

Case study: VLT® AutomationDrive FC 302 with IMC

Concrete maker sharpens competitiveness thanks to **Integrated Motion Controller**

0.5 mm

precision in
positioning of
concrete blocks

Bringing flexibility to concrete blocks

With intensifying urbanization, producing concrete blocks for construction is a vigorous growth industry.

As manufacturer of concrete making machines and automated robotic lines, Metalika is constantly innovating to make its machines more competitive in the dynamic market.

The Metalika concrete making machines take care of the entire process of mixing concrete, casting and curing concrete blocks, and packaging of the concrete blocks on pallets, ready for transport.

In the past, a concrete making machine delivered fixed dimensions of concrete blocks. Casting blocks of more than one size required more than one machine. However, with its newest automated concrete machine, Metalika aimed for more flexibility. Metalika needed a solution enabling them to build a machine with flexibility to produce a range of different dimensions of concrete blocks, and palletize them in different ways for transport.

From experience, Metalika knew they needed close control with a positioning function to achieve this flexibility. In the past, they had already attempted introducing a positioning function with various manufacturers of drives, but could not achieve appropriate precision. In addition, these early proposals involved inconvenient complex PLC programming as well as requiring external positioning sensors.

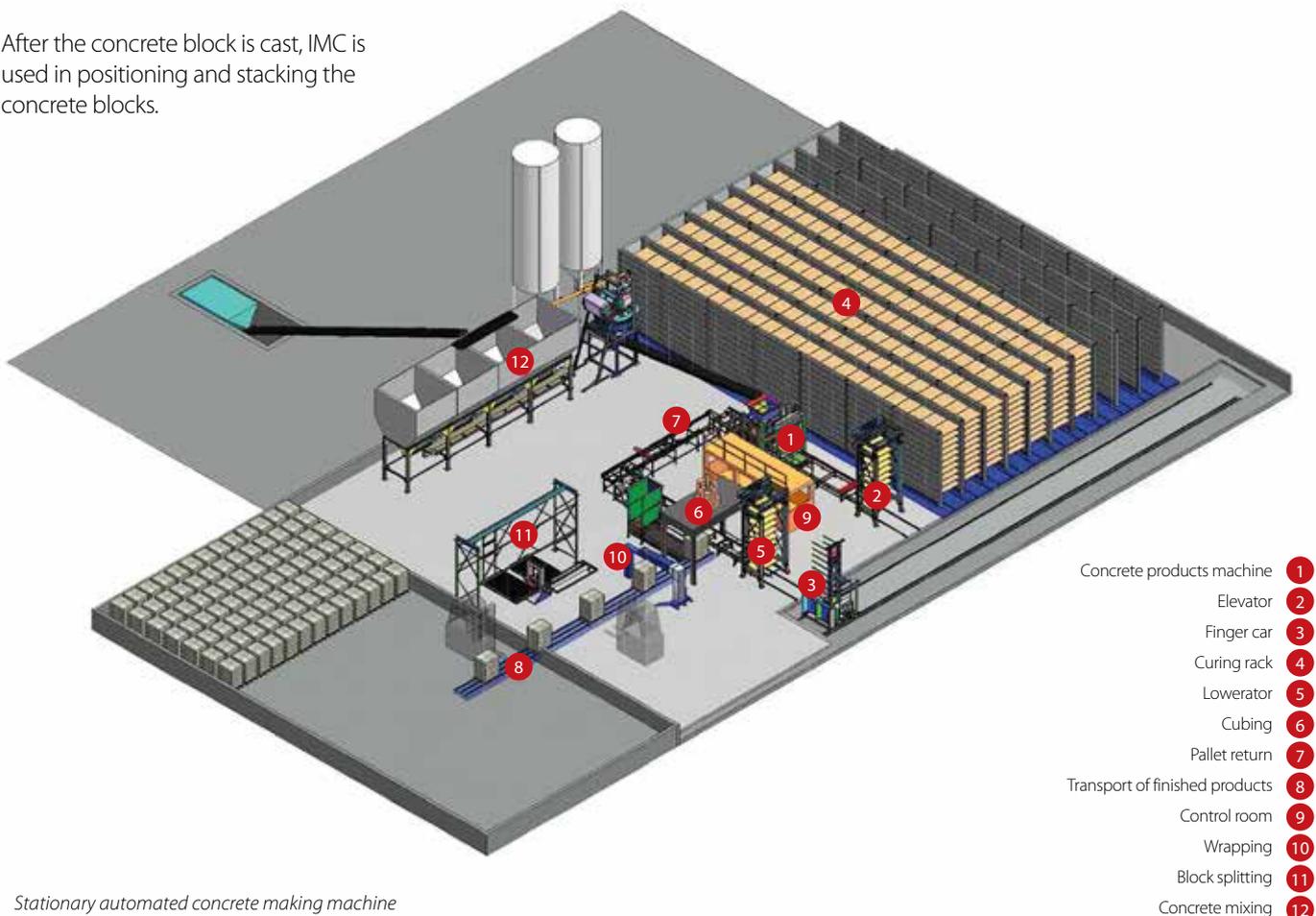
Metalika had already successfully used Danfoss VLT® drives in the past, so their next step was to ask Danfoss Drives for their solution in this application. Danfoss proposed the VLT® AutomationDrive FC 302 with Integrated Motion Controller (IMC) as a solution for exactly this need. IMC delivers the precision required and offers with a parameter handling functionality which is free of complex programming. IMC is simpler to use than the earlier proposed systems, and even better for project costing, it does not require external sensors for positioning.

