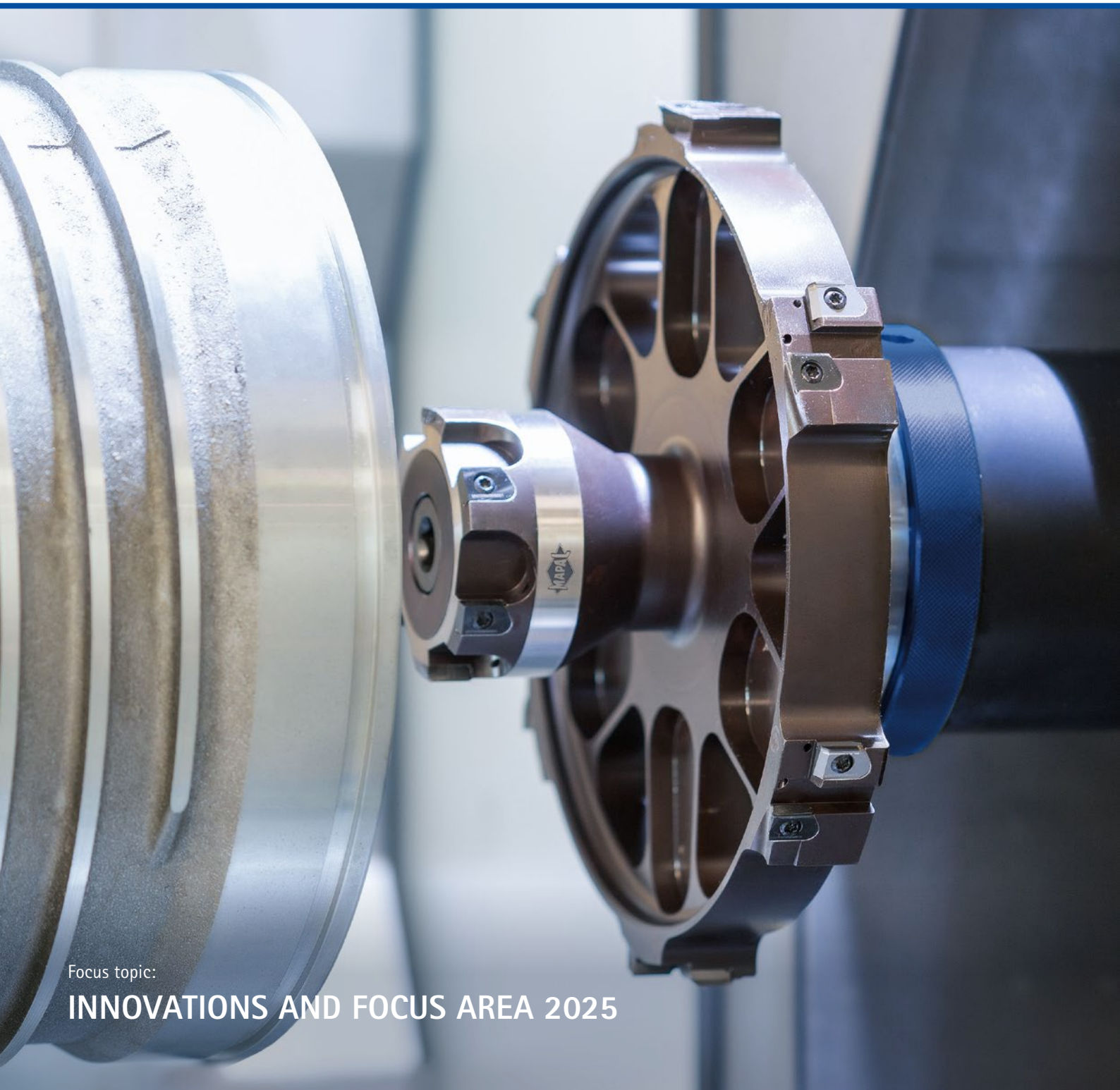
IMPULSE

MAPAL TECHNOLOGY MAGAZINE | EDITION 83



Focus topic:

INNOVATIONS AND FOCUS AREA 2025

Dear Business Partners,
dear Readers,

if I'm asked what makes MAPAL stand out, above all one thing comes to mind: the close collaboration with you, our business partners, often over many decades and always with the goal of creating added value for both sides. True to what we call the MAPAL Effect: "When something exceptional develops between us, that's the MAPAL Effect."

Why does this apparently obvious fact happen to occur to me now? The reason is that we are in a phase of upheaval and uncertainty that we haven't experienced since the fall of the Iron Curtain in 1989. What has driven economic progress over many years – namely globalisation and market growth, above all in the automotive industry – has lost its momentum. As can be seen in the wars in Ukraine and the Middle East, as well as the rise of populism, the political situation has become unstable. On top of that, there are the megatrends such as deglobalisation, digitalisation, the demographic transition and the necessity to decarbonise all aspects of life.

We have to adjust to all of this and align our business activities and company accordingly. We at MAPAL are doing so, too. We report time and again about what we are doing and how far we've come in MAPAL Impulse. For example, we have invested in infrastructure to reduce our carbon footprint. We are thinking and working in processes more and more often to better meet changing demands. And we are restructuring our offering based on your requirements.

We do all this so that one thing stays the same: We want to continue to offer you the MAPAL Effect in future and make the added value of our collaboration tangible. And we want to support you to navigate the changes that affect you and your company as well as to seize the opportunities that arise for you. Our goal: To be your reliable partner today and in future. That is our claim, our motivation, and the motor for change in our company.

One important change in particular is pertinent to our customers: Claudio Gabos joined the Executive Board of the MAPAL Group as Chief Sales Officer on 1 July 2024. In addition to the considerable international sales expertise that he is bringing along, he has ten years of "MAPAL Experience" under his belt and will concentrate on continuing to develop our collaboration with you – across industries, countries and distribution channels. In his interview in this issue of IMPULSE, Claudio Gabos talks, among other things, about his motivation to meet the challenges together with MAPAL in this "new age that is dawning in our industry".

