

Avermann Maschinenfabrik GmbH & Co. KG, 49078 Osnabrück, Germany

# Platform staircase formwork for facing concrete elements

In the last few years, requests have become more frequent for staircase formwork for manufacturing staircases with a “negative” process to be able to produce stairs with facing concrete quality on the visible side. This was grounds for Avermann to analyse the needs and requirements afresh from a current, practical viewpoint and reappraise existing solutions. In developing their new staircase formwork, special attention was paid to easy handling and flexible application possibilities. In addition, this new development was to be inexpensive and without elaborate adjustment technology and operations, etc.

## Development stage

A comprehensive analysis of needs marked the outset of the new development. This was carried out by talking to many customers and their employees, who, on a daily basis, have to create formwork and reinforcing for the most varying of staircases before concreting them. The suggestions and advice from “practitioners” were particularly valuable for the development department.

Parallel to this, extensive research was undertaken on the market in respect of all available technology for manufacturing stairs with a negative process. Avermann solutions were examined as well as variations from other manufacturers.

As could have been expected, there was a whole series of different versions. However, in their content none of the solutions entirely combined guidelines drawn from practice as regards simple handling, great flexibility and low-cost design. Handling was perhaps good but the formwork was too expensive due to elaborate (electromotive) adjustment technology and operations. Or else there was no flexibility for rapid modifications to accommodate other dimensions in respect of riser, tread, numbers of steps, etc.

Avermann’s design team maintained a basic approach in developing formwork according to these points:

- Inexpensive solution
- Flexibility for manufacturing the most varying dimensions and designs
- Easy handling for the operator

## Platform staircase formwork for facing concrete elements (negative process)

The staircase formwork is adjusted purely by mechanical means. It is made up of a sturdy base frame with stringer support on one side, a lower and an upper platform plus freely configurable staircase steps. Platform inclination and step design can

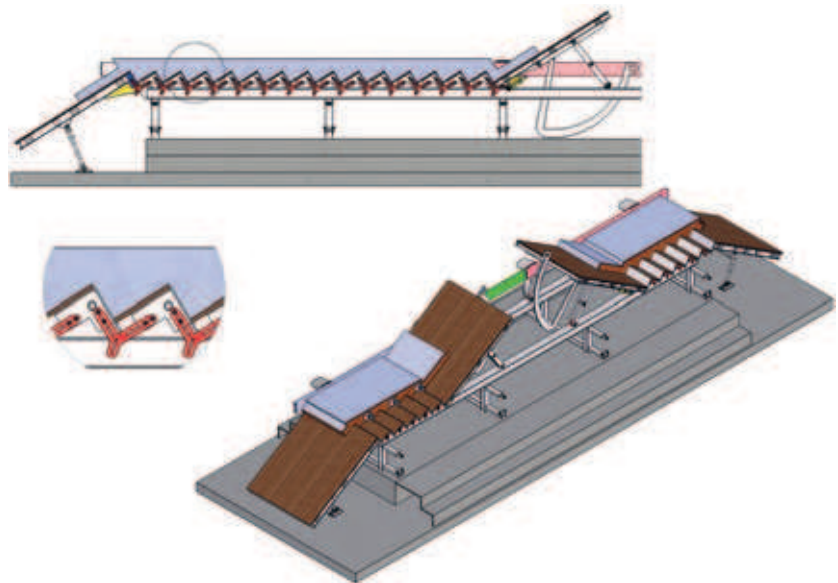


Fig. 1 Platform staircase formwork for facing concrete elements (negative process)



Fig. 2 Standard staircase production

also be freely selected from within the range of common international dimensions (tread 240-320 mm, riser 155-200 mm). The stairs are produced lying flat rotated 180° to their installation position to ensure facing concrete quality with the visible side. Concreting can be carried on for staircases

up to a maximum of 18 steps. Step risers are made from 8 mm sheet metal and treads cut to size from Betoplan or film coated plywood panels.

The staircase is created by positioning the individual components in stages on the

