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

Ceremonial opening of the first modern precast plant in Makhachkala, Dagestan

Following a 4-year planning and construction period, a new plant for the manufacture of precast concrete elements was put into operation in Makhachkala this summer. The plant manufactures laminar concrete elements such as solid, sandwich and double walls, as well as lattice girder slabs and solid slabs. In addition, concrete pipes, manholes and various custom parts are produced. The ceremonial inauguration of the plant took place in July in the presence of high-ranking guests from politics and industry.

Makhachkala is the capital of the Caucasian Constituent Republic of Dagestan. Situated directly on the Caspian Sea, Makhachkala was a very popular holiday destination as a spa and seaside resort during Soviet times.

However, the region has had very few positive experiences over the last 20 years. The headlines were mostly concerned with the terrorist activities of Caucasian splinter groups and the associated assassinations and bomb attacks, etc. Therefore, many buildings here are derelict and in need of renovation.

There was not really a functioning building industry and consequently no precast plants either. Therefore the management of the "Stroidetal" residential construction collective made contact with the Avermann company in summer 2010 in order to develop a concept for a new precast plant.

Planning/building phase

With the involvement of the B+S and Teka companies, Avermann created a suitable installation concept, on the basis of which the further planning was driven forward until it met the user's expectations.
Particular importance was attached to high flexibility of the facility in order to be able to meet the requirements for both underground construction and residential/industrial construction.

Once the technical concept had been finalised, a responsible general contractor was enlisted in EPC Engineering Consulting GmbH Rudolstadt from Germany, which has experience of business in Russia, together with its subsidiary HI Bauprojekt GmbH Jena. Their services included the construction planning, including preliminary and detailed engineering in coordination with the plant equipment to be installed, the interface coordination and delivery of all system components as well as the organisation and implementation of assembly and commissioning of all subsystems, including the handover of the entire installation to the end customer, OAO "Strojdetal".

A total of three halls were available for use as the production area, but they were in a particularly bad condition. In particular the hall columns were not designed to meet the increased loads and had to be strengthened accordingly. New cranes and craneways were supplied by the Dahs company from Germany.
In addition, the entire building was completely renovated and repaired, as were the entire exterior layout.

Presentation of the installation during the plant opening ceremony on July 22, 2015

View of the building façade with the adjacent concrete mixing plant

Production equipment

Most of the equipment was manufactured by Avermann Maschinenfabrik, which is headquartered in Osnabrück, Germany.
The equipment for the production of laminar precast elements is installed in halls 1 and 2.
The most diverse façade and wall elements are concreted on six hydraulic tilting tables. All the tables are equipped with a side shuttering with an infinitely adjustable height as well as permanently installed vibration technology, so that wall thicknesses of up to 400 mm can be manufactured from SCC, normal and also lightweight concrete.

In addition, special elements as well as wall and ceiling elements can be manufactured on a stationary production line with a length of 75 metres. On top of that there are four folding pallets for the manufacture of lattice girder slabs and double walls.

Laser projection systems supplied by Lap GmbH Laser Applications and permanently installed on the hall ceiling are used for the calibration of the precast elements to be manufactured. The geometry of the structural element is displayed exactly on the table surface, so that the formwork and built-in components as well as reinforcements can be placed in the exact position.

The production planning system begins with the generation of the required production data. This is done using AutoCAD-based programs from the German company Idat. Several employees have received the corresponding training for this and generate the reinforcement drawings, table allocation plans, etc. on two parallel workstations. Avermann's scope of supply also included appropriate machinery for the concreting (concrete distributor in a gantry version with levelling device and two concrete buckets) and subsequent smoothing (power trowel for normal concrete and smoothing roller for the compaction of lightweight concretes).

View inside one of the two production halls with tilting tables and smoothing machine

Folding pallets for the production of double walls and lattice girder slabs

The run-off trucks for the transport of the concrete elements to the outdoor store as well as the demoulding systems (made by Ratec) were also supplied by Avermann.

The equipment for the third hall was supplied and installed by B+S GmbH from Rheine, Germany. In particular, bell pipes and manhole rings are manufactured here.

