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Modernisation of Voorbij Prefab – just-in-time, customisable solid precast elements

The Dutch firm of Voorbij Prefab, which has been producing precast concrete elements for decades, decided on a comprehensive modernisation programme for its carrousel plant. The aim was to optimise and fully automate the production processes and to increase output, while focussing on the final product and thus on the end customer. Voorbij Prefab found a partner in the Progress Group, who assisted them to modernise their machinery, integrate robotics and implement software solutions. The successful result speaks for itself.

Voorbij Prefab, one of today's most up to date producers of precast concrete elements, can look back over a long history. Founded in 1935, the Dutch company was quick to cease production of timber piles and steel reinforcement for the construction industry and to change to producing precast concrete elements. In 1996 the family firm was integrated into TBI Holding, one of the largest property, construction and technology groups in the Netherlands.

The company was, however, finding it increasingly difficult to make a profit: "Our market was too diversified, our lead times had become too long, customers were losing satisfaction", explains the CEO, Jos Mulkens. During these years the company supplied innumerable sectors of the industry and produced precast concrete elements for residential, commercial and industrial construction, for tunnels, bridges and noise barriers. They employed a total of 180 employees.

The core of the renovated Voorbij Prefab plant is the Form Master shuttering and deshuttering robot. Infinity Line® makes it possible to shutter without leaving gaps and without using polystyrene elements, while at the same time reducing the number of shutters required to a minimum. For the first time this system is applied for solid wall shutters.

Jos Mulkens

A new business concept

A clear decision was taken: a change was needed and Voorbij Prefab must undergo an in-depth modernisation process. The aim was to optimise and fully automate the production processes and to increase output, while focussing on the final product and thus on the end customer.

In the future the company would produce only solid precast elements for residential construction – just-in-time, economic and customisable. The target was to fully automate production and to calibrate to the maximum extent all the processes from preparation and planning to manufacture and logistics. The company sought a partner for all this, who would be able to implement the renovation and re-organisation to turnkey standard.

Finally the Progress Group was awarded the contract to devise, together with Voorbij Prefab, the technical solutions for modernising and optimising the factory. The two firms had worked together in the past. In 2003 the existing carrousel plant was designed and installed by two of the Group's sister companies, Ebawe Anlagentechnik and Progress Maschinen & Automation.

The aim: to quadruple hourly output

Prior to the renovation all the systems had to be serviced manually and separately, the shutters were manually produced from wood, and because the precast concrete elements were not standardised, throughput was very low. With the impending modernisation in view, the existing technology was closely scrutinised and tested to see if it could be improved. It was only possible to achieve the target of quadrupling output per hour by using robotics, modernising the machinery and introducing a comprehensive data networking system.

Four priorities for modernisation

The plant was modernised by concentrating on four core areas: the shuttering and de-shuttering process was fully automated by a new robotic system, mesh production was integrated into the cycle, the entire carrousel plant including the control system was improved and ebos®, a software solution from the Progress Group, was implemented.

Fully automatic shuttering and deshuttering process without polystyrene elements

The core of the renovated Voorbij Prefab plant is the Form Master shuttering and deshuttering robot. The robot carries out all the individual operations in the shuttering process. At the start of the production cycle a storage robot takes the shutters out of storage and passes them to the shuttering robot. This robot positions the shutters on the pallet according to CAD specifications and activates the magnets.

At the end of the production process the pallet is scanned, the shutters released, removed and delivered to the cleaning system. When the shutters are stored once more, the cycle ends. Thus, the shuttering and deshuttering process becomes not just more precise, it can also comply with exact production times. The figures speak for themselves: it was possible to reduce the time for preparing a pallet to only six minutes.

Six minutes: the time required for the shuttering process has been significantly reduced by sophisticated robotics and software.

Now Voorbij Prefab concentrates exclusively on manufacturing precast concrete elements for the residential construction industry. These are supplied to construction firms or used for customers' own projects.

In addition, Infinity Line®, a shuttering system developed and patented by the Progress Group, ensures extra efficiency. For the first time this system is applied for solid wall shutters. Infinity Line makes it possible to shutter without leaving gaps and without using polystyrene elements, while at the same time reducing the number of shutters required to a minimum. This not only makes the shuttering process simpler and less expensive, but also improves the quality of the precast concrete elements. With the removal of the need for polystyrene panels it becomes possible to produce perfect outer edges.

