Vollert|Weckenmann, 72358 Dormettingen, Germany

A new floor and wall production facility commissioned

In the middle of 2008, the most modern precast production plant in Saint Petersburg began operations at DSK Block, which belongs to the leading LSR construction and building materials group located in northwest Russia. DSK Block has set itself the goal of achieving a yearly rate of 750,000 m² dwelling space construction by 2011 with its two precast facilities. To this end, €19 million have been invested in a first phase to generate 180,000 m³ precast per year. DSK Block decided to go over to a new, more efficient technology for the production and construction of multi-storey apartment buildings and this entailed modernising their factory. Contrary to usual Russian design, the outer walls are not made in a sandwich construction method but rather from load-bearing massive walls which have been furnished with complete heat insulation. This changed method of construction possesses considerable advantages as construction progress can be accelerated and no joint appears on the façade.

DSK Block was founded in 1992 and has reached its current market position employing 2,000 persons and utilising conventional technology. The company's site covers 45 ha and it has a 30,000 m² storage area available.

A competent team from DSK Block made contact with Vollert|Weckenmann in 2006 via Anton Ohlert, the firm representing the company locally. The team formulated the ambitious objective of doubling production capacity.

Project procedure

Together with engineers, a concept was devised with a view to manufacturing load-bearing and non load-bearing walls and massive floors in a rational, high-quality way. A selection was made of vertical battery formwork for manufacturing the wall elements and a pallet circulation system for producing the flooring horizontally.

The Russian team was particularly impressed with the Vollert|Weckenmann battery formwork system. This boasts decisive improvements in two important details for the Russian market – in the vibration technology and heat treatment. There was a desire for the best possible compaction, given fluctuating aggregate quality, in order to produce high quality concrete surfaces. At the same time, great demands were placed on the concrete's early compressive strength, which meant that heating and the regulation of the same were of major importance.

Transport , assembly and commissioning

In the period from December 2007 until June 2008, the Vollert|Weckenmann logistics department had to handle a total load of 1,300 tonnes transported on 75 trucks. Most of these had excess width and went on their way to Saint Petersburg as abnormal loads. On arrival there, the circulation system was assembled first. Its erection was supervised by up to 4 highly trained Vollert|Weckenmann foremen who organised and monitored the qualified employees supplied by DSK Block. All the preliminary construction work on the building stipulated by Vollert|Weckenmann had been perfectly carried out on the Russian side, thus ensuring that the plant could be erected on schedule. The project teams held regular meetings in order to monitor assembly progress. Any correction necessary was immediately established and directly implemented.

Training / orientation

The operating staff, who had already been involved in the erection and assembly of the plant on site, received intensive training and instructions on using the plant. The Vollert|Weckenmann foremen only handed over the plant once they could be assured that DSK Block employees could operate it for themselves.

The construction method with massive walls and heat insulation cladding possesses considerable advantages as construction progress can be accelerated and no joint appears on the façade

DSK Block's site covers 45 ha and it has a 30,000 m² storage area available

Thoroughgoing after-sales support in a plant of this size and complexity is especially important. This follow-on support was assisted by the possibility of remote control unit diagnosis via modem. Specific persons and departments at Vollert|Weckenmann are available to the customer for this on a permanent basis. The utilisation of components from well-known international suppliers has also ensured that the plant's operator can access their service network rapidly.

Pallet circulation

The massive floors are required in a standard width of 3.59 m, a thickness of 160 mm and a maximum length of 6 m. The pallet circulation system is equipped with 40 pallets (3.9 x 12.5 m) which have edging formwork fastened with screws on the longer side. Longitudinal and transverse shuttering with strong built-in magnets completes the formwork system.

Curing chamber

The curing chamber, which is completely clad with insulation panels, has a capacity of 40 storage positions. Each storage point can be accessed by a segmented gate whose parts open separately. This is activated by a rack servicing unit working outside of the heated area and which also loads the pallets. This device features a continuously variable drive and rapid storage and retrieval capabilities.

The pallet circulation system is equipped with 40 pallets (3.9 x 12.5 m) which have edging formwork fastened with screws on the longer side

Loading the curing chamber with pallets is carried out by a rack servicing unit

The thermo oil employed for heating is regulated by a temperature control unit and is conducted via spiral ribbed tubes located at the bottom of the chamber. Air circulation is provided by ceiling fans.

The operating process in individual stages

- Removal of the longitudinal and transverse shuttering from the pallet with an in-house crane system and a special traverse - can operated by one person rapidly and safely.
- Automatic transport of the lateral formwork to the stripping station including cleaning.
- Lifting the finished flooring slabs with a gantry and transport to outside storage on a platform carriage.
- Automatic cleaning and oiling of the pallets removed.
- Plotting element contours including assembly parts on a pallet at a scale of 1:1.
- Placing the formwork manually with the aid of a manipulator and activating the built-in magnets.
- Setting in assembly parts

Lifting the finished flooring slabs with a gantry and subsequent transport to outside storage on a platform carriage

Plotting element contours including assembly parts on a pallet at a scale of 1:1

- Setting up the reinforcement which is produced in a separate section of the facilities.
- Concreting with a spiked roller concrete spreader capable of processing varying concrete recipes. The holder capacity is 3 m³. A bucket rail supplies this station continuously with concrete.
- The poured concrete is compacted during a high frequency vibration stage. The SL vibration technology is supplied by Brecon and achieves the best possible compaction results at a reduced noise level.
- Finally, the floor element is surface treated by means of a dressing device attached to the concrete spreader. This results in a precise floor thickness and a level top side.

