

MAKA

INFO 05

Wood has a lot to offer
CNC in customised staircase construction
On the road to the digitised company
Guardian of space and time
Everything that wood machining needs
The art of model making
Challenges of material diversity



CNC Spezialmaschinen

Wood has a lot to offer



Dr Jens Muckli and Klaus Kern, Managing Directors

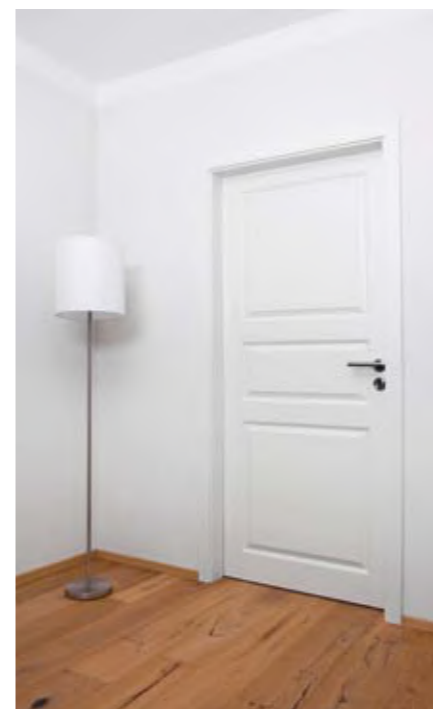
In particular it combines a homely atmosphere with excellent structural properties and high energy efficiency. So it's no wonder that wood is enjoying growing popularity, and that the demand is increasing constantly. The structural timberwork industry is booming, and there is an increasing call for wood also for interior design.

As a natural material, however, wood also makes high demands on the machining technology. MAKA has been building machines for furniture production, for glued wood construction and for staircase, door and window production for around 60 years. Add to that almost 40 years of CNC competence. In an age in which digitisation of production is advancing rapidly, that is certainly a strong argument. Whether for beginners in CNC technology or for advanced users - our experience enables us to understand the future best.

MAKA CNC technology is already successfully used, for example, in simultaneous 5-axis milling for complex and high-precision machining operations. But MAKA also has answers to production applications in structural timberwork where reliable and extremely high-performance solutions are called for. Last but not least, we are one of the few machine manufacturers with a full understanding of material mixes. MAKA has traditionally gained experience in wood and lightweight construction in all its facets. Here again, a clear benefit for our customers who are increasingly including composite materials in their product portfolio.

Our customers get a full-service package in the form of a customised, all-inclusive solution for all their applications.

If you want to learn more about the MAKA competence in wood and composite materials, just read on. In this issue of MAKA Info, customers report on their experience with our technology – from handicraft business through to industrial company. We are confident that you will also find yourself in your expectations for modern production concepts.



From woodworking to wooden glasses, MAKA has everything in its sights.



MAKA staircase competence: A long success story

MAKA was one of the very first manufacturers of staircases on CNC machines. First milling trials were carried out together with software specialists as long ago as the 1980s. In the meantime, vast know-how has been developed that enjoys the highest recognition in the industry. MAKA 5-axis machines are employed in both aspiring craft workshops and in industrial plants. Beginners in CNC machining technology value them particularly for their ease of operation. At the high end, MAKA solutions impress especially due to their unlimited possibilities. One example is Schön GmbH in Rennerod, where 20 staircases a day are produced on a MAKA machine. Fully automated, robot-aided loading and parts handling ensure maximum productivity and outstanding machining precision.



Staircase builder with a passion: Heinz Cramer jun. in front of his company's first MAKA, a KPF 555.

One plus one is more than two

H. Cramer GmbH not only excels with customised staircase constructions made of wood. The company also adds a creative touch to the production. MAKA has been cooperating in this success since 1992. As system supplier and as a congenial partner in the development of new production solutions.

Anyone who wants to take a look at the modern, nesting-controlled staircase production at H. Cramer GmbH has to go down into the cellar! What sounds like a temporary measure is in reality an ingenious solution born out of necessity. When the first MAKA 5-axis machine was purchased in 2006, there was simply no room for it on the ground floor of the workshop. But it is typical of the team headed by the imaginative Heinz Cramer jun. that it didn't let itself be disheartened by that fact. Instead they immediately started to look for a solution. Within a short space of time, a cellar was dug and the new machine was installed there. And of course it didn't take them long before they had found the right idea for organising the machine feeding. The problem of the materials handling was solved using a lifting table developed in-house. The decision had already been taken in advance that the steps should be milled using the nesting method. The table of the machine was therefore adapted accordingly.

As it was a second-hand machine that had already been in operation for many years at the time of purchase, the decision was taken in favour of a replacement investment in 2016. And MAKA was first choice once again. And yet again, the machine aroused the inventive spirit of the management team. In the meantime, Heinz Cramer had more or less withdrawn from the operative business and handed over the reins to his managing director, Hubert Gövert. And he is no less inventive than his predecessor. His declared goal was to use the new

investment to reduce reworking and to optimise the process workflows. The result is a PIN table that enabled the milling process using the nesting method to be completely reorganised. The main advantage is working at different levels. This is made possible by hundreds of cylinders distributed uniformly across the table. The cylinders that can be controlled individually by the staircase production software, Compass, move up and hold the material. Only the cylinders that are underneath the step and not in the contour are activated at any time. Then all the milling operations are performed. The steps are then moved down by one cylinder length while the next workpiece is moved up for 5-axis machining. In addition to the milling of the steps, particularly challenging work such as the production of stringer wreaths is also performed on this floor. The technology of the PIN table thus allows all the machining operations to be performed in a single step. The horizontal drilling is performed separately beforehand on another machine. "An enormous boost in efficiency," emphasises Hubert Gövert. The PIN table is naturally not an off-the-shelf solution. It was developed in close cooperation between the Cramer technicians, the MAKA design engineers and one of the staircase builder's external service providers. The specifications came essentially from Cramer who had exact ideas about what the table should be able to do. "MAKA provided outstanding support in the realisation of this project, bringing in its many years of CNC experience," says Hubert Gövert.

