

# MAKA

## INFO 04

Future: Megatrend lightweight construction

Profile machining: Solid partnership

**Investment: That's why it should be a MAKA**

Automation: Heading for the intelligent factory

Safety: The subtle but important difference

Automotive: Holistic door opener competence

Technology: First step to achievement



# Dear readers,



Klaus Kern, Managing Director



Dr Jens Muckli, Managing Director

an important contribution to the process optimisation. MAKA sets standards in the machining precision and the handling of dusts as well as providing comprehensive tool expertise. We are leaders in NC work piece handling and your competent partner for the introduction of innovative processes such as laser machining.

MAKA technology is in demand worldwide. An important role here is played by the Asian market. With the recent establishment of a subsidiary in China, we have further expanded our presence in the region. The positive development with complex tasks led us to install a dual leadership in the board of management. Dr Jens Muckli has now joined Klaus Kern in guiding the fortunes of the company. He is responsible for design, production, service and the commercial sector. Klaus Kern will in future focus on sales and the expansion of the Asian business.

Your technology partner, MAKA, has taken up the challenges associated with growth. Grow with us. We are looking forward to a good cooperation – in all your production tasks for aluminium, composites and wood.

Aluminium is the material of the future. Not only because it is the most widely used metal. Aluminium is the ideal material for energy-efficient lightweight construction. An average car today contains 150 kilogrammes of aluminium. Some 50 million tonnes of the metal were produced worldwide in 2014. Every year, the demand rises by around 4 percent. Companies involved in aluminium processing have all the trumps in their hand – as long as they produce efficiently. With the help of MAKA.

MAKA can help them here with 5-axis CNC machining of light alloys. Our customers come from the automotive industry as well as from curtain wall construction, the aerospace industry, boat making and the sector for other supporting structures. The customised MAKA machine concepts make





Whether in aerospace, automotive or any other advanced industry. Success is the sum of right decisions. One of those is the decision in favour of a customised MAKACNC solution.





# A masterpiece of statics

Creating rooms in a minimum of time that can be quickly dismantled again if necessary is a great challenge – anyone who wants to be successful in this business needs a great deal of know-how in lightweight construction. Losberger has mastered the balance between supporting structure and shell to perfection. The most recent project is a 60 metre wide self-supporting marquee. For the machining of the long aluminium profiles for this project, they chose the technology from the profile machining specialist, MAK A Systems.



**01**  
Gigantic: Maxiflex marquee

**02**  
Ready for shipment: Structural profiles after machining

**03**  
A giant puzzle: Parts before assembly

**04**  
Network: Supporting structure from above

**05**  
Airy: Lifting platform for assembly

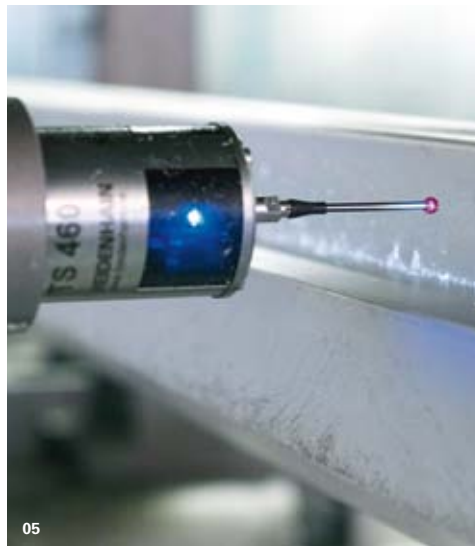
# “Very few can do what MAKA can do”

Losberger started out as a classic marquee constructor. But “mobile construction” is probably a better description of the company’s challenging field of activity today. In the meantime, Losberger has become one of the world leaders in this industry. Apart from constructions for events and storage facilities, halls for industry, trade and commerce as well as modular residential units or “housing units” are produced at the company’s headquarters in Bad Rappenau. Plus a wide variety of different room solutions, starting from inflatable tents that can be erected within minutes, through containers and room modules right up to hangars and airport terminals. The temporary room solutions with their system design have to be extremely robust and satisfy, if necessary, high demands on comfort. As a full-line provider, Losberger can meet practically any configuration wishes and supplies turnkey solutions. Most recently the company built 40,000 m<sup>2</sup> of tents for the Olympic Games in Rio. But anyone who has celebrated in one of the beer tents at the “Cannstatter Wasen”, one of the world’s largest folk festivals, was most probably under the roof of a Losberger construction.