Pipes of various sizes are produced in five special moulds up to 5,000 mm in length and in the diameters DN 600, 800, 1000, 1200 and 1500. The stationary moulds each consist of a 2-sided external formwork and an inner pipe with hydraulic shrink function, as well as the required vibration technology. Three stations are available for this.
Included here is a fully automatically operated wire cage welding machine for the production of reinforcement cages in diameters of up to 2,500 mm and lengths of up to 5,000 mm, supplied by MBK Maschinenbau GmbH from Kisslegg, Germany. There is also a vacuum spreader bar for the careful lifting of the concrete pipes.
Furthermore, an SPM-1500 was supplied for the production of manhole rings in the sizes DN 1000 and 1500 (length up to 1,000 mm).

Mixing plant

Teka Maschinenbau GmbH, a leading supplier of high-performance mixers and concrete mixing plants for the concrete product and precast industries, was selected to supply the precast plant with quality concrete.

Moulds for the production of concrete pipes

Teka mixing plant during the construction phase

The mixing plant consists of two completely independent mixing stations, each with a Teka TPZ 2250 high-performance planetary mixer with a concrete output of 1.5 m³. Both planetary mixers have two discharge openings. One discharge opening supplies a bucket track with concrete for the plant, while the other alternatively supplies mixer trucks with ready-mix concrete.

Each mixing station has a 5-chamber inline silo with a total capacity of 175 m³, which is fed by a wheel loader. Frequency-controlled dosing belts guarantee precise dosage of keramzite. Dosing gates are used for the remaining aggregates. Weighing is carried out by weigh belts, each with a weighing capacity of 4,000 kg. These belts also transport the aggregates in Teka tilting bucket feeders, which are filled in a pit. The two independent tilting bucket feeders transport the aggregates to the two Teka planetary mixers. Scales for binding agents, additives and water with negative weighing provide for the exact dosage of cement, chemical admixtures and water. Four binding agent silos with a total usable capacity of 320 m³ are available for cement storage on a gantry that can be completely driven under. Unnecessary manoeuvring times for truck mixers are thus eliminated and these can be optimally supplied with concrete.

The complete electrical control system including remote maintenance as well as consistency and sand moisture measuring devices was supplied by the Bikotronic company.
The mixing plant was equipped with a dye metering system made by Würschum with a big-bag emptying station and a weighing and conveying unit.

Furthermore the concrete supply to the factory hall, including a distribution bridge, was used for the filling of pipes by means of a bucket track from WMW with a coated track carriage in a rollover bucket design with radio remote control.

Conclusions and outlook

With the investment in this modern stationary production line, the Russian company OAO "Strojdetal" now has many different possibilities to manufacture precast concrete elements for the construction of individual housing and industrial buildings. Moreover, concrete pipes and manhole rings of various sizes can also be manufactured in the plant.
The strengths of the plant lie in particular in the variety of products and the high flexibility: for example, the parallel manufacturing of structural elements with widely varying processing times. Experience shows that conventional pallet circulation plants reach their limits here.
EPC Engineering Consulting GmbH Rudolstadt was responsible for the project as general contractor, including the planning services, interface coordination and delivery of all plant components.
Due to extensive work for the renovation of the existing halls, the project stretched over a period of approximately four years from the planning to the start of production. The result is all the more remarkable - this plant is unprecedented in the region.
Following completion of the commissioning in the summer, the opening ceremony took place on 22 July 2015 in the presence of high-ranking guests from politics and industry and the plant was officially handed over for its purpose.

FURTHER INFORMATION

AVERMANN Maschinenfabrik GmbH & Co. KG

Avermann Maschinenfabrik GmbH & Co. KG
Lengericher Landstraße 35
49078 Osnabrück, Germany
T +49 5405 505 0, F +49 5405 6441
info@avermann.de, www.avermann.de

EPC EngineeringConsulting

EPC Engineering Consulting GmbH
Breitscheidstraße 152
07407 Rudolstadt, Germany
T +49 3672 302300
mail@epc.com
www.epc.com

Teka

TEKA Maschinenbau GmbH
In den Seewiesen 2
67480 Edenkoben, Germany
T +49 6323 8090
F +49 6323 80910
info@teka-maschinenbau.de
www.teka.de

B+S

B+S GmbH
Kanalstrasse 63
48432 Rheine, Germany
T +49 5971 7911310, F +49 5971 79113119
info@bs-baumaschinen.com, www.bs-baumaschinen.com

OAO „Strojdetal"
367009 Russian Federation
Southern Federal Region
Republic of Dagestan
Machatschkala, UZK Region