

Hörmann: A flexible factory for manufacturing garage door guide rails

When production systems are implemented and optimized in steps, as is the case with Swiss company Hörmann Oensingen AG, the control technology must have a special flexibility and openness. In partnership with Peter Huber AG, Hörmann has equipped its production facility for garage door guide rails with a PC- and EtherCAT-based automation platform from Beckhoff.



The ALR Vitraplan industrial door from Hörmann won the renowned "red dot award" for design in the category "Architecture and Interior Design". © Hoermann.ch

Level of automation increases to keep up with demand

Hörmann Oensingen AG is a production facility within the German Hörmann Group, which specializes in the manufacturing of all types of gates and doors for residential, industrial and commercial buildings. Hörmann manufactures in 23 locations worldwide. The main products made at this Swiss plant are guide rails for garage door operators, which are manufactured on two production lines. "We work closely with Hörmann Antriebstechnik (Drive Technology) in Steinhagen, Germany," says Ruedi Christen, General Manager of Hörmann Oensingen AG.

From coiled sheet to fully assembled and packed guide rail

The newer of the two production lines was built in 2009 and then progressively automated by Peter Huber AG, the Beckhoff Solution Partner with headquarters in Hochdorf. The plant produces eight different guide rail systems. The starting point of the production includes the coils, from which the galvanized, 1 mm thick sheet metal is unwound and fed into a profiling machine. There, the sheet is continuously formed into a

50 mm wide C-profile. Further processing is carried out in a punching and cut-off machine that cuts the profile to length and creates openings and stops for mounting or installation. "The throughput rates of the individual machine modules are synchronized with each other," explains computer specialist Beat Huber of Huber AG, who has a degree in Computer Science. The profile rails are then moved into a cross-conveyor and their ends are aligned. The final step is the insertion of the drive components, also known as toothed belts.

For this process there are two different procedures. For the low-cost variant, the toothed belts are just inserted, and customers have to fit them themselves at a later stage. After the belts are inserted, a conveyor moves the rails to the sorting station, where a handling robot adds further components.

With the slightly higher-quality variant, the toothed belts are fitted automatically, with the belt tension being measured by a sensor and the corresponding reading saved in a database. For this purpose, the coding



Production of the guide rails begins with the coiled sheet. The 1 mm thick, galvanized sheet is transformed into a 50 mm wide, endless C profile.

Plant photo showing the cross-conveyor. The profile rails, which have been cut to length and pushed in, are aligned in the front station.



of the profile rail, which is placed over the toothed belt after it is fitted, is recorded by an optical reading station. "We thus have a traceability system with which every product we assemble can be documented with regard to production time, the components installed and the belt tension," says Ruedi Christen. When the guide rail is fully assembled, it is transported to the packing station, where the guide rails are packed in boxes. A palletizing robot at the end of the production line stacks the boxes onto a pallet, with every other box being turned through 180° in accordance with palletizing practices.

The control platform must adapt to further developments

With the PC-based control platform from Beckhoff, connections to other subsystems and to higher-level computer domains by Bus links or the Beckhoff Industrial PC's Ethernet interface can be implemented without difficulty. As the automation expert Beat Huber says, the current multi-core technology of PCs has a positive impact. "In the production facility for the Hörmann guide rails, we use multi-tasking, for example, because as well as controlling the



Ruedi Christen, General Manager of Hörmann Oensingen AG:

"Hörmann has been manufacturing in Switzerland for 27 years.

With the latest production facility, we manufacture guide rails for garage door operators in the low-cost segment. We have developed and built this line over the past two years, and designed it in such a way that we can manufacture up to eight different products on it."

line we also have to control two scanner systems. Looking at the overall picture, this system includes several independent subsystems. The handling robot, the power screwdrivers, the hot-gluer in the packing station, and the toothed belt stations all have their own control systems, which are connected to the Beckhoff PC control system."

The Hörmann production line includes two AX5000 EtherCAT Servo Drives and AM3541 servomotors from Beckhoff. A Servo Drive is used in the belt-winding station to insert the toothed belt in the profile. The length is measured by a displacement transducer. The second Servo Drive is used to position the guide rail in the assembly station.

