

Nordimpianti System Srl, 66100 Chieti, Italy

New non-load bearing partition wall panel production in Vietnam

In a market like Vietnam where the construction industry continues to enjoy double-digit growth, construction companies have no choice but to keep up with demand. This is certainly what the company Bao Quan has firmly understood and in order to maintain its leading market position it continues to invest in state-of-the-art machinery and equipment, not least from the Italian company Nordimpianti.

Bao Quan is a joint stock company located in Dong Mo industrial park, Quat Luu Ward, Binh Xuyen District, Vinh Phuc province and has always aimed to have in its factory the best machinery and equipment with the purpose to supply the best concrete products at the lowest possible cost.

The first construction products it manufactured were:

- Concrete tubes with diameters from 250 mm to 1800 mm and lengths 2500 mm
- Bricks, curbs and concrete blocks
- Ready-mixed concrete

- Prestressed hollow core slabs for floors in heights from 150 mm to 300 mm produced using a Slipformer machine

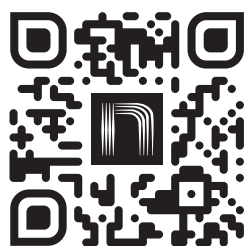
It was due to the wide range of high quality products offered by the company that Bao Quan was called upon to supply construction materials for some of the most important infrastructure projects in the country including the industrial zone of Ba Thien Park and the connection of the National Route 2, via the Thuy Van Industrial Park to the Hong River. They have also been involved in more civil construction projects such as the Vuing Me Hotel and the Vinpearl Nha Trang Resort as well the construction of a military command centre in Vinh Phuc Province. In the past Bao Quan's traditional products were concrete pipes in diameters from 400 to 800 mm and in lengths of 2.5 m as well as open box culverts. In 2013 other prefabricated element production lines were launched, particularly aimed at infrastructure such as prestressed beams with spans up to 38 m and precast tunnel lining segments.



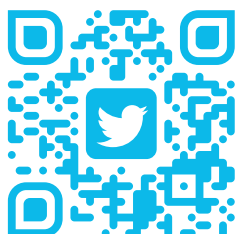
External view of the Bao Quan factory

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Multi-angle saw for cutting concrete elements

In 2016, prestressed hollow core slab manufacturing at the company underwent an important production change that allowed the company, not only to improve the product quality but above all to simplify the production process and at the same time lower production costs. Up to that point Bao Quan had produced hollow core slabs using a Slipformer machine. This meant that they were missing out on some substantial advantages that could be gained by using the extrusion casting method and in particular the extrusion casting offered from Nordimpianti's EVO 120 Extruder machine.



H = 150 mm Hollow core slab made with the new EVO Extruder from Nordimpianti



Nordimpianti's EVO extruder during casting of a hollow core slab H = 150 mm

The same height elements produced by the Nordimpianti EVO 120 Extruder rather than the old Slipformer machine are:

- Lighter and therefore use less concrete per m² of floor,
- Of a better finish quality with higher compaction,
- Less complicated to produce than the Slipformer machine.

Element weight of slabs produced by Nordimpianti's Extruder Machine are between 17% and 24% lower than the equivalents produced by the Customer's previous Slipformer machine, in detail:



H = 150 mm Hollow core slab made with the previous Slipformer machine

Hollow Core Slab Weight Comparison

Slab height (mm)	Customer's previous Slipformer Machine (kg/m ²)	Nordimpianti's New Extruder Machine (kg/m ²)	Difference in kg/m ²	% Difference
H150	258	197	61	~ 24%
H200	316	244	72	~ 23%
H250	383	317	66	~ 17%
H300	448	371	77	~ 17%

In addition to the reduction of element weight, the amount of cement used in the concrete mix has also been cut considerably, by around 14% falling from 420 kg/m³ to 360 kg/m³. With an estimated annual production output of 100,000 m² of flooring, Bao Quan has been able to lower concrete consumption by 2,500 m³ and save over 875 tons of cement per year.

At about the same time as taking on board the new Extruder technology to produce hollow core floor slabs, Bao Quan wanted to add non-load bearing partition wall panels to its range of products on offer. This type of product, widely used in the countries of South East Asia, China, India, Russia and Northern Europe, is usually produced by fixed, inflexible and very expensive extrusion plant.