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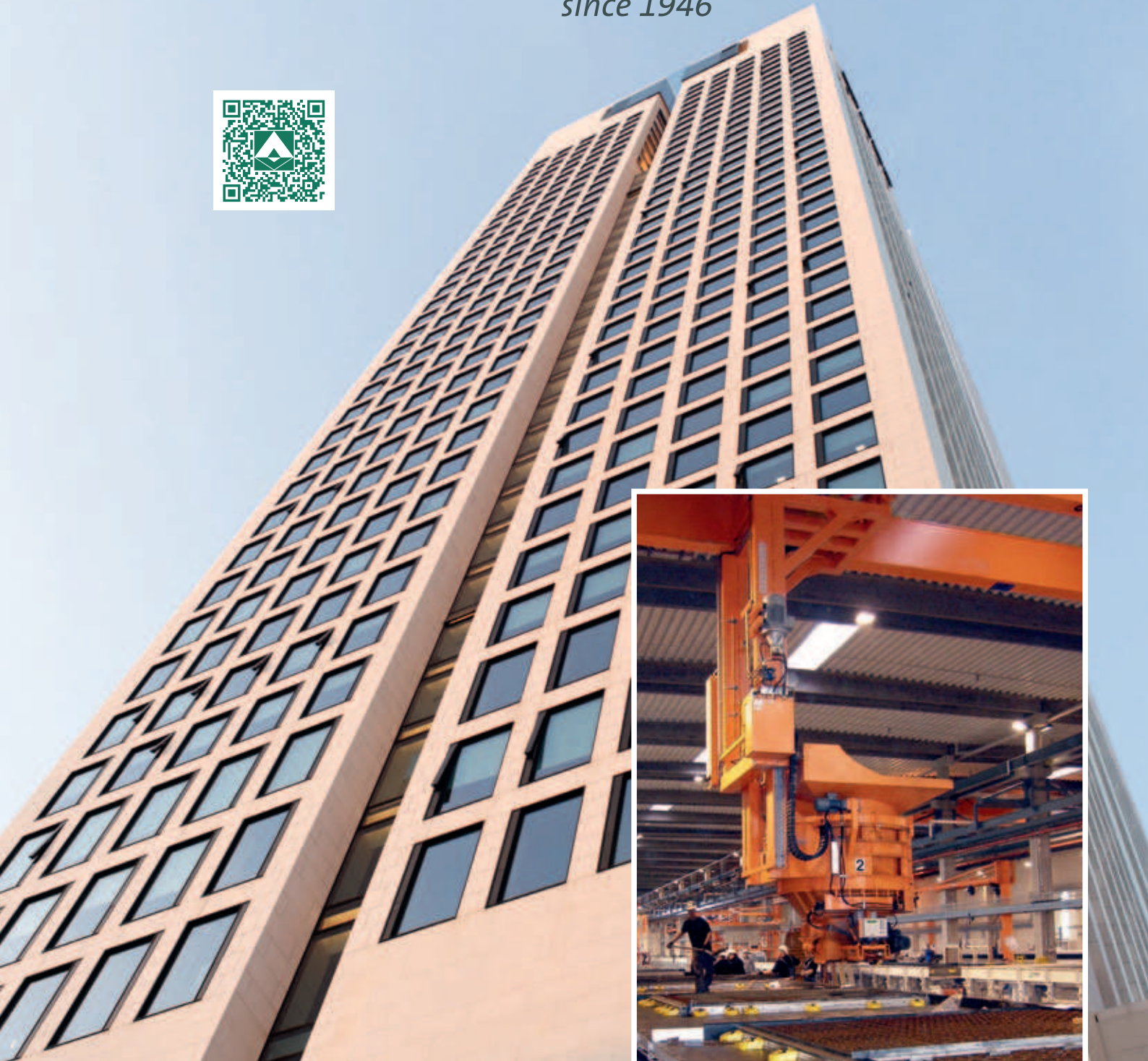
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Fig. 3: Optional double configuration for 2 staircases

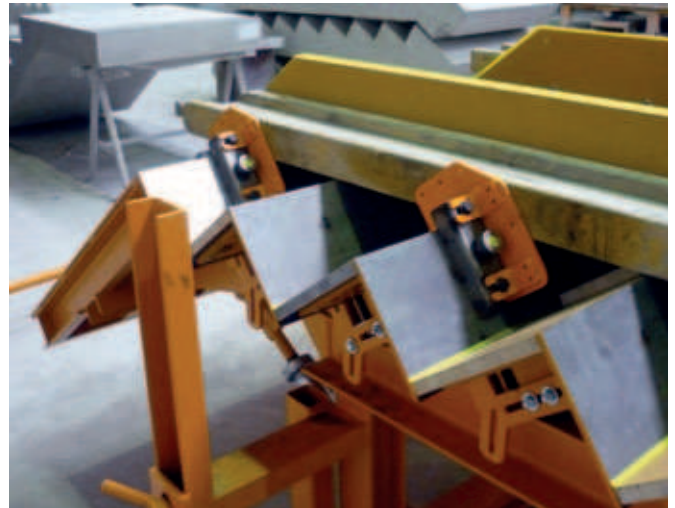


Fig. 4: Detail view – fixing the saw tooth profile

base frame: beginning with adjusting the lower platform's inclination, continuing with setting in the steps and finally the upper platform. Each platform's inclination can be adjusted and can optionally be broadened either to the right or the left with a 200 mm stairwell hole support. The stringer is formed on one side by means of shuttering boards and on the other side with the appropriate saw tooth tread design.

The standard version is based on a maximum production width of 1,600 mm with maximum 18 steps and upper and lower platforms each 2,000 x 2,000 mm in size. However, on request, the staircase formwork can also be produced in differing versions. As an option, the platform formwork can be supplied in a double configuration.

With the aid of an additional lower and upper platform, two smaller staircases (e.g. 2 x 8 steps) can be manufactured in parallel.

#### Manufacturing and testing a prototype

Once the development work had been completed, a prototype of the staircase formwork was produced and tested at Avermann Maschinenfabrik. Special checks were made in respect of the components' easy handling and the precision of the overall structure.

The findings were consistently positive. This included customers who received a demonstration of the staircase formwork in house at Avermann's facilities and who could test its handling.

Suggestions from customers and their own findings from the prototype subsequently led to some improvements in detail before the prototype was subjected to long-term testing at HV Betonwerk Anhalt at its location in Löbnitz/Köthen, Germany.

#### Conclusion and outlook

This new platform staircase formwork development for facing concrete (negative process) meets increasing demands from practice.

Long-term testing validated the approach. Right from the outset, employees at the HV Betonwerk Anhalt precast concrete production facility were enthusiastic about the quality and functionality of the equipment received. The first large orders have already been completed and the formwork will be operating at capacity for the coming months.

Avermann's newly developed platform staircase formwork fulfils all essential present day requirements in respect of flexibility and handling at a low initial cost.



Fig. 5: Detail view – upper platform inclination adjustment

#### FURTHER INFORMATION



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