

Weckenmann Anlagentechnik GmbH & Co. KG, 72358 Dormettingen, Germany

New precast plant inaugurated in Siberia

A complete plant for precast concrete elements, an annual capacity of 70,000 m² of living space, from the groundbreaking ceremony to the first concrete in less than two years – that was the vision of the Russian concrete specialist Armaton and at the same time the challenge that faced the specialists from Weckenmann, which oversaw the construction of the new plant as general contractor.

The building contractor 1st Stroyfond from Novosibirsk had already invested in a brick-making production line of its own from a German supplier in 2009 and had got to know and value the quality of German mechanical engineering. For this reason it also turned to Anton Ohlert from Moscow, the agency for Weckenmann Anlagentechnik GmbH & Co KG in Russia and the CIS, for the next step – a plant for the manufacture of precast concrete elements. Until now the precast elements had been procured from various suppliers in the vicinity and also further away. However, the scope of the building projects made self-production worth considering.

In 2012 the top management from Armaton visited a reference customer of Weckenmann in St. Petersburg and before the year was out they had already been to the Weckenmann headquarters in Dormettingen, Germany. Agreement was reached in 2013: A state-of-the-art plant for the manufacture of precast elements was to be built on a greenfield site. The development of a modern construction system, the obtaining of the required permits for the erection and operation of a plant as well as the development of the site led to the start of construction in May 2014. The complete project has a volume of 1.7 billion roubles.

In order to realise this demanding project within the given framework, Armaton chose the German mechanical engineering company Weckenmann as general contractor.

In the last few years Weckenmann had realised several projects of a similar size and complexity as general contractor in Russia and other countries. Under the project leadership of Weckenmann the well-versed team from Weckenmann (overall management, circulation plant and stationary production), EVG (reinforcement plants), Nordimpianti (hollow-core slab plants) and Teka (mixing plant) supplied a solution tailored to the customer's needs,



Circulation plant with preparation for sandwich wall production



Concrete distributor with compaction station



Shuttering store for the Weckenmann M-series shuttering profile



Control centre of the WAvision master computer

which went into production on 13 March 2015 during an impressive opening ceremony in the presence of the Russian Minister of Construction Mr Michail Menj, the Governor Mr Vladimir Gorodezkij, the mayor of Novosibirsk Mr Anatolij Lokotj, the personal consultant of the Russian president in Siberia Mr Nikolai Rogozhkin and Senator Nadezhda Boltenko.

Getting this far has been demanding and the schedules were tight. Overall project leader Wadim Grünwald from Weckenmann commented: "In this project we were able to fall back on our many years of experience in projects as a general contractor in Russia and the CIS, and the proven team of suppliers in co-operation with the Armaton project leadership under Alexander Kolesnikov also mastered this challenge."

With regard to the interfaces and requirements the individual components had to be adapted at an early stage to the building layout and the media supplies.

Weckenmann Anlagentechnik, circulation plant and general contractor

The heart of the production is the flexible circulation plant with 42 pallets. Both solid and sandwich walls can be manufactured on it. Solid floor components can also be produced for special building objects.

The construction system was developed according to Armaton's vision by the well-known design office Jakushev in Moscow. Based on the element drawings, Weckenmann's shuttering department worked out a co-ordinated and optimally executed shuttering system. The maximum number of elements had to be formed with a minimum of shuttering profiles. At the same time, as many shuttering systems as possible had to be in circulation and as few as possible in storage. The shuttering system from Weckenmann's M-series formed the solution for this. The shutters are equipped with integrated switchable magnets. The M-series is very well suited to the manufacture of solid elements (floors, walls and facades) with custom chamfers and profiles. The M-series can also be used for sandwich elements through the use of M-Top auxiliary profiles. The flexible shuttering system can also be used at any time for another construction system. This allows Armaton to follow the developments in the building sector without having to invest in new shuttering profiles each time.

Armaton plans building types with 14, 17 and 25 floors. The wall elements for this, up

to 425,000 m², come from the circulation plant. Special elements are produced on the tilting tables also supplied. Ventilation shaft shuttering, stair moulds and driven pile moulds are to be found in the stationary production area.

The circulation plant is controlled by the Weckenmann WAvision master computer. The master computer coordinates the flow of production with data from the work preparation, specifies the required shuttering profiles and supervises the manufacturing process. The concept is rounded off by product tracing as far as the open-air storage area. In WAvision, Weckenmann has developed a control tool that uses all available data in the company and unites management, production and reporting in a single system. This modular software solution thus enables the linking of various systems for the control of automated precast element manufacturing so that there are no interfacing problems between different sub-solutions.

Reinforcement plants from EVG

Such a large production volume and the associated variance of the components required that the company produce its own reinforcement elements. The manufacture of lattice meshes with different wire diameters and geometries had been a complex affair until then. Protracted conversions and intensive adjustment phases had been necessary in order to achieve the desired result. This time-consuming process caused high costs as well as a considerably lower output.

