 Holdorf, Germany
T +49 5494 916470
info@bwh-holdorf.de
www.bwh-holdorf.de



Avermann Betonfertigteiletechnik GmbH & Co. KG
Lengericher Landstraße 35
49078 Osnabrück, Germany
T +49 5405 5050
F +49 5405 6441
info@avermann.de
www.avermann.de



RIB SAA Software Engineering GmbH
Gudrunstraße 184/4
1100 Wien, Austria
T +43 1641 42470
office@saa.at
www.saa.at



EVG Entwicklungs- und Verwertungsgesellschaft m.b.H.
Gustinus-Ambrosi-Str. 1-3
8074 Raaba/Graz, Austria
T +43 31640050
F +43 3164005500
evg@evg.com
www.evg.com