



Steel frame processing line: PC-based Control replaces conventional clamping technology with high performance servomotors

Highly flexible special-purpose machine construction with PC-based Control



Based on an ERP order, all cutting and clamping parameters for the frame are calculated from the geometric dimensions at the saw inlet, so that the saw feed control is optimized at all times.



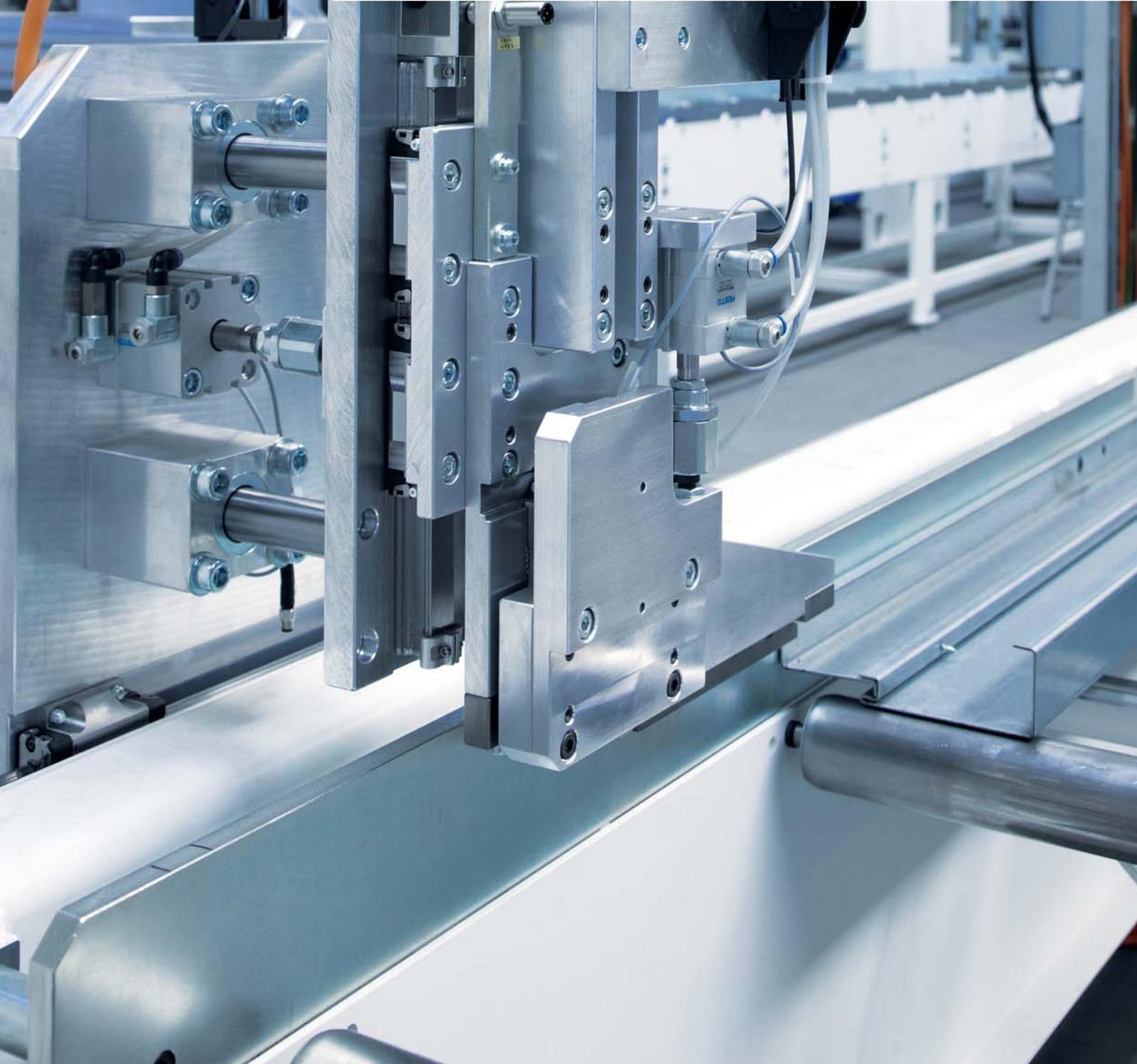
Ottemeier Werkzeug- und Maschinenteknik GmbH based in Verl, Germany, specializes in custom solutions for machine construction and tool engineering. From initial design to final handover, the company deals with all aspects of projects that are tailored to the individual requirements of its customers. During 25 years of cooperation with Beckhoff, Ottemeier has always been able to respond flexibly and creatively to meet customer needs with the help of PC-based control technology. These characteristics were particularly useful during a recent steel frame processing line project for the company Hörmann KG based in Werne, Germany.

Flexibility right from the start

Ottemeier customers come from the construction, automotive, furniture and sanitary industries. These customers expect project management based on quality, expertise, pragmatic creativity and flexibility. The Ottemeier management team consisting of Managing Partner Marion Ottemeier-Esken, Proxy Holder Heike Ottemeier and Technical Director Christian Wölki meets these challenges on the basis of a strong 50-year company tradition. Christian Wölki said: "Each customer requirement results in individualized development and production processes, which means that each machine we build is different. We basically do what other machine builders don't do – in a sense, we start where others finish."