Many products are developed by engineers of the Losberger Group, are produced there and are marketed from the sites. The most important core competence of the production alongside the plastic-coated heavy fabric for the tent covering is the aluminium supporting structure. The starting material for that is supplied as bar material. Production manager, Dustin Kadlubsky, summarises the subsequent machining process: “The extruded profile is sawn, milled, deburred and chamfered in our works.” Losberger recently extended the CNC machine on which these steps are performed with a customised MAKA solution. “We needed a technology that met our current aspirations, and we also wanted to be faster,” says the production manager. A major role in our deliberations was played by the newly developed maxiflex P10 marquee. With a span of up to 60 m without intermediate pillars, it is around 10 metres wider than its predecessor and thus sets new standards. The demands on the supporting structure have changed



01



05



03



06



07



08



**01**  
Individual: MAKA PA 37 as a customised solution

**02**  
Good team: Dustin Kadlubsky and MAKA applications engineer Hans-Joachim Paduch

**03**  
Everything in view: 4 cameras monitor the inside of the machine

**04**  
Automatic: Feeding of the raw material

**05**  
Precision work: Detection of the position of the work piece before machining

**06**  
Sturdy mobile construction: The aluminium profiles are machined using MAKA technology

**07**  
One last check by means of simulation

**08**  
Automatic: Discharge of the finished part

**09**  
Turning station: Changing of the machining plane



accordingly. Profiles measuring 420 x 120 mm are now required. Dustin Kadlubsky: "Our central demand on the new machine was the machining of profiles up to a height of 500 mm." The old machine couldn't manage that.

MAKA was on the shortlist of technology partners for the new investment from the very beginning. "There are very few suppliers of special machines on the market that can do what we need. We made the right choice with MAKA," says Dustin Kadlubsky. The PA 37 continuous-pass machine was customised to the required profile dimensions by the MAKA design and construction team. The inevitable larger volumes of waste material can also be easily discharged via the installed wider machine bed.

Losberger also took a step forward in efficiency from the point of view of automation. Dustin Kadlubsky: "The MAKA machine has clamping elements with their own motor for positioning. On the old machine, the portal still performed this function." The two machine generations stand side-by-side in the workshop and are used for similar production applications. A big advantage when it comes to identifying differences: "In a direct comparison for which we used a number of identical profiles, we discovered an increase in productivity of 15 percent," says Dustin Kadlubsky, reporting on the initial experience with the new MAKA technology. He also has praise for the quality of machining, including the deburring of the bores. And the production manager was very satisfied with the cooperation: "The MAKA service staff were very quick and flexible in the start-up phase. Having such a partner gives us the confidence of being able to keep our delivery dates even in the event of any problems."



# MAKA PU A NUTSH

You want to invest? Here you can find

1

## **Innovative development and design**

One idea more – that is characteristic of MAKA solutions. Where others are happy to just reach into the drawer, that is where we get to work.

Being a MAKA engineer means looking for the special challenge. We bring you the crucial step forward and are your reliable partner on the road to Industry 4.0.

2

## **High machine availability**

Technical competence does not end just with innovative solutions. Your machine has to operate reliably also under the tough conditions of day-to-day production. Only then does it give you the expected return-on-investment.

MAKA machines are sturdy and durable. Produced from excellent materials and by employees who have clear quality requirements.

3

## **Customised industry solutions**

You want a standard machine? No problem.

But it is something else that we are well-known for worldwide. Our mission is to provide the customised solution. No matter how special your production application may be. No matter whether you have to machine light alloy, plastics or wood. No matter what industry you are involved in. Our concept will be a perfect fit.

4

## **Excellent CNC competence**

MAKA was already building CNC machines when many people still didn't know what the abbreviation stands for. That was almost 40 years ago. Today more and more complex systems are demanding precisely this accumulated know-how. You will immediately recognise the assuredness in the command of up to 70 axes and 6 sides in the discussions with our specialists.



# PUTS IT IN HELL

out why it has to be a MAKA.

5

## **The whole system technology from a single source**

CNC systems are becoming more and more complex. That's why the whole package offered by your technology partner has to be just right. MAKA has the central competences for machine, tool and automation in-house. And we have well-proven, strong partners for highly specialised tasks. Always with a view to finding the best solution for you.