Carrying out projects with the customer as an equal partner is common practice at MAKA. The experienced CNC specialist is also on hand when the initiative comes from the partner, as in the case of H. Cramer GmbH. "For us it's a question of finding a solution with the highest possible benefit for the customer. We consider it a challenge to help turn



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Trendsetting: Customised staircase construction with Compass software.

02
The work comes from above: Manual loading with workpieces on the ground floor.

03
Up and down: The lifting table construction with perforated plate matching the PIN table connects ground floor and cellar.

04 - 05
Space-saving solution: Complete machining without retooling on two levels.

06
The product: Staircase steps milled and fully machined using the nesting method.



Stairs, in all shapes and sizes. The generous showroom reflects the high quality requirements and the wide product range of H. Cramer GmbH.

an innovative idea into reality with our know-how," says Michael Meer, Sales Manager North at MAKA.

There is no doubt that the cooperation between experts led to an optimum solution. Material flow and machining technology have become extremely efficient in view of the given spatial constrictions. The process workflow remains more or less unchanged: The steps to be machined are moved down by lifting table, completely machined on the new MAKA PE 90 X, moved back up to the ground floor and transferred to the surfacing department. A further compact MAKA is available on the ground floor for small parts such as short handrails and upright posts. This helps to save tooling time in the whole process.

Also on the ground floor is a second CNC production machine. The old KPF 555 installed in 1992 was the first Cramer machine produced in Nersingen and is still operating reliably even today. Together with the old machine in the cellar, however, it will be going into retirement in the near future. "Sooner or later, mechanical wear makes even the best machine unprofitable," admits Hubert Gövert. For him it would make sense to invest in MAKA technology again. "Our experience with the sturdy and flexible MAKA machines has been good, and with the MAKA design engineers we have partners who get the best out of our ideas," says the managing director. At present, H. Cramer GmbH produces 500 staircases per year in Coesfeld. Hubert Gövert: "With the higher productivity of the recently installed MAKA, I estimate the possible volume at around 600 staircases." And the production method for the future will continue to be: Hubert Gövert and his creative team always have an extra arrow in their quiver.



Interestingly, Managing Director Hubert Gövert and Maka's Michael Meer browse through MAKA-Info.



STAIRCASE TREND INFORMATION

Thanks to its specialisation in the production of individual staircases for private customers, sales partners, carpenter's workshops and building companies, H. Cramer GmbH has a finely tuned ear for the developments on the market. Oak is very much the trend at the present time. Rustic, knotty surfaces are particularly popular. Handrails and steps are frequently ordered in natural wood, often combined with white painted stringers, posts and risers. Material mix is also popular. Stainless steel constructions and glass elements are in demand. For the surface, oiled wood has overtaken painting in customers' preference.



In operation at the H. Cramer GmbH: PE 90 stationary CNC centre with high cutting performance for perfect surfaces, individually configurable.

A perfect symbiosis

In the Günzburg show house of FingerHaus, the market leader for turnkey houses of wooden frame design, energy efficiency and cosiness become one. One of the highlights is the staircase with its flowing paper-fold design. It is produced by Finger-Treppen, the Group's own specialists. CNC technology from MAKA Systems has been supporting the company since its early days using the modern production technique.

Michael Boucsein knows his way around staircase production. He has held a responsible position at FingerTreppen in Frankenberg (Hesse) for 30 years. Since the growing company moved to its new premises, he has been plant manager at the head of a team of 37 employees. As a member of the FingerHaus Group, FingerTreppen produces mainly for the parent company and its turnkey house product range.

But if you think they offer only standard solutions, then you're wrong. Michael Boucsein proudly presents the FingerHaus show house in Günzburg. The staircase up to the first floor is impressive. It is designed with a paper-fold appearance. As the name suggests, the staircase looks like a piece of paper that has been folded several times. By contrast with

a stringer construction, the steps have no clearance. Riser and tread are flush at the front. In addition, the staircase has a glass handrail and a shelf system underneath the construction. Together with LED lighting for stringers and steps, such solutions are very much the trend, says Michael Boucsein.





Two who enjoy their work: Deputy Production Manager Markus Mühlenbacher and Plant Manager Michael Boucsein.



The latest production technology enables Finger-Treppen to meet practically any demand. That wasn't always the case, of course. Michael Boucsein still remembers when production was still manual as in a small carpenter's workshop. Although a CAD system was already used in the design department in the early days, the next phases of production were somewhat simpler: Stringer and step design were plotted on paper. The paper templates then formed the basis for milling the step pockets in the stringers using a router. The production figures were correspondingly modest. In some cases, staircases even had to be bought in to meet the demand.

In the meantime, some 800 solid wood and over 2,100 steel-and-wood staircases leave the factory. CNC has made it possible. FingerTreppen purchased the first 5-axis machine in 2004. It was a MAKA PE 70. Contact to the Nersingen-based CNC specialists was made at the LIGNA in Hanover. "Even then, MAKA was already a pioneer in the machining technology for staircase production," recalls Michael Boucsein. But the plant manager also recognised another difference compared with the competition: MAKA machines had a more rigid construction. "You could see the sturdy steel construction of the machine bed. Quite different from other models where it looked like sheet metal," says the plant manager. The MAKA served reliably for twelve years. And probably would still do so today if growing sales figures had not made a new and more productive solution necessary.

In the meantime, a PE 90 2X is in operation in Frankenberg. The most important feature of the machine

is the equipping with a 3-axis and a 5-axis unit. The units operate alternately, the one performing the programmed machining while the other fetches a new tool. "If you consider that for a complete staircase, some 100 tool changes are necessary, and that each takes almost 30 seconds before the tool is positioned again, then that means a huge saving in time," says Michael Meer, Sales Manager North at MAKA. With the new machine, the non-productive times are heading towards zero, emphasises Michael Boucsein. For him, the boost in productivity is enormous. He has calculated that it now takes 1.5 hours less for the production of a complete staircase. "An improvement of over 30% compared with the old solution with only one unit," he adds. The calculation is, of course, for the whole process that has been optimised in all areas of late.

