

Earthquake-proof construction systems on a precast basis significantly change the face of Uzbekistan

The face of Tashkent as the capital of Uzbekistan is subject to constant change. The city with more than 2 million inhabitants has been the political, cultural as well as the economic center of the former Soviet state since the 1990s. New residential buildings are constructed as quickly as modern shopping malls, hospitals and universities – those projects are subject to precast architecture, also due to their high earthquake resistance.

The Uzbek BINOKOR group, which emerged from a former Soviet state-owned enterprise in 2010, is considered as a renowned expert on constructional concrete elements such as foundation blocks, irrigation channels for agricultural economics or even up to 26 meter-high catenary masts for railway lines. “Until 2014, these were our main areas of expertise. Pre-stressed hollow core slabs, which we also produced for smaller housing projects, were rather secondary business. However, this has changed with the growing construction activity in Uzbekistan, especially in the heart of the capital Tashkent,” said Aleksey Lozinskiy, responsible for the industrial manufacturing equipment at BINOKOR group.

Nowadays, the face of Tashkent is characterized by attractive residential buildings as well as multifunctional building complexes. The demand and the construction boom is unbroken. Thanks to industrialized prefabrication, today's precast architecture makes it possible to finish off construction projects notably quicker. Moreover, walls and slabs which are exactly accurate to size, not only increase the construction quality considerably, they also have an outstanding heat-performance and are weatherproof, fireproof and earthquake-proof. Nowadays, the modern precast architecture opens up brand-new possibilities as multistory construction systems were technically not possible a few years ago due to constantly occurring seismic activity in Uzbekistan. “An enormous growth potential for the BINOKOR group,” describes Aleksey Lozinskiy. Against this background, the management decided in late 2014 to notably expand this construction division and, in addition to it, to set up its own modern precast concrete production of filigran slabs and solid concrete parts for housing projects, shopping malls and multistory car parks.

Expertise in systems planning and earthquake-proof construction systems

Apart from time, extremely limited space posed a formidable challenge. “The reconstruction of the former Soviet residential construction combination KSK to a state-of-the-art precast concrete parts factory with the latest system and machine technology was completed in less than 10 months. A close coordination with the client and the architects was important”, said Igor Chukov, Head of Sales CIS at concrete plant specialist Vollert, who contributed a lot of expertise as knowhow partner and technology supplier. “All

machines and transport routes as well as the degree of automation have been optimized for the given circumstances," said Igor Chukov. A refined circulation system provides a fluent transfer of pallets from workstation to workstation.

The knowledge of modern construction systems of Vollert's engineers was also decisive. In collaboration with the leading Chilean housing developer BauMax and the earthquake specialist Sirve SA, Vollert had already developed a special construction system for the earthquake-prone country of Chile, in 2015. "Today, we are able to automatically manufacture earthquake-resistant walls and slabs in Chile within a short period of time for our building projects," said Sebastián Lüders, Technical Director at BauMax. Vollert adjusted this knowhow to the special seismic circumstances in Uzbekistan. In collaboration with the construction experts of BINOKOR and an external engineering office, a new sustainable construction system for multistory multifunctional buildings has been developed. Specifications for the walls and slabs which were to be produced were transferred from 3D models made for this purpose.

Optimized plotting and concreting processes for precisely tailored walls and slabs

Besides ideal processes, the focus in the plant design was on the machine technology. "Today, modern shuttering systems, high-precision large plotter for the application of contours and CAD/CAM-controlled concreting processes play a central role for accurate walls and slabs in regard to part geometry as well as to measurements. It is necessary to avoid measurement mistakes as they have cost-intensive consequences," explains Igor Chukov. For this purpose, a CAD/CAM-controlled SMART PLOT plotter with an application precision of +/- 1 mm draws – with water-soluble color – the contours 1:1 on the shuttering area. The processes were markedly rationalized through automatic operation and shuttering velocities of up to 5 m/s. A modern CAD/CAM-controlled SMART CAST concrete spreader with high-precision the exact predetermined amount of concrete with a spiked rollers and valve construction. The applying volume and the velocity of the spiked rollers (frequency-controlled) can optimally be adjusted to different concrete textures. Hydraulically operated valves omit the section in which no concrete is to be applied, e.g., windows. By compressing the concrete through a VARIO COMPACT vibrating station afterwards, an ideal cover of the solid concrete parts in the quality of exposed concrete is created.