6

## **Maximum added value**

Anyone who has a customised machine configured by MAKA wants to be a step ahead of the competition. MAKA traditionally stands for the highest productivity, profitability and work piece quality with maximum material yield. Our test engineers will prove it to you. Naturally with your raw material.

7

## **Aspiring service**

Anyone who knows MAKA service knows that we don't need to talk about matters of course such as hotline or spare parts stores. MAKA service is enthusiasm and a sense of responsibility. And that is also why MAKA service is regarded as one of the best in the world. With a performance that gives you the assurance of always being in the best hands.

8

## **Top references**

From aluminium to composites and wood machining – the names of the MAKA customers read like a Who-is-Who in these fields of business. High-tech industries such as automotive or aviation rely on MAKA technology just as much as segments with a long tradition. That's something we are proud of.

# On the road to the future of production

State-of-the-art competence in automation technology opens up a boundless market. That brings an enormous variety of products to challenge production. World market leader Festo has now taken a big step forward and is steering resolutely towards Industry 4.0 using intelligent technology from MAKA Systems.

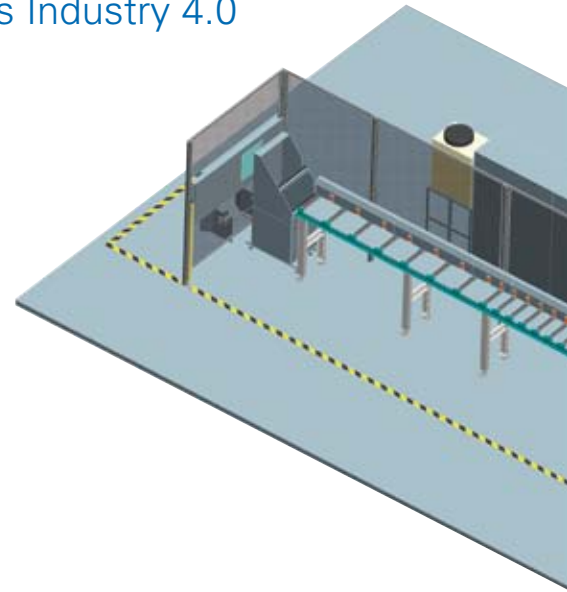
The family-owned company Festo with headquarters in Esslingen is a giant: Some 18,700 employees in more than 250 branch offices around the world generate an annual turnover of EUR 2.64 billion. Festo is successfully established in practically all branches of industry – from the automotive through the chemical up to the textile industry. The automation specialist's huge portfolio includes approx. 33,000 catalogue products in several hundred thousand variants. When last year the modernisation project for the production at the St. Ingbert site was launched, competition among suppliers was correspondingly high: "We wanted the perfect solution, not the cheapest offer," emphasises Kai Peter Felten, responsible for process planning and optimisation in St. Ingbert, looking back.

The invitation to tender was for a CNC machine for the production of extruded profiles as the basis for linear drives and electric axes. The central demand was for the cost-effective production of batch size 1. The basic conception was for a highly automated flexible continuous-pass solution with short cycle times. An innovative technology was expected that should also represent a step towards Industry 4.0. A first attempt towards the digitisation of production had been unsatisfactory. A partner was now needed who could present a future-viable overall concept with a reliable process communication system on the basis of profound mechanical competence. "A system in which the feasible maximum was uncompromisingly called for across all the components, and where the

question of costs was only secondary," recalls MAKA design engineer, Markus Hepp, looking back on the initial discussions. The customised solution from Nersingen was chosen against strong competition and has been installed in St. Ingbert in the meantime.

On the machine, the work pieces delivered as bar profiles in lengths from 5.50 m to 10.5 m are first separated into the individual orders before the front face is machined in a continuous pass. The essentially fairly unspectacular process takes its complexity from the fact that no two parts have the same length. "The raw bars run through a cutting computer that determines the optimum cutting lengths with minimum waste on the basis of different customers' orders," explains Kai Peter Felten. The parts are always machined in batch size 1. "The challenge for the technology is the great variance in the raw materials," explains the expert. 180 different profile geometries have to be precisely identified, clamped and reliably assigned to the respective work steps.

