

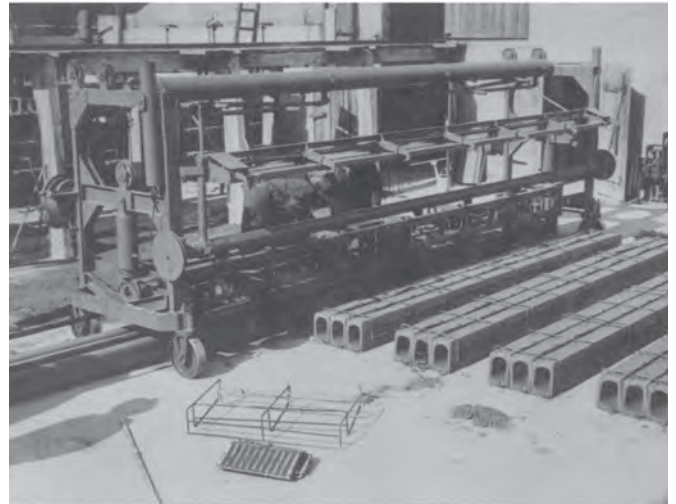
Nordimpianti System Srl, 66100 Chieti (CH), Italy

15 years of continuous growth of prestressed hollow core slab production

Fingo N.V. is a well-established company that started production of its prestressed concrete hollow core slabs in Belgium in 2009 but its history actually began back to 1946, when the Van Cauwenbergh family started production of hollow core floor slabs manufactured using reinforcing rebar, which was the method of production widely used before prestressing. These slabs were used in residential construction.

Since 2009, Fingo has not only become a leader in the Belgian market but has gradually consolidated its presence in other countries such as Germany and the Netherlands. It is in the Netherlands, where the use of hollow core slabs is particularly well developed, that the Belgian company is starting the construction of a third, ultra-modern production plant, building on its experience gained from its other two plants located in Belgium in the towns of Malle and Tessenderlo.

Today, just 15 years after the start-up of the first prestressing plant, this company, run by the third generation of the family, continues with consistent double-digit growth. Its CEO, 40-year-old Gert Van Cauwenbergh, has always had clear and



Production of concrete elements in 1946

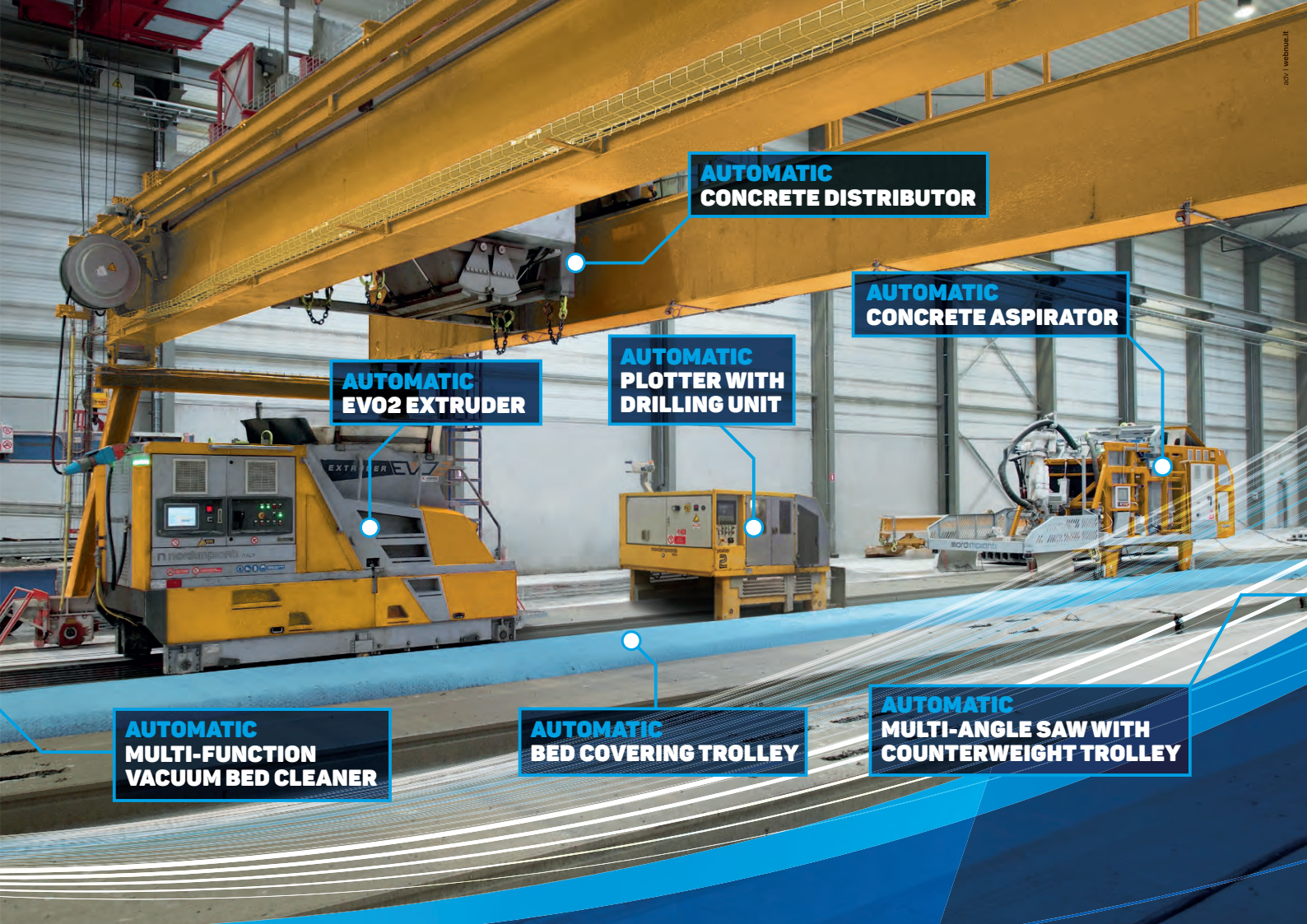
determined ideas to become the leading player in the sector, both in terms of the size and the quality of products offered.