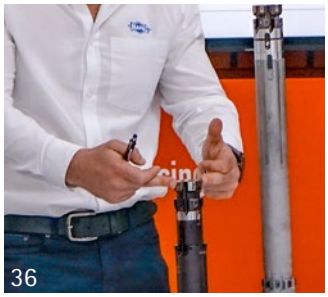
On that note, I look forward to a continued close and successful collaboration with you and hope you enjoy reading this issue of IMPULSE.

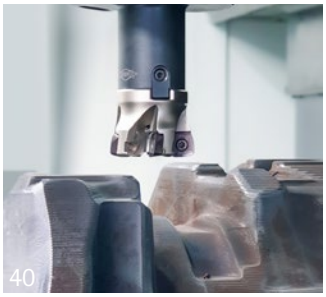
Yours

Dr Jochen Kress

FROM THE COMPANY

APPLICATION REPORTS





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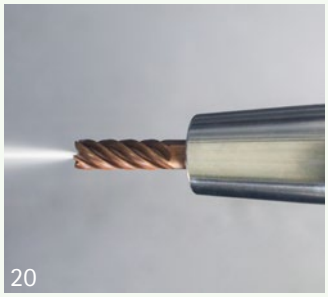

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PARTICULARS

MOVING FROM BRAZIL TO ITALY

Conrado Couto Diniz becomes Managing Director at MAPAL Italy on 1 January 2025

The current Managing Director of MAPAL do Brasil, Conrado Couto Diniz, assumes the position of Managing Director at MAPAL Italy on 1 January. He succeeds Claudio Gabos, who took over the role of Chief Sales Officer (CSO) for the entire MAPAL Group in July of this year and had temporarily remained Managing Director of MAPAL Italy.

Conrado Diniz is a leader with extensive industry experience in various management roles. His expertise and leadership skills will significantly contribute to the growth and development of MAPAL Italy.

To ensure a smooth transition in Brazil, Conrado Diniz will temporarily continue to serve as Managing Director there.

ENHANCING CAPABILITIES IN INDIRECT SALES

Sergio Zanfrini is the new Director of Distribution

Since 1 September 2024, Sergio Zanfrini has been the new Director of Distribution of the MAPAL Group. He reports directly to Chief Sales Officer Claudio Gabos in this role. "I look forward to getting to know the sales organisation at MAPAL and to collaborating with the team at the MAPAL Group", he says.

Zanfrini has expert knowledge regarding the machining industry and extensive experience in sales. Amongst other things, he was Country Manager in Italy and Distribution Manager for distribution sales channel in the EMEA region (Europe, Middle East, Africa).

With this strategic appointment, MAPAL aims to enhance its capabilities in the distribution channel, laying a strong foundation for future growth in indirect sales.

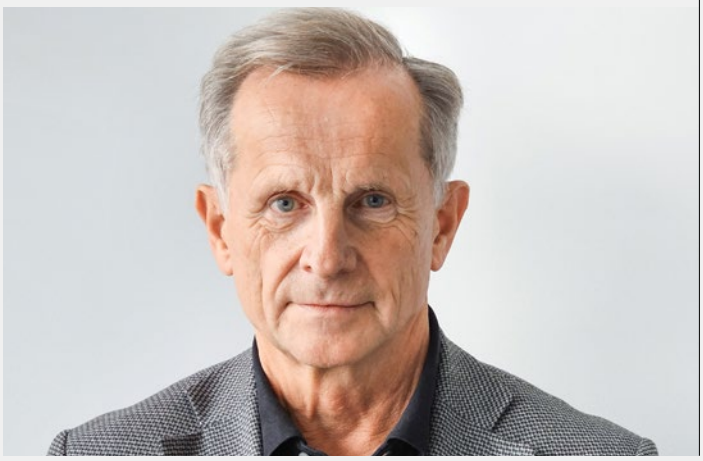
NEW MANAGING DIRECTOR AT MAPAL POLAND

Dr Piotr Tyczynski takes the helm from Aleksander Zielonka

Dr Piotr Tyczynski takes over the role of Managing Director of MAPAL Poland on 1 January 2025 from Aleksander Zielonka, who begins his well-earned retirement at the end of 2024.

Over the last 20 years, Zielonka has provided excellent work to the MAPAL Group in general and MAPAL Poland in particular. He played a key role in assembling a team of skilled employees, is responsible for the large number of tool management projects and for building the new facilities in Poland.

His successor in the Managing Director role at MAPAL Poland is Dr Piotr Tyczynski, who was responsible up to now for the focus market aerospace as Global Head of Segment Management Aerospace & Composites. He has acquired comprehensive industry experience in various management roles. With his expertise and leadership qualities, Dr Tyczynski will make a considerable contribution to the development of MAPAL Poland.



NEW HEAD OF MARKET SEGMENT AEROSPACE

Laurent Benezech is the new Global Head of Segment Management Aerospace

Laurent Benezech is taking on the role of Global Head of Segment Management Aerospace starting 1 January 2025. He is following in Dr Piotr Tyczynski's footsteps, becomes Managing Director of the MAPAL subsidiary in Poland on January 1.

Benezech has held several positions at MAPAL France since 2011. As an expert in aerospace, he brings valuable specialised knowledge to the position of Global Head of Segment Management Aerospace.

In recent years, his expertise and leadership of various teams have been crucial to the growth and success of the Aerospace segment. Amongst other things, he was responsible for setting up the Global Organisation for Assembly, where MAPAL's activities in aircraft assembly are bundled. He will continue to head this endeavour going forward.