Highlights of the MAKA system are the complete control of the machine from the ERP system, the special tables for part handling, the internally cooled milling spindle and the linear changer with 100 tool places. MAKA takes particular pride in the digital component of the solution: "In addition to the Sinumerik controller there is a MAKA host computer that has an interface to the Festo production computer and is able to integrate the existing data into the newly cre-



ated process," emphasises Andreas Heinemann from MAKA IT. A key role in the successful implementation of the system was played by the long-standing business relations between the MAKA specialists and the system partners involved. The experts for processor technology, software and internal cooling met alternately with Kai Peter Felten under the coordination of the Nersingen-based mechanical engineering company. "The efficiency of the meetings was very good," says the Festo expert summing up. The machine will be going into production in the next few weeks. "We're making good progress," says Kai Peter Felten. "For the future we could imagine that one operator will be sufficient for several machines with such an intelligent system," he says, looking to the future of an investment with signal character for the Festo St. Ingbert site: It is the first machine project geared towards Industry 4.0.

**01**  
 Absolute precision:  
 High demands have to be met  
 in lightweight construction



**02**  
 Chip coding:  
 Checks whether the right  
 clamping jaws are installed



**03**  
 Tooled for performance:  
 Festo uses original  
 MAKA saw blades



MAKA is at  
 home where  
 progress is to  
 be found.



**04**  
 Highly efficient internal cooling:  
 Is effective where most  
 of the heat is generated



**05**  
 Fast tool changer:  
 Capacity for 100 tool places,  
 high-speed shuttle to keep pace



**06**  
 Linear transport:  
 The tool is in the right  
 place at the right time



01

02

01

Length measuring probe: Every strand is cut to optimum lengths

02

High degree of automation: Digitally controlled part transport

03

Safe system: Light barriers communicate with the computer

04

Absolute precision: Measuring probe for complex applications

03

04

# State-of-the-art aluminium machining

**Festo's customised MAKA PA 37 is worth a closer look. Driven by the high demands of the automation specialist and guided by the creative potential of the MAKA design engineers, a solution was found that sets standards with both the overall concept and in detail. At the same time, the implementation is a perfect example of a successful system partnership.**

## Combined minimum quantity cooling and lubrication technology

Festo's MAKA PA 37 has a milling spindle with dry lubrication and internal cooling. It is the first time that this innovative principle has been used together with the new MAKA spindle.

During the aerosol dry lubrication, high-performance oil is forced under pressure through a diaphragm and finely atomised. The particle size is many times smaller compared with the classic minimum quantity lubrication process. Only the amount of lubricant that evaporates during the cutting process and can be drawn off by electrostatic extraction is injected at the tool tip. In this way, outstanding lubrication is achieved with a significantly reduced lubricant consumption. Furthermore, there are no lubricant residues – the part comes out of the machine clean. Kai Peter Felten from Festo: "Normally the parts have to be degreased after machining before they can be assembled. With the aerosol dry lubrication process, we eliminate the washing process and reduce the consumption of process medium by a factor of 8."

But aerosol dry lubrication has another advantage: It achieves a highly efficient cooling effect at the cutting tool. The "internal cooling" is particularly interesting because the medium can be applied exactly at the point where the tool contacts the work piece material. The "generous" lubrication from the outside is therefore now a thing of the past. After good experience with the lubricant supplier, Menzel, Festo has now integrated the innovation into the new production in cooperation with the MAKA technicians. The combined minimum quantity cooling and lubrication technology is a reliable process and – with a minimum of adaption – increases the productivity of the highly automated machining centre.

## Intelligent parts management

The Festo machine is equipped with special tables that were geared to batch size 1 production and which allow highly efficient handling of the aluminium profiles with minimum staff requirements. All four moving cross bar tables have quick-change clamping jaws with integrated, pneumatically controlled hold-down devices. The actual technology