Innovative curing chamber shelving system saves place

Another technical highlight: the all-insulated VARIO CURE curing chamber, with two shelf systems in one row. Both shelf systems comprise nine pallets on top of each other – through the tandem version, they provide an especially innovative, space-saving concept as two circulation pallets can be stored on the same shelf. The shelf systems are heated and have a passing and extending tier with sectional lifting gates, which ensure that no heat gets lost. A VARIO STORE storage and retrieval machine, which is installed between the shelf systems, takes over fully automatic warehousing and outsourcing of the circulation pallets. These pallets are conveyed pairwise through the shelf systems by a special coupling system. The necessary forward speed is ensured by friction wheels and a rack and pinion drive. Here, all storage processes as well as production processes are controlled by a central Vollert master computer. The order management, the automatic warehousing and outsourcing process as well as the transport of the pallets in the production line are controlled – among others - from this computer.

Close contact even after a successful start of production

Aleksey Lozinskiy is positive about BINOKOR: "With this new precast building system, we will sustainably change the construction industry in Uzbekistan. Finally, we can meet the high demand for well-priced, but likewise high-quality residential construction." Concerns on the part of the public opinion and politics were overcome. This can already be seen in today's numerous requests for ever-growing construction projects. Although production has already started in October 2016, a close contact with the Vollert engineers is still existent. "Currently, we are planning construction systems with up to twelve stories. For this purpose, we are developing earthquake-proof wall concepts as well as connection concepts in consultation. Therefore, we do not see ourselves as just a supplier of equipment but as a real, long-term engineering and know how partner to our clients," says Sergey Lapyrev, Head of Vollert RU OOO.

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III.1:

Traditionally, residential buildings in Uzbekistan are predominantly made out of bricks – even today



III.2:

All transport routes as well as the degree of automation have exactly been optimized to the given circumstances



III. 3:

A CAD/CAM-controlled SMART PLOT plotter draws the contours 1:1 before the shuttering systems and the reinforcement are applied



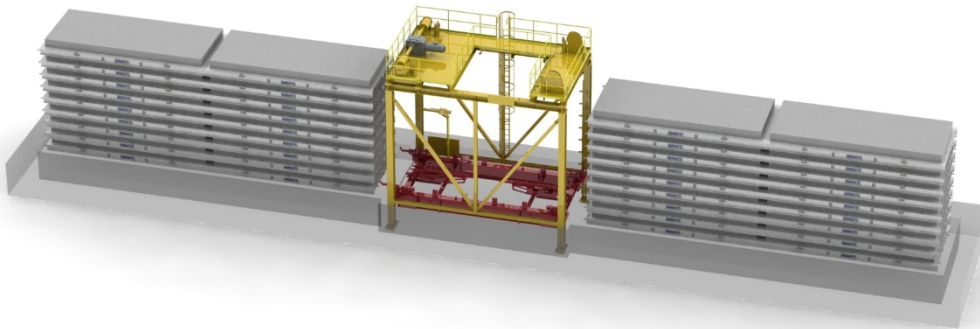
III. 4:

The applying volume and the velocity of the spiked rollers of the concrete distributor can optimally be adjusted to different concrete textures



III. 5:

A Vario COMPACT vibrating station creates an ideal cover of the solid concrete parts in the quality of exposed concrete



III. 6:

Another technical highlight: the all-insulated Vario CURE curing chamber, with two shelf systems in one row



III. 7:

The circulation pallets are conveyed pairwise through the shelf systems by a special coupling system



III. 8:

The first precast slabs for new construction projects in the heart of Tashkent have been in production since October 2016



III. 9:
Quality control is very important for construction quality



III. 10:
Igor Chukor (on the right, Vollert Anlagenbau) and Sergey Lapyrec (on the left, Vollert Russia OOO) see themselves as a long-term engineering and know how partner to the BINOKOR group



III. 11:

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