Guest article from MAV magazine 8/2024, Konradin publishing, author: Frederick Rindle

Dr Jochen Kress, President of the MAPAL Group

"OVER THE LONG TERM, A RETURN TO THE INTERNAL COMBUSTION ENGINE IS NOT THE RIGHT PATH TO GO"

In an interview, Dr Jochen Kress, President of the MAPAL Group, talks about the challenges of e-mobility, his internationalisation strategy and MAPAL's particular strength in aluminium machining.

The interview was conducted by: Frederick Rindle

mav: Dr Kress, you said: "I believe the desire of some politicians to revert to the combustion engine is misguided" Why are you so sure that electromobility will prevail?

Kress: All things considered, battery-powered vehicles are the better alternative for private transport in the long term. The key factor is the significantly higher efficiency of an electric drive compared to a combustion engine. In addition, the drive unit is a lot less complex, which will lead to lower maintenance costs for e-cars in future. Of course, there are still many challenges to master on the way to electromobility. These include a reliable and efficient infrastructure for charging and subsequently recycling vehicles, the availability of resources, and the affordability of the vehicles.

Due to these challenges, the transition to electromobility is a task that will take generations and will not be completed in five to ten years. During the transitional phase, politicians would be wise to concentrate on setting framework conditions and goals related to mobility and providing stability, while giving players as much free rein as possible to find solutions. I think this has worked very well with carbon offsetting. I'm sure it would work with electromobility too, if there is trust in the players. For my part, I'm convinced combustion engines will no longer be produced on a grand scale when I retire.

Hybrid technology is considered by many to be an interim solution on the way to purely electric cars. Most car manufacturers are seeing growth in this segment and declines for all-electric vehicles. How does that fit?

It isn't a contradiction for me. Electric cars with a long range are simply quite expensive at the moment, which is why hybrid technology is the better alternative for many right now. The growth in sales figures for hybrid drives is also a consequence of the shrinking proportion of internal combustion engines. So we see that people are certainly willing to adopt electromobility, if only with the intermediate step of hybrid technology. This trend is not limited to Germany and Europe. South Korean and Chinese colleagues have also confirmed the trend towards hybrid vehicles in their regions.

How do you feel about the mixed signals being sent by politicians: first they provide funding for e-cars, then they cancel the funding and then they call the ban on combustion engines into question?

The constant back and forth is deadly for business and industry. The lack of planning security that results is augmenting the prevailing reluctance to invest even more. Many companies have already pivoted towards e-mobility and built up corresponding capacities. Now we see that the production facilities for e-mobility components are only operating at 35 to 40 per cent capacity. The reluctance to invest will continue as long as this doesn't change.

In addition to the electric motor, many see the hydrogen engine as an alternative for commercial vehicles in particular. Have you had any project requests in this area?

Yes, but the commercialisation of this technology is still in its infancy. Whereby the hydrogen motor in itself, i.e. the use of hydrogen in a piston engine, is not the difficult part. Manufacturing the injector to directly inject hydrogen is also not the biggest challenge. The difficulty lies in the refuelling infrastructure and the production of green hydrogen. However, I can imagine that hydrogen production could be used for energy storage if there is a temporary surplus of solar and wind energy.

Alongside the automotive sector, MAPAL's key industry, Germany as a production location is also undergoing transformation. In particular, manufacturing products for global export is becoming increasingly unattractive. How are you reacting to this trend?

We have to live with the fact that many countries have customs barriers for goods of all kinds. As precision tool producers, we're also affected by this. With landing costs of up to 40 per cent, this means that imported products are 40 per cent more expensive than the local rival products at the same production costs. Based on this calculation, you simply cannot be competitive with simple products. We have an advantage when it comes high-end tool solutions and the gains in efficiency that can be attained with them – but this is difficult for standard products. The local competition isn't sleeping.

Does this also mean that MAPAL will produce more abroad?

Today, the MAPAL Group has 25 subsidiaries with production, sales and service in just as many countries worldwide. We've always endeavoured to be a reliable partner for our customers and to make them an attractive offer at their international production facilities as well. We've grown internationally together with our customers in this way. That's why we already produce according to the "in the region for the region" doctrine.

We see this as an opportunity for MAPAL to keep growing. We have the requisite structures within the Group to be active in the regions that are important to us with region-specific offerings. Let's take our site in Coimbatore, the MAPAL India headquarters, as an example. We built one of the most modern and sustainable productions facilities of the MAPAL Group on a greenfield site there. We can now supply customers in India and neighbouring countries from there and hopefully grow with the market.

Over the last few years, you've highlighted that bureaucratic requirements – such as the Posted Workers Directive, the Supply Chain Due Diligence Act, the Whistleblower Protection Act, the NIS-2 Directive and as of late the Corporate Sustainability Reporting Directive – are slowing the German economy down. Do you see a change in this trend or is bureaucracy increasing unabated?

The frequency with which new laws are enacted has dropped significantly – likely due to the European Parliament elections. This was urgently necessary, however, as we're still busy implementing existing directives. The process requires many highly skilled employees who could likely be more productive in other areas.

It's not the individual provisions that worry me, but rather the growing tendency among politicians to shift responsibility for socially relevant tasks onto companies. As a result, this responsibility will become untenable for smaller companies at some point, causing them to disappear from the market.

Which changes in politics are necessary from your point of view to take this burden off companies?

On the one hand, politicians should stop making their own lives easier and address some issues themselves instead of shifting responsibility onto companies. On the other hand, we as a society need to examine the inherent issue: Where does this tendency to overregulate come from? In my opinion, our society tends to be somewhat risk-averse, which politicians are not immune to. If we want less bureaucracy, then we also have to live with certain residual risk and a certain degree of inequality. This is also true for industry itself. The number of required audits is continuously increasing, and I'm sure employees at MAPAL also grumble about a few unnecessary rules.

Without wanting to cast judgement: The defence industry is currently a growth market worldwide. Is this an interesting industry for MAPAL as well?

We've also noticed the growth in this area. In principle, however, our focus continues to be on the automotive, aerospace, fluid power, and die and mould sectors. Wherever we can offer customers from the defence industry suitable solutions, we can, may and will do this.