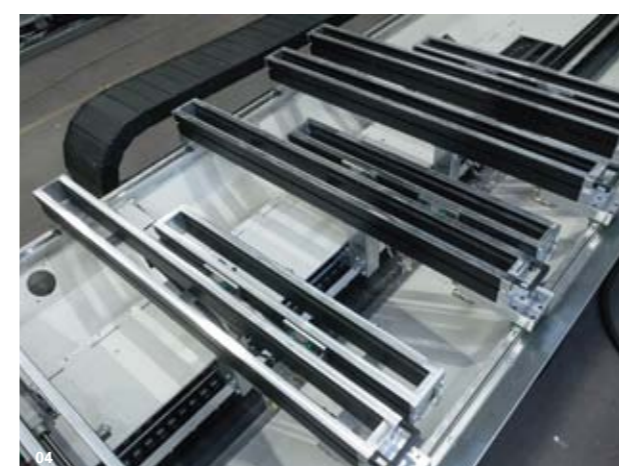
At the end of the day, the plant manager is very satisfied with his MAKA. Although there are solutions with 4 units on the market, the more convincing overall package from MAKA was ultimately the deciding factor, says the plant manager. Here he means in particular the tool magazine that on his PE 90 has a capacity of 51 tool places. Both units can fetch tools from this magazine at any time. On other machines, the magazines have fixed toolings, reports Boucsein.

FingerTreppen has high ambitions for the future. In view of the good order situation, a decision was taken to purchase another MAKA. This machine is to replace the first machine dating back to 2004. This time FingerTreppen decided against equipping with 2 units. Surprising? No, says Michael Boucsein.

"With the high productivity of the 2-axis solution, the downline departments could not have kept up," he says. In his opinion, the in-house organisation would need to be changed before such a new investment was made. Furthermore, a machine with two units would have needed more space than was available in the production shop.

Nevertheless, the third MAKA is a further step towards more efficiency. The new PE 90 has a step separating device as a special option. It serves to perform a separating cut on the workpieces fed into the machine as rectangular boards. The front and rear of the step are then formatted separately. Michael Boucsein: "Due to the fact that the two steps are moved apart, I can form and profile the contours with a larger tool." A further new feature is the VPN port for remote maintenance. The technicians from Nersingen thus have access to the machine that they can use e.g. for reading out errors or for corrections to the software. A maintenance contract with an annual inspection goes without saying for Michael Boucsein. He has only praise for the MAKA service. "MAKA has only very well-trained technicians in the Service department," says the plant manager. In the meantime an "almost friendly relationship" has developed. And what is his experience with MAKA when it comes to the precision of the machining? Michael Boucsein laughs: "When you see that we have bought three machines, we don't really need to talk about quality, do we?"

30% faster per pass with MAKA technology.



- 01 The operator has everything in his sights: Work area of the PE 90 with MAKA spindle.
- 02 Flexible positioning: Support with vacuum cup.
- 03 Highest precision: Clamping device for posts and stringer wreaths.
- 04 Step separating device: Creates space for the machining of the sides.
- 05 Very short tool changing times: Travelling chain-type tool magazine.

On the road to the digitised company

Being a technical pioneer has a tradition at MAKA. That is true of both the machining technology and of the machine production in the factory. The virtual commissioning is once again proof of MAKA's pioneering spirit. A trendsetting step that also benefits the customer.

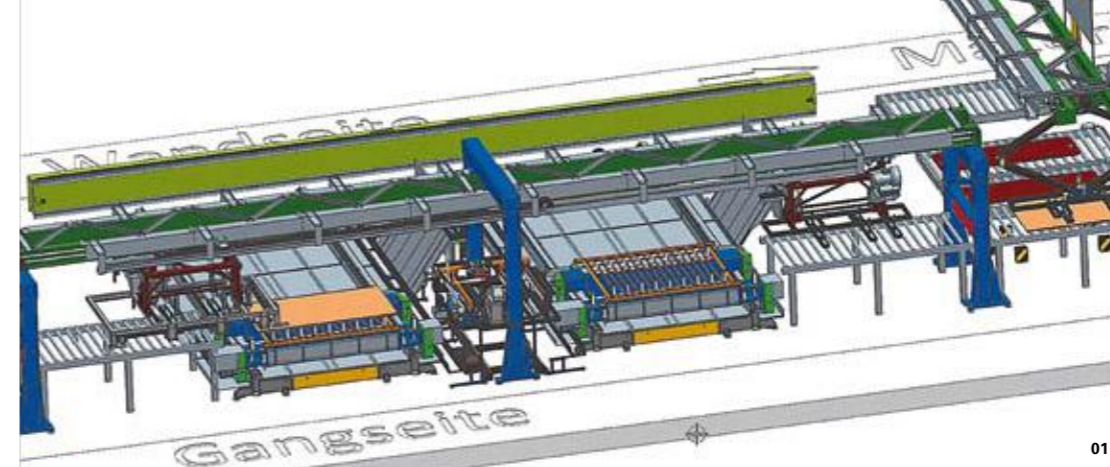


Faster commissioning thanks to MCD: Peter Hofsäss (Siemens) celebrating the machine ready for delivery together with MAKA managing director, Dr Jens Muckli.

Systems with a continuous digital data stream offer an outstanding basis for boosting efficiency. They are increasingly superseding mechanically or manually controlled processes. The production methods in the factory are also undergoing this change. At least at MAKA. As part of the MAKA 4.0 standard, the Nersingen-based CNC specialist is one of the first companies in the industry to introduce virtual commissioning.