Battery formwork system

In two enclosed neighbouring bays, a total of 9 battery formwork systems with the dimensions 7.18 x 2.60 m, 5.68 x 2.60 m and 3.88 x 2.59 m have been set up. The wall elements have a thickness of 120 and 160 mm. Each formwork has 2 x 10 chambers.

The existing construction design was improved in terms of statics and vibration activity using the finite element method. This meant being able to reduce the number of vibrators, which has had a positive effect on noise generation, costs, energy consumption and wear.

One further advantage with the Vollert|Weckenmann battery formwork system is that the formwork panels are fitted with undercarriages at ground level driven by electric motors. This offers both practically unrestricted access to the chamber compartments for detailed work and enables the chambers to be moved quickly and without any physical effort.

All panels are equipped with heating coils which are supplied with thermo oil via a central heating unit. One sensor on each formwork side sends the current temperature reading to a control unit which monitors temperature progression and the length of the heating period.

The bottom and vertical formwork is made from steel and possesses sealing edges. DSK Block can adjust and define the standard dimensions quickly and accurately by means of a grid system.

The compaction procedure, devised in conjunction with Brecon, reached the starting

Concreting with a spiked roller concrete spreader capable of processing varying concrete recipes. The holder capacity is 3 m³

In two enclosed neighbouring bays, a total of 9 battery formwork systems have been set up

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line with a couple of new items that had never been seen in the world before. There are a total of 748 synchronised vibrating units, developed especially for this project, which attain a rotational speed of precisely 6,000 rpm at a frequency of 100 Hz. These vibrators possess a very slim shape and fit into special assembly pockets inside the panels to save on space. The bearings and cables have also been designed to withstand high temperatures.

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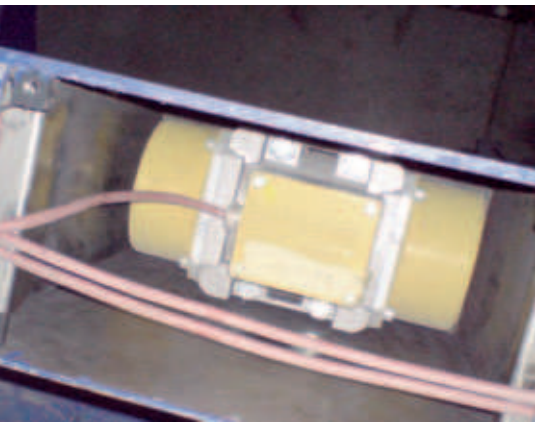

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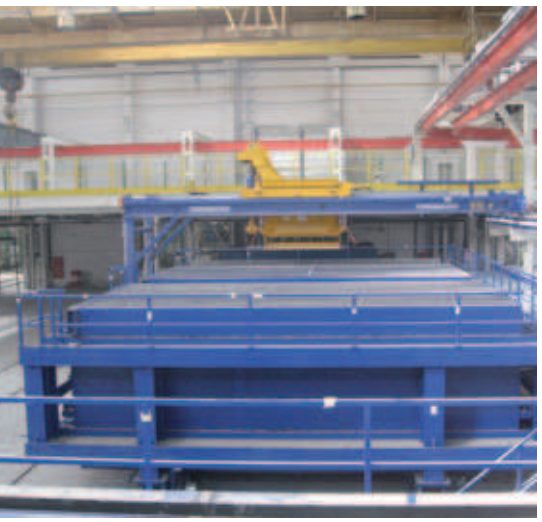
The reinforcement consists of prefabricated cages which are set into the battery with a crane



Casting the concrete is carried out by two semi-portal spreaders in conjunction with a spiked roller batching unit. The concrete is conveyed precisely into the chambers via a swivelling hydraulic filling device. A bucket rail ensures a continuous supply of concrete

The elements feature practically pore-free surfaces with good edge formation. Tight dimensional tolerances guarantee smooth, rapid assembly

The vibrators are monitored by two control systems whose main component is made up of a frequency converter which is, in turn, controlled by a PLC. All vibrators can be monitored and controlled by touch panels where their operating status is also displayed. Monitoring is aided by a radio-controlled terminal at each battery system. The individual touch panels are configured redundantly. Each one can operate any battery system within a given hall.

Summary

Through this investment, DSK Block has strengthened its pre-eminent position as a major manufacturer of high quality precast in the Saint Petersburg region. Both the amount produced and the quality attained propel standards to a new level in this important market in Russia – second only to Moscow. Vollert|Weckenmann and their partners have proved themselves supremely competent in consultancy work, professional project management and the provision of the latest technology.

Despite the great geographical distances separating them, the project teams worked effectively together with a focus on results.

FURTHER INFORMATION

"HBP "Block" LTD

HBP "Block" LTD
(House-building plant "Block")
3d Verhniy st., 5
194292 St. Petersburg, Russia
T +7 812 5985283
F +7 812 5985283
info@block.lsrgroup.ru · www.lsrgroup.ru

Anton Ohlert St. Petersburg
Chernyshevsky prospect, 16
191123 St. Petersburg, Russia
T +7 812 2737757
F +7 812 2727244
ohlert@ohlert.spb.ru · www.ohlert.com

Vollert | WECKENMANN

Weckenmann Anlagentechnik GmbH+Co. KG
Birkenstraße 1
72358 Dormettingen, Germany
T +49 7427 94930
F +49 7427 949329
info@weckenmann.de · www.weckenmann.de

Vollert Anlagenbau GmbH + Co. KG
Stadtseestr. 12
74189 Weinsberg, Germany
T +49 7134 520
F +49 7134 52202
info@vollert.de · www.vollert.de