

VOF Humarbo Betonmaschinen und Formen, Vaassen, Netherlands

# Programmable logical controller simplifies automatic production in concrete plant

Production processes in the concrete industry should be as automated as possible for cost reasons. However, concrete manufacturers produce different products using the same equipment – which means that specific parameters frequently need to be adjusted.

With their many years of experience in the production of machines for the concrete industry, the engineers of the Dutch company Humarbo first developed a wish list for an innovative control concept, as Managing Director André Bouter reported: “We asked ourselves whether every new plant needs to be designed from the ground up or whether there are modules which can be put together depending on customer requirements? And above all: is there a concept for the control, or must each procedure be programmed from scratch each time? Can the operator call up and quickly adjust all significant parameters? Can he change the sequence of the processes easily and quickly? Can he optimize production processes and save them under mixture names?”

The developers at the company accepted these challenges and can now answer these questions with yes.

They developed special software for the automation of their own MPS system which is just as modular as the machines themselves. It adapts to the requirements and only activates the modules required.

Flexible production options result in combination with the special software:

- Production of a large variety of concrete products using immediate formwork removal
- Even steel reinforced concrete elements can be produced
- The compaction takes place using vibration shafts or vibration motors in a tilting mold, usually without an additional load
- All products are made on steel pal-

The Dutch company Humarbo, in Vaassen, has accepted this challenge and developed a concept for the individual control of plants. The trick: the operator of the equipment can set up the software himself to meet the current requirements.



Compaction using load vibration



Oiling the mold



The core concrete layer is added here

lets which run through a curing chamber

Complete production lines can be installed using standardized modules. The automation technology they developed themselves also makes flexible adjustments possible:

- The programmable logical controller (PLC) automatically controls all functions. A fast connection to the PC ensures good data exchange rates



**Immediately formwork removal for the concrete elements**

- The control can be monitored using the Internet and the programmers can provide online help if required

process at this point – a function which the manufacturers say is significantly different from the systems from other producers.

### Placing the reinforcement

- This PC is used for the data processing and the flexible programming
- The processes can be easily adjusted by changing the parameters
- The system stores the work programs under mixture names for each product
- A unique software package controls the various pieces of equipment

This means noticeably simpler work for the operator for a typical production process since the operator first sees a simple main menu. He selects the mixture and sets the sequence of the actions, the vibration frequency, and other adjustments using the command list. He can change the functions of the filling car without any knowledge of programming. The operator can check the options selected once again via simulation and has the opportunity to optimize details of the

Cycle times and production data remain in memory as long as desired and are available for the next production of the same concrete element. There are two ways to do this: changing a general parameter, this applies to all following actions. Changing a mixture-dependent parameter, on the other hand, only applies to that specific mixture. Expanded menu options make additional functions like mixture saving, calling up mixtures, and the alteration of mixture names possible. The status of all inputs and outputs can be read from the screen.



**Smoothing the surface**

There is an additional module for extensive production data administration so that the data for each production process can be individually set up and queried. The software fulfills all the standards of ISO 9002 for plants which would like to set up their production accordingly.

### ***An example: production of noise protection walls with immediate formwork removal***

Absorbent concrete elements are suitable as noise protection walls in residential areas.

Their manufacture requires the use of

two different types of concrete: an absorbent mixture made of porous concrete and a normal mixture to bear the weight of the element. Since typical elements are up to five meters long and up to 1.5 meters wide, the mold and pallets of the plant must be dimensioned accordingly. Another special feature: the special mixture for the sound protection absorbs compaction energy during production which in turn requires special measures during manufacture.



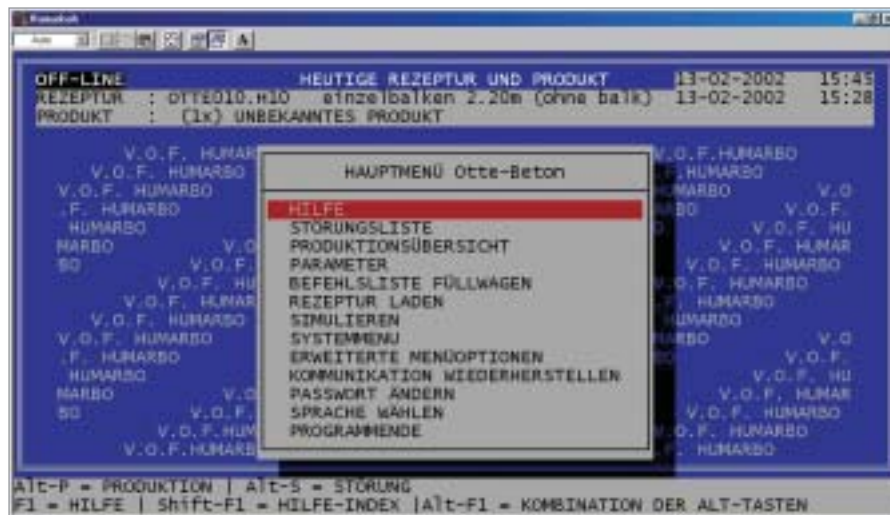
The MPS system is also suitable to handle these complex elements in every way thanks to its open structure. The result is an element which connects the sound absorbent concrete layer with the load bearing core almost everywhere.

The individual steps:

- The mold is oiled, either by hand or by the machine (photo 1)
- The absorbent mixture is put into the mold (photo 2) and is compacted using load vibration



Removing and stacking the finished products



- A first core concrete layer is added from above and vibrated from below (photo 3)
- The reinforcement is placed, either by hand or by the load unit. (photo 4)
- A second layer of core concrete is added, then vibrated from above and below
- Smoothing the surface with a smoothing rod and a smoothing plate which are attached to the filling machine (photo 5)
- Formwork removal (photo 6)
- At the same time, the system moves the pallets forward and stacks them
- The pallets with the product move through a drying tunnel
- At the end of the tunnel, a gripper arm automatically removes the product from the pallet and stacks it. (photo 7)

The system has its real strengths in the production of colored, individually designed elements such as those which are in demand by landscape architects. The precast concrete element plant can then inexpensively produce such elements using a largely standardized system with this flexible technology.

## Further information:



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