MAPAL has consciously dedicated itself to the topic of supply quality recently and has been able to achieve considerable improvements. Where were the problems before?

For us, supply quality means fulfilling our customers' requirements regarding delivery time and reliability – regardless of whether the customer has ordered a special tool or a standard tool. For the catalogue products, for example, we've streamlined our offering considerably and slimmed down the processes behind them. We've also implemented a series of measures to improve the production of special tools. Our optimisation measures involve the entire process from preparing an offer to the receipt of incoming goods by the customer. For example, some multi-bladed reamers which are ordered until 11 a.m. at the latest can already be on their way to the customer from the factory by 4 p.m.

It's encouraging to see that customers and employees have noticed a positive change. That's why this issue remains at the top of our agenda and we will continue to work on improving our supply quality even more.

"Empowering your aluminium machining" – that was MAPAL's motto at this year's AMB trade fair. What's so special about MAPAL's tool solutions for aluminium machining?

MAPAL has dedicated itself intensively to the topic of aluminium machining for over three decades. We've developed a deep understanding of the requisite processes as a result. In addition, we have a very high-degree of in-house manufacturing – we even produce PCD and diamond-coated cutting material ourselves. In this way, we have been consistently developing tool solutions, such as the red-anodised PCD milling head at the time, which have set benchmark in machining aluminium.

We're also able to transfer this understanding of processes to various applications and types of aluminium. We've developed a very comprehensive range of solid-carbide and indexable-insert milling cutters, especially for the high-volume milling of aluminium. These tools are special because of the material removal rate they achieve despite their relatively low machining forces. The high-volume milling cutter OptiMill-Alu-Wave was thus able to realise a removal rate of over 20 litres per minute on a high-performance machining centre from Bavius. ■

X-PRO S.r.l., based in Bologna, Italy, is a new member of the international MAPAL Group.

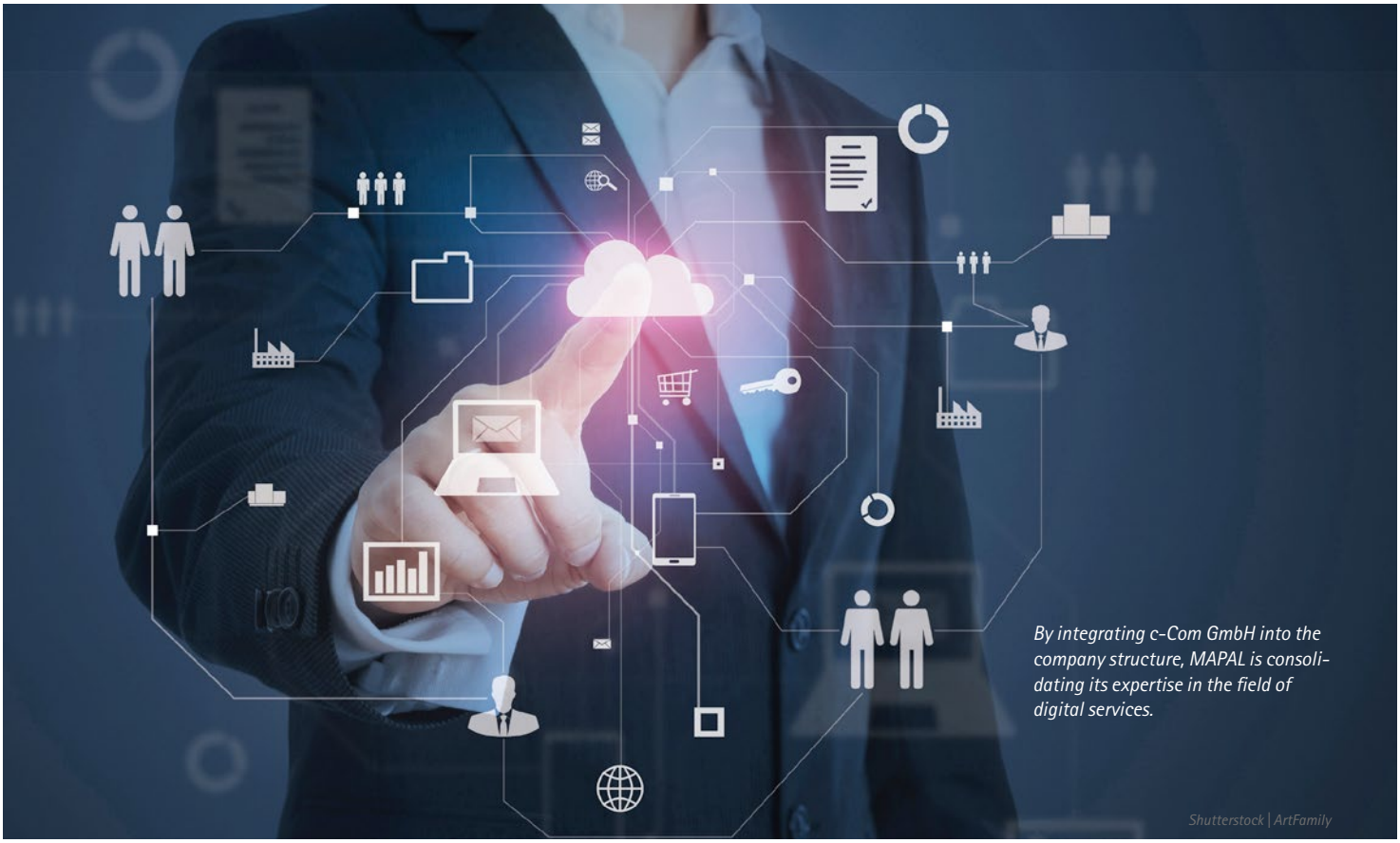
X-PRO S.R.L. NEW MEMBER OF THE MAPAL GROUP

MAPAL strengthens expertise in project business

The MAPAL Group has acquired X-PRO S.r.l., an Italian specialist for turn-key projects and fixtures. "X- PRO fits perfectly into the MAPAL Group," emphasises Dr Jochen Kress, President of the MAPAL Group. "We are a recognised specialist in the development of complete projects, with the focus so far being on our excellent cooperation with machine tool builders and on large-scale projects for the automotive industry." With the expertise and know-how of X- PRO, MAPAL is creating additional capabilities to be able to offer projects quickly and comprehensively to customers in other focus industries as well. The company is thus meeting a global demand from potential customers who want to completely outsource the design of machining processes to a reliable technology partner.

