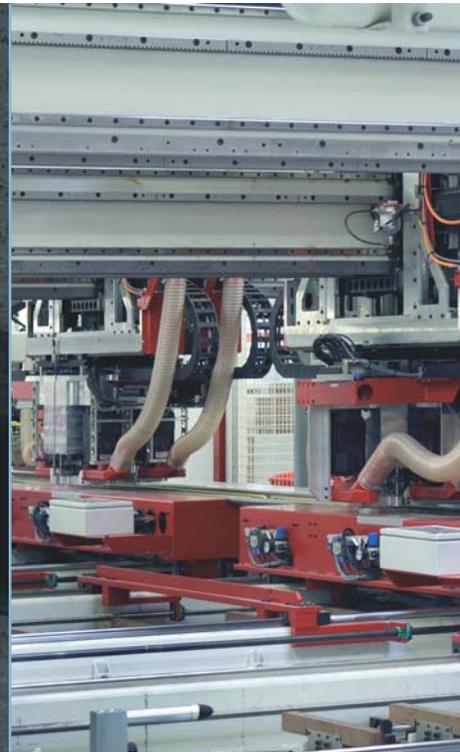


IPCs and TwinCAT standardize production at Nobilia

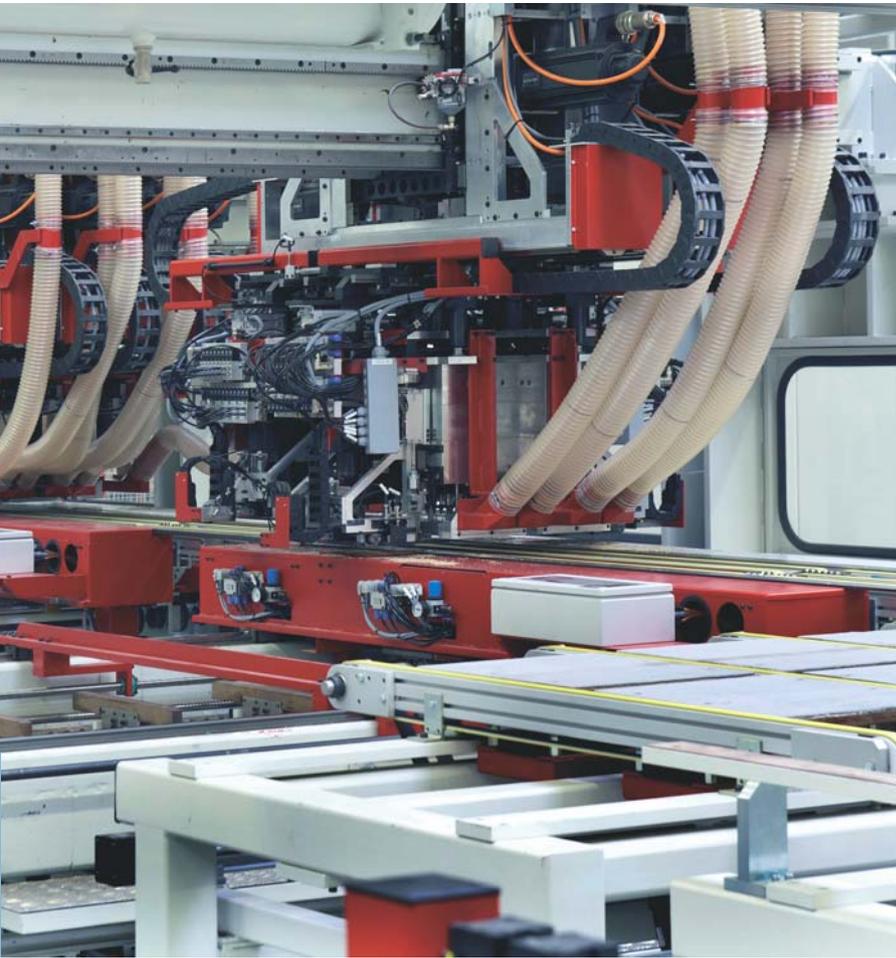
# PC Control – precision manufacturing for high-end, custom kitchens



→ Nobilia is one of the leading manufacturers of fitted kitchens in Europe. The company is booming and in the summer of 2006 established a new production facility. PC-based control technology from Beckhoff had already been implemented successfully in Nobilia's main plant and was chosen for the production lines of the new plant.



The C6140 control cabinet IPCs with CP7032 Control Panels are used for controlling highly complex drilling processes as well as for time registration.



The long-standing cooperation between Nobilia, Beckhoff and Hüttenhölischer Maschinenbau GmbH was the basis for the speedy construction of the new Nobilia plant and its completion within the planned schedule.

The main plant of Nobilia-Werke J. Stickling GmbH & Co. KG, Germany, is among the most efficient and advanced production facilities for kitchen cabinetry in Europe. Nobilia's main plant churns out more than 1,500 kitchens per day, which corresponds to an annual production of around 350,000. Exports to European countries, China, Israel, Kuwait and Turkey account for 25% of the production. When Nobilia reached the limits of its production capacities at the existing site, the company decided to build a subsidiary plant. The design for the new plant was based on experience gained at the main plant over the years. Successful machine concepts were transferred to the new plant without modification. The new plant assembles 2,700 kitchen cabinets per day.

### Successful cooperation continued

The main Nobilia plant is mainly equipped with control technology from Beckhoff. The Beckhoff engineering division, which has been providing support for Nobilia's special control applications for many years, also dealt with the design, project planning, programming, installation and commissioning for the new plant, including integration of older production units that were relocated from the main plant. The main focus was on integration of the new equipment with complex in-house production data acquisition systems.

