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New precast element production facility near Gdańsk – maximum automation with logistical sophistication

EBAWE Anlagentechnik and Progress Maschinen & Automation, both PROGRESS GROUP subsidiaries, just recently installed one of the most modern precast element production facilities in the whole of Poland close to Gdańsk. The cutting-edge factory is state-of-the-art in terms of internationally available technology. The production hall erected for this purpose is composed of two levels. On the lower level, a carousel system is located for manufacturing element floors and double walls with or without insulation plus traditional walls as an add-on product. On the upper level, the totally automated reinforcement area can be found. This is made up of a lattice girder welding unit, mesh welding unit and magnetic lifting beam. Pekabex is well equipped for all possible demands from the local market with this cutting-edge machine technology.

Pekabex Group board member, Christophe Carion, summarised the major advantages with the new carousel system in the following way: "We have been able to enlarge our portfolio with the new production facility and manufacture double walls for the first time as well. Its high degree of automation has both substantially enhanced the quality of our end products and enabled us to achieve greater output through accelerated production. We have been able to quadruple our production capacity."

Fully automated shuttering process

The production cycle in the new facility begins when a pallet is introduced into the de-shuttering robot's automated area. The pallet is scanned; the shuttering supports are lifted off fully automatically and the pallet is conducted to a roller conveyor for cleaning and storage. Once the pallet has passed through the pallet cleaning unit and the residual concrete has been removed via a disposal conveyor belt for further processing, release agent is applied fully automatically to the clean shuttering surface – but only onto that part of surface that will subsequently be concreted. The pallet then travels to the shuttering robot.

The "FormMaster" shuttering robot also carries out all the working stages in the shuttering process fully automatically. It sets magnets for electrical sockets in place with the aid of a gripping tool; it positions shuttering supports previously

The Pekabex production facility features an impressive degree of automation, beginning with a pallet surface scan and the fully automated removal of shuttering supports by the shuttering robot

High-class surfaces for end products are attained by the pallet travelling through a cleaning unit before a new production cycle. Residual concrete is removed via a disposal conveyor belt for further processing

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Christophe Carion, Pekabex Group board member, was awarded the TopBuilder Award 2020 for the most modern precast facility in Europe. The award is one of the most prestigious in the Polish construction sector

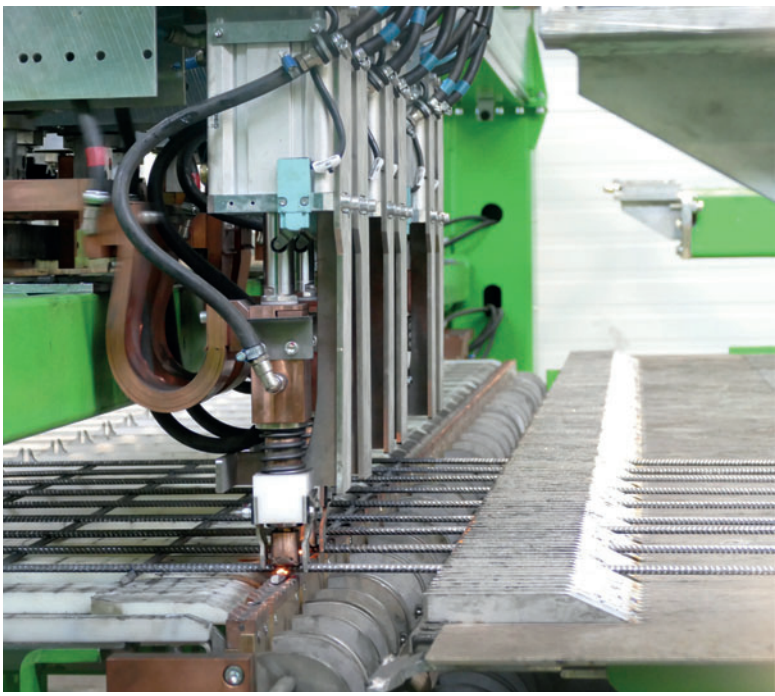
A robot system composed of storage, de-shuttering and shuttering robots carries out all steps in the shuttering process fully automatically. It also sets magnets for electrical sockets in place with the aid of a gripping tool; it plots contours and other information with a plotter

coated in release agent automatically according to CAD-CAM specifications on the pallet; its integrated plotter plots contours and other information, such as the position of inserted components. The 60 pallets with integrated edge shuttering are loaded with the Infinity Line® Notch-Free shuttering system.

Fully automated reinforcement area on the second level

Building plots are very expensive in Poland. Hence, the decision for a second level was promptly taken. Half the hall's area was roofed over with the second level. Pekabex sees advantages in this through lower maintenance costs and more storage area for end products leading to greater flexibility in storage management and processing new orders.