MAPAL has been working successfully with X-Pro on the Italian market for several years. Claudio Gabos, Chief Sales Officer of the MAPAL Group: "We are convinced that the acquisition of X-PRO will enable us to tap additional market potential even in these challenging times and generate momentum for further development."

X-PRO S.r.l. was founded in 2001 in Bologna, Italy, and employs around 35 people. Stefano Vitali continues in his role as managing director and remains in charge of the organisation. ■



By integrating c-Com GmbH into the company structure, MAPAL is consolidating its expertise in the field of digital services.

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MAPAL GROUP INTEGRATES DIGITAL SERVICES

c-Com GmbH will be incorporated into the company structure on 1 January 2025

With the aim of being able to provide digital services on the market more quickly and in a more targeted manner, MAPAL will incorporate the business activities of its subsidiary c-Com GmbH into the company structure on 1 January 2025. MAPAL will take on the c-Com employees.

MAPAL's subsidiary c-Com GmbH, which was founded in 2017, drives modernisation, interconnectivity and automation in the metalworking industry through innovative digital solutions. The company makes an important contribution to increasing its customers' productivity with the open cloud platform c-Com and accompanying services for digitalising tool and machining processes.

From the very outset, there was close collaboration with MAPAL with the integration of products and services from c-Com in the area of setting fixtures and dispensing systems and, in particular, in the planning and management of tool management projects. The "digital tool management" from c-Com makes stocks, performance and application information on machining processes transparent and is now an important part of MAPAL's tool management solutions.

"As a result of our close collaboration and as part of the continual improvement of our processes and workflows, it is only logical to consolidate our digital services and concentrate them from an organisational point of view", Jacek Kruszynski, Chief Technology Officer of the MAPAL Group, explains about the decision. "The best way to achieve this is by combining the know-how and expertise of MAPAL's Machines & Services division and c-Com's business activities."

By consolidating its digital services under one roof on 1 January 2025, the MAPAL Group is becoming more flexible and focussed and strengthening its market- and customer-oriented approach. The c-Com employees will continue their work in MAPAL's Machines & Services division. ■

FOCUS EVEN MORE ON THE CUSTOMER

Claudio Gabos has been Chief Sales Officer (CSO) of the MAPAL Group and member of the MAPAL Executive Team since 1 July 2024. He started his career at MAPAL in 2015, had been Managing Director of the Italian subsidiary of MAPAL since 2017 and was also responsible for strategic projects with a global scope.

IMPULSE talked to Claudio Gabos in October 2024 to get a feel on focus areas, opportunities, and experiences.

Claudio Gabos, the first four months in your new role at the MAPAL headquarters have passed. Looking back, how would you describe or summarise them?

In short? Extremely busy! Over the past months, I've dived deeply into all aspects of our strategic work, which is crucial right now to ensure stability for the coming years in these challenging times. I've also dedicated significant time to connecting with colleagues across nearly all MAPAL locations worldwide. My goal has been to understand their perspectives, listen to their needs, and gather insights on their expectations—knowing the landscape is essential before making decisions. I'm pleased to say I've met many talented and motivated individuals, all eager to lend their support. Honestly, it feels like 1 July was just yesterday; time has truly flown by.

Which experiences that you gained in Italy can you draw from with regard to your role as CSO?

Having worked in a subsidiary within a local market, I gained firsthand experience in understanding what a local organisation truly needs to succeed—in terms of support, speed and flexibility. I'm eager to leverage this experience to drive changes, focusing more sharply on making customer needs the centre of our work. This means recognising that customer demands vary significantly, especially in markets outside of Europe, where unique dynamics are at play. At the same time, as someone new to the headquarters, I'm now gaining valuable insights into the central perspective, which complements my local market experience.

Is there something special in the headquarters in Aalen you hadn't expected?

Naturally, there are aspects I hadn't been aware of before. The headquarters has its own history, shaped not only by the people working there but also by established processes—each with a reason behind it. With 3,000 employees in Germany, it's only natural that a rich history and background influences our operations. For many years, the German market has been the group's primary driver, so the organisation is understandably optimised for success here. Our aim now is to blend this legacy with the needs of emerging markets to build an even stronger, more globally aligned company for the long term.

MAPAL serves a wide range of industries—what key industries will have the most impact in the future?

MAPAL will continue to have a strong presence in the automotive industry—our core market—where we aim to remain one of the market leaders. With the industry undergoing a significant transformation, it's essential for us to expand our offer to include new components and adapt to maintain our success, a goal I am fully committed to.

We also see other high-potential segments, starting with aerospace, where we have deep expertise in final assembly line solutions. Over the next five years, we are striving to increase our market share, particularly in key regions like France, USA and China. Aerospace is a growing market, and we are committed to seizing this opportunity.

In fluid power, despite current economic challenges, we're focusing on leveraging our strengths in bore machining. Additionally, we have a strong product range for the die and mould industry, as well as opportunities to explore new industries that promise future growth. And of course, we aim to expand our role as a leading provider of solutions for aluminium machining, which is particularly connected to our DNA.

Beyond these customer industries, which we serve mainly through our direct sales network, we also see significant potential in expanding our distribution channel. With a strong brand and an attractive product offering, we are well-positioned to grow our share substantially in this area.

