

GOLDBECK Betonelemente GmbH, 59071 Hamm, Germany

## Investment in a new production facility pays off

As a medium-sized, family-owned group, Goldbeck is one of the driving forces in the commercial and municipal construction industry. A key element of the service portfolio is the planning, construction and management of office buildings, warehouses and car parks. Recent additions to the portfolio include accommodation blocks such as senior citizens homes and student halls of residence. Goldbeck offers integrated solutions from a single source. Building is done with system components that are mainly produced in their own factories. Therefore, orders can be fulfilled quickly and economically.

A high degree of prefabrication guarantees a consistently high standard of construction and allows for short construction times on site, virtually regardless of the weather. Project-oriented planning leads to timely delivery of the individual components and thus to a rapid assembly phase. The use of modern technology and professional logistics are the prerequisites for high efficiency when building with system components.

The company produces the majority of the system components itself, but some are manufactured externally, for example, if relatively simple concrete structures cannot be produced economically in their own facilities due to transportation logistics. With their new precast facility in Hamm, Goldbeck has taken a pioneering step and achieved a significant increase in production capacity of high-quality precast. In addition to being conveniently situated for road transport, the production site is located next to a canal, which offers the option of shipping. Likewise, a rail connection is possible, although this has not yet been taken up.

■ Mark Küppers, CPI worldwide, Germany ■

Founded in 1969, the company has its roots in traditional steel construction. Then trading as Goldbeck Stahlbau KG, it gained experience with individual orders. In the eighties, Goldbeck extended its competences from individual steel constructions to encompass turnkey construction.

To enable efficient production of steel elements, the enterprise developed the pre-production and systemization of components and processes into sophisticated building systems. In order to serve local customers and to take into account the region-

al aspect of the building industry, Goldbeck built a nationwide network of branches. In the 90s with growth rates in double figures, Goldbeck developed its product range, especially in the service sector. Competences now range from real estate development and financing know-how via turnkey construction through to the care of buildings, or facility management.

In recent years, the group's growth has not only been focused in Germany - Goldbeck now also supplies turnkey construction work in Central Europe, Great Britain, Austria and Switzerland. The product range has been extended in the areas of SOLAR,

refurbishment and Public Private Partnership. Since the middle of the last decade, Goldbeck engineers have been developing energy efficiency concepts in interdisciplinary teams. The company is now synonymous with construction and services in all aspects of commercial and municipal property.

Goldbeck now produces components for steel structures and aluminium elements in Bielefeld and in Treuen in the Vogtland region. They also have a precast facility in the Czech Republic close to Prague and a new precast production location in Hamm. The four Goldbeck facilities have an annu-



Goldbeck's new precast concrete location in Hamm after the 2011 extension



View from one of the cement silos of the outside storage area for ribbed flooring and supports



*Ribbed flooring, whether untensioned or prestressed, is produced and stored individually for each project*



*Prefabricated concrete supports being loaded*

al processing capacity of 70,000 tons of steel and 170,000 m<sup>3</sup> of concrete. In these factories, a large proportion of the work (the industrial prefabrication of components) is accomplished with modern technology.

### Quality through serial production

To increase performance in the field of precast concrete elements, Goldbeck invested about € 10 million into a new facility in Hamm in 2009, which was expanded at a cost of a further € 7 million in 2011. These days, the main focus in the two original halls, each 150 m long, is on production of concrete supports, foundations and flooring slabs. The two new halls, added in 2011, now host the manufacturing of complex precast wall elements, which is taking on increasing importance with the steadily growing demand for office and senior citizen housing, schools, hotels and student halls of residence. The partial turnkey exterior wall elements, which have the dual functions of outer skin and load transfer, come factory-equipped with insulation and windows, including glass and sun-screen, before the elements leave the production hall.

### Custom-built concrete supports

The concrete plant stands directly adjacent to the 7,000 m<sup>2</sup> section of the building erected in 2009. Two concrete mixers produce con-

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*The automatic mesh bending machine in the front section of the hall for precision manufacturing of reinforcement*

crete for the entire production. The distribution of the concrete to the installation stations is carried out using a bucket conveyor system. As part of the 2011 hall extension, this system has been extended into the new areas so that the production areas in the 6,750 m<sup>2</sup> of additional floor space can also be supplied from the concrete plant.

On average, 25-30 concrete supports are produced daily in the first hall, in some cases with the associated foundations. Similarly, individual foundations are prefabricated with optimized geometry in this area. The appropriate formworks are built in their own steel processing plants. A con-



*The concrete is distributed to the installation stations by a bucket conveyor system*

crete distributor spans the entire support and foundation production area.

There is an automatic mesh bending machine in the front part of the hall for the accurate prefabrication of reinforcement. Here, component-specific reinforcement is produced from prefabricated steel mesh.

### Precast concrete flooring - untensioned or prestressed

Goldbeck floors are made of untensioned or prestressed concrete flooring slabs in the form of a ribbed floor and stretch from the outer wall element to the central joist. They are designed as composite floors and usu-



*View into the "old" section of the hall from 2009 where supports and ribbed flooring are produced*





The concrete distributor spans the whole production area in the first hall.



Concreting station for ribbed flooring



Formwork for ribbed flooring with untensioned and prestressed reinforcement



Removal of ribbed flooring after setting

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ally have spans between 5.00 and 8.10 m at the two standard panel widths of 2.50 and 2.70 m.