Production hall at the Malle plant



Production hall at the Tessenderlo plant



NORDIMPIANTI supplies "ready-to-go" automatic machines for prestressed concrete element production, leading to significant labour cost savings.

Numerous successful installations worldwide mean our company can guarantee efficient production from the start.

NORDIMPIANTI also offers dedicated after sales service, spare parts and technical support.

NORDIMPIANTI's casting machines produce a wide range of prestressed concrete hollow core slabs, T-beams, lintels and much more.

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Fingo's third generation CEO Mr. Gert Van Cauwenbergh

The numbers speak for themselves: since 2009, Fingo's turnover has quadrupled from 12.5 mln€ to 50 mln€ in 2023.

Up to 2009, the product range was limited to reinforced hollow core slabs made using carousel plants.

Even then, production volumes were respectable. The company's annual production capacity was 900,000 m² of hollow core slabs with a width of 600 mm and heights between 130 mm and 210 mm.

2008 was the year in which Fingo, then managed by the second generation in the person of Mr. Marc Van Cauwenbergh, took the decision to diversify production and add prestressed reinforcement elements to its range, a sector that was experiencing strong growth.

In less than 12 months, the first prestressed hollow core slab plant was built in Malle, where the company now has its headquarters.



Carousel plant for non-prestressed hollow core slabs

The Malle plant was so designed that it is still a state-of-the-art plant today. The site is equipped with ten production beds, each 120 m long. Over the years, the Van Cauwenbergh family has made numerous investments, mainly in automation, with the goal of optimizing efficiency.

The high productivity of the factory, a motivated management oriented towards continuous improvement and a three shift work pattern has led the company to a production level of 2000 m² of hollow core slab per day.

Fingo has taken production operation to the next level. Using only five people it produces five beds per shift meaning that Fingo has a labour rate of under 4 minutes for every square metre of produced element. Impressive numbers that are hard to find in any other production plant in the world.

With the passing years, strengthened by growing markets and with a lot more experience behind him, the third generation with Mr Gert Van Cauwenbergh enters the scene and it is



Aerial view of the Fingo production site in Malle



Extruder casting machine casting hollow core slabs at the Malle factory



Aerial view of the Fingo production site in Tessenderlo

his turn to point to the future. In 2018 he took the decision to continue riding the growth by building a second production plant, this time in the town of Tessenderlo.

The young CEO's engineering vision led to a plant where production volumes and efficiency reached their maximum potential.