What excites you most about the future of MAPAL and the cutting tool industry as a whole?

MAPAL is working hard to transform its organisation, offer and business model. We have a lot of strengths and a very good team. And we have a very strong brand. For the market, MAPAL means technology and quality and it's recognized as one of the top brands. There are many markets where we have limited share. This brings

"MAPAL will continue to have a strong presence in the automotive industry—our core market—where we aim to remain one of the market leaders."

Claudio Gabos, Chief Sales Officer

us new opportunities, a lot of potential customers and another mindset. We will come out from our "comfort zone" and face different challenges around the world. To become more international is a challenge, but it's also an exciting experience. I'm happy to be part of this process and to contribute. And I'm sure we will achieve our goals bringing the MAPAL Group to the next level. This industry is moving into a new age. ■

Interview with Claudio Gabos

Successful MAPAL trade fair appearance at the AMB in Stuttgart

SPOTLIGHT ON ALUMINIUM MACHINING

Looking back on the AMB in Stuttgart, MAPAL's trade fair team can reflect on a highly successful outcome. As one of the most important events in the industry, this biennial, leading international trade fair of the metalworking sector attracted more than 65,000 visitors across five days once again in 2024.

"Empower your aluminium machining" was the motto of this year's MAPAL exhibition appearance. Over 390 square meters, expertise in the area of aluminium machining took centre stage. "MAPAL is the leading technology partner for machining aluminium components thanks to its many decades of experience designing, producing and applying tools for aluminium machining", says Jacek Kruszynski, Chief Technology Officer of the MAPAL Group. He continues: "In order to offer our customers optimal machining processes, we place our market, material and engineering expertise at their disposal along with our production and application portfolio within the framework of a cooperative partnership. Only by aligning all influencing factors can the full potential of a machining process be realised."

The AMB also provided the platform for presenting the innovations for 2025 (see page 18). Pioneering machining solutions for the four focus market segments automotive (including e-mobility), aerospace, fluid power, and die and mould rounded off the trade fair appearance.

BUILDING RELATIONSHIPS, GENERATING LEADS

The MAPAL team sums up the appearance very positively, both in view of the in-depth discussions with existing customers and meetings with prospective customers. Once again, MAPAL presented itself as a professional and competent technology partner, who recognises market trends quickly and supports its customers with innovations and solutions.

"In particular, the focus topics of the segments, together with eye-catching components, were very well received", Frank Stäbler, Sales Director DACH/HU, concludes with regard to the general mood of the trade fair.

"INSPIRING BOTH PROSPECTS AND CUSTOMERS WITH SOLUTIONS"

Despite the current market challenges faced by MAPAL customers in the DACH region, Stäbler reports that the AMB was filled with optimism and positivity. This feedback will be factored in after the trade fair by providing both leads and customers with inspiration through relevant solutions.

Dr Jochen Kress, President of the MAPAL Group, was also upbeat in his assessment of the AMB: "The commitment and professionalism of the team significantly contributed to the success of our trade fair appearance. The good collaboration and positive atmosphere among colleagues, which prevailed over the course of the entire trade fair despite the current challenges, really impressed me and serves as a motivation for the tasks ahead." ■

Strong partners for groundbreaking solutions: Innovative tools and machining solutions were presented on nine booths of machine manufacturers – both in live machining situations and as exhibits.

A large team for intensive discussions and consultations.

Innovations 2025

NEW BFS CONNECTION FOR QUICK TOOL CHANGES

MAPAL is introducing a new, patent-pending bayonet-type connection for milling cutter systems with replaceable heads to the market. Users benefit from very easy handling with rigid connection and optimal cooling. The tool manufacturer also saves carbide with the connection, conserving resources.

The functional principle of the new connection couldn't be easier: the replaceable head only has to be inserted and turned 90 degrees to be locked. That's a lot easier than the previous system for replaceable head milling cutters from MAPAL or comparable systems where the replaceable head is threaded and has to be screwed in several turns. The new BFS connection (Bayonet Fitting System) achieves very high rigidity thanks to the large cylindrical face connection. While the force only acts on one side while tightening a thread due to the thread's pitch, the new MAPAL system ensures a symmetrical insertion and good distribution of force.

Together with the connection, MAPAL is also presenting a new tool holder design. The tool holder has a ring of cooling channel bores, which enables a much higher volume of cooling than conventional internal cooling is able to provide. By channelling the coolant directly to the area of the cutting edges, the tool life is extended and machining quality improved. In addition, by doing away with a central cooling channel bore, the milling head becomes much more stable. The tool holder is 10 to 15 percent more rigid than comparable systems, resulting in higher achievable form and position tolerances, smoother processes and longer tool life.

The solid carbide replaceable heads from MAPAL impress thanks to their high process reliability as no cutting edges can become loose at high temperatures. If tool breakage does occur, the connection's simple assembly ensures that the machining process can be resumed quickly.

Modular tool systems with a steel-shank tool holder have also been marketed to conserve carbide. With the BFS connection, MAPAL is

Interview with Michael Villwock on the new BFS connection.

Further information on MAPAL's innovations and solutions on https://mapal.com.

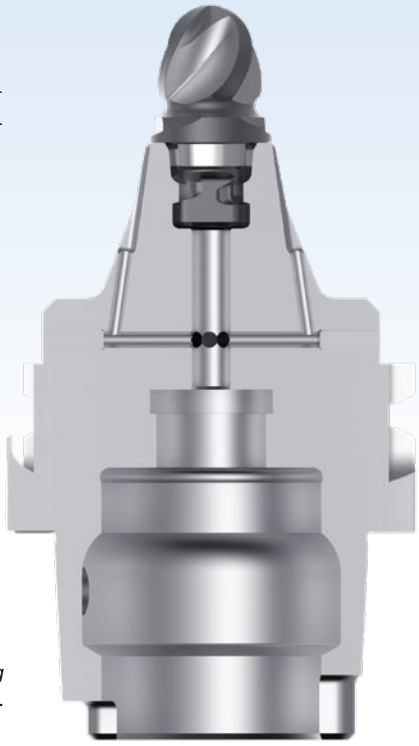
The patent-pending BFS connection for milling cutter systems with replaceable heads impresses with easy handling, rigid connection and optimal cooling.