To understand the method and its advantages, we need to take a look at the conventional process. A 5-axis CNC machine is a complex construction. Particularly with MAKA solutions in which a large number of customised components is generally integrated, installation requires a great deal of care. That applies also to the commissioning test. It is time-intensive in order to avoid causing damage to the expensive machine due to malfunctions. This leads to non-productive times in the works, which in turn result in costs. If faults occur nevertheless, tedious investigation of the cause is often necessary. The later a fault occurs, the more costly it is and it delays the delivery of the machine.

The risky and cost-intensive process gave the impetus for investigating the possibilities of "virtual commissioning". Together with the long-standing systems partner, Siemens, a new tool was integrated into the production that sets standards. The "Mechatronic Concept Designer" (MCD) provides the operator with a kinematic model of the machine to be installed on the PC monitor. All the relevant CAD data from the machine design are stored in the "digital twin". The link to the "real world" is created by means of an integrated behavioural model by field bus emulation. The central interface at MAKA is the Sinumerik 8400D sl controller that is connected to the mechanical components via sensors and actuators. The digital model displays the machine reactions on the screen in a 3D view from any conceivable angle and with the possibility of zooming in on details. A test is possible at any stage of the assembly. The program compares the target data with the actual data. If a fault is discovered, an analysis is performed with direct feedback to the automation components with respect to the impacts on the whole system.



- 01 Intelligent link: The digital twin of a machine is based on the CAD data of its design.
- 02 Via Simit to the MCD: The machine controller finds the same interface in every detail.
- 03 Fit even before the machine goes into operation: Employees learning on the virtual model.



Just how important the MCD is for the accelerated handling of challenging projects was soon to become apparent. Portal robots had to be retrofitted in the plant of the French door manufacturer, Righini, and weeks of production threatened to be lost. MAKA decided to immediately use the MCD – that at that time was still in the introductory phase – in a "critical case": MAKA sent the necessary CAD data to Siemens in mid-November 2016. 14 days later, PLC and NC programs and the digital model of the plant were ready at the same time. It was then a question of linking the CNC and the model via Simit. That took just three days. From that moment on – just two and a half weeks after the start of the work – the MAKA developers were first able to verify and commission the PLC software, and then the NC cycles for the portal robots. There was no time for training, but everything worked out OK: "After two days you know what's happening, and then everything works as it should," says Peter Schäch, Team Leader Control and Electrical Engineering at MAKA, quoting one of his colleagues. "The complete virtual commissioning was finished before Christmas 2016, at the same time as the completion of the mechanical equipment. And then, after setting up the real drives, when the portals functioned immediately, everyone was delighted," says a proud MAKA managing director, Dr Jens Muckli.

The key benefits of the MCD are obvious: On the one hand, the risk of damage during installation of the machine is far smaller. On the other hand, the tool shortens the commissioning time and thus makes production more efficient thanks to the better capacity utilisation. As a consequence, the customer benefits from a faster availability of his ordered MAKA machine.

But the benefits of virtual commissioning are still far from being exhausted. Particularly for the customer, it offers highly interesting starting points for added value. The program allows the operating personnel to be very efficiently trained even before the real machine is delivered, thus accelerating productive use of the machine. And Peter Schäch sees a further important point: "We expect the virtual commissioning to create an even more intensive relationship to the customer, as the tool allows the development status of the machine to be ideally coordinated with him and to be easily presented at any time." One example of this was provided again by the project handling at Righini. After the training with the "digital twin", it took just one week before the machine was in production at the customer's works. Last but not least, virtual commissioning should also serve as an interface for the Service department. For example, machine modifications requested by the customer can be communicated to the tool and the implementation digitally optimised and carried out with maximum efficiency. "Virtual commissioning is an absolute win-win system," says a delighted Peter Schäch.



At home in the virtual and the real production world: Peter Schäch, MAKA Team Leader Control and Electrical Engineering.

“Ideas that make the difference”

Offering the highest individuality is the claim of the French door manufacturer, Righini. For the long-term safeguarding of the batch size 1 strategy, the company relies on flexible MAKА production technology.