From the right: Mr. Maarten Kreemers with Fingo's CEO Mr. Gert Van Cauwenbergh

'The planning and construction of the new Tessenderlo plant took 12 months,' says Mr. Gert Van Cauwenbergh. 'We wanted to implement all our knowledge supported by numerous tests we had conducted at our first plant in Malle'.

A significant contribution to the design of the new production unit was also made by the new production manager, Mr.

Maarten Kreemers, who has a high level of expertise in the production of prestressed hollow core slabs gained at other Belgian companies.

The Tessenderlo plant covers an area of 78,000 m² of which 11,000 m² is covered. The production area is divided into two bays of 200 m each with eight, 150 m long, production beds. The two production areas are divided as follows: one for the production of hollow core slabs with a width of 1200 mm, the other dedicated to the production of hollow core slabs with a width of 2x600 mm. Equipped with the most modern production machines, the plant has a production capacity of 900,000 square metres per year.

The contract to supply the production machines was won by the Italian company Nordimpianti, as was already the case for the first plant in Malle in 2009. The excellent working relationship between the two companies led to the development of even newer state-of-the-art automatic machines.

The Tessenderlo plant project was an engineering challenge for both companies. Fingo's objective was not to simply replicate what had already been achieved in the Malle plant, it was not just to increase the production volume. Its aim was to develop fully automatic machines to further reduce the incidence of labour per square metre, which already was at record values at the Malle plant. Automation was the mantra for the entire project.

Up to 2018, the automation of hollow core slab production was limited to only certain equipment and work processes, examples include the transport and distribution of concrete by means of overhead fly buckets and automatic concrete distributors.

Such equipment was already widely used in production plants since the concrete, produced by a concrete batching plant, has to be transported to the various halls and distributed to stationary formworks or mobile casting machines in an ordered manner.

For the new plant, Fingo tasked Nordimpianti to extend automation to all, or almost all of the production stages with the aim of reducing manpower requirements for the production cycle.

The production steps for which the development of new automatic machines was required were as follows:

- Cutting the elements on the bed
- Bed preparation (cleaning, oiling and laying of prestressed cables)
- Fresh concrete work on the elements produced (open cores, side pockets and holes)
- Removing elements from the bed.

Cutting the elements on the bed

A multi-angled saw was developed to automatically cut the elements. It is capable of performing not only transversal but also longitudinal and angular cuts directly on the production bed.

One of the most complex aspects that Nordimpianti had to solve is that the saw, in order to be able to cut accurately, had to take into account the shortening of the entire element on the bed caused by the de-tensioning of the prestressing cables.

This is because the element is marked immediately after casting and therefore when the concrete is still fresh. The cutting lines are automatically marked by a plotter, which performs the marking according to what is in a plot-file.

Once the concrete has reached a certain strength, the de-tensioning of the reinforcement is carried out. At this time, the prestressing force previously applied to the stressing cables (strands) is transferred to the concrete element. This results in a slight shortening that can be in the order of a few centimetres over the entire bed.

The cutting machine, which is equipped with a laser device that controls the position of the machine along the bed also works with a plot file that contains all the information of the bed to be cut, such as lengths of the elements, cutting angles, height of the element, etc. The plot file is loaded onto the machine by an operator according to the production bed to be cut.

The saw uses the same plot file as the plotter but, unlike the latter, which marks the element when the cables are under tension, the saw cuts when the cables are de-tensioned. This creates a difference in the cutting position between before de-tensioning and after de-tensioning.

To solve this problem, Nordimpianti developed a special algorithm within the saw's software that has the function of compensating, cut after cut, for the total shortening of the element.



Automatic multi-angle cutting machine from Nordimpianti

Thanks to this solution, the cutting machine is very precise without having to resort to special hardware solutions required for the exact location of the cutting line, which would compromise practicality and running costs.

Bed preparation (cleaning, oiling and laying of pre-stressed cables)

The preparation of the bed is a production phase consisting of three operations all of which are both time consuming and labour intensive.

In chronological order the three operations are the cleaning of the bed, the oiling of the bed and finally the laying of the prestressing cables and their attachment to the anchors located at both ends of the bed.

The preparation of the bed is carried out with a multifunctional cleaning machine with an operator on board who supervises the progress of the machine during the entire journey, back and forth, from one side of the bed to the other. The three steps require several passes and as the production beds are very long, they take between 45 and 60 minutes to complete.

Fingo's objectives were twofold, to do everything in a single pass and, above all, for the multifunctional machine to work without the need for an operator.

