High-speed data flow in furniture production

In order to offer a fully-coordinated and complete range of kitchen cabinets and furniture, a high degree of quality and precision is required during the processing of individual furniture components. A prerequisite for achieving this is deep and interlinked technological know-how for successful machine construction and system automation, as exemplified in the long-standing relationship between Hüttenhölscher Maschinenbau GmbH and Beckhoff.

Nobilia is one of the leading manufacturers of fitted kitchen cabinets and furniture in Europe, with around 1,500 staff and sales of 481.5 million euros during the 2004 financial year. The 107,000 sqm plant at Verl is one of the most advanced and high-performance facilities for kitchen furniture in Europe. Each year more than 275,000 kitchens are produced, with every fifth kitchen being exported to other European countries, as Turkey, Israel, China and Kuwait.

Regular cooperation between the two companies over many years has led to the development of high-performance production machines for Nobilia, one of the leading kitchen furniture manufacturers in Europe. The recent upgrade to EtherCAT as a communication medium opens up immense potential for production line optimization.

The engineers at Hüttenhölscher Maschinenbau GmbH are experts in special purpose machine construction for a wide range of industries. The majority of these machines are built for the furniture industry. Using the example of kitchen specialists, Nobilia, Norbert Jürgenhake, chief designer at Hüttenhölscher, explained: "We supply the machinery for final assembly at Nobilia – this includes all assembly lines for the different cupboard assembly groups. For prefabrication we also supply complete side and front component drilling lines. Special lines, such as those for inserting beading in glass fronts using robots, are also part of our portfolio."

"Advanced automation and communication technology plays an important role in several respects," said Dieter Großekatthöfer, manager for engineering systems at Beckhoff: "These systems are very demanding, requiring continuous access to information such as system status, messages and provision of system data via CAD systems. The systems are not operated in stand-alone mode, but are invariably integrated in an IT environment and linked via the ERP system." Since Beckhoff has been cooperating with Nobilia for years in the development of control concepts and data structures, acceptance of EtherCAT as an Ethernet-based communication technology was high right from the start.

Long and intensive cooperation

Hüttenhölscher and Beckhoff have been cooperating for about 25 years – the early beginning days for both companies. Accordingly, the machine manufacturer strategically uses PC-based control technology from Beckhoff across the board. "This concentration on a single supplier significantly reduces design effort
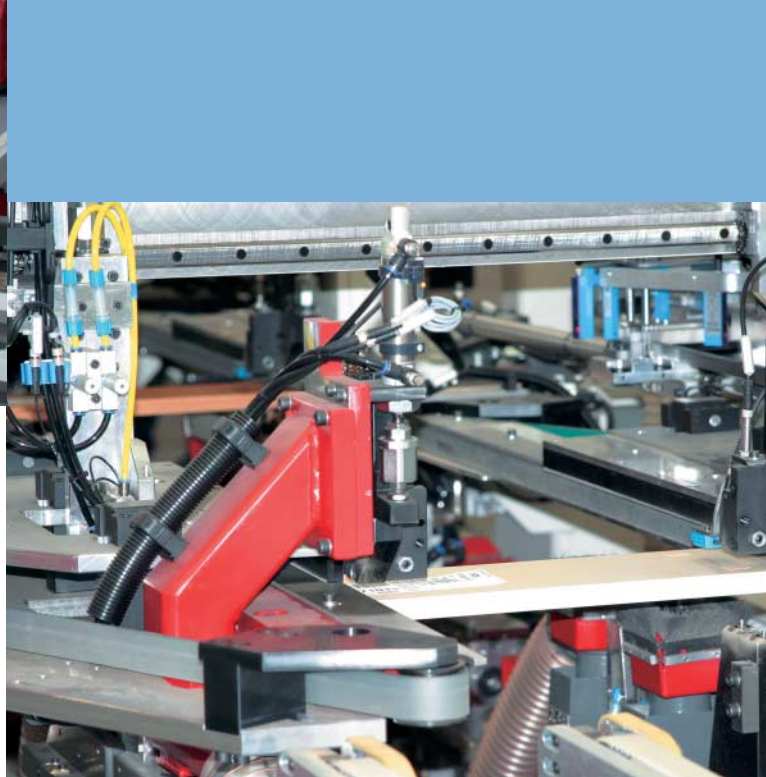
Nobilia uses EtherCAT technology in a drilling system for small and narrow components, and in a front drilling line as part of a drawer production line.

and costs since the need to adapt to new developments is minimized," said Norbert Jürgenhake. "Moreover, the Beckhoff engineering department acts as a quasi-control section for Hüttenhölscher and is involved in discussions with the end customer relating to system concepts right from the outset."

Nobilia decided to use EtherCAT for a drilling system for small and narrow components and for a front drilling line as part of a drawer production line. Both lines have very high output: The drilling system for small and narrow components produces more than 22,000 individual components per day in two shifts. The drawer production line is fully automated. It features a total of 14 robots and can be operated with only three staff. Up to 12,000 drawers can be produced each day in two shifts.

Future-proof data communication

"The change-over from Lightbus communication system to EtherCAT was not superficially driven by the faster data transfer offered by the Ethernet system," said Dieter Großekatthöfer: "Even with the original Lightbus equipment, the machines were never limited by the fieldbus. However, EtherCAT was the first step towards an integrated data structure." "For us as users, this step was quite straightforward," said Norbert Jürgenhake. "We didn't notice much difference in terms of system handling."

However, Hüttenhölscher often has to deal with complex process sequences, which is where EtherCAT's reserve capacity is especially useful. Due to the high output of the drilling system for small and narrow components (up to 40 furniture components per minute), very short cycle times had to be realized at the I/O level in order to ensure precise parts positioning and in order to apply a dual cycle for drilling the components vertically (from above and below) and for fitting dowels horizontally. The system is controlled via 36 NC axes, about 600 I/O points, and around 25 EtherCAT stations. According to Norbert Jürgenhake, there are no problems whatsoever in terms of data transfer.

"We are currently in the process of designing a drilling system involving more than 40 axes with parallel drilling optimization that has to be completed within 2 seconds in each case. Using conventional technology, we would have quickly reached the limits with this new system. Our assembly line is able to produce lot size 1. Very few systems can do this, and it is only possible with truly high-performance control technology." Dieter Großekatthöfer said: "EtherCAT's reserve capacity offers further benefits. In the past, systems with a large number of axes had to be subdivided into modules, each with their own control computer. With EtherCAT a single PC is often sufficient. Notwithstanding the complexity of the system, the end customer also requires universal parts or data tracking, resulting in high data throughputs. Here too, we benefit from EtherCAT's performance potential."

⟶ Hüttenhölscher Maschinenbau **www.huettenhoelscher.de**
⟶ Nobilia kitchens **www.nobilia.com**