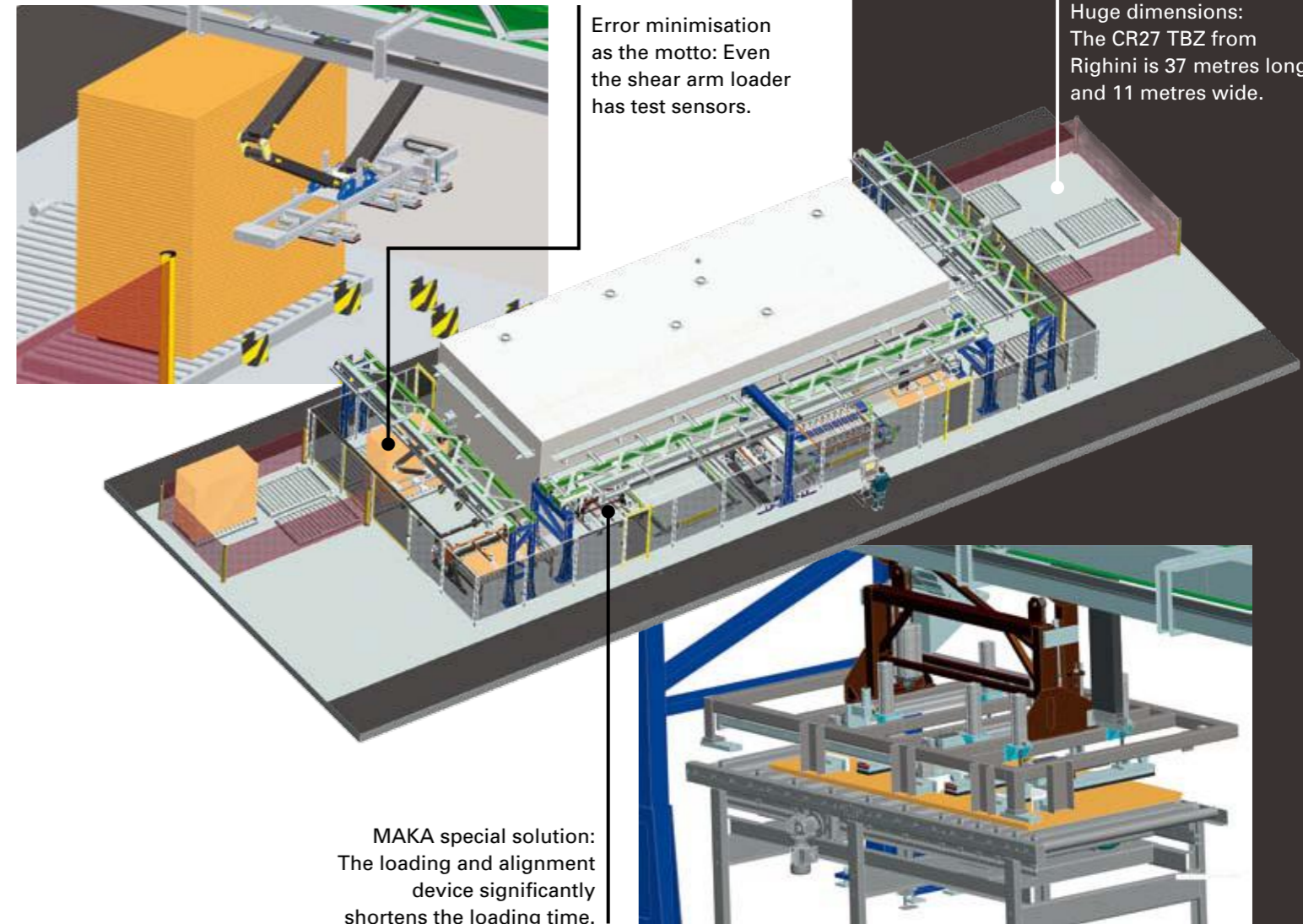
The family-owned company Righini is one of the largest independent producers of interior doors in France. Some 700,000 units leave the works in Tonneins every year. The customers are predominantly retailers. Righini underlines its particular strength on the market with the slogan “Ideas that make the difference”. The company offers a broad portfolio of door designs that can be further customised with various features such as groove millings, fittings and functional openings. Small batch sizes are therefore characteristic of the production. The enormous costs that were necessary with the conventional technology prevented Righini from further expanding its differentiation strategy. The company therefore invested in a highly flexible MAKА system.

On the CR27 TBZ, a stack of door panels is automatically processed and stacked as a finished part stack on the delivery side. The machine has multi-channel technology with a total of 4 portals. Two of these are used for NC workpiece management upline and downline of the machine. At the heart of the machine are four units with a total of 4 milling spindles. A turnover station is integrated into the plant for doors that require machining on both sides. Eight portal axes, six servo-controlled roller tables and the complex process logic are particular highlights of the plant. The demand from Righini for short lead times was given particular consideration during the design. In the MAKА solution, workpiece identification and tracking play an important role. The door blanks are given a barcode with the order-specific data before being loaded onto the machine. These determine the type of machining and which automation processes

are required for the specific door. The electronic data are checked for plausibility with no loss of time during machine loading.

A scissor-arm loader is used for picking the blanks from the stack. During picking of the blanks, the double door and rebate position detector ensures by laser distance measurement that only one door panel is picked up at a time. A check is also performed that the door is lying on the correct side. “The loading concept contributes significantly to the process reliability and stacking precision of the plant,” emphasises design engineer, Markus Hepp. The workpiece is then aligned on an external station and not on the machine table as with conventional machines. A special MAKА loading and alignment device was installed for this purpose. It picks up the door panel, aligns it according to the dimensions on the barcode pneumatically and then deposits it on the table again as soon as it is free. Markus Hepp: “The alignment of the parts is the most critical element for the machine speed. Our solution minimises the time taken for this process and also permits the highest possible positioning accuracy on the table.” Finally the parts are clamped by vacuum and machined completely without retooling, irrespective of the batch size. When all the raw panels of a stack have been machined to finished doors and stacked, the pneumatic sliding doors on the delivery side are opened and the stack is transported out. “We are very proud of the plant at Righini,” says MAKА managing director, Klaus Kern. “It is an innovative, customised solution that sets standards for precision, speed and flexibility.”

The latest methods were used also during commissioning of the plant. MAKА employed the Siemens Mechatronic Concept Designer (MCD) both during the production of the plant in the works and during the discussions and coordination with the customer. A virtual model of the planned machine made the design transparent in every respect. The digital twin is an extremely helpful tool even after virtual



commissioning. If Righini reports a fault or wishes for functions to be expanded, the MAKА staff can simulate and evaluate this in the MCD and prepare a solution without the machine being blocked or travelling expenses being incurred. “We will be using virtual commissioning in future for all customised machines,” emphasises the second MAKА managing director and initiator of the MCD introduction, Dr Jens Muckli. MAKА has proved itself here once again as an extremely innovative company. The Righini slogan, “Ideas that make the difference”, is unfortunately already occupied. A shame really, because it applies outstandingly also to the CNC specialists from Nersingen.

At the heart of the machine are four units with a total of four milling spindles. A turnover station is integrated into the plant for doors that require machining on both sides.



Maximum variety: Righini makes door dreams come true.

EVERYTHING
THAT
WOOD MACHINING
NEEDS.

**MAKA
HAS IT.**

Sturdy machine engineering
Powerful drives
Open control systems
No spacial or dimensional restrictions
Tool precision
High productivity
Intelligent parts handling
Resource efficiency
The complete solution from a single source

... AND THE LOVE OF THE MATERIAL.



Sales

Design Engineering

Purchasing

Assembly

Application Engineer

Customer



"Control room" planning tool. All the data for every order in your sights.

Guardian of space and time

A high workload is good, but presents the works with organisational challenges. The decision as to what is produced and where is the responsibility of the control room. The trained master of mechanical engineering and time&motion technician, Harald Bleher, together with his colleague Uwe Henschel, ensures smooth work scheduling. We spoke to him.