The tool holder of the new MAPAL connection features a ring of cooling channel bores that channel the coolant directly to the cutting edge area. This increases machining quality and tool life.

going one step further. Compared to previous connections, 70 percent less material is used, in keeping with the trend towards more sustainability.

DIVERSE RANGE OF APPLICATIONS

The connection is offered in seven different sizes with head diameters from 11.8 mm to 22.5 mm and head lengths up to 1xD, which enables a variety of applications. In addition to the replaceable heads, the tool manufacturer can also custom design the tool holder to optimise the coolant supply for particular requirements, for example. MAPAL presented two initial applications together with the bayonet connection at AMB: A five-bladed solid carbide head is used by customers from the automotive industry as a ball nose milling cutter to manufacture homokinetic joints. The soft machining of this component, which is integrated in the power train, requires a high degree of precision. Another tool is a form milling cutter for machining ball joints on drive shafts. ■



Long tool lives through efficient cooling and high rigidity: The new BFS connection.

Innovations 2025

PRODUCT INNOVATIONS AND PROGRAMME EXTENSIONS

COUNTERSINKING

Spotfacing tool with microstop cage for aeroplane assembly

To protect aircraft from lightning strikes, all parts must be electrically connected to each other. Paint is removed around bore holes during assembly for this purpose, a machining task that is called spotfacing.

MAPAL has developed a tool with a patend-pending microstop cage for this. It replaces the brushes which are usually used. Processes like countersinking, chamfering and deburring are also possible with the system.

How does it all work in detail? The spotfacing tool is a plug & play solution and revolves in a microstop cage. The tool only protrudes as far out of the cage as the material is to be removed. This ensures reliably precise machining.

Because the tool can replace hundreds of brushes due to its long tool life, it is particularly economical. It stops the surface from getting scratched and being penetrated too deeply, minimises operator errors and is easy to maintain.

With respect to deburring, the spotfacing tool has the advantage that the cutting edges are entirely within the cage. Only 0.1 mm of the burr remains. The depth stop is also useful for countersinking and chamfering.

The spotfacing tools are available in two sizes for standard coating thicknesses. The two sizes come in different colours – another advantage ensuring faultless application. The optional dust extraction is a highly valued feature for machining composites.

The new spotfacing tools with microstop cage offer the highest process reliability.

ACTUATING

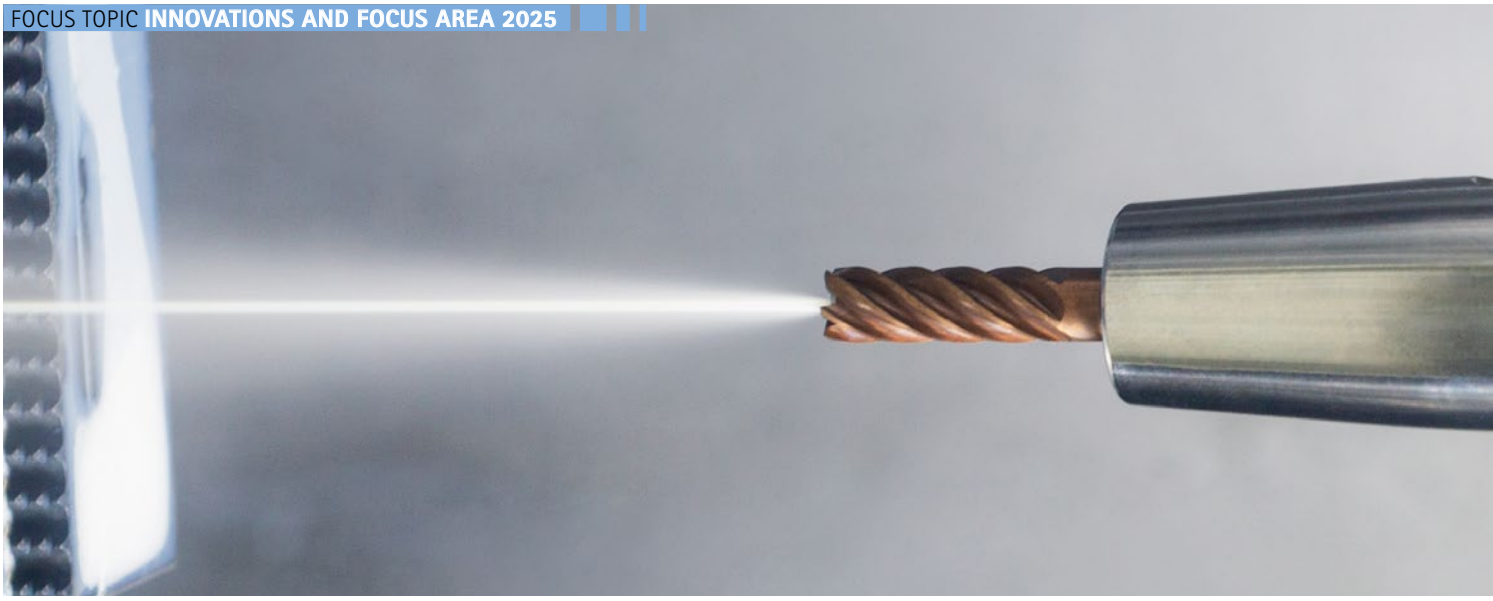
LAT "Performance Line": Standardised facing heads for the highest demands

Facing heads are used for turning operations in machines with facing units, especially rotary transfer machines. These process recesses, face surfaces and internal and external contours, primarily in mass production. Standardised facing heads from MAPAL are equipped with an individual mounting tool, so a wide range of turning operations can be handled with the NC-controlled facing unit.