The resultant performance vastly exceeded the Metalika's expectations. Using FC 302 drives with IMC, Danfoss achieved 0.5 mm precision in positioning of concrete blocks. The specification for the machine was plus/minus 1-2 mm precision.

Where does IMC optimize the automated concrete machine?

Seven FC 302 units rated 3 kW – 5.5 kW are installed per concrete machine, four of them equipped with IMC software. An induction motor with encoder is used, both directly connected to the drives. A homing sensor communicates the machine zero position. The whole process is executed via Modbus TCP fieldbus communication, which facilitates easy wiring of the system.

After the concrete block is cast, IMC is used in positioning and stacking the concrete blocks.

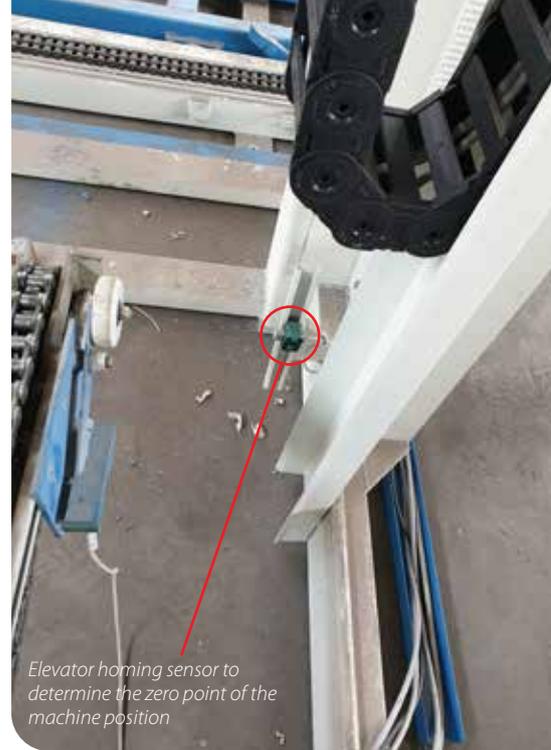


Stationary automated concrete making machine

- Concrete products machine 1
- Elevator 2
- Finger car 3
- Curing rack 4
- Lowerator 5
- Cubing 6
- Pallet return 7
- Transport of finished products 8
- Control room 9
- Wrapping 10
- Block splitting 11
- Concrete mixing 12



Elevator



Elevator homing sensor to determine the zero point of the machine position

Elevator:

Using the IMC homing function, the drive receives a position for placing each row of the concrete blocks, for example three blocks in one row. The elevator lifts the precise height required for each row, After curing (drying) the concrete blocks are transferred via finger car to the lowerator.

Lowerator:

The IMC homing function gives the exact position of each row to the motor in the lowerator. The forklift then takes the concrete blocks and moves them to the cubing process.



Lowerator

Cubing:

Two drives are at work. One drive uses IMC in rotation of rows to stagger the packing of a stack. The other drive positions the stacked concrete blocks on the pallet. The distance from the conveyor to the pallet is different, depending on the stack dimensions.



Cubing, showing the pallets on the conveyor



Blue cables show comms from encoder - yellow cables are for Modbus TCP comms

High-precision positioning and synchronization with reduced costs and system complexity

To optimize performance, many applications across all industry sectors have a need for precise positioning and synchronization. These applications include rotary tables, packaging machines, labelling machines, conveyors, extruders and palletizers.

In the past, positioning and synchronization operations have been performed using servo drives. However, servo equipment is expensive; it is difficult to commission and requires additional cabling. And, as servo drives do not work with open loop control systems, there is a high failure rate. Many applications do not

require the high dynamic performance offered by a servo drive. An alternative was to use an AC drive. But, until recently, an additional internal or external module or an encoder on the motor was required.

An innovative alternative to servo control is the Integrated Motion Controller (IMC) functionality that enables an AC drive to perform high-precision positioning and synchronization operations without the need for additional modules or hardware.

IMC is configurable in the software of the VLT® AutomationDrive FC 302, and offers many advantages. It works with all conventional motor technologies, with closed loop or open loop control, and offers sensor less homing with torque detection.

Drives are adapted to the applications through simple parameterization. This means that knowledge of servo technology or programming languages is not required. As no encoder or additional cables are needed, engineering, installation and commissioning time and costs can be reduced.

About Metalika

Metalika is a manufacturer of advanced machines for concrete production industry, offering standard and customized solutions, upon request. Metalika has been in business for 40 years and is now positioned as a market leader in Serbia and the surrounding region. It offers machines and equipment ranging from entry-level to high-end production capacities to satisfy different market needs. Its mission is to provide the most suitable solutions for the concrete product industry during planning, installation and training, as well as the best after sales service.

To date, Metalika has delivered its machines to over 15,000 customers all around the world.

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