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Potentials for automation in precast plants – Part 3

The “Potentials for automation in precast plants” series introduces automation solutions for operations that are currently still carried out manually in most precast plants. The first two parts of the series, which appeared in the last two issues of BWI, were concerned with the automatic positioning of electrical box magnets and the automatic placing of threaded sockets and recess bodies. Another automation solution will be presented in part 3 of series.

Automatic application of retarder during the manufacturing of façades

In the present part of the series presents an ecologically and economically meaningful solution that has been implemented by Vollert|Weckenmann and Unitechnik at the Belgian company EWI.

EWI, which belongs to the RVM-Group and is located in Kluisbergen in Belgium, is a specialist for the production of façade elements made from washed concrete. These high quality façades are proposed in various colours and can be up to 6.50 m x 3.20 m in size. Three years ago an existing plant was demolished and replaced in record time by a modern circulation plant by Vollert|Weckenmann. Unitechnik implemented the entire control and supervision system.

Motivation

Façade elements made of washed concrete consist of several layers: an exterior shell, thermal insulation, if required, and the load-bearing wall. The application of a retarder prevents the concrete from hardening at the surface of the exterior shell. After the harde-

ned façade element has been lifted up from the pallet, the ‘retarded’ concrete can be washed out of the surface. As a result of this the small pebbles appear, giving the washed concrete its characteristic surface. The retarder is normally applied on the pallet by an employee using a paint roller. At this point the formwork has usually already been fitted to the pallet. The employee does not apply the retarder evenly overall, which means that he uses more retarder than is necessary. He must take care that the formwork is not moistened, since the retarder would have a negative effect on the quality of the edges in this case. All of these things take time. One employee is virtually exclusively occupied with applying the retarder. Another disadvantage is that the retarder is corrosive, so contact with the skin and eyes should be avoided. All in all, we are dealing here with a monotonous workplace that is also hazardous to health. Reasons enough to consider automating this work operation.

Task

An automatic solution was sought that applies the retarder evenly over the oiled pallet. Only the precise areas of the pallet

should thereby be moistened that will also later be covered with the facing concrete. The retarder should therefore not get onto and under the formwork. Retarder that dries without having been in contact with concrete is very difficult to remove from the pallet. The task, therefore, was not only to meet the exact edge of the element but also to leave free window and door recesses precisely. Manual reworking had to be avoided as far as possible.

Implementation

The retarder application station was located before the formwork robot. The retarder is applied to the cleaned and oiled, but otherwise empty pallet. A portal robot made by Weckenmann was used. It is equipped with a spray nozzle that is specially adapted to the viscosity of the retarder. The nozzle generates an approximately 30 cm wide and very narrow spraying cone. This allows the corners to be filled very precisely. The ‘coating robot’ receives its driving coordinates from the UniCAM production supervision computer. The Unitechnik system knows the exact dimensions of the elements and the recesses to be produced. In calculating the optimum driving route, it



The coating robot sprays the retarder onto the pallet



The formwork robot places the formwork following the application of the retarder



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Pallet fitted with formwork with window recesses



Concreting the exterior shell

also takes into account the switch-on and switch-off delays of the spray nozzle. In order to keep the retarder application as even as possible, the travel speed in the X direction is constant.

Conclusions

The advantages of automating this work step are cost savings and quality improvements. Retarder is saved by means of exact dosing. In addition, a monotonous work

step is eliminated that is also hazardous to health. Furthermore, the uniform application of the retarder brings about an improvement in the surface quality. Since in this procedure the formwork and the built-in parts are only positioned afterwards, they are free of retarder, which has a positive effect on the quality of the edges. ■



The UniCAM supervising computer controls the entire production

FURTHER INFORMATION

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Facade elements with washed concrete surface and integrated thermal insulation