The newly developed M-System BlueMesh® mesh welding unit supplies the pallet carousel system with the reinforcement meshes needed. This cost-efficient machine is energy-saving and requires only little space. For producing element floors, the machine is additionally equipped with an automated bending device for bending rebar end projections at angles. This means that rebar for element floors can be bent over both longitudinally and transversely and those for walls bent up. Special bends can also be carried out unproblematically to provide solutions for individual customers. The magnetic lifting beam transfers completed mesh through a recess in the floor to the first level and sets them down automatically on pallets. Mesh unable to be positioned automatically can also be transported smoothly to the manual insertion stations by means of an integrated stacking trolley. For the first time in Gdańsk, a third reinforcement mesh can be set in place fully automatically using the magnetic lifting beam without interrupting the production flow when manufacturing insulated double walls.



The BlueMesh® mesh welding system made by Progress Maschinen & Automation produces the meshes needed just-in-time and cost-efficiently. An automated bending device is employed for bending rebar end projections at angles

The newly erected production hall is composed of two levels. The totally automated reinforcement area is located on the upper level. A magnetic lifting beam transfers finished meshes through a recess in the floor to the lower level and sets them down automatically on pallets

The highly flexible VGA Versa lattice girder welding machine ensures cost-optimised, good quality processes in preparing reinforcement. Its just-in-time manufacturing principle makes it possible for every lattice beam to be produced individually and fit perfectly, thus eliminating storage costs and off-cuts. This lattice girder welding machine features the benefits of fully automated height adjustment with a corresponding automatic change of wire diameter. The lattice girders are conveyed to the lower level by means of a lift and positioned by a robot.

Lattice girders manufactured with the VGA Versa lattice girder welding machine are conveyed to the lower level by means of a lift and positioned by a robot

Pekabex has been able to expand its portfolio from element floors and traditional walls to the manufacture of double walls with or without insulation at the new precast element production facility in Gdańsk

The carousel system was equipped with two different compaction units for optimally compacting end products under production: a low frequency vibration system for element floors and a dynamic vibration system for particularly heavy loads

Impressive carousel and master computer technology

Back on the first level, pallets, on which the reinforcement has been set in place, pass through a dual head laser projection system for quality checking. In addition to this, a camera system takes a photo of the pallet for documentation that will be filed in the ebos® software master system.

Once the elements in production have been concreted, Pekabex has the choice of two different compaction devices: a low frequency vibration system for element floors and a dynamic vibration system for especially heavy loads e.g. double walls with or without insulation. In manufacturing traditional walls, the concrete is levelled off and smoothed using a screed with integrated external vibrators. Element floors, on the other hand, pass through a roughening device after compaction.

For cleaning the concrete spreader, Pekabex possesses a washing carriage which captures the contaminated water and conducts it back to the mixing system for recycling.

The automated storage and retrieval unit places pallets with their freshly concreted elements into the rack system and removes them again once they have hardened. Element floors are then lifted off; the second shell is subsequently produced with double walls. A turning device takes over bringing the two shells including pallets together – thus producing a double wall. Hardened double walls are brought into a vertical position with the assistance of a tilting table and lifted off with the hall crane.

ebos® is employed in the new production facility in Poland as the complete solution for work preparation, production and process analysis. This software master system was developed by Progress Software Development, also a Progress Group company. Alongside the main module and numerous connection modules for the fully automatic machines, the customer can also avail himself of an automated pallet loading system as well as applications for printing out work sheets, etiquettes

Freshly concreted pallets are taken by an automated storage and retrieval unit and brought to a rack system with heating to harden

View of the Pekabex new production hall in Gdańsk with concrete spreader, automated turning device and reinforcement section located on the second level

The tilting table has been equipped with a bracing beam, which gives additional support to a finished wall element during the tilting process and facilitates its removal

and reports automatically. This eliminates time-consuming interface problems. All work processes can thus be implemented in one single, homogeneous, user-friendly system.

With sophisticated logistics for a perfect system

The new production system at Pekabex features maximum automation, few operators and rapid production with high output. Attention was also paid to clearly separating processes. There are separate paths for each end product and the material flow was implemented completely separately with its own accesses. This means, for example, that the company is capable of manufacturing reinforcement mesh for external production and special products during ongoing operations. "The planning phase was very complicated but the time and effort have paid off – we have achieved the perfect system," is Christophe Carion's praise, especially for the good cooperation in creating the layout and in the assembly phase.

Pekabex – with its excellent reputation and high requirements regarding quality and perfection – has established a unique selling point with its new fully automated precast concrete element production facility in the Gdańsk region. The precast produced there in the highest quality are mainly utilised for residential construction work in Poland, Sweden and other Nordic countries. ■

A great deal of storage space has been gained through the dual level production concept at Pekabex. The precast wall and floor elements produced there are mainly for residential construction work and are employed in projects in Poland, Sweden and other Nordic countries

New ORU ZENITH MID 8/360 mixing system for Pekabex facility in Gdańsk

Imer Group, the Italian systems manufacturer, supplied the mixing system for the new Pekabex precast concrete production facility in Gdańsk (see: "New precast element production facility near Gdańsk – maximum automation with logistical sophistication"). The ORU Zenith MID 8/360 is set up as a modular system and is an ideal solution if space for installations is restricted and great productivity is demanded. It can process many different classes of aggregate and be employed both for the production of precast elements and ready-mix concrete. The system was also adapted to the high standards of quality at Pekabex.

