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Economical production of precast concrete elements for affordable living space in India

BCC Infrastructure Pvt Ltd. (BCC) is one of the largest property developers in India for private residential construction and commercial buildings. The company is presently building around 9,000 residential units in Ghaziabad, to the north-east of Delhi. In order to reduce construction times and costs, BCC is building with precast concrete elements, which are produced on a stationary production plant made by Weckenmann from Germany.

There is a huge demand for affordable living space not only in large European cities such as London, Paris, Berlin or Munich, but also and in particular in populous and aspiring countries such as India. With a population density of more than 380 inhabitants per square kilometre, and a total population of over 1.2 billion people, India is the second most populous country in the world after China. Experts predict that more people will be living in India than in China by 2025.

In addition to the remarkable annual population growth of 15 million people (1.4 percent per year), there is increasing urbanisation on account of migration into towns and cities from rural areas. 46 cities in India have more than one million inhabitants, including mega-cities such as Mumbai (18 million inhabitants) or Delhi with almost 17 million inhabitants. The creation of a modern infrastructure and, above all else, affordable living space, is a huge challenge for the Indian government, but it is indispensable for the further positive development of the Indian economy. India is one of the ten largest economies in the world and doesn't want its economic development to come to a halt. "Smart Cities" and "Housing for All" are the names of two of the programmes for meeting India's enormous living space requirements.

Creation of affordable living space

BCC Infrastructure Pvt Ltd. (BCC), founded by S.P.Singh in 1980 in Ghaziabad near Delhi, is demonstrating how affordable, high-quality housing can be built in a short time. More than 50 large property projects have been implemented in India in the last 35 years under the management of BCC. BCC currently has 450 employees. Kumar Bharat, the son of the company founder, is particularly proud of the current mega-project "Bharat City". To the northeast of Delhi, almost 20 kilometres west of Ghaziabad, BCC is developing and building a total of 9,000 homes in apartment blocks, each with 15 storeys.

While the first phase of Bharat City was still under construction – it is being implemented using the classic construction method (floors of cast-in-situ concrete, brick walls) – Kumar Bharat and his management board realised that building this mega-project using the conventional construction method would firstly take far too long and secondly far exceed the budget. "We have clearly recognised that we cannot fulfil our standards of economy and quality in this way", says Kumar Bharat, "besides which we wanted to reduce the construction time by half. Therefore we have done a great deal of research and decided to build Bharat City II with precast concrete elements."

Tailor-made precast plant

Following extensive research, discussions and a visit to Dormettingen in Baden-Wurttemberg, Germany, Weckenmann Anlagentechnik GmbH & Co. KG was chosen as the partner for the building of the precast plant. "On the one hand we were able to impress with our almost 60 years of experience as a plant manufacturer, but it was above all our concept of a tailor-made precast element production that convinced BCC", says Benjamin Zeh, Area Sales Director at Weckenmann, and he adds: "We have developed and built a stationary production plant for BCC for precast slabs with in-situ topping and solid interior and exterior walls."

The plant consists of two battery moulds, each with 20 compartments for the solid precast walls, and two gigantic formwork tables,

Production of precast slabs with in-situ topping in the Weckenmann precast plant in Bharat City, India.

One of the two battery moulds for the interior and exterior walls.

Important for the dimensional accuracy and surface finish: homogeneous distribution of the concrete.

each with a length of 40 m for the production of the precast slabs with in-situ topping. The matching shuttering system from Weckenmann is equipped with integrated magnets and thus ensures fast and precise shuttering of the precast concrete elements. A crane-guided concrete distributor ensures homogeneous concrete pouring.

The opening of the slide valves and the vibration take place fully automatically, enabling a very homogeneous surface to be achieved. Since May 2015, following a four-week test phase, 250 BCC employees have been manufacturing around 500 m² of precast slabs with in-situ topping and 1000 m² of solid walls every day on the Weckenmann plant.
"The surface quality and the dimensional accuracy of our precast concrete elements is more than convincing", says Kumar Bharat proudly. "But that's not all: we can produce in any weather. The electrical cables, switches and pipes are embedded, apart from which we can build faster with a smaller workforce. In comparison with the usual Indian construction method, we save around 2 years of construction time for each residential tower that we build in Bahrat City II."

Economic construction thanks to fast assembly of the precast concrete elements.

Bharat City, India. Affordable living space is being created here for numerous Indian families.

Satisfied: BCC Director Kumar Bharat, Managing Director Hermann Weckenmann, BCC founder and Managing Director S.P.Singh, (from left)

9,200 m² living space on 15 floors in 105 days

When you know that professional construction workers are a scarce commodity in India and that many workers leave the building site at harvest time, it is obvious that such a large project with a construction area of nearly 700,000 m² can only be implemented economically and within a reliable timeframe using the precast concrete construction method. In just 105 days, 100 workers build a solid residential tower from more than 3,000 precast elements (precast slabs with in-situ topping, supporting and non-supporting walls, stairs and balconies). These meet both the requirements of the future residents and the high Indian seismological safety standards. Like Delhi, Bharat City is situated in a zone with a high risk of earthquakes. The construction requirements for BCC are accordingly high. In technical experiments carried out in India it has been shown that the precast concrete walls from the Weckenmann plant can withstand higher forces than walls erected using the conventional construction method.

Construction with precast concrete elements has a future

BCC is confident that more precast concrete complexes like Bharat City will be commissioned in India in the near future. BCC Director Kumar Bharat says: "In order to be able to quickly raise the infrastructure in our country to a better level, we need four or five precast plants like the one from Weckenmann – in each of our 29 federal states."
For Hermann Weckenmann, too, there is no alternative to construction with precast concrete elements: "You can't build high-quality living space for millions of people any faster or less expensively. Concrete is durable, stable, resistant to the weather and termites and can be manufactured just about anywhere."

The magnitude of the public and media interest in the trailblazing project Bharat City II is illustrated by the fact that the renowned National Geographic magazine reported on it on its TV channel. Hermann Weckenmann was given the opportunity in the TV programme to explain in detail the advantages of construction with precast elements.

Weckenmann opens branch in India

With the establishment of an Indian branch in the southern Indian city of Bangalore, the worldwide active Swabian mid-size company has reacted foresightedly to the positive prospects. Head of Weckenmann Engineering (India) Pvt. Ltd. is Ans Hariharasudhan, who has himself worked for many years in a precast plant in southern India He knows the particular technical requirements and, as an Indian, is very familiar with all the cultural customs.

FURTHER INFORMATION

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