

Integrated solution offers potential for rationalisation

→ The woodworking machine manufacturer "IMA Klessmann GmbH Holzbearbeitungssysteme", renowned for its innovative ability, is breaking new ground with the new modular "Combimat" series. The range is characterised by consistent modularity, the first formatting and edge processing machine of its kind. The concept is supported by the distributed PC control concept from Beckhoff. Together with Beckhoff as their partner for automation, the machine manufacturer from Germany implemented the new PC concept within two years.

## Edge processing: Industrial PC controls continuous processing machine

At first glance, nothing special is apparent. A factory manufactures parts for the furniture industry. Machines deal with loading, processing and stacking of furniture parts. Edge processing machines refine the workpieces, drilling machines tirelessly go about their business, conveying devices take the individual workpieces to the next processing station and place them into the required starting position. In short, a production process similar to many others. Yet there are differences between the production at Rabe & Meyer, Rotpunkt kitchens in Germany, where body parts and furniture fronts for the main plant are produced, and

other installations. There is a striking lack of voluminous control cabinets. Another striking feature is that large control consoles have given way to slender Control Panels. The reason: Rabe & Meyer is one of the first furniture manufacturers to use the new "Combimat line" from IMA Klessmann. The example shows that the development of powerful machine concepts – from simple to highly automated continuous processing machines with conveying devices – is only possible through high-quality automation technology.

**IMA Klessmann GmbH**  
woodworking systems, Germany  
edge processing and  
CNC processing centres

With now over 900 staff, the IMA-Klessmann machine factory, founded in 1951 by Erich Klessmann, has been a trend setter in terms of the latest woodworking technology for edge banding machines and CNC processing centres for many years. Many furniture manufacturing processes have been developed by IMA-Klessmann, a fact which is testified by a large number of patents: Innovative constructions and manufacturing technologies are set to continue this success story. The latest developments are continuous contour processing and very high throughput through high-speed processing.

A highlight of current developments is the Combimat series with its PC based control concept. The consistent modularity and therefore upgradability of this product range makes machine modifications due to changing customer requirements very easy. Very early on, IMA-Klessmann started to look into CNC technology for routing machines and processing centres. This also very powerful second product range perfectly complements their range of products. The CNC processing centres of the BIMA series are also renowned for their performance and reliability. The integrated edge banding machine developed by IMA enables complete mechanical processing of machined parts for the first time.

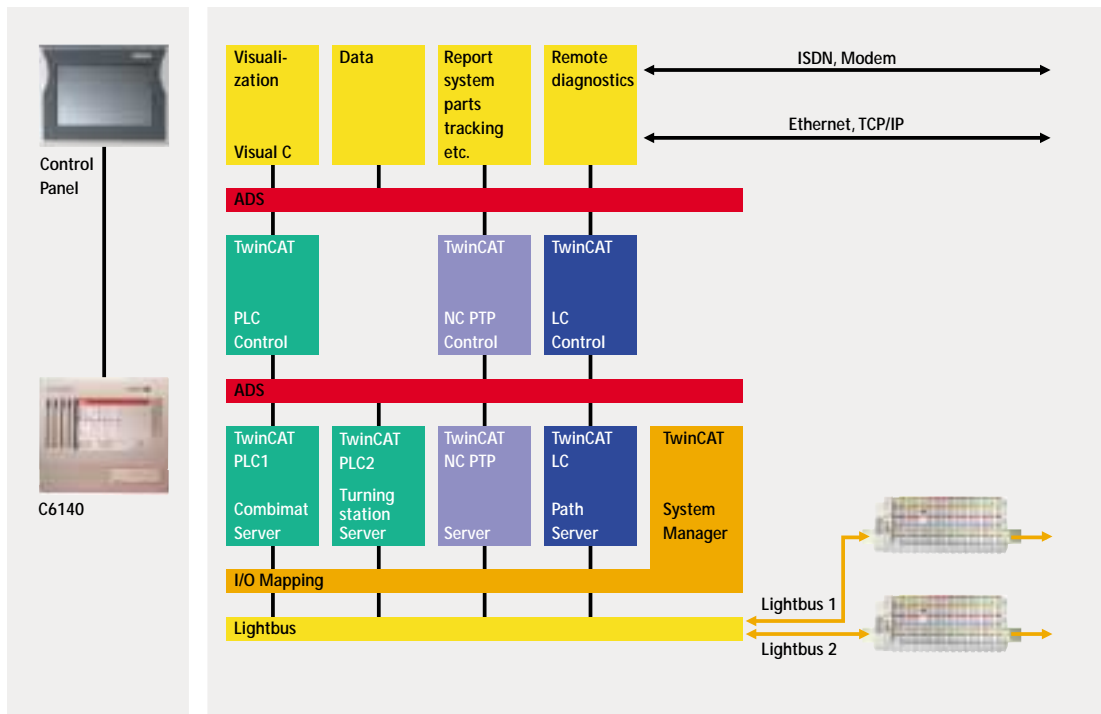
Apart from individual machines, IMA-Klessmann also supplies complete production lines. The high synergy effects of short communication routes, regular tuning and targeted planning based on advanced computer networks ensure that the products from the other members of the IMA group are in tune with each other and can therefore be integrated seamlessly to complete systems.



