Ratec GmbH, 68766 Hockenheim, Germany

Future-oriented recess solutions for intelligent precast concrete element production

With increasing requirements for speed and simultaneous flexibility in the product spectrum in producing precast concrete elements, even formwork solutions must be continuously reconsidered and developed. It is necessary to offer precast concrete elements producers practicable and intelligent recess solutions, especially for elements with window and/or door openings. Here, automation plays a central role. A new recess solution suitable for use with robots is taking the next step into the future.

Especially in fully or partially automated production, recesses often represent, in practice, a challenge in designing production processes. The goal is usually to find an optimal formwork solution with regard to the following quantities:

- Setup times
- Material consumption (formwork timber, etc.)
- Element quality

One option is working with prefabricated box sections made of steel or polystyrene which are fastened to the pallet. This variant, however, is only really suited to constant recess dimensions and element thickness, which are not attainable in many regions.

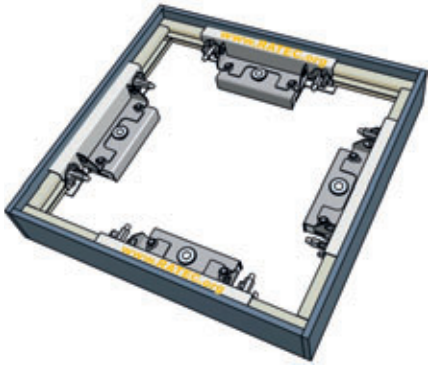
Until now, for flexible element and recess geometries, there was only the option of forming each recess by hand.
A very common magnet-based solution is the combination of a magnet box and adapter with "C" sections for attaching a formwork shell. This variant, the PSV Pro-System-Vario at Ratec, allows the customer a flexible adaptation to his requirements regarding the length, width and height (= element thickness) of the recess, and is a suitable path for the production of heterogeneous elements with differing recess dimensions.

Indeed, the most varied recess dimensions can be implemented for all element thicknesses with only a few components; the disadvantage of this variant, however, is on the one hand the labour and personnel expense, the required accuracy in manual formwork shuttering and demoulding, and on the other the danger of damaging the element or the formwork when demoulding the formwork. In order to remove the formwork, this must e.g. be separated from the element using a wedge, which can lead to damage both to the formwork timber and to the element.
Due to its flexibility, this system is nevertheless a very practicable solution, which in many cases represents the optimum with regard to setup time, material consumption and element quality.
In fully automated circulation plants with formwork robots, however, recesses can become a critical time factor if these must be manually shuttered and demoulded. The Ratec development team wanted to find a solution for this which would allow largely automated formwork manipulation and reduce the required manual handling to a minimum.
In a particular case, the prerequisites are precisely defined window and door dimensions, which are serially produced so that fixed dimensions can be used. Based on the side elements of the MSR Modular Siderail System by Ratec, shorter supports are developed in suitable lengths for window and door recesses, which are used especially for windows and doors in combination with a new magnet holder edge. The short supports are provided with robot receptacles which can be adapted to the individual formwork robots used and are positioned automatically like the transverse and longitudinal shuttering. In all, only four magnet holder edges, which are also equipped with a switchable magnet system, are positioned by hand.

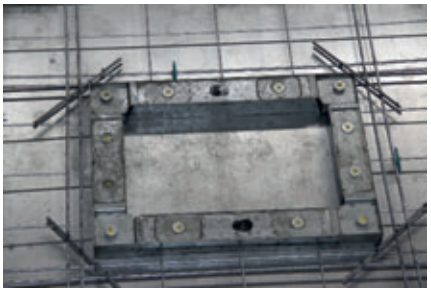
To demould the formwork, the magnet holder edges are first removed. The magnet is first deactivated using the special release tool. Due to the draft on both joining edges to the side elements, it can then be very easily lifted out.

An optimal solution is thus found for the desired objective of reducing setup time and minimising manual work.
A further advantage for the customer: the magnet holder edge can also be used flexibly with other formwork systems. For example, for elements with special sizes for windows or doors, the PSV system can be used, and is then supplemented by the magnet holder edge. Due to the simple removal of the magnet holder edges, formwork demoulding can also occur non-destructively in this case. The draft is standardised and can very easily be made in the formwork shell in the customer's carpenter's workshop at no additional cost.

Future developments will seek to allow greater flexibility, and in particular to cover many element thicknesses with a few components, even for automated circulation plants.
The focus is on simplified and efficient production processes and time saving for the

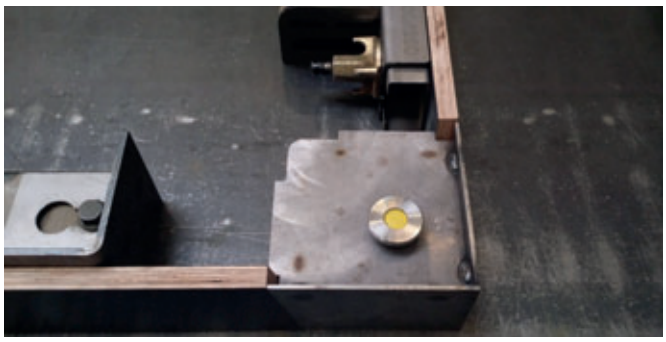


The PSV System for window recesses



Recess based on the SAS formwork with 4 magnet holder edges

To demould the formwork, only the magnet holder edges are manually lifted out; the side forms are removed by the robot.



Combination of the magnet holder edge with the PSV recess formwork.

customer, with an economically practical solution which is adaptable to the individual requirements of every factory. To this end, the development team develops the optimal solution jointly with the customer, starting with the desired element spectrum and the available manufacturing processes.

FURTHER INFORMATION

RATEC GmbH
Karlsruher Str. 32
68766 Hockenheim, Germany
T +49 6205 940729
F +49 6205 940730
info@ratec.org
www.ratec.org