05

**05**  
Minimum set-up time:  
Clamping jaws are  
changed in 6 seconds

**06**  
All-sided machining:  
Milling of the front faces  
from all sides

**07**  
Batch size 1:  
180 profile geometries  
have to be handled



06

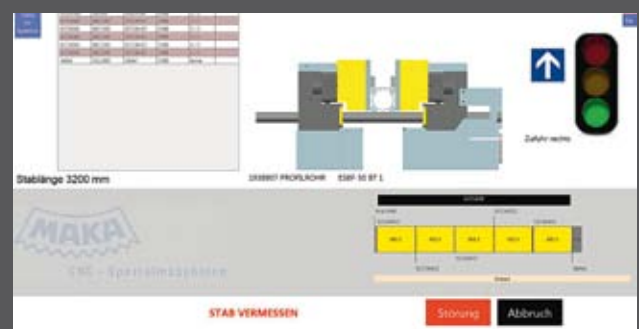


07

is therefore inexpensively integrated into the cross bars proper. The hold-down pressure is variable and can be adapted individually, depending on the profile geometry. A chip code enables the machine to check whether the right jaws are installed. The machine is so intelligently designed that it automatically calculates different travel logics of the NC cross bars which clamp the part and transport it through the machine chamber, depending on the part length.

### Flexible tool use

180 profile geometries are produced on Festo's MAKA PA 37 for which around 60 different special tools are required. MAKA has therefore integrated a linear changer with 100 tool places and a high-speed shuttle into the machine concept. The tools are thereby arranged in a frame over the whole machine length. The machine travels at 100 m/min past the tool changer, selects the tool required for the particular production process and hands it over to the spindle. The changing location is variable according to the point at which the machine is working at that particular moment. A special feature of the Festo solution is that there are 5 of each milling tool in the tool changer. MAKA design engineer Markus Hepp explains: "The machine thus has quick access to the same tool again when the one tool has become worn."



### "First Festo machine geared to Industry 4.0"

The machine is completely controlled from the Enterprise Resource Planning (ERP) system. Heart of the system is the MAKA host computer that acts as communication manager between the Festo order management system (SAP side) and the control system (on the machine side). The operator receives the complete week's production as main program displayed on the screen and then decides what he wishes to produce in what order. The machine therefore knows what tool it needs and requests this from the magazine. The operator sets up the machine and finally checks the process. In addition, the system allows a 3D simulation of the production and offers collision protection for the whole machine. For Festo, the new MAKA PA 37 is the first machine geared for Industry 4.0. Kai Peter Felten: "With this configuration, we have taken a major step forward towards our goal of digitisation of our process and plant technology."



**Gerhard Polzer** Head of Service Centre

# 49

Eight from

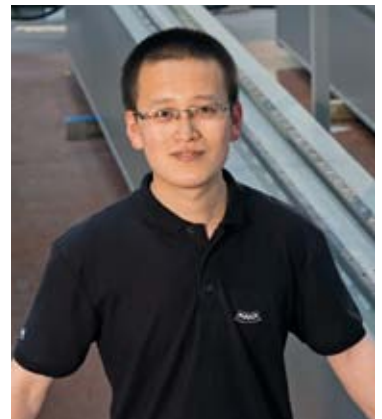
# Full Service



**Karin Schöffler** Spare parts sales



**Michael Hanke** Internal coordination



**Jian Zhang** Service and applications technician, Asia region



**Tobias Doser** Service Centre/Retrofit

**Patrick Fischer** Head of Technical Hotline



**Jutta Brosa** Order processing



**Bernd Wiedenmann**  
Hotline

## “MAKA Systems, How can we help you?”

The eight ladies and gentlemen that we wish to introduce to you here all have one thing in common: They all work to ensure that the many MAKA machines worldwide run perfectly. And because MAKA attaches great importance to customer satisfaction, they form part of a big team: 49 people work in our Service department. With their know-how, their enthusiasm and the wide range of MAKA services, they ensure maximum machine availability day in, day out.

Comprehensive service as MAKA defines it involves a great deal of effort. “The demands on reaction time, contactability and part availability have grown,” says Patrick Fischer, Head of the Technical Hotline. The processes within the department have been specially adapted accordingly. Remote maintenance with which MAKA can identify and remedy problems from Nersingen is increasingly in demand. Every new MAKA machine is equipped with the necessary technology, older machines can be retrofitted. “We are pioneers in our industry with our hotline quality and offers such as remote maintenance, and the word spreads fast among the customers,” says Patrick Fischer. He is responsible for the team that can be contacted by the customers by telephone, for the 25 field service technicians and for the internal coordination. Organisationally independent is spare parts sales headed by Ewald Goefsky. At the head of the whole department is Gerhard Polzer, an experienced service man for whom customer service is a passion.