At the machine manufacturer IMA, the hardware PLCs have become redundant, since the company is now fitting PC based controller equipment to all their woodworking machines. The first step has been taken with the "Combimat" edge processing machine.

<http://www.ima.de>

Today, this is achieved through interdisciplinary and standardised control technology, where operational concept and controller, drive and sensor technology and the transfer of information are integrated into a functional overall system. "Our aim has always been an integrated system. Hitherto, we were only able to implement such a system to a limited extent, using mainly traditional PLC technology, supplemented by our own functional hardware and software expansions", explains Ralph Januschewski, responsible for software development at IMA Klessmann GmbH. "But as soon as the first PCs started to visualise our processes and manage our recipes more than ten years ago, the path towards PC based control technology was predetermined". "We anticipated these developments, and therefore started to build a new control concept in 1998" says Peter Klemme, responsible for continuous processing



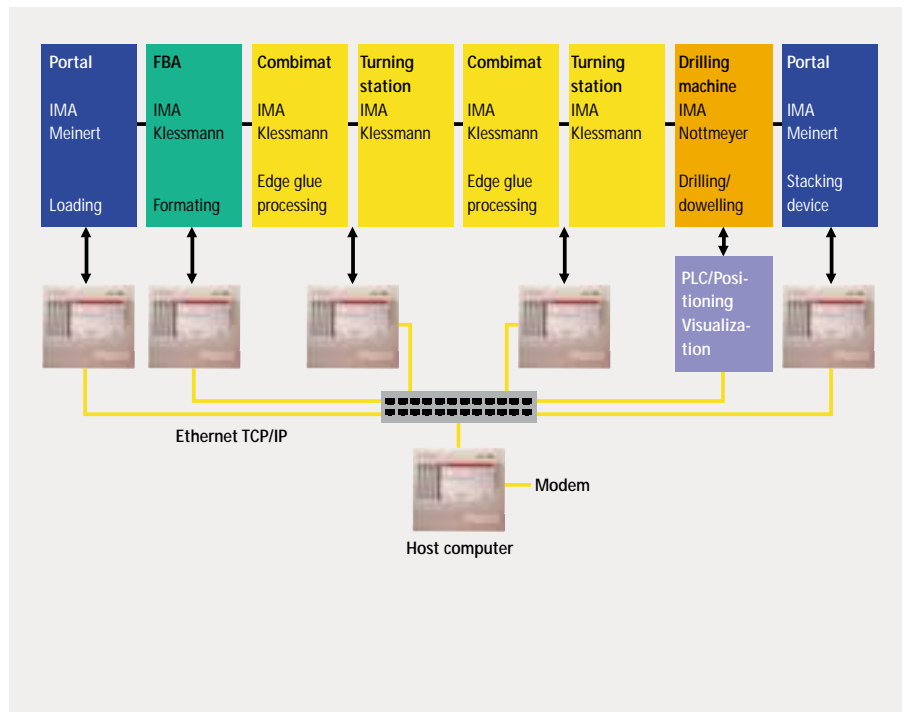
platform development and control technology at IMA. "Beckhoff has always been part of the equation, as system supplier for the woodworking machine industry and generally as a pioneer for PC based control systems". Based on the TwinCAT software control platform from Beckhoff, a control system was developed in co-operation with the engineers from IMA that is customised for the requirements and based on open standards.