As the second generation of leadership, Marion Ottemeier-Esken, Heike Ottemeier and Christian Wölki (left to right) successfully manage the Ottemeier Werkzeug- und Maschinentechnik company.



A door frame consists of two side jambs and a header. All three elements are made from beveled sheet metal and are mitered. The steel frame processing line for Hörmann consists of four saws, two gantries for material loading and several roller tracks for material handling. In addition to the saw unit the line also includes a laser cell with a special material supply concept and was extended with a complex punching machine during the course of the project.

Frank Kampschnieder, Engineering and Project Development Manager at Ottemeier, explains the complexity of the project: "At first glance the production process seems quite clear, and the material processing also appears quite straightforward. However, the realization of a job-specific, automated processing line for special door frames with more than 250 product variations in batch size 1 with an interface to the ERP system and integration with a semi-automatic welding line was a clear case for our special-purpose machine engineering."

Demanding tasks for Beckhoff Servo Drive technology

In order to enable clamping of the different geometries and lengths on a single production line, Ottemeier developed a highly flexible servo clamping system. The widths of the frame sections vary between 60 and 560 mm and the heights vary between 15 and 115 mm. Two different material thicknesses are used. Instead of traditional clamping systems based on mechanical, pneumatic or hydraulic components, servo-driven clamps and grippers are used, in order to produce each product variation in an optimum manner. Ottemeier stores a clamping profile for each frame in a database, since not only the position but also the contact pressure of each clamping unit is crucial for a first-class sawing result. Ottemeier uses AX5000 EtherCAT Servo Drives in conjunction with TwinCAT NC PTP automation software. Optimization for multi-axis applications and fast control technology make EtherCAT Servo Drives ideally suited for such applications.

Hörmann benefits from the versatility of the system in several respects. All three frame elements (left side jamb, header, right side jamb) can now be produced on a single line. New product variants no longer necessitate mechanical adjustments to the clamping system: A new clamping profile can simply be "taught" in software.

The scalable automation toolkit

Ottemeier has been using the hardware and software options in the Beckhoff automation toolkit for special-purpose machine construction for many years. The 40 m long and 9 m wide sawing unit is equipped with Beckhoff components throughout, since the scalable product portfolio enables the automation of each function for any dimension. The central controller is a C6640 Industrial PC with TwinCAT NC PTP software. Two 15" Control Panels from the CP7932 series are used for the operator interface. The real-time characteristics of TwinCAT and the performance of the EtherCAT components, which include the drive system as well as the I/O modules in IP 20 and IP 67 ratings, also contribute to efficient system design and transparent communication.

The open platform of the PC-based control technology in combination with TwinCAT makes ERP interfacing straightforward. The manufacturing orders are called up from the ERP via Ethernet, tracked through the line with TwinCAT and fed back into the ERP system together with all production data. The cutting parameters and clamp settings are calculated individually for each frame and each manufacturing order. The intelligent feed control of the saw enables optimum machining of the door frame at all times and therefore extends the service life of the saw blade.



25 years of joint project work with streamlined communication:

Andreas Hülshorst (Beckhoff Systems Engineering, left) and Frank Kampschnieder (Ottemeier, right) discuss further optimization options directly at the machine.

Mutual trust built through 25 years of cooperation

Ottemeier and Beckhoff started working together 25 years ago. According to Christian Wölki, this long-standing cooperation makes Ottemeier fairly relaxed when it comes to new developments: "Technical progress and increasing competitive pressure result in ever more complex customer requirements. At the same time, demands regarding the economic efficiency of the production processes are also increasing. As a general contractor we are ultimately responsible to our customers. For projects of this size it certainly makes a difference to have a trusted automation partner."

Flexibly extended without system limitations

With EtherCAT and PC-based control technology there are virtually no limits that would restrict expansion of a system. For example, it was relatively straightforward for Ottemeier to extend the line with a punching machine as an additional machining station and to integrate it in the program sequence of the central controller. By combining the three core processes (sawing, laser cutting, punching) in a single system it was possible to improve the production process and optimize the lead time.

For Ottemeier the integration of the laser cell was new territory – not in terms of the technical implementation, but due to the required cycle time: Laser production is only cost-effective if the waiting times during communication and material handling approach zero. TwinCAT, in conjunction with a postprocessor, enabled optimum data exchange with the laser cutting system. Thanks to the sophisticated material feed concept for the laser cell developed by Ottemeier, the components are prepared in parallel with the machining process: While one part is machined in the cell, the next part is prepared in a second working area within the cell.

Safety assured with TwinSAFE

For safety screening of the system, particularly the laser, Ottemeier uses the flexible TwinSAFE I/O solution for safety functions from Beckhoff. It can cope with the dynamic changes in a custom machine: Operations are easier and less expensive to modify in software than in copper.

Further Information:

www.ottemeier.com