For that reason Armaton invested in a fully automatic mesh welding machine of the type FBE/158 from the Austrian manufacturer EVG. The FBE welding machine itself consists of a laterally mobile welding portal, which carries individually controllable welding units at distances of 100 mm. The single spot-welding units can be specifically activated or deactivated as necessary.

In addition, the FBE combines a straightening unit of the type RA-XE, which produces longitudinal and transverse bars. The automatic wire diameter changer allows flexibly usable wire diameters of 5-12 mm, without conversion times. Through this combination both door and window cutouts as well as different wire diameters and geometries in one mesh can be realised without manual intervention.

In addition, EVG supplied an automatic stirrup bending machine of the type Polybend PBC 2-12 with integrated 3D bending

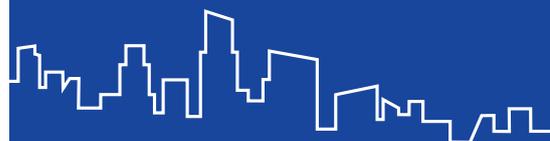


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FBE/158 mesh welding plant from EVG



Polybend PBC 2-12 with 3D bending mechanism from EVG

mechanism for the production of stirrups and rebars. This enables the processing of both cold and hot-rolled, randomly wound or coiled material off the coil with a diameter of 6-12 mm. The required reinforcement cages are manufactured from the individual elements at vertical workstations.

Mixing plant from Teka

The necessary mixing plant was supplied by Teka. A weighing and mixing plant was selected with two planetary mixers of the type TPZ 3000 with concrete discharge into two bucket tracks. During the alternative production of ready-mixed concrete, the concrete is discharged directly into the truck mixers. The mixing plant enables production of around 80 m³ ready-mixed concrete per hour with simultaneous use of both planetary mixers. One mixer can also be used alone for the production of about 40 m³ ready-mixed concrete per hour.

The aggregates are stored in a round silo system with a storage capacity of approx. 408 m³. The mixing plant is fed by a charging hopper with grab-crane unit; feeding

with a charging hopper for trucks is also provided for. Microwave sensors for the measurement of the sand moisture level in the silos, moisture and temperature measurement in the mixer, protective devices for voltage fluctuations in the control system, consistency measurement for ready-mixed concrete and remote maintenance via Internet ensure smooth processes in the plant.

An emergency computer as well as the possibility to continue to operate the plant manually guarantees additional operating reliability.

The two track carriages of the Weckmann bucket track each have a volume of 2 m³ and supply the circulation plant and the prestressed hollow-core slab production with the appropriate concrete qualities.

In total, up to 420,000 m³ of concrete can be processed per year in the new plant. Such a modern plant would be incomplete without a fresh concrete recycling unit. All concrete sludge from the mixers, the transport buckets of the bucket track system and

the cleaning of the truck mixers is fed to the recycling plant by means of a collecting tank. Water with cement is separated from aggregates in a catchment tank. Deposits such as sand and crushed stone are separated out and stored on heaps by means of spiral conveyors. The recycling water can be fed both to the mixing plant for re-use or can be used for the cleaning of the truck mixers.

Dosing equipment for dyes (dry and liquid) was integrated for the production of coloured concrete (fair-faced concrete). The respective recipes are stored in the controller.

Prestressed hollow-core slab production from Nordimpianti

Nordimpianti supplied the prestressed hollow-core slab production equipment for elements with a height of 220 mm and a width of 1200 mm. The fully automated production consists of six casting beds, each of which is 120 m long and is equipped with a single-wire stressing and detensioning system. Other equipment supplied included



The necessary mixing plant for the new plant was supplied by Teka



TPZ 3000 planetary mixer



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Prestressed hollow-core slab production from Nordimpianti



Concrete saw from Nordimpianti

the half-portal concrete distributor, an angular concrete saw (for the cutting of the concrete elements up to 520 mm with cutting angles from 0 to 180°), the multifunction bed cleaner, the lifting equipment and a transport system.

The production capacity was calculated by the planning engineers to be 850 m² of prestressed hollow-core slabs per work shift. The high level of automation of the production line, which is based on extrusion technology, means that only 5 persons are required per shift. The plant now produces

prestressed hollow-core slabs with spans of up to 9 m and a load-bearing capacity of 800 kg/m².

The production of these lightweight prestressed hollow-core slabs offers both the manufacturer and its customers advantages such as a higher live loads with a lower dead weight. The prestressed hollow-core slab system enables a reduced concrete consumption and at the same time a lower heat requirement in the manufacture.

Following the commissioning of the individual areas, the detailed training of the operators and the maintenance staff takes place. Here, too, the customer can rely on the experience of the qualified suppliers.

"A quick handover of the general contractor projects and thus fast market positioning are crucial advantages that have a major influence on the long-term corporate success of our customers", says Karl-Wilhelm Bögl, head of the Project Department at Weckenmann. In the final stage of development the plant will have a production output of 300,000 m² of living space per year.

At Weckenmann the next project of a similar order of magnitude is already ready for delivery. Once again here Weckenmann is the central point of contact for the customer.

FURTHER INFORMATION



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Inauguration ceremony at Armaton