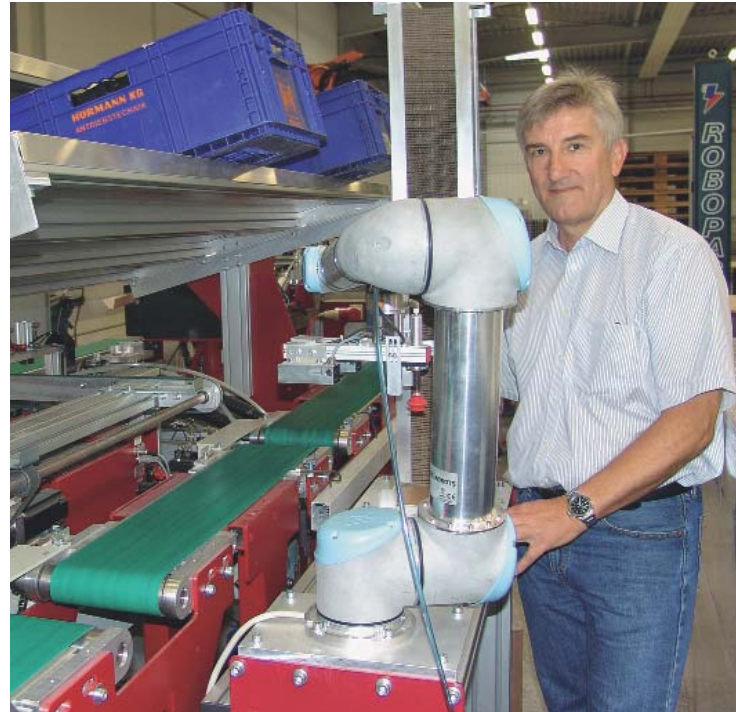
A C6920 control cabinet Industrial PC from Beckhoff functions as the master controller. The connections to the areas of profiling machine, belt dispenser, glue applicator, assembly table, palletizing robot, universal handling robot, labeller, and banding machine are implemented via digital I/O terminals. The scanner for automated assembly and the hand scanner for manual production are conveniently integrated with EtherCAT via serial interfaces.

TwinSAFE: integrated safety expands with concept

The safety of the operator and the plant are taken care of by the Beckhoff TwinSAFE terminals, which are incorporated in the EtherCAT terminal system. However, the application focus is moving, from semi-automation to full automation with manual intervention, so the safety concept must be able to gradually grow with it. Here, too, the Beckhoff platform offers significant advantages over other approaches, in which the safety technology must be



Assembly station for the installation of the toothed belts in the guide rail, with Panel PC CP6201-001



Beat Huber, of the Swiss company Peter Huber AG, has overseen the progressive implementation of the automation concept for the Hörmann production facility. "To successfully solve the range of challenges posed by Hörmann, we used an industrial-strength, PC- and EtherCAT-based control platform from Beckhoff. This allows access to other subsystems as well as to higher-level computer domains."

implemented as a stand-alone system. "The integration of the safety technology in the Bus Terminal system or in the control cabinet represents a major advantage," comments Beat Huber.

Highest priority goes to operational reliability and system availability

The specialists from Peter Huber AG have attached particular importance to the operational reliability and availability of the line. For this purpose, a standby PC is in place, which can take over the function of controlling the line components in the event of a fault. "This is not a classic hot-standby redundancy design, because as well as the program, the hard disk removed from the faulty PC contains all the necessary process data and line-status information. We have a hard disk for all PC-controlled production machines, and the spare PC has a push-in slot for this disk," emphasizes Beat Huber. "These hard disks are not permanently built into their respective control systems, but are used more in terms of removable media."

Intuitive operation without hierarchies

The system is operated via a 15" touch screen. To help the operators, Peter Huber AG have programmed plant diagrams that list various plant conditions, such as faults or impending events, in tabular format. This allows the operator to quickly grasp what is the current status of the production line. Says Beat Huber, "It's as if we were keeping a log book in which every action and event could be read, such as who was logged into the plant as well as

when and why a system fault occurred, when and by whom it was resolved, etc. We have not implemented a hierarchy concept, i.e. the plant operator has access to every function. And there are no hidden or limited functions." The C user program supplies this data – like the guide rail assembly data that has to be documented – to a Hörmann IT database. On the control system side, the program binding takes place via a TwinCAT-ADS interface. "We use the TwinCAT System Manager for handling the I/O ports and TwinCAT NC PTP for the Motion Control functions," explains Beat Huber.

Remote maintenance without plant downtime

The automation experts from Hochdorf, Switzerland, are also responsible for maintaining and servicing the Hörmann production lines. On this topic, Beat Huber says, "We carry out our services mainly through remote maintenance. From our perspective, that is a great advantage of the PC-based control platform."

Hörmann Managing Director Ruedi Christen can only confirm this. "Our productivity is ideal, availability is very high and our employees in production have no problems in operating the plant."

Hörmann Oensingen AG

Peter Huber AG

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