Approximately 60 floor panels per day are made in the second hall of the section built in 2009. For the prestressing process, a cross-beam connected with the production pallets acts as an abutment and the mobile tensioning station exerts the clamping force on the steel strands. The ready-prepared pallets then enter the concreting plant. Then the freshly concreted production pallets are stacked centrally and the ribbed flooring can set.

After setting, the production pallets are unstacked, the prestressing strands are removed from the mould and the ribbed flooring is lifted from the formwork by crane rail. Then the finished concrete slabs are placed in the central warehouse and stored until they are required to be removed to the construction site.

### The Goldbeck outer wall element

Goldbeck outer wall elements consist of a structural frame made of high strength, reinforced concrete with integrated steel supports. About 20 to 30 wall elements are produced daily in heights up to 3.85 m and lengths of 5 m to a maximum of 10 m. Minimal dimensional tolerances and thus a high level of precision are required in the production of wall elements.

Up until the expansion of the production area in 2011, the wall panels were also made in the first two halls. With the increase in floor space, this part of production was removed and rebuilt from scratch in the third hall. The generous allocation of space allowed for a well thought out plan, which not only creates pleasant working conditions for the staff, but also facilitates an efficient and self-sufficient production process for the individual wall elements, independent of the total production.

Casings, reinforcement, recess formers and other fitted components are mounted or fixed on the steel pallets at a total of six workstations. Each workstation is equipped with its own crane rail, which allows it to work independently and also saves energy. The material is supplied from a platform behind the workstations on which the respective parts are temporarily stored in advance.

Once a pallet is prepared, it is removed from the station and brought to the concreting plant. The bucket conveyor brings the concrete to the concreting station and passes it to the concrete distributor. This ensures precise insertion of the concrete in the sometimes very narrow webs of the wall elements. An accuracy of 3 cm was envisaged in the concrete casting planning. This high degree of accuracy was fully implemented by the plant engineers, and production manager Andreas Thiele is extremely satisfied with the new concrete distributor.

A washing area with recycling system has been located in the centre of the concrete distributor, where the bucket conveyor and concrete distributor can be cleaned of concrete debris after the work is done. The water is recycled and the solids collected. These can then be added to the concrete mixing process. An additional recycling station is installed adjacent to the support and flooring production area. The amount of waste is reduced drastically. The resulting waste must be disposed of according to the normal procedures.

The freshly concreted wall panels are then placed on the steel pallets by the storage and retrieval unit in one of the 30 curing chambers of the new drying rack storage system. Each chamber can be opened individually. If a pallet is loaded, the other 29 chambers



*The workstations for wall production are each equipped with their own crane rail*



*New formwork pallets*



*The new concrete distributor is able to meet the demanding requirements*



*Storage and retrieval device and curing chambers*



remain closed. After setting, the wall elements are taken out of the curing chamber and the pallets are brought to the tilting station. The concrete elements, standing in a vertical position, are removed by crane. The wall panels are then set down at the next workstation, where glass, sun protection, insulation, facades, etc. are mounted. To protect against damage during transport and subsequent assembly, the inside of the wall panels is protected with a film.

### Additional line for modified wall elements

Due to the changing demands on wall elements for new construction project types such as senior citizens homes or student halls of residence, new formwork tables were recently purchased, on which modified exterior and interior wall panels are produced for such construction projects. Walls of various designs can be produced on the new tables, as solid walls with or without recesses. This again increases Goldbeck's range of construction components.

### Flatliner for internal transport

The completed wall elements are placed on project-specific flat pallets in the hall – called the "flats". Three external wall elements can be placed on one flat. The elements are secured and ready for removal from the hall.

Goldbeck uses its own flatliner at its plant in Hamm for internal transport. The enhanced two-axle version is designed specifically for internal use, such as the secure and rapid movement of loaded flats. The flatliner has a small turning radius and the hydraulic axle compensation facilitates rapid lifting and lowering.

When a flat pallet is fully loaded in the hall, the flatliner picks it up and removes it from the hall.

Diagonally aligned, numbered parking bays are located outside the hall. The flatliner drives to a designated parking bay and deposits the pallet. In this way, the flatliner gradually fills the outdoor space and keeps the production hall supplied with empty pallets.

Since all wall elements are stored in an assigned place in the exterior area, the transport companies can collect the goods at any time and bring them to the construction site. The carrier can come to the external warehouse at any time with his flatliner, take the pallet from the designated position and leave the premises without having to rely on any other assistance for loading. This solution saves on intermediate storage and greatly simplifies transportation logistics.

### Investing at the right time

With its new precast production location, Goldbeck is breaking new ground and opening up new markets. The facility in Hamm was designed and built precisely during the crisis years 2008-2009, which, as is generally known, shook the entire industry. By deciding to invest during hard times, Goldbeck was able to absorb the excess capacity and to integrate the staff in the new building. That this was the right decision was later confirmed by the hall expansion just two years later.

While three of the four halls are currently involved in production, the fourth hall serves as a storage area for the windows, sun protection, insulation and other necessary elements. It remains to be seen how this modern precast production in Hamm continues to develop.



*Fitting concrete exterior walls with windows, etc.*



*Flatliner in internal use*



*Flat pallet being deposited in the allocated place*



*Transport of external walls from the plant to the construction site*

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*The "flats" remain in their static numbered position in the outside storage area until they are collected by the transport company*



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