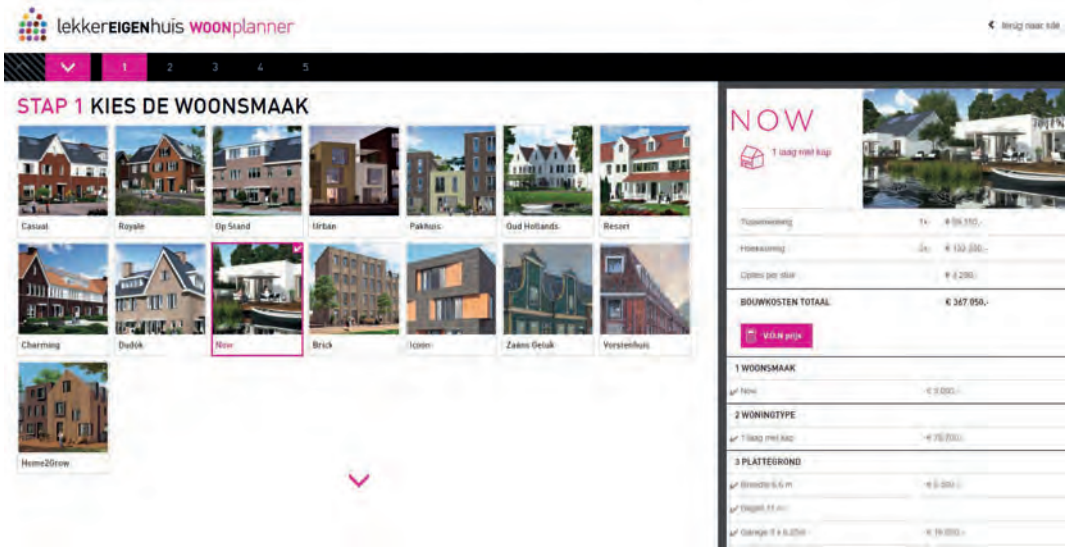
Optimising steel preparation

The production of the required made-to-measure mesh was also re-organised. For mesh production the priority lay in improving the preparation of the steel. The Type MSR straightening machine was adapted and provided with an additional decoiler. The transport system to the M-System mesh welding plant was also improved.

The mesh welding plant itself, as well as the magnetic traverse was re-positioned. Together with the magnetic traverse, which automatically deposits the bespoke mesh on the pallets, a mesh stacking carriage now makes it possible to transport without problems the mesh, which cannot be positioned automatically, to the manual insertion stations. Furthermore, the software has been completely replaced. These measures made it possible to increase the capacity of the reinforcement plant and the production flow has been optimised by coordinating the manufacturing steps.

Control system with comprehensive analysis functions

ebos, the Progress Group software solution for prefabricated concrete plants, completed the modernisation of Voorbij's production system. This entire software system now consistently accompanies all the aspects of the production process from work preparation through production to process analysis The specialised analysis functions offered by ebos contribute to a large extent to the planning reliability and transparency of production. A PTS (Production Test Service) test can be used to verify CAD data for their producibility prior to production. This tool also makes it possible to optimise production. Another function, known as GPA (Graphical Performance Analyser) offers the possibility of retrospectively playing back and examining the entire process



With the online "lekkerEIGENhuis" (beautiful home) configuration tool you can plan your dream house down to the finest detail and calculate the costs.

sequence in detail. Thus, bottlenecks and possibilities for improvement are obvious at a glance. With this tool and others ebos supports an increase in production and at the same time helps to identify deficits, weak spots and unnecessary additional costs.

Modernisation is the path to success

The success of the modernisation of the carrousel plant makes Voorbij Prefab one of today's most technologically up-to-date producers of precast concrete elements. "We moved a traditional production company wide into the middle of today's digital world," is the satisfied comment of Jos Mulkens, the CEO. The comprehensive reorganisation has also brought about a change in the company's mindset.

The renovation was completed within a very few months. Whereas formerly the company produced precast concrete elements for 200 houses per year, it has now been possible to increase output to 2,000 houses and at the same time the period from design to start of production of the elements has been reduced from five weeks to five days. Voorbij Prefab now employs a total of 40 employees, of whom only 12 are involved in production.

Innovative sales and marketing

The success now experienced by the company testifies to the fact that this step was worthwhile. Voorbij Prefab not only supplies precast concrete elements to construction firms for residential construction, it also builds for its own customers. In the process the sales and marketing aspect functions as a logical extension of fully automated, networked production.

Using the concept, "1-2-3 casco" – freely translated as "1-2-3 building shell" – Voorbij Prefab puts service philosophy and customers at the core of its business. The design of the precast concrete elements is flexible, changes can be made shortly before the start of production and a delivery time of six days is guaranteed – everything is geared to "stand the construction industry on its head" as the company puts it. TBI Holding, Voorbij Prefab's parent company, has also started up the "lekkerEIGENhuis" (beautiful home) initiative. The aim of this initiative is to make it possible to construct your own home as simply as possible. On the relevant Internet portal with a few clicks of the mouse on a configuration tool you can plan your dream house down to the finest detail and calculate the costs. This system offers a choice of 15 different types of house, numbers of storeys and various shapes of roof. The planning process goes into the finest detail on the positioning of windows and staircases, as well as of floors and sanitary facilities. The precast concrete elements required for construction come from Voorbij Prefab – quickly and just-in-time. ■

FURTHER INFORMATION

voorbij prefab

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