Nordimpianti System Srl, 66100 Chieti (CH), Italy

Fresh concrete working on hollow core floors is no longer a problem with a new automatic concrete aspirator

In general the manufacture of hollow core slabs has consisted of a number of work phases, more or less being repeated as a production cycle. This process has largely remained the same because, until recently, floors had standard dimensions and there was no requirement to work on the fresh concrete during the production work phases. Over the years, the evolution of architectural building design has led producers of hollow core slabs to have to undertake various procedures on the floors, whilst in their fresh concrete state and which, in turn, has led to complications in the production process. The production companies found themselves having to reorganise their production to use suitable machines and technologies for these fresh concrete processes in order to reach a level of efficiency necessary to maintain the competitiveness of the hollow core slabs compared to other products for floors. Without the use of machines, fresh concrete working can be labour intensive and carry with it harsh working conditions that make it more difficult to attract suitable personnel. Even with the help of certain machinery, the health and safety of workers is always an important consideration.

Fresh concrete working on hollow core slabs mainly consists of the following:

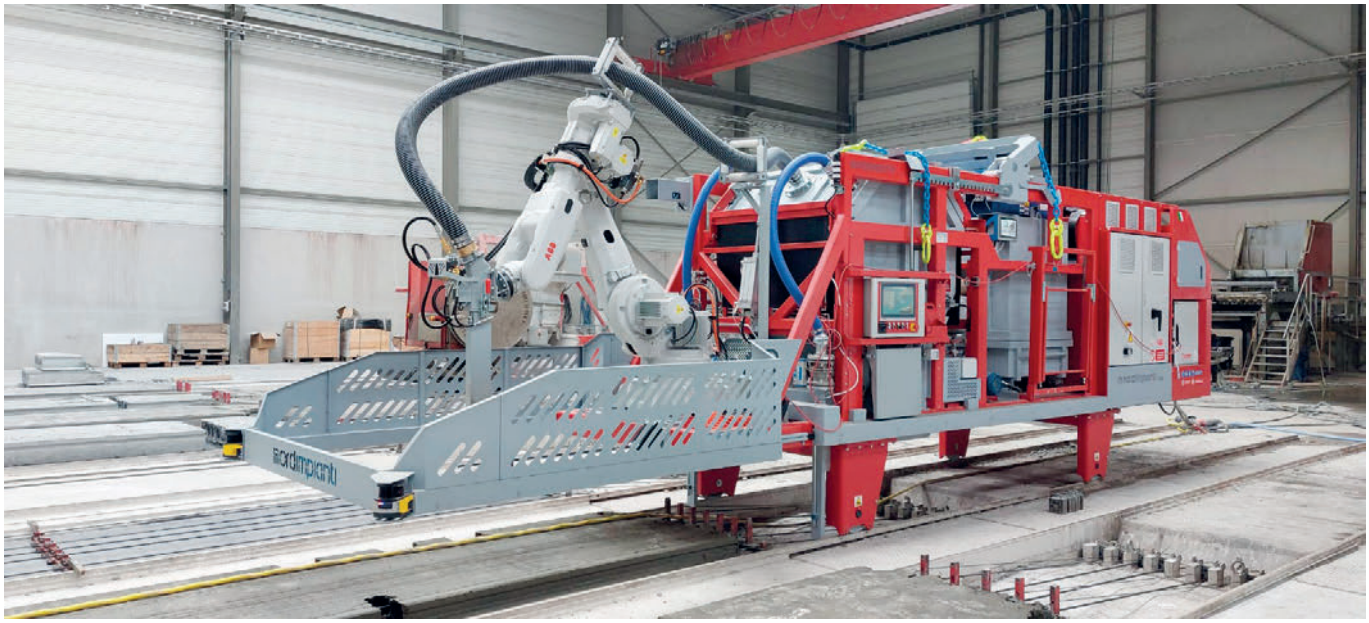
- opening the cores at the slab ends
- cut outs
- exposing the prestressed cables

On a simple basis the marking out can be done by hand by operators following the casting machine. This method has many inherent disadvantages. However, the marking out can also be done autonomously using an automatic plotter depending on the level of automation within the factory.

Opening the cores at the slab ends

The opening of the cores is done to house and anchor the normal reinforcing bars required by the design for connection at the slab supports.

The open cores may vary in number and length depending on the design requirements of the project.



The new Nordimpianti Automatic Concrete Aspirator

THE **NEW** AUTOMATIC
CONCRETE ASPIRATOR

Working on elements which have not been cured, it is used to make openings such as notches, holes or breaks with an efficient **highly automated machine** using a multi-axis industrial robot arm.

