MAKA Max Mayer Maschinenbau GmbH; Nersingen (Germany)

**Fast Retooling**

**Integrated automation in door processing**

As part of a pilot project, the MAKA Max Mayer Maschinenbau company developed a new machining center for wooden, aluminum, and plastic door machining. With its minimal space requirements and flexible applications options, it also offers vocational businesses the opportunity of implementing automatic machining. Equipped with state-of-the-art control and drive technology, the machining center for doors meets all of the company’s expectations in terms of speed and flexibility.

MAKA has been manufacturing automatically controlled machines for the wood industry for more than 50 years. Over the years, the company has accumulated an enormous amount of experience in the machining of all types of doors, and has also developed a good understanding of customers' needs. In order to cover all of the needs requirements from vocational business to large factories, the Swabian specialist for CNC machines developed the new CR 27 TBZ 5-axis machining center for doors, which can be retooled quickly and flexibly.

**Innovative and compact machine design concept**

As part of the project, MAKA developed an innovative pallet system with which the pallet tables are alternately drawn into the machine. The machine enables the machining of doors measuring 1,400 x 2,800 millimeters. The tables themselves feature no stops. Rather, the doors are precisely positioned using feeding robots. Two independently controlled robots operate alternately to measure the workpiece, position it and remove it. During machining, they assume additional functions such as table and vacuum positioning or protection plate removal. The advantage of the pallet machine as compared to a tandem machine is that it requires far less space while providing the same level of performance.

The CR 27 TBZ also combines a high degree of working safety with flexible processing capabilities, and easily accommodates the large volumes of chips. A chip conveyor located under the completely open machine frame and covering the processing area removes the chips generated during machining. A CNC-positioned chip catcher and dust suction as well as the fully encapsulating machine guard also help to protect the machine against flying chips.

**High performance to meet high-speed requirements**

The machining center features a tool magazine with 51 bays. The machine can be equipped with tools measuring up to 200 millimeters in length and saw blades with a diameter of up to 400 millimeters for every conceivable application. The tools are exchanged with the help of a feeder system. A shuttle collects the new tool from the magazine during machine operation. Toward the end of the machining process, it approaches the unit at a speed of 150 meters per minute and synchronizes its X-axis speed with the milling unit to conduct the tool change, while the milling unit moves to the starting point of the
next machining process. Control of this demanding task is handled by the new SINUMERIK 840D solution line, equipped with an NCU 730 and highly efficient SINAMICS S120 drives. The advantage of combining of SINUMERIK 840D SL with SINAMICS lies in its modularity, openness, flexibility, and high performance. Thanks to the multi-channel structure, it is possible to control processing, feeding, and tool change as separate processes.

"We chose the SINUMERIK 840D SL controller generation because it offers a wide range of functions in connection with high processor performance. A high powered controller and efficient drive system are essential for operating rapid traverses at 150 meters per minute, for controlling 12 NC axes plus one high-speed spindle, as well as for performing NC machining with 5-axis transformation," as Johann Hefler, head of electrical design at MAKA, explains. Servomotors of the 1FT6 and 1FK7 design series are used for the axis drives. The integrated DriveCliQ interface offers maximum convenience for drive parameterization and commissioning.

The Ethernet-based control architecture provides the user with a wide range of options for integrating the machine with a production control system to control material and data flow, as well as to coordinate the processes between the machining center and the positioning and removal robots.

**Graphical user interface for reliable operation**

In addition to the controller’s own user interface, a CAD/CAM-based graphical user interface precisely tailored to the requirements of MAKA is also available. The controller features a PCU 50 with Windows XP operating system operated by a SINUMERIK OP 015A panel PC. The clamping procedure is projected onto the graphical user interface, and the part to be machined graphically positioned on the table. The tool magazine can also be loaded with the help of the graphic support. Thus, the operator is able to monitor the collision-free machining or collision-free tool positioning already on the screen, and can intervene before a "crash" occurs in the event of a collision risk.

**Modern machine technology with integrated automation**

With the CR 27 TBZ, MAKA will be presenting a flexible and innovative machine at LIGNA 2007 capable of quick retooling to meet changing door machining requirements with little effort, and that can also be fed manually. In summary, Max Mayer, managing director of MAKA, comments "I think that we are heading in new directions with this machine version. What is important for us and our customers is a very high level of availability, safety, speed, flexibility, and, of course, state-of-the-art machine technology. This is what ultimately distinguishes us from our competitors." By equipping the machine with Siemens automation technology, provides MAKA with the advantage of having a system from a single source. This ensures a high level of integration extending from the controller to the drives, an aspect that is very important in terms of engineering, service, and diagnostics.

Spectrum LIGNA 2007