

Unitechnik Cieplik & Poppek AG, 51764 Wiehl, Germany

Potentials for automation in precast plant

The degree of automation in precast plants for slabs and walls varies widely. The range extends from table production to highly automated circulation plants. The optimum degree of automation for a factory depends on many factors. Examples that should be mentioned here are: wage cost level, availability of qualified personnel, production space, financial means, sales quantity, product variety, product complexity, quality demands on the product and many more. However, an existing plant can also be adapted to changing situations. Circulation plants in particular are very well suited to the subsequent automation of working steps that are initially performed manually. In the next instalments of the series 'Potentials for automation in precast plants', examples will be presented of how working steps can be automated that are still performed manually in most plants, even today.

Placement of electrical back box magnets

This first article in the series describes the automatic positioning of electrical back box magnets.

Motivation

Nowadays, precast concrete parts are often intelligent building components that fulfil a series of other functions besides their structural task. Preparation for electrical installations is one of them.

The wall or slab delivered to the building site already has electrical back boxes built in for accepting switches, sockets and lighting. Conduits enable the subsequent pulling of cables. That saves the electrician at the building site a lot of time and dirt and leads to faster construction progress. However, what often leads to complaints is the exact position of the electrical back boxes. Unlike some other errors of dimension, electrical back boxes cannot be hidden or filled.

The position becomes clearly visible when the socket or switch is fitted. For example, if multiple combinations are not positioned vertically or horizontally, or if the switches along a long corridor are not at the same height, this is immediately noticeable. The rectification of such a fault is time consuming and costly.

Task

The task, therefore, is to position electrical back boxes precisely on the production pallet and to prevent subsequent slippage. This must take place so quickly that the work step does not represent a bottleneck for the cycle time even in the case of walls with many back boxes. In addition, as few personnel as possible should be tied up with the task.

Implementation

The concept was drawn up by the Unitechnik and Weckenmann companies together with a precast plant. The idea is to use magnets to fix the electrical back

boxes. The magnet was developed by Weckenmann such that the position and alignment of an electrical back box placed on top of it is precisely determined and can be gripped by the robot simultaneously. Besides that, the back box sits so tightly on the magnet that it cannot float upwards during concreting.

The existing formwork robot is used to place the magnets. This ensures precise, quick placement of the magnets. If a robot head with external grippers is in use, the robot can be used in most cases without needing to be converted.

The magnets are supplied via a feed belt. The magnets are offered up to the robot at a predefined distance to one another and exactly aligned. The latter is ensured by means of two locating pins. The robot now grips up to 4 magnets simultaneously begins to place them. In particular when placing several back boxes alongside one another, the UniCAM master computer has the task of preventing collisions between



Weckenmann formwork robot with quadruple external gripper



Feed belt for the electrical back box magnets



Electrical back box magnets ensure the exact position of the back boxes for switches



The magnets were developed especially for this application



Switches and sockets are important design elements in building today



Modern planning often requires very flexible solutions for the positioning of electrical back boxes.

the gripper and the magnets that have already been placed. This is especially useful when a robot head with a multiple gripper is used.

The manual placement of the electrical back boxes over the magnets at the next workstation takes place quickly and hardly allows any errors.

When the finished concrete part is raised, the magnets remain on the pallet. They are released from the pallet manually and placed on the feed belt.

Practical experience

The automatic placement of electrical back boxes had been practised for some 4 years now. The precast concrete part producer uses the method for manufacturing both double and solid walls.

The feeding device for the electrical back box magnets for both systems was supplied by the Weckenmann company. It was possible to use the existing Vollert|Weckenmann formwork robot without modification. With the UniCAM master computer, Unitechnik ensured that the magnets are placed quickly, precisely and without collisions.

The Unitechnik CAD-CAM interface provides for the transfer of such special magnets, so that the continuity of the data from the CAD system to the master system is ensured.

The customer is very satisfied with this system. The number of complaints due to electrical back boxes has virtually fallen to

zero. The production process has become more reliable and faster, ultimately saving money.

Conclusions

The placement of electrical back boxes takes place in two steps. In the first step, the existing formwork robot places special magnets. At the next workstation, the electrical back boxes are fitted over the magnets manually. This procedure leads to increased process reliability and the acceleration of production. Exact positioning of the back boxes avoids complaints. Due to the use of existing systems, the realisation costs are relatively low.

FURTHER INFORMATION

Unitechnik^{AG}

Unitechnik Cieplik & Poppek AG
Fritz-Kotz-Str. 14
51764 Wiehl, Germany
T +49 2261 9870, F +49 2261 987510
info@unitechnik.com, www.unitechnik.com

Vollert WECKENMANN

Vollert | Weckenmann
Weckenmann Anlagentechnik GmbH & Co. KG
Birkenstr. 1
72358 Dormettingen, Germany
T +49 7427 94930, F +49 7427 949329
info@vollert-weckenmann.de, www.vollert-weckenmann.com