Every year, several dozen machines and plants for customers leave the MAKA works in Nersingen. From compact to gigantic, every size and shape is represented. Just as machines from standard to complex and customised with the highest level of confidentiality. When one of them has left the factory again, Harald Bleher breathes a sight of relief. The head of work scheduling needs nothing as much as space. As a long-serving MAKA man, he has registered the constantly high work load on the factory with pleasure. For his job, however, it means a great deal of planning. He recently had to redirect the production of a 60 metre long machine into an adjacent workshop. The dimensions had simply gone beyond the possibilities of the normal workshop. "Here in this workshop, the machine would have occupied ten assembly stations," says Harald Bleher.

The next enquiry is already lying on his desk in the small office from where he can oversee the work going on down in the production shop.

As usual, it has come from the internal sales team. Harald Bleher routinely scrutinises the new order for the information that is important to him: Machine type, industry, configuration, size and strokes, application, clamping devices, lubricants, guards. As a first step, he then contacts the design engineering department. He needs to know when the colleagues have free capacities to provide him with the parts lists. The whole scheduling depends on that. When he receives the parts lists, Harald Bleher then turns to the purchasing department. The crucial question is: When will the necessary parts be available for the assembly of the machine? As always, everything is urgent. The customer is waiting, he has the delivery time in black and white. If nothing unusual happens, there should be space in three days' time, thinks Harald Bleher.

The individual assembly stations in the workshop are marked. The space requirement is calculated in close cooperation with the shop supervisor. He has the layout of the production shop with the current situation in front of him on the monitor. Harald Bleher and his colleague, Uwe Henschel, have had the planning tool "Control Room" at their disposal for the last three years. The two of them can call up the data on every order at the click of the mouse. "A huge step forward

compared with the old system," says Harald Bleher. Until 2012, the team worked with MS Project – a rigid system that depicts only the existing situation. The new program offers far more possibilities. "I can see who is working on what and how much time has already been invested in a process," says Harald Bleher. The difference between the planned time and the actual progress gives him the information he needs on the status of the project. The time window is then adjusted automatically. The head of work scheduling can therefore decide at any time which adjusting screw has to be turned to keep the deadline. "The higher efficiency of the tool ultimately benefits our customers, as we can offer them shorter delivery times." Before that, however, there are a few other deadlines to be kept. Once the machine has been assembled, the applications engineer comes along. That is the person who accompanies the project from the very beginning and who is also the contact person for the customer later. A speciality of MAKA that the customers have come to appreciate. In this case he runs in the machine and carries out trial runs. Then comes the exciting moment of the acceptance test. Harald Bleher is there when the customer comes to the works. Extensive tests are performed to determine whether the performance specifications are achieved.

Only then can Harald Bleher tick off another project.

He likes the variety most in his job. "We are practically the linchpin for the production planning," he says. That is why there are interfaces to practically all the other departments in the company. From design engineering through sales, purchasing, assembly and the applications engineer through to the customer. His professional background is helpful for Harald Bleher in his job. He started in the assembly shop. Later he added training in time & motion (REFA). In this way he became familiar with plant organisation in addition to his practical know-how in machine engineering. Harald Bleher has been with MAKA for a total of 31 years. An old hand, so to say, who knows his way around. At some point, however, it all became too much for him on his own in work scheduling. That was when colleague Uwe Henschel came into the picture. He, too, has vast experience and is an ideal complement to his boss. His know-how as an electrician stands him in good stead, as does his commercial background. Together the two of them are a strong team that puts enthusiasm into their work. Typical of MAKA.

Machine type, configuration, size and strokes the collecting of information is one of the functions of the control room.



01

From tree trunk to filigree sculpture



02

Production of models and exhibits of all shapes and sizes is the specialisation of the Berlin-based company, werk5. Architects, designers and CNC specialists work hand-in-hand at the company. A MAKA MM7 plays the central role in the production of the exhibits, works of art and presentation pieces.

A lot of things are different at werk5. Although production is carried out on CNC machines, as in thousands of workshops up and down the country. But the workforce, customers and ultimately also the products differ significantly. The 24-strong team consists of architects, designers, model makers and CNC specialists. The customers include planners and builders, PR agencies and artists, galleries and museums. Well-known names from the international creative scene go in and out of the lofty old building of werk5. They all want just one thing: Their idea as a 3D object. The expectations are high. The "building block model" has long since made way for high tech. LED, interactive features, mechanisation and robotics are increasingly establishing themselves. The subject of accessibility is becoming more and more important. Many museums today demand Braille for their objects, and the raised characters are then milled with modern CNC technology. As far as the materials are concerned, there is one clear favourite: "Many of the parts are made today of CORIAN®," reports Gunnar Bloss, one of four managing directors at werk5. CORIAN® is a solid surface material. It looks like marble,

01 Milled on the MAKA: Model of Hedwig's Cathedral in Berlin.

02 Filigree tool in operation: Machining of miniature parts with the highest precision.

03 Architects' order: Upper West Berlin of CORIAN® for the Exporeal.

04 Programmed by experts: Free-form milling for Bugatti.



Creative mind: Gunnar Bloss is one of four managing directors at werk5.

"MAKA has won us many an order and new customers."

is available in 72 colours and can be thermally formed three-dimensionally and joined seamlessly. Those are important properties for werk5, because the products are often complex and have to look good. CORIAN® is particularly popular for exhibits in museums where the frequent contact every day demands a sturdy, easily cleaned material. In addition to CORIAN®, other plastics are used, but frequently also the unadulterated natural and high-quality material, wood.

The production process at werk5 is preceded by careful and thorough consultation with the customer. This includes the production of samples, but also milling tests. "The whole process is very technical right from the beginning," says Gunnar Bloss. Handicraft comes in only at the end of the process, when the often very complex models have to be assembled. Because the production is very digital-biased, the transitions between planning and CNC technology are fluid. The project develops in a constant interchange. "We produce almost exclusively one-off parts. The workflow here is completely different from that in series production," emphasises Gunnar Bloss.