A machine with these features was not available on the market. The solution came from Nordimpianti, who proposed a new multifunctional machine based on a standard cleaner but equipped with an efficient suction system necessary to guarantee the perfect cleaning and drying of the bed.

To be able to lay the prestressed cables at the same time as cleaning and oiling the bed it was imperative that the bed was free of the slightest trace of dirt or concrete residue so that it could be oiled effectively.

This is why the suction unit, placed between the front rotating brushes and the oiling device, removes any debris and dries the residual water allowing the oil to be applied.

At the rear of the machine is the system for laying the strands, which is also achieved in the single pass. The new multi-purpose cleaner is equipped with four motorised wheels and a robust steel frame capable of pulling up to 20 1/2' strands simultaneously.

The machine travels at a speed of around 10 m/min, which allows, in the case of Fingo, the preparation of the production bed to be completed in just 15 minutes.

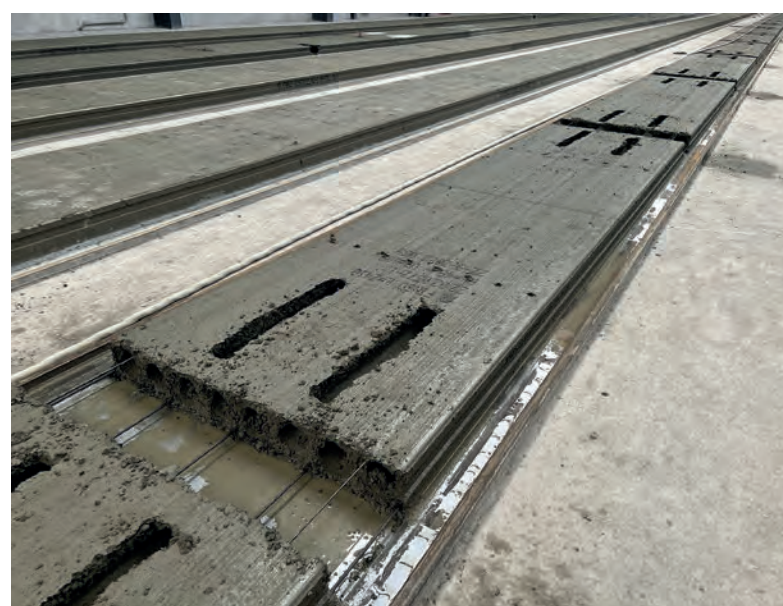
The use of this new cleaner allowed the bed preparation time to be reduced by 66% and without the need for an operator.

Fresh concrete work on manufactured elements (open cores, side pockets and holes)

In the production of hollow core slabs, fresh processing is becoming increasingly common. The hollow core slabs must be able to be assembled while respecting the geometry of the floor to take into account pillars or duct passages between the various floors. In addition, in compliance with earthquake regulations, openings (open cores) must be made at the heads of each slab in correspondence with the voids, to allow for the insertion of the steel reinforcement to guarantee slab continuity after casting the topping.



Automatic multi-function bed cleaner from Nordimpianti



Fresh concrete works on the hollow core slabs



Manual Concrete Aspirator operation at the Malle factory

The fresh concrete work processes are carried out either manually, in some cases involving three or four operators, or, as Fingo chose for its first production plant in Malle, using a machine capable of removing the concrete by means of a concrete suction system.

That machine, known as a Concrete Aspirator, is manoeuvred by an operator who, following the lines marked on the element by a plotter, moves the machine along the bed and manoeuvres a suction hose where the concrete needs to be removed.

The increasing number of openings to be made in today's slabs means that the operator still has a heavy workload even with the use of this machine. What is more, manoeuvring the suction hose requires a certain amount of effort on the part of the operator.

Fingo's wish was to also automate this machine, to replace the operator with something mechanical capable of simulating the same movements without the need for visual capabilities.

The solution proposed by Nordimpianti was to employ a robotic mechanical arm in place of the operator, managed by software specifically developed by Nordimpianti.

For the instructions on the work to be carried out the concrete aspirator uses the same plot file that is downloaded by the plotter and the saw.

The development of the new Automatic Concrete Aspirator took around 12 months between design, construction and commissioning. The machine was successfully showcased by Nordimpianti for the first time in 2022, during the BAUMA trade fair in Munich, Germany.