To the mixing system belong: a vertical, completely galvanised aggregate silo with an overall volume of 360 m^3 – four of its total of eight silo chambers possess a pneumatically operated outlet and the four others a discharge conveyor for sands; two cement silos each with a capacity of 60 tonnes; one silo for silica fume with a volume of 60 tonnes; a unit for dispensing liquid concrete admixtures and a unit for adding four different types of water (tap water, cold water, hot water, recycling water). All silo chambers are equipped with a hot air distribution system to protect the aggregates against frost.

All components are batched and weighed independently from each other. There is an electro-magnetically induced volumetric system in addition to the measuring scale for high precision water dosage.

The ORU MS 2.250/1.500S planetary mixer is kitted out with wear-resistant materials and is very well protected. It makes both high mixing speeds and outstanding mixing quality possible. An access opening enables samples to be taken during the mixing process entirely without danger.

The aggregate/cement ratio is continuously monitored by Ludwig microwave probes installed in the silo chambers; the water/cement ratio is on the other hand measured by a Ludwig microwave probe in the mixer's interior.

Completely autonomous system

The entire system is absolutely autonomous. The concrete is transported securely and cleanly from the mixer to the concreting stations with an ORUFLY EDR 2.250/1.500 bucket conveyor, which is controlled by WIFI and continually supplies the stations with concrete according to their actual requirements.

The system is fitted out with a dust extraction unit and a device to control cement dust pollution. Added to this, there is an automatic washing unit for cleaning the mixer and the buckets of the bucket conveyor, which substantially shortens the time required for cleaning and maintenance work in the evening. The entire wash-out water is then freed of aggregate and fed into the production cycle again.

All aggregate silos are loaded straight from trucks. To this end, the trucks drive onto a special charging hopper with a volume of 20 m^3. A conveyor belt of 70 m in length transports the aggregates, which are then distributed into different chambers by a belt that both revolves and rotates. All these processes run entirely automatically.

The Sauter control unit made by Elema is very user-friendly and provides great flexibility. The control unit continually communicates with the Progress system's control unit in order to manage daily operations with the mixing system.

Imer Group, the Italian systems manufacturer, supplied the mixing system for the new Pekabex precast production facility in Gdańsk

The mixing system is equipped with an ORU MS 2.250/1.500S planetary mixer

A 70 m long conveyor belt brings the aggregates to the silo where a belt that both revolves and rotates distributes them to individual chambers

Pekabex – company history

The opening of the Pekabex company group's highly automated precast concrete production facility in Gdańsk-Kokoszki in January 2020 marked a temporary high-point in the company's almost 50 years of history and in its impressively rapid growth – especially over the last ten years. The company is today listed on the Warsaw Stock Exchange and is one of the leading construction companies and precast concrete element manufacturers in Poland. In 2019, the group produced 143,000 m^3 of precast with 2,097 employees and had a turnover in the region of 772 million Polish Zloty – roughly corresponding to € 171 million or US$ 201 million US.
Pekabex has specialised in constructing office and commercial buildings and halls as well as residential complexes, infrastructure projects (bridges, tunnels, etc.) and special projects. Precast concrete elements for such projects are manufactured at sites in Gdańsk, Poznań, Mszczonów and Bielsko-Biała. All precast and prestressed precast concrete elements needed for these market segments are manufactured on two systems made by Echo Precast Engineering.

Founding and growth

The history of Pekabex goes right back to socialist Poland, where the beginning of today's company, the Poznan House Building Combine (Poznański Kombinat Budowy Domów), was founded in 1972. The Pekabex name appears for the first time in the company chronicle with the introduction of the market economy in 1991.
The company grew continually over the years and received a significant boost from the construction of stadiums and the expansion of infrastructure for the European football championship staged jointly in 2012 by Poland and Ukraine. Pekabex supplied several stadium construction sites in Poland with precast. At that time, the management decided on reviving another earlier business unit – the area of infrastructure. Bridge girders and noise protection walls were adopted into their portfolio as were tunnel linings at a somewhat later date. There is great demand for everything.
Between 2012 and 2016, Pekabex continued to grow by purchasing or founding production facilities in Bielsko-Biała (2012), Gdansk (2015) and Mszczonów (2016). Pekabex supplied precast for the new railway stations in Poznań and Łódź, for the Volkswagen factory in Września and lining segments for the tunnels under the Vistula and Dead Vistula in Gdańsk.

Strengthening the power of innovation

A phase followed on from 2017 up to the present time, in which the concern has reorganised its structures and modernised its corporate image on this firm foundation. The new logo from 2019 is a sign of this. Part of the new image and appearance is that Pekabex refers for the first time in its annual report to its own societal and environmental commitment as well as to a commitment to its own employees.
The company also apparently found time and peace enough in this phase to develop its strategy for tomorrow. Its power of innovation is strengthened through a partnership with the Poznan School of Logistics, amongst other things.

Their greatest investment in the power of innovation must surely be the new highly automated precast concrete production facility mentioned above in Gdańsk-Kokoszki whose commissioning was celebrated in January 2020 as a second Gdańsk facility. It has been successfully producing filigree floors and walls as well as solid and sandwich walls since that time.

FURTHER INFORMATION

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