"Through our long-standing cooperation with Nobilia and other machine builders such as Hüttenhölischer Maschinenbau GmbH, we have a sound technical understanding of the special requirements of kitchen production installations. We have incorporated this know-how into our hardware and software concepts", said Dieter Großekathöfer, manager of the Beckhoff Engineering division.



### Flexible control for individual customer requirements

There is fierce competition among kitchen suppliers, so individual consumers' requirements have to be implemented quickly and with high quality to earn and retain business. For example, the positioning of holes or recesses in the cabinet fronts may differ for each order. PC-based control technology from Beckhoff is ideally suited for this type of flexible production. The control hardware was standardized throughout, irrespective of the task. "In view of the production cost, even unusual requirements have to be implemented with standardized processes", said Dieter Großekathöfer. "The C6140 control cabinet IPCs with CP7032



Integrated building services: Beckhoff control technology is also used for building automation.



Control Panels from Beckhoff are used for controlling highly complex drilling processes as well as for time registration."

The C6140 offers such high performance that it can handle all processes at Nobilia with ease. "During the system design phase, we had to think carefully about whether the components would meet the performance requirements. The IPCs installed at Nobilia offer such high performance that we can operate the systems right up to the machines' physical limits", said Dieter Großekathöfer. "This makes the engineering much simpler and creates a future-proof solution."

An integrated control concept for all systems is a prerequisite for achieving this. This is where TwinCAT comes in. All the PC control systems installed at Nobilia – around 70 Industrial PCs – run the Beckhoff software system: TwinCAT simultaneously acts as real-time controller, multi-PLC system and NC axis controller. The PC controllers are integrated throughout the production process including goods reception, assembly lines, processing centers, PDA and outgoing goods.

### TwinCAT handles Motion Control and SAP interfacing

The control mechanisms can be illustrated using the drilling systems as an example: all Industrial PCs are connected with the master computer and the in-

house database via Ethernet. The PC controller for the drilling system receives all relevant processing data for a particular order. TwinCAT calculates the required process parameters for the I/Os and drives. The associated drive parameters are transferred to the frequency and servo converters in the form of a central control architecture. TwinCAT handles the motion control for the axes in real-time, acts as software PLC for coordinating the process, realizes diagnostic functions and, finally, reports the completed order back to the ERP system – in this case SAP. The sensor and actuator I/O data are picked up via the Bus Terminal system.

Dieter Großekathöfer is convinced that the IPCs only represent a comparatively small cost factor in the life cycle of expensive production, especially in view of the benefits of controls standardization: Using consistent hardware leads to reduced training effort, reduced stockpiling of spare parts, and faster service response. "Our service staff knows exactly what to expect when they open the control cabinet doors. They are familiar with the components and can re-commission systems much faster", said Stefan Schneider, technical project manager at the new Nobilia plant. "The machines have to run non-stop. Every minute of downtime that can be avoided is critical."

The importance of smooth operations for Nobilia is illustrated by the fact that each kitchen is manufactured individually based on a specific order, including delivery date in the background. "While we standardize our processes with the aim



of maximizing productivity, ultimately, each order represents a batch size of 1. We don't produce off-the-shelf kitchens based on high production runs", said Stefan Schneider. The individual design options, combined with high quality and efficient manufacturing technology, are the basis for Nobilia's success among European competitors.

The processing of raw panels requires utmost precision in order to ensure that all components match and all fittings are made smoothly. Drill holes have to be positioned with a precision of a tenth of a millimeter; edges have to be sawed exactly. Any additional finishing costs Nobilia money and slows down the production and logistics chain. If a single kitchen part leaves the production with inadequate quality, a new part has to be produced with maximum priority in order to complete the overall order. Rush jobs are controlled via Nobilia's ERP system, which is linked to the overall control system via Ethernet.

Process visualization has been standardized throughout the Nobilia plant, covering new machines as well as machining stations that have already been running for years. The system is based on CP7032 Control Panels from Beckhoff. While the IPC is protected by the control cabinet, the IP 65 Control Panels are able to withstand harsh conditions.

## EtherCAT replaces Lightbus in production expansion project

Throughout the plant, around 5,000 I/O data points are connected via modular Bus Terminals. Lightbus from Beckhoff is used as the fieldbus for machine and control concepts that were transferred directly from the main plant. For new systems, the EtherCAT real-time Ethernet system is used as the communication medium. Expansion plans for the new plant are already being drawn up with a view of taking standardization even further. Ethernet will become increasingly important, both as a vertical communication medium covering all aspects from control to the command level, and as a real-time capable drive bus. "EtherCAT sets new standards", said GroBekathhöfer. The advantages of the new bus system are obvious: high performance, almost unlimited network size, and flexible topology. This reduces the cost for expensive infrastructure components. Any number of Ethernet devices can easily be integrated via switches or switch ports. The RJ 45 connector is a physical cable that can be supplied ready-made and is simple to install, thereby aiding standardization.

Nobilias owner Werner Stickling and managing director Dr. Günter Scheipermeier selected Verl-Kaunitz as the location for the new plant. In his opening address, Dr. Scheipermeier explained the reasons: "An important factor in favor of Verl-Kaunitz as the location for the new plant was continuity of, in some cases, decades of cooperation with regional suppliers, machine builders, plant manufacturers, and service providers. Nobilia closely cooperates with more than 100 regional companies. We regard this kind of networking as part of our strength and also the strength of Eastern Westphalia in Germany as a manufacturing location."