Element removal from the production bed

The 2x600 mm wide hollow core slab is manufactured in various lengths between 2 m and 8 m and is normally available as a stock item.

This type of slab is intended exclusively for the residential sector and differs from the manufacture of slabs with a width of 1200 mm which follow the rules of a made-to-order production.

The removal of the 1200 mm floor slabs from the bed is done by means of a telescopic lifting beam attached to an overhead crane.

The 2x600 mm slabs are medium-short elements and Fingo was keen to automate this process, again with the aim of reducing the labour costs and especially for this type of slab. To achieve this, Nordimpianti set out to use a lifting machine



The new Automatic Concrete Aspirator developed by Nordimpianti for the Tessenderlo production plant



Hollow core slabs being lifted by a telescopic lifting beam and overhead crane

widely used in the production of other products such as T beams, lintels and concrete poles for which the company has great experience.



Hollow core slabs being lifted with the new stacker machine developed by Nordimpianti

The new slab lifting machine was required to work fully automatically and be battery-powered to avoid pollution within the plant.



Stacks of hollow core slabs made by the stacker machine along the casting bed

The task of the slab lifter is to create stacks of slabs along the bed according to their length.

Once the stacks are created, an operator removes them by means of a special balance lift and loads them onto a trolley that then transfers the finished products to the storage area. The use of this automatic stacker machine has drastically reduced the time needed to clear a production bed, which because the elements had to be removed one at a time with a balance lift used to take around 90 minutes.

The new average time for clearing a production bed using the automatic slab lifting machine is now 30 minutes, meaning a saving of 67%.

The stacker moves along the bed taking the information regarding the height of the elements and their length directly from the plot file. The number of stackable elements, as well as the sequence and placement of the slabs are calculated by the machine's software, also developed by Nordimpianti. The plot file, used by all Nordimpianti's automatic machines is generated by the AutoFloor software from the Belgian company i-Theses. During the development of the machines, the collaboration between the three companies (Nordimpianti, i-Theses and Fingo) was essential to fully meet the objectives of the customer.

The new plant in Tessenderlo went into operation in April 2019 and is capable of producing 900,000 m² of slabs annually, divided between:

- 1200 mm wide elements
Hollow core slabs h 150-200-265-320-400-500 mm
- 2x600 mm wide elements
Hollow core slabs h 130-150-180-200 mm



July 18th, 2024: signing of the contract for the new site in Hardenberg, Netherlands

2025 will be a very important year for Fingo and Nordimpianti. The growing demand for hollow core slabs in the Dutch market has led Fingo to decide to open yet another new factory in the city of Hardenberg.

Already well established in the Dutch market, Fingo continues to increase its range of products on offer, in particular for the production of hollow core slabs with insulation and for foundations, using a recently acquired special Extruder casting machine from Nordimpianti.



November 15th, 2024: signing of the contract for special machines for the Netherlands market. From the left: Gian Piero and Nunzio Gagliardi (CEO and President of Nordimpianti), Marc and Gert Van Cauwenbergh (President and CEO of Fingo)



On the left: hollow core slabs with insulation, on the right: hollow core slabs with channels specific to the Dutch market

The figures for this third plant envisage an annual production capacity of 900,000 m².

The new plant will also feature highly automated solutions requiring the minimum level of personnel.

A strategy that continues to bring success to the company, which continues to invest in state-of-the-art technology and concentrate on key highly skilled personnel.

"The collaboration with the Italian company Nordimpianti is one of the key aspects of our success," says Mr Gert Van Cauwenbergh. "We are convinced that, in order to achieve certain results, the three most important things a hollow core slab manufacturer must consider are:

1. Skilled personnel, both in management and operations, since producing hollow core slabs is heavy work which can make recruitment of the right personnel a tricky undertaking
2. Quality concrete, selected aggregates and control over concrete production parameters to ensure homogeneity and constant moisture content
3. Technologically advanced production machines and a supplier with excellent after-sales service

I would like to add that we have established a strategic partnership with Nordimpianti. First of all, we recognise in the Italian company a great flexibility and willingness to develop, with our collaboration, ever more high-performance machines with low maintenance costs".

Nordimpianti is represented in the Benelux by the company BTON, with whom the Italian company has been collaborating with for over 30 years. A collaboration characterised by deep industry knowledge and a mentality strongly oriented towards customer satisfaction. ■

FURTHER INFORMATION

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