Assembly of the partition wall panels for a residential project



Residential villas built using partition wall panels

The advantages of constructing with this product are:

- It can be produced at high daily output rates to satisfy growing market needs,
- It is available in both standard and lightweight versions. The standard version uses conventional concrete at 2,400 kg/m³ whilst the lightweight version at 1,400 kg/m³ makes use of light aggregates such as expanded clay,
- Construction is very fast compared to conventional block concrete systems or other materials,
- Available from 80 mm to 120 mm thickness depending on the type of application required.

The choice facing Bao Quan was either to use a fixed system, with all the disadvantages mentioned above or to use a mobile Extruder type machine. Nordimpianti, having already supplied an Extruder machine as a replacement for the slipformer machine on the previous production line, was able to work with Bao Quan on an idea to help the company make an informed decision.

Working closely with the Vietnamese company, Nordimpianti's engineers and technicians, across many disciplines, came together to design and build a new machine that could satisfy the demands of Bao Quan. Bao Quan set Nordimpianti quite a high bar for the project's requirements. As well as being able to produce this new prefabricated element, Bao Quan also stipulated:

- that the budget for the new investment was to be far below that of the fixed production plant,
- that as much as possible of the existing floor slab production plant be used. This included the production beds, the batching plant, the cutting saw and the bed cleaner,
- That as well as being able to produce non-load bearing partition wall panels it would also produce prestressed floor slabs,
- that it would be able to produce panels in both 600 mm and 1200 mm widths.

On the one hand, all the requests from the founder of Bao Quan, Mr. Bui Xuan Trung, had a logical and economic sense, on the other hand, he himself was aware that there was no single machine on the market that could satisfy all his expectations. Fixed production plants generally used for the production of partition wall panels can produce only 600 mm wide elements and have absolutely no capability to produce prestressed floor slab panels.

So, with all the above in play, in July 2016 the contract was signed to create a new machine, the NANO Extruder. Notwithstanding the many challenges that the company faced, Nordimpianti's team was able to design and build the new machine in just 6 months and initial testing began in Italy in February 2017.

Engineers from Nordimpianti were able to test the Nano and fine-tune its performance in many different configurations, making sure that the production of thin concrete elements would be trouble free for the customer from the moment of start-up. The new Extruder Nano was successfully commissioned at Bao Quan in July 2017, with both companies pleased with the outcome. The Nano Extruder machine has met all the requirements of the project and with the big plus, over fixed plant production, of being able to produce two 600 mm wide panels at the same time instead of a single 600 mm panel. This, combined with a casting speed of about 2 m/min, allows for an hourly concrete element production rate of about 120 m²/h.

The success of the Nano also marks an important milestone for Nordimpianti, especially for the development of the Asian market where non-load bearing partition wall panels are in high demand. This development of the Nano Extruder means that Nordimpianti has expanded its range of casting machines available to its customers within the Extruder, Slipformer and Wet Casting technologies.



Nano Extruder during the tests conducted in Italy



Nano Extruder during casting of the 2 x 600 mm partition wall panels at the Bao Quan factory



Nano Extruder during the casting of a 1200 mm wide hollow core slab for floor at the Bao Quan factory



Photo showing the high surface planarity as a demonstration of the excellent finish quality produced by Nordimpianti's Nano Extruder.

The collaboration between the Italian company and Bao Quan was supported throughout by Nordimpianti's commercial partner in the Vietnamese market, Mr. Tri Anh Hoang of Concrete World Technologies Ltd. Mr. Tri Anh Hoang has extensive knowledge of both precast and the Vietnamese construction market, where in the last 12 years he has provided precast technologies to some of the most important companies operating in the industry.

This project bodes well for all concerned. For Bao Quan the decision to go for the new Nano Extruder machine has allowed the company to further expand its product range and all this with a comparatively small investment, for Nordimpianti, the launch of the new machine has already opened up other opportunities in India and Georgia and sales of the new Nano Extruder machine are expected to increase rapidly. It is testimony to what makes Nordimpianti the partner of choice for companies from all over the world. ■

FURTHER INFORMATION

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