COME AND DISCOVER AT

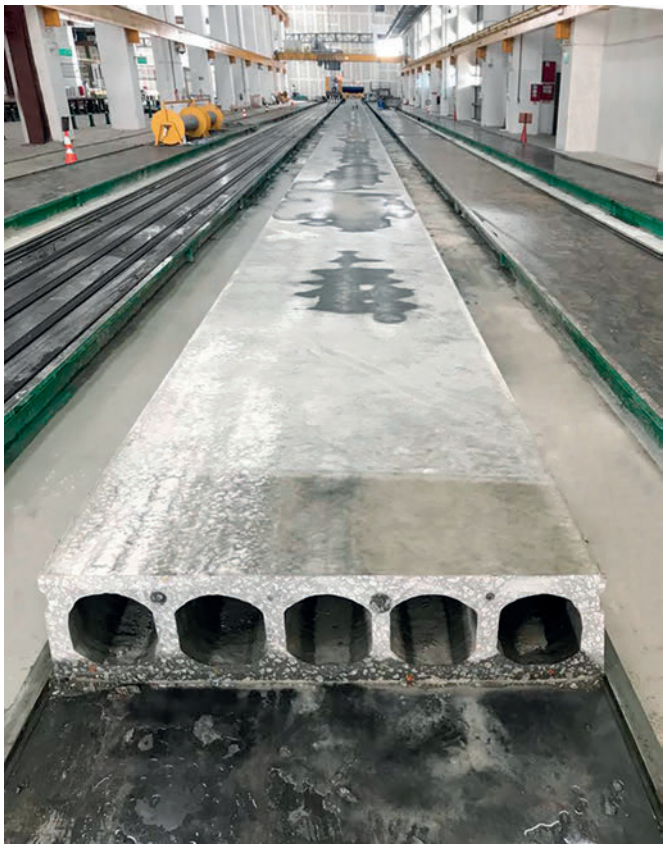
mordimpianti Concrete Experience ITALY

nordimpianti.com

HALL C1 - STAND 349

bauma

October 24-30, 2022



Hollow core slabs produced without any fresh concrete workings

Hollow core slabs produced with numerous fresh concrete workings

Notches and holes

Very often hollow core slabs must be cut or notched for adaptation to the design geometry.

These operations are performed immediately after casting, when the concrete is still fresh, removing the concrete around the stretched strands so as to allow the cutting of the strands following hardening.

Exposing the prestressed cables

In some countries the building regulations require the presence of exposed cables. In this case, the hollow core slabs are not cut through using a saw machine. Immediately after casting, the concrete near the slab ends is removed leaving the prestressed cables visible. After the curing of the concrete, the cables are cut.

Opening the cores at the slab ends

Side notch

Exposed prestressed cables

Manual concrete aspirator in operation

A manual concrete aspirator in operation immediately after casting and being preceded by a Plotter marking out the areas to work

A 5 member work crew carrying out fresh concrete work immediately after concrete casting

In the past these processes were carried out by hand by the operators and required considerable physical effort and incurred high costs.
Some of these operations required the use of 5-6 operators with a corresponding significant increase to the cost of labour.

Factors such as a shortage of personnel, the need for large daily production volumes and an increasingly competitive market in floor sale prices have prompted manufacturers to reconsider the working method by moving from a manual to an automated approach.

Operator manoeuvring the suction tube

The concrete suction machine works behind the casting machine and, at times, preceded by an automatic Plotter that marks the processes to be carried out in the freshly cast concrete.

An operator positions the machine to carry out the fresh concrete working and by means of a suction tube removes the concrete according to the geometry required.

While this machine, on the one hand, has helped to improve the efficiency of a purely manual work phase, it still requires considerable physical effort on the part of the operator in having to manually manoeuvre the suction tube.

In heavy work conditions, or when the amount of fresh work to be performed is considerable, the operator must expend a considerable amount of energy, making them especially tired at the end of the day.

The pros and cons of the manual concrete aspirator are:

Pros:
- Efficient removal of fresh concrete
- Easy cleaning of the system since the removed concrete is collected in a debris container on the machine

Cons:
- Operator tiredness in the case of numerous operations along the production bed
- The need for an operator in the first place

Nordimpianti's goal was to eliminate all the negative points of this manual machine to make this production phase even more efficient and automated. This request was also made to Nordimpianti by the Belgian company Fingo NV, one of the largest producers of hollow core slabs in Europe.

The solution to the problem was found by replacing the operator with a multi-axis industrial robot arm. The new Nordimpianti automatic concrete aspirator was designed on the basis of the manual machine with the following upgrades:

- Installation of an industrial robot in place of the operator
- Increasing the suction power of the machine
- Improving the water spray system with a high pressure system

Hollow core slabs on the production bed with a large number of holes and notches that required a tremendous amount of labour.

The Robotic arm mounted on the Nordimpianti Automatic Concrete Aspirator

- The geometry of the suction pipe has been improved, with nozzles on all four sides of the mouth capable of atomising water at high pressure

The automatic concrete aspirator is able to perform any fresh work with high speed and efficiency. Programming the machine is simple and does not require the employment of a specialized operator.

The working data is the same as used by other production machines such as the plotter and the automatic angle saw. The processes to be performed are all contained within a Plot File which is loaded onto the machine via a Wi-Fi communication system.

The achievement of this new goal represents a great milestone for Nordimpianti. Nordimpianti has spent many years in the development of automatic production machines for the production of prestressed concrete elements.

With the use of this new automatic machine, Nordimpianti is able to supply production plants for prestressed concrete elements with a level of automation of over 70%.

In addition to the automatic concrete aspirator, Nordimpianti is able to offer fully automated solutions for the following work phases:

Work phase	Automatic machine type
Element casting	EVO2 extruder
Element covering	Bed covering trolley
Concrete transport	Fly bucket
Concrete distribution	Bridge crane bucket
Element cutting	Multi-angle saw
Element marking	Plotter
Weep hole drilling for water drainage	Plotter
Bed cleaning *	Multifunction suction bed cleaner
Detaching oil spraying *	Multifunction suction bed cleaner
Laying of the prestressing cables along the production bed *	Multifunction suction bed cleaner
Concrete curing	Hot water heating system

* All three phases are performed in a single pass by the same machine

The new automatic concrete aspirator represents the top of the range of automatic machines that Nordimpianti can supply to customers who are increasingly interested in innovative solutions capable of achieving low production costs and minimising the personnel employed in the production departments. ■

FURTHER INFORMATION

Nordimpianti System SrL
Via Erasmo Piaggio, 19 / A, 66100 Chieti (CH), Italy
T +39 0871 540222, F +39 0871 562408
info@nordimpianti.com, www.nordimpianti.com

bauma Stand C1.349

FINGO NV
Malle 1 Nijverheidsstraat 21, B-2390 Malle, Belgium
T +32 (0)3 309 26 26
fingo@fingo.be, www.fingo.be