The result of this fruitful co-operation is the new "Combimat" edge processing machine. An Industrial PC with TwinCAT automation software controls all devices and tools of the machine via the fast "Lightbus" optical fibre fieldbus. The IMA engineers also made fundamental changes to the basic construction of the machine. The machine consists of a series of processing modules (formatting, edge banding, edge finishing, etc.). The control technology required for control-

ling the machine modules such as drives and input/output units in the shape of Bus Terminals is located directly within the modules. The big advantage lies in the distributed production of the modules and in the upgradability of the machines. Furthermore, the consistent decentralisation of the machine control components does away with the need for a central control cabinet, reducing the space requirement and planning effort for the installation of the machine.

#### PC conquers plant

The "Combimat" was first installed at the Rabe & Meyer, manufacturer of kitchen furniture, within a complete machine line. The modern plant consists of a portal from IMA Meinert for feeding and separation of the plate stacks, a double-end tenoner (FBA) for the format processing and two double-sided "Combimat" edge



processing machine from IMA Klessmann. A drilling and dowelling machine from IMA Nottmeyer and an automatic stacking device from IMA Meinert are also part of the production line. Between the machines there are various transport and handling devices, bringing the workpieces into the exact starting positions for further processing.

All machines of the production line, with exception of the drilling and dowelling machine, are controlled by Industrial PCs from Beckhoff via the TwinCAT automation software. The control units are networked via Ethernet TCP/IP, the standard network of the IT world. A higher-level machine control computer is responsible for co-ordination and control tasks for the complete machine line such as parts tracking, setting up of the units, processing of machine messages etc. Furthermore, this computer also provides a central modem connection for all machines. This is available at any time, e.g. for remote diagnostics purposes or for software updates.

#### Software modules have replaced hardware

The Industrial PC and the distributed machine actuators and sensors are the only visible components of the new control concept. Many control functions that were hitherto executed by special hardware platforms, some of them specially developed for the purpose, have been replaced by software modules that are centrally processed on the PC. Amongst them are, for example, axis and linear path control.

The new control configuration can be described as follows: A C6140 Control Cabinet PC controls the double-sided "Combimat" edge processing machine and a subsequent turning station. Under the standard Windows 2000 operating system, the TwinCAT NC PTP automation software manages approximately 1100 mainly digital inputs and outputs and controls 25 positioning axes. Depending on indi-

vidual requirements, these are simple stepper motor and high/low speed axes, or servo drives for more dynamic or higher precision requirements. The PC controller communicates with the distributed Bus Terminals via the fast Lightbus system, detecting devices states via the sensor system and issuing switching commands to the actuator system.

"Combimat" and turning station are each controlled by a dedicated software PLC (four runtime systems are possible under TwinCAT). The NC controller integrated in TwinCAT also manages axis positioning. A special feature for continuous processing machines is the linear path control, which is also implemented under TwinCAT. This enables tracking of all workpieces within the machine without sensors, a must for an edge processing machine.

The system is operated via a Control Panel that can be installed up to 65 m away from the Industrial PC. On the 15 inch display, the user can select all functions such as program selection, machine diagnostics or device selection via the standard keyboard or a mouse.

#### Better quality at higher speed

Following the successful application of the control system at Rabe & Meyer, Peter Klemme draws extremely positive conclusions. The replacement of the PLC solution required the development of a completely new control architecture by IMA, which was a significant challenge in certain areas. "Our efforts were worth it", says Klemme with a smile, "this technology still has tremendous potential – the development of 'Combimat' was just the beginning." The control expert is planning to gradually convert all processing lines in his company to the advanced PC technology.