More and more often it is not technical problems that keep the hotline busy. A large number of callers are interested in service products. Service contracts – very useful, but frequently underrated in the past – are better received today. “In modern production systems, the technology that was previously spread over several machines is now concentrated in one place. Hence the risk of failures becomes more acute for users and they are more receptive to prevention measures,” reports Patrick Fischer. Retrofit is also very successful. The retrofit concept enables older MAKA machines and systems

already in operation to be brought up to the performance level of the latest technology with comparatively little investment. The possible measures range from individual mechanical components up to the controller. Complex modifications are also possible, for which a separate design and construction team headed by Patrick Fischer has been set up in the Service Centre.

MAKA service is particularly in focus thanks to the positive sales development. The rapid growth in the number of customers is particularly noticeable in the Asian region where MAKA is expanding most strongly. MAKA has already reacted to this development with the establishment of a service branch in China. “It is important for us that we can offer the same first-class on-the-spot service in China and the neighbouring countries that customers have come to expect from us in other regions,” says managing director, Klaus Kern. Customers confirm time and again that MAKA service really does set standards. Wolfgang Schöller from Bavaria Yachtbau and Heiko Wohlgemuth from automotive industry supplier, Quin Deutschland, are highly impressed. For Peter Rauch, managing director of CNC Manufaktur in Baden-Baden, MAKA service is even “way superior to that of other providers”.

Head of MAKA service, Gerhard Polzer, a typical team player who identifies himself closely with his department, is naturally pleased to hear this: “Such statements are confirmation of the efforts made by our team, and at the same time an incentive to become even better.”



# Great challenge Automotive

**The automotive industry is a highly coveted customer among mechanical engineering companies. Many want to get in, very few achieve it. MAKA is already firmly established there – a clear indication of the lightweight construction competence of the Nersingen-based CNC specialists.**

Comfort and safety features have made cars increasingly heavier. Whereas in 1981, a middle-class car such as the Opel Ascona weighed only around 900 kg, the current successor model, the Insignia, today weighs in at around 1,500 kg. The SUV boom with vehicles easily in excess of 2,500 kg is a further chapter in this development. The manufacturers are now taking steps to stop this trend. Not least because less weight also means less pollutant emissions, and infringements of ever more stringent standards result in heavy fines. One proven

means in this direction is the use of lightweight materials. With its extremely low density, aluminium is roughly two-thirds lighter than conventional steel. Relatively high rigidity and strength with very good forming properties and outstanding resistance to corrosion make it an excellent material that can be easily processed.

In 1994, Audi was the forerunner with the A8. Since then the aluminium content in motor vehicles has risen rapidly. Whereas cars produced in Europe already contained around 120 kilogrammes, this figure has already risen in 2015 to an average of 160 kilogrammes, according to estimates by the German Federation of the Aluminium Producing and Processing Industry (GDA) in Düsseldorf. A sharp rise in this curve is expected for the future. The current Jaguar XE is the first vehicle in its class with a body shell made completely of aluminium that

