# Master Complexity

## Automation solution for fully automatic roller door production

Every week, around 1,000 roller doors leave the ConDoor factory in Dutch Zeewolde – and that in customer-specific variations. Modern control and drive technology, including Safety, masters the extremely complex manufacturing process.

The custom-equipment manufacturer Weber Machinebouw from Zwaag (NL), specializes in manipulators, cutting, punching and milling machines. The largest contract in the company's 60-year history to date is the fully automatic production line for roller doors at ConDoor, a Dutch manufacturer of industrial and garage doors.

Covering an area of 150 x 60 meters, 1,000 roller doors are produced every week. In this complex production process – due to the customer-specific door configuration – a total of 178 synchronized servo axes for sawing, milling and drilling units, as well as pick&place logistics and 60 frequency-regulated motors are used.

With support from SigmaControl, a systems integrator from Barendrecht (NL), the system was realized in record time. The complete automation solution from Sigmatek includes such hardware as compact machine and Safety controls, HMIs for operating and monitoring, as well as all servo drives. The application software was created with the all-in-one engineering tool Lasal.

**Multiple-CPU Strategy Minimizes Complexity**

Using an automatic ordering system that is unique in the industry, the extensive ConDoor dealer network electronically forwards the individual requirements of each project directly to the Dutch specialists.

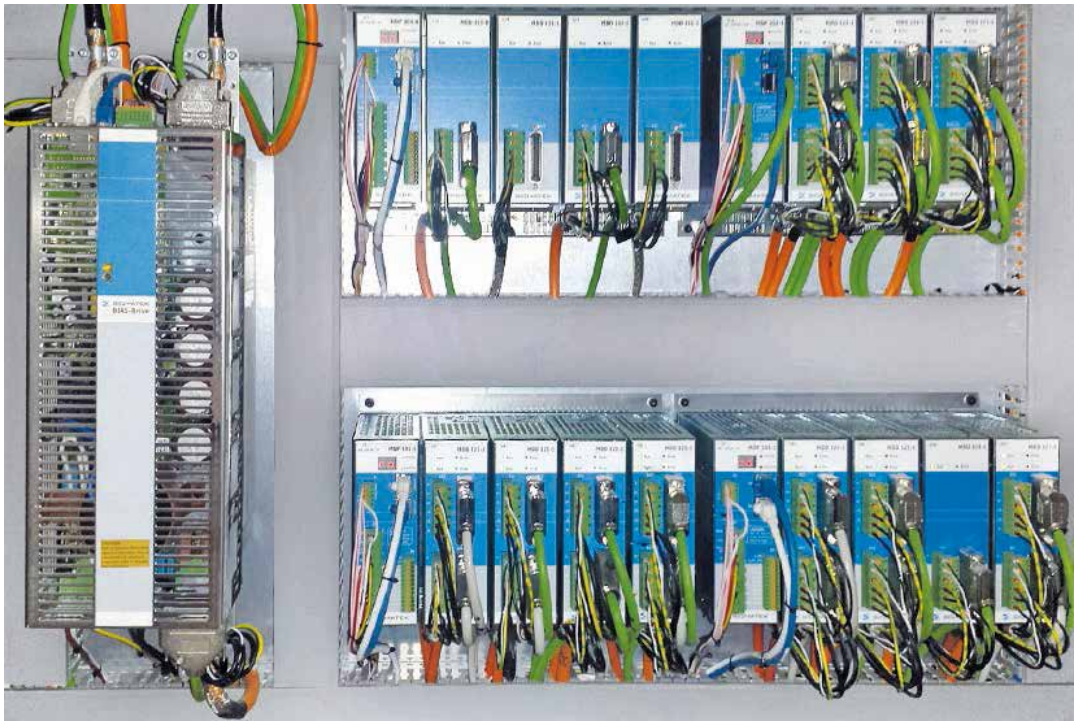
The production of the roller doors starts with cutting and sawing the panels, special pick&place grippers transport them at a speed of up to 120 m/min to the milling and drill units with millimeter precision. To achieve the required transfer capacity, seven servo-controlled Gantry drive units with a load-bearing capability of up to 1,700 kg are operated.

To create the applications, Weber Machinebouw utilizes the comprehensive motion library from Sigmatek. The object-oriented engineering tool Lasal Class provides templates for the control of complex kinematics, so that coordinated motion systems are operated with up to nine axes each. The total number of servo axes that can be controlled is virtually unlimited. The 178 servo drives and 60 frequency-regulated motors are connected to the controls via Varan, an Ethernet-based real-time bus system that is 100 percent deterministic.

In the intelligent buffer system, the processed panels are then packaged and sent to the assembly area. "There are also panels that must be lacquered, these are assigned a unique code and fed back into the project later. When you think of the countless variations with window frames, access doors and small steps - these options make the production process extremely complex," explains Kees Geelhoed, Managing Director at Weber Machinebouw, the challenges in the process.

Sigmatek's multi-CPU strategy favors a distribution of the entire line in smaller manageable function units, each with separate processor components, and fits perfectly into the concept. "This enables us to test the units independently of one another and start them individually, which in such a complex system, greatly simplifies the process and saves a lot of time", explains Niles Joosten, responsible for programming this project at Weber.

With the thin S-Dias component series, the space required for the



There are 178 servo axes in the production line at ConDoor: Weber Machinebouw opted for the SDD 300 and MDD 100 multi-axis systems from Sigmatek and the system integration via the real-time Ethernet system Varan, as well as the engineering platform Lasal.

control solution is low, even the CPU components have a width of only 12.5 mm and can be modularly expanded with Safety controls. With ConDoor, all emergency-stop circuits, including the numerous door tumblers installed, are covered by the Sigmatek control concept.

**System Optimization Reduces Waste**

From Weber Machinebouw's point of view, the optimization of material usage is a key point. The aim is to produce as many segments as possible from the available standard lengths of the panels with minimum waste. To achieve this goal, the Dutch company uses a special software application with which the production volume is intelligently distributed over a week. A production day consists of several batches that include up to 20 doors. The product mix within a batch provides the flexibility to optimally utilize the machine. After cutting, the panels are transferred to the assembly line in a defined sequence since for delivery, there is a sophisticated stacking pattern. The customer therefore always has the right part during assembly at the construction site.

**Exact Coordination of Manufacturing Resources**

Via Ethernet TCP/IP, the plant-wide ERP system provides the machine controls and operating panels with verified production parameters. In addition to system information, the high-performance HMIs of Sigmatek's ETV series with 12.1 and 19-inch touch screens provide important order details clearly for the operator.

The shift supervisor changes the sequence of the batches on the HMIs as required and confirms the production start. Niels Joosten explains the approach in the software application: "Before a single panel comes to production, the status messages from the Sigmatek controls are queried via approximately 200 telegrams. This allows us to ensure that the required system sections are ready for production and exactly coordinate our manufacturing resources. That is the key to error- and interruption-free production, and we optimize our throughput."

The data exchange between the compact CPUs is configured in the Lasal Machine Manager via drag&drop. The graphic software interface displays all CPUs found in the machine network and the Lasal applications for control, visualization and Safety are directly opened with a mouse click. With the Lasal software suite, developed in-house, Sigmatek has been utilizing fully integrated, object-oriented programming since 2000.

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