03

CNC technology has been used at werk5 ever since its founding in 1995. It started with a 3-axis machine, before a 5-axis MAKA MM7 opened up all the possibilities in 2005. The machine has operated to the complete satisfaction of werk5 until now, as Gunnar Bloss is quick to point out. He is particularly proud of the fact that with this machine class in Berlin, he is practically unrivalled in his segment. "The MAKA is not only precise and reliable, but also very flexible," he says, praising the technology. That is due not least to the large z-axis stroke and to the generous tooling that covers milling cutters from 0.2 to 100 mm. The unit configuration of the MAKA also contributes to the flexibility. In addition to the set milling cutter, werk5 can also make use of 5-axis simultaneous milling. This method is used for freely formed parts that have to be trimmed after machining. In addition, werk5 benefits from the vast MAKA material competence. Not only metal, but the whole bandwidth of materials from which werk5 produces its models can be processed on the machine. The range extends from wood through PU foam right up to perspex. That also means a major challenge for the handling of the dusts. Dust extractor and chip collection system are designed accordingly. The machine is also surprisingly resistant to fine dusts, says Gunnar Bloss.

In a company that produces almost exclusively one-off parts, quick retooling is naturally an important aspect. Here again, MAKA convinced the decision-makers. One advantage is the pure size of the machine. Although a concrete floor had to be laid specially for the 3 m long and fairly heavy machine in the production shop, the table offers above-average machining possibilities. Some objects wouldn't have been possible at all using another technology due to their pure size. "With this, MAKA has won us many an order and new customers," says a delighted Gunnar Bloss, who sees in this a unique selling position for werk5: "When the technical implementation is challenging and time is of the essence, we are the right partner when it comes to model making."

There are enough examples of that. The flexible CNC technology from Nersingen enabled the model of the architect, Christoph Langhof, for the spectacular Upper West skyscraper in Berlin to be produced. The MAKA offers the productive platform also for fairly unusual ideas: An artist recently commissioned werk5 to produce a sculpture. The raw material was delivered in the form of a three metre long lime tree trunk. Thanks to precision programming work and high-quality machining technology, it was quickly turned into a work of art on the MAKA.



04



LMC has been relying on MAKА know-how for three decades.



The quality is right: Johannes Kreimer and Markus Grabosch from LMC are pleased with the milling result, right Michael Meer, MAKА Sales Manager North.

The Fun of travelling in a sandwich

The “house on wheels” is not only a hit in the Netherlands. Caravans and mobile homes are in demand also in Germany. The product range from LMC is particularly popular. When it comes to the machining of the outer shells with their pressed sandwich design, the premium manufacturer has been relying on MAKА know-how for three decades and has just ordered two new machines again.

Everything started in the 1950s with the models Knospe and Falter. Today the caravans built by LMC Caravan GmbH & Co. KG in Sassenberg in the north of Germany are called Style or Maestro. Mobile homes complete the product range. Whereas in the early days, the solid roof over the head was the real advance, today the trend is “connectivity”. In the comfortable vehicles of today, almost everything can be controlled by app from the outside in the meantime. Despite the growing demands, the main purchasing argument for LMC customers is still the same as 50 years ago: The desire to travel. Some 6,500 caravans and 1,500 mobile homes currently leave the factory every year – and the number is set to rise. More and more young families are catching the camping fever. In the near future, a

new production shop twice as large as the existing shop is planned in order to meet the growing demand. That will allow an expansion of the production capacity to 14,000 caravans. In the medium term it is planned that all the caravans of the Erwin Hymer Group (EHG), to which LMC has belonged since 1991, should be produced in Sassenberg. The Group includes such illustrious names as Dethlefs, Eriba or Bürstner. LMC will thus further strengthen its position as premium brand and competence centre for caravans within the Group. The production for all brands has been concentrated in Sassenberg for some time already. A platform strategy – common in car production – is employed. On the uniform basis, the vehicle receives its brand identity from the various attachment elements.

The milling and drilling for the functional openings in the outer shell and the formatting of front, rear and side panels and roof of the caravans have been carried out on CNC machines since 1988. At that time the company invested in the first MAKА. As part of the production expansion, this machine was replaced by another machine in 2013 – and again the Sassenberg-based company relied on MAKА technology. In the meantime, orders have been received for two further machines from Nersingen. Following the installation of these two machines, the whole machining process at LMC will have been converted to MAKА. There is no great difference between the three machines – a calculated decision to ensure interchangeability. After all, the same products are to be produced on all three machines. Furthermore, the standardisation offers maximum cost-effectiveness when it comes to maintenance, spare part procurement and tooling. For this reason, the existing machine will also be converted to the extremely high-performance MAKА spindle that is already part of the overall package of the two new machines. There are obvious reasons why the company relies completely on MAKА. In Sassenberg, everyone is very satisfied with the cooperation. “In addition to the high quality of the machines, we also appreciate their flexibility. Special machine production is one of the particular strengths of MAKА and gives us as customers plenty of scope to fulfil our wishes,” says Markus Grabosch, head of work scheduling. All the machines

were designed in close cooperation with the MAKА technicians. On the basis of a two-portal CNC centre from the standard product range, a solution was created that is ideally tailored to the needs of LMC. One of the highlights is the lowerable belt drives for moving the parts. Furthermore, the NC suction pad positioning units can be programmed in advance on the LMC machine. The machine is also able to automatically position and simultaneously produce up to



01 First choice at LMC in future: The MAKА spindle, the power pack for maximum machining performance

Flexible MAKA technology for high-quality material mix.