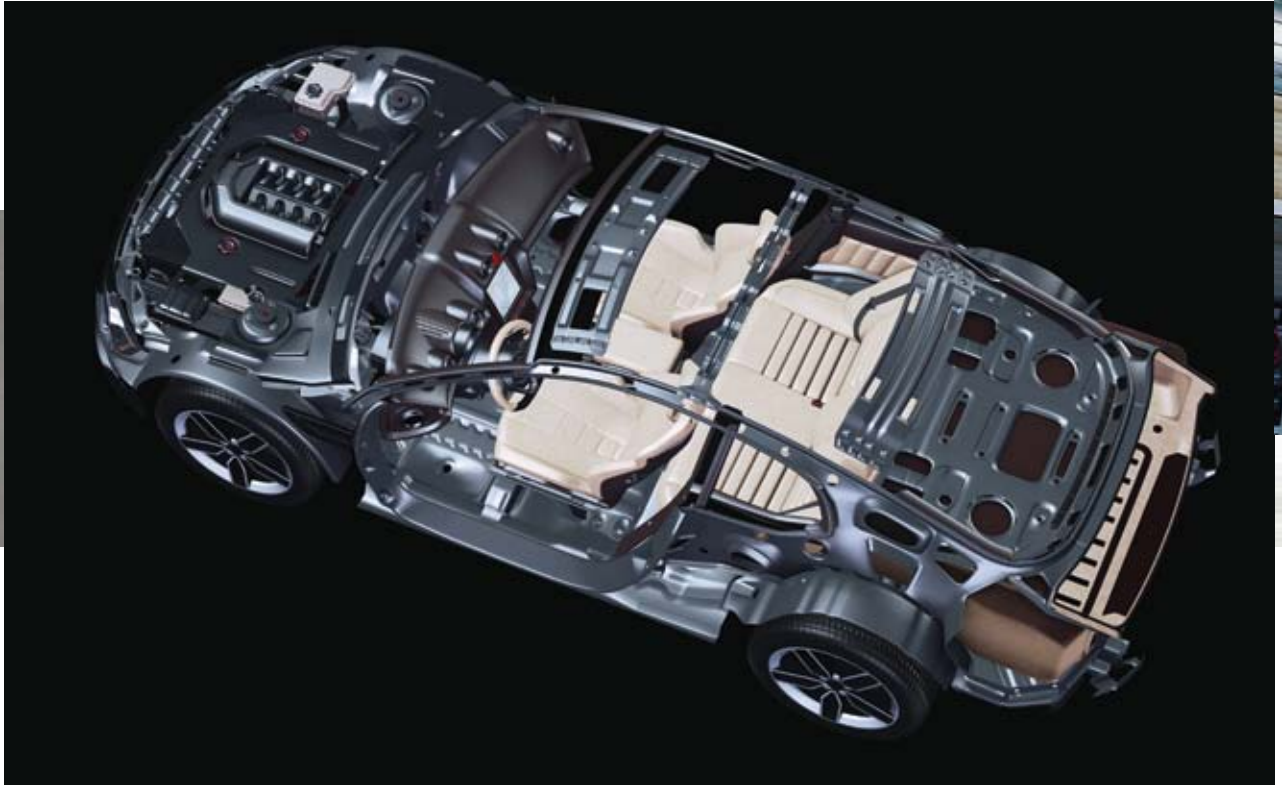




weighs only 251 kilogrammes. Audi uses space frames of multi-material that integrate hot-formed steel and aluminium and which make large SUVs such as the Q7 71 kg lighter. In the meantime, the vehicle body of the A8 weighs only 231 kilogrammes thanks to the ASF architecture and the material mix. Made completely of steel, the same body would be around 40 percent heavier. But aluminium is not only used in the chassis and outer shell. Components such as the powertrain, the seats, brakes and wiring are also included in the "dietary measures" and contribute to the overall weight loss balance.

In order to achieve their ambitious targets, the car manufacturers lay down quantitative specifications for their developers and

suppliers for the continuous reduction in weight of the components. This leads to a permanent pressure of innovation along the whole value-added chain. The machine engineering companies are ultimately also called upon to supply high-quality, efficient and cost-effective production technologies. With its CNC experience in aluminium machining, MAK A has earned itself an outstanding reputation in the automotive sector. Key Account Manager, Saladin Zolotic: "Our customers are predominantly the suppliers with whom we maintain a good relationship based on trust." The large group of partners includes top names such as Alcoa, Faurecia, Dura, Benteler, Magna or Quin. Companies who work for the elite among the car manufacturers.



## State-of-the-art technology for top products

AMG, Audi, Bentley, Ferrari. Illustrious names that are synonymous with exclusivity. Many of these vehicles are equipped with MAKА technology. The flexible turnkey concepts for the machining of the aluminium profiles, in particular, impress the top players in the key automotive industry, both national and international.

Aluminium has an outstanding position among the various material competences at MAKА. In terms of total turnover, it is currently well ahead of wood and composites. One success factor is the know-how in CNC machining and the construction of customised machines gained over almost 40 years. Particularly when it comes to aluminium machining, MAKА can look back on an even longer tradition. An oscillating chisel mortiser for aluminium profiles was presented at the International Machine Tool Exhibition in Hanover as long ago as 1970. Since then MAKА has repeatedly given new impetus to the enormously dynamic industry. In the meantime, the ever more demanding customers are expecting high availability paired with maximum flexibility. The engineers at MAKА had foreseen this trend and brought special solution models for the needs and

demands of the aluminium processing industry to the market.

The MAKА aluminium competence is particularly well established in the automotive sector. Fields of application for MAKА technology are cars, trucks, rail vehicles and special-purpose vehicle manufacturing as well as caravan and commercial vehicle production. High-performance CNC machine tools for work pieces measuring between 1x1 and roughly 6x20 metres, easily accessible tables, simple loading and minimum tool changing times have contributed significantly to this.

5-axis MAKА machines offer outstanding freedom in space and dimensions. High work feeds, outstanding precision and mature energy-saving concepts are further



## MAKA Automotive Competence on board



characteristics of the MAKА technology. Practically all leading suppliers rely on this know-how from Nersingen. The many years of experience with other materials also prove to be a great advantage. "As all-rounders, we unquestionably benefit from synergies," emphasises Saladin Zolotic. The reason for this is the increasing trend towards multi-material in lightweight construction.

In 2009, MAKА attracted great attention when they succeeded in integrating CNC solutions into assembly lines for the production of the new Porsche Panamera. The DC 7 concept with vertical clamping has also proved to be very effective in the automotive industry, as it makes the machines very compact. At the supplier Quin in Romania, a space saving of 40 percent is achieved compared with conventional machines with a horizontal double table. Furthermore, the DC 7 machines have a rotary table that reduces set-up and machining times. The work pieces are clamped on the jig hanging vertically downwards. While one part is being machined on the one side, a finished part is being replaced with a blank on the other. The rotation takes just a few seconds. At Quin, the DC 7 also have two spindles that machine the work pieces simultaneously on one side of the table. But MAKА technology is not only well-proven in mass production. For the complete machining of the space frame for the exclusive Ferrari California in one pass at the former company of Alcoa, now OMR Automotive, MAKА developed the CM 27t X CNC machining centre that is characterised by numerous innovative features. An absolute revolution for aluminium machining on a CNC machining centre was the possibility of rotating the

space frame, including clamping fixture, by a full 360 degrees. Some models from AMG, the high-performance brand of Mercedes, contain more than 100 parts manufactured on MAKА machines. MAKА presented one of these exclusive vehicles at the Aluminium Trade Fair in Düsseldorf, thereby documenting the high standing that its CNC solutions have in the automotive sector.

Innovative technologies for process optimisation, such as tool shuttle and high-performance spindles produced in-house expand the MAKА machine portfolio into the type of attractive comprehensive high-level concept that is demanded in the automotive sector. That also includes the work piece management. Apart from a wide range of application-oriented clamping systems, MAKА has great experience in the CNC integration of robots that offers the user great rationalisation potential. The heart of this system is the "Run my Robot" option. "Run My Robot" transforms CNC commands into control commands for the KUKА robot remote control. The robot can then be operated and programmed completely via the CNC user interface. Neither machine operator nor service technician need special robot know-how for this. The robot moves in the same coordinate system as the CNC and is able to perform movements synchronised with the machine. In this way, for example, a new work piece can be loaded while another work piece is still being machined. As the NC program uses a separate channel for the robot, it is even possible to control several robots. Managing Director Klaus Kern: "Flexible, highly automated and reliable full-line solutions are the key to success in the automotive sector. MAKА is a technological leader in this field."



# Intelligent special solutions need a solid foundation

Standard at MAKA? Of course. Our various basic constructions are already designed for special demands in aluminium machining. And if you need more: High quality, customised system solutions naturally remain our core competence. Find the basis, expand, combine. Machine, automation and tool system – at MAKA all from a single source.

## MAKA PA 37

Sturdy, particularly high-performance moving gantry machine. Short machining times thanks to alternating loading. Flexibility thanks to tool magazine with up to 100 tool places and optimum chip management.



## MAKA AP 70

Moving gantry machine for large dimensions and a variety of machining possibilities. Chain-type tool magazine travelling with the working unit, machining management, exceptionally high safety standards.

## MAKA BC 150

Moving gantry machine for most exacting requirements: Travelling magazine for a variety of machining possibilities and rapid tool changes. Removable internal partitioning for machining of particularly large components.



## MAKA DC 7

Moving column machine with one or two 5-axis units. Very flexible concept. Simultaneous machining of vertically positioned work pieces, high-speed turning table for alternating loading.



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CNC Spezialmaschinen

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