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six individual parts. "MAKA was the only company able to meet these demands," says Markus Grabosch. The decision in favour of MAKA was taken not least due to the Longlife technology. With this standard, LMC sets not only the benchmark for quality, but also makes high demands on the machining technology. The high-quality material mix calls for a great deal of competence in the handling of different materials. MAKA was particularly able to score here with its decades of experience with composites, aluminium and wood. Sitting together at a table with system partners, an extremely efficient solution was also found for the dust extraction. Particularly during the machining of PU and GFRP, dusts are produced that present a major challenge. The solution employed ensures that no dusts can escape into other areas of the production. A lip channel is used here. In addition, the MAKA is coupled to a cleaning system that cleans every part in a single pass after machining. A critical point when it comes to changing over to a new production system is sometimes the question of control system, interfaces and software adaptation. Not so in this case. "The planning and coordination with the system partners involved, MAKA, Cobus and IMR was absolutely unproblematic and results-oriented at all times. That was not easy, because we had to clarify down to the last detail who needs what signals and where, and who has to provide these signals," recalls Markus Grabosch.

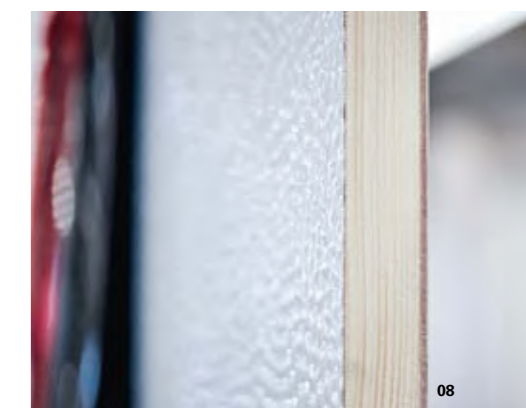
A complete production line consists of 5 stations. All the machines within the line are

networked and communicate via the Cobus NCAD controller with the upline and downline stations. All the production programs are generated in the work scheduling department. The actual control of the machines is the responsibility of the team leader on the production line. He specifies which parts are to be produced and in which order. A barcode ID on the parts is used for this purpose. The materials required for the particular order are then brought into place. Finally the parts are pressed together according to the corresponding bonding pattern. Via the control system, the MAKA receives the information on the part just leaving the press. Every finished panel that is loaded automatically onto the MAKA consists of different layers. The "sandwich" generally comprises an outer layer of sheet aluminium or GFRP, a lattice-type middle layer of Fita or PU strips whose spaces are filled with XPF material or polystyrene, and an inner layer of plywood coated with paper. The first portal of the machine travels over the board and drills the holes, the second performs the milling operations. The double portal minimises the machining times. The MAKA is designed for panels measuring up to max. 9000 x 2600 mm. Alternatively, up to 6 smaller parts can be machined, while the instructions from the controller ensure that maximum use is made of the panel. Small parts are moved up against the stops under individual control. In this way, for example, a side wall or 2 front and 2 rear sections can be machined at the same time. When all the required constructional openings such as doors, windows and supply ducts have been produced, the

panel is milled into its final form. The panel is then automatically transported for further processing in the shop. "The machining quality is very good and the productivity high," emphasises Markus Grabosch, who is already looking forward to the two new MAKA machines. The future production concept provides for the roof and the front and rear sections to be machined on the existing machine. One of the new machines will then be used for the side panels that until now are still machined on another CNC centre. This machine will have to make way. "MAKA technology is simply more flexible," says Markus Grabosch. Finally, the second new MAKA machine will be used for the production of all the parts. "With the three new machines, a service contract makes sense," says the head of work scheduling, who has great praise for the service provided by the MAKA team to date. With full MAKA power, there are no obstacles to the capacity expansion.



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01 Lightweight sandwich: Foam filling around a functional opening.

02 Adds stability: Side panel with plywood layers.

03 Convenient: Free-moving operating terminal.

04 Advantage MAKA: Table with automatic feeding and discharge.

05 Milled and drilled: That's how the side panel comes out of the machine.

06 A camper's dream come true: Assembly of the caravan body.

07 Sizeable part: The finished side section is up to eight metres long.

08 Cleanly milled sandwich: Side panel material mix with sheet aluminium and two timber plies.

09 Maximum yield: The board is optimally divided into workpieces.

With **thermoface** to the perfect MDF surface



Profiled doors have never gone out of fashion. And the structure is coming back also to the furniture industry. For the machining operation, however, the groove is a greater challenge than the flat surface. Things get difficult when the tool mills through the top layer of the MDF board into the softer middle layer. During coating, "the paint is then just swallowed", as Michael Meer, MAKA Sales Manager North, describes the situation drastically. The rough surface then has to be smoothed in several time-consuming grinding and filler steps. The achievement of a uniform quality is almost impossible, particularly with V grooves.

The solution here is a very simple but effective process: Thermofacing. It was developed by MAKA together with the Institute for Wood Technology Dresden (IHD) and the saw specialists, AKE, and is successfully in use at more and more MAKA customers. All that is required for the process is a tool for milling the profile and a separate unit analogous with the profile, but without blades. This stationary tool has an induction heater. It is heated to around 400°C and pressed into the joint. A cartridge heater keeps the temperature at a constant level. In this way, the machined surface is plasticised. Now, where otherwise scuffed fibres stand up, a thin layer of high density is produced that looks like clear lacquer. Practically no finishing is necessary.

Thermofacing makes the machining of profiled surfaces far more cost-effective. At door manufacturer, Kontrast, where milling and smoothing are performed in parallel on a MAKA shuttle table, unit costs and lead times have been significantly reduced. Garant Türen is another wood processor who has just decided to install the equipment because there is still space on the MAKA for it. The Thermoface process is essentially of interest wherever profiles are milled on CNC machines. In companies that work with powder coating, it is the almost essential basis for top quality. "We are seeing a growing demand for machines with integrated Thermoface," says MAKA managing director, Dr. Jens Muckli. Anyone considering investing in the innovative process should contact his MAKA sales contact. Arrangements can then be made for tests and trials with the customer's own workpieces to be carried out at the IHD in Dresden.

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