Single- and double-slide versions of the standardised facing heads from the "Performance Line" are available from stock and are offered with or without internal cooling. Diameters of 100, 125 and 160 mm are available, with a traverse stroke of up to 30 mm. Special adaptations are available on request. The standardised connection allows the customer to deploy the tool flexibly with existing machines and mounting tools.

Special attention was paid to maximum service life and the highest level of precision for all components – which can even be used in difficult conditions. ➔

Single-slide (left) and double-slide (right) versions of the new facing heads are available.



REAMING AND FINE BORING

FixReam 700: The range is being expanded to include M, N and S machining groups

The FixReam 700 family was introduced in 2023 – now it's being extended to include additional machining groups. When high cutting data and short machining times are required, high-performance reamers are the first choice. The FixReam 700 is also a particularly sustainable tool as a high level of reusability is achieved through regrinding and replacing the cutting edges. The high-performance reamer can be reground twice before new cutting edges are needed.

The upgrade includes new cutting materials with PVD coating and leads that have been specially developed for use in stainless steels, non-ferrous metals and difficult-to-machine materials. New designs with coatings for steel and cast iron are also available. Short or long versions of the reamers are available for through bores and blind bores and have diameters ranging from 9.9 to 32.2 mm.

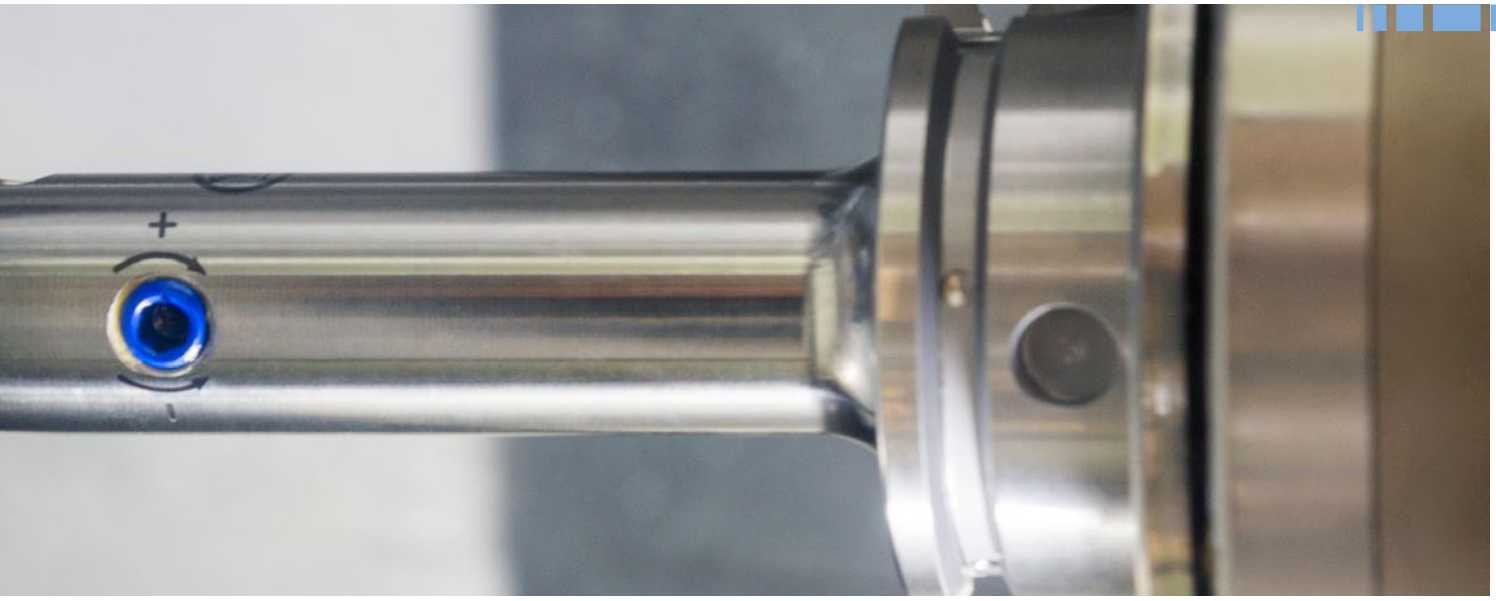
The FixReam 700 reamers with patented geometries for 30 per cent better roundness and cylindrical form are now also available for the M, N and S machining groups.

MILLING

OptiMill-Tro-Inox and OptiMill-Uni-HPC-Pocket: Additions to the solid carbide milling cutter range

The solid carbide milling cutter range is growing: The OptiMill-Tro-Inox trochoidal milling cutter has been specially designed for applications with problematic chip removal. To ensure high cooling and flushing capacity, a new central cooling channel ensures safe removal of chips especially from small pockets, pocket corners or difficult component contours. The solid carbide milling cutter is available in diameters from 6 to 20 millimetres.

In contrast, the OptiMill-Uni-HPC-Pocket was developed with a 3xD design to optimise time-consuming ramping processes when machining pockets. The milling cutter has a patented plunge face and can be plunged at angles of up to 45°. Chip removal is straightforward thanks to the arrangement of the chip breakers. The milling cutter is available in diameters from 5 to 20 millimetres.



CLAMPING

UNIQ DReaM Chuck, 4.5°: New lengths added to range

New lengths and connections have been added to the UNIQ DReaM Chuck 4.5 range for reaming and drilling application and for use with finish milling cutters. MAPAL meets specific customer requirements with this programme extension and continues to support the switch from shrink chucks to hydraulic expansion technology.

MAPAL is the first company worldwide to offer UNIQ DReaM 4.5° hydraulic chucks with the original heat shrink contour as per DIN 69882-8 in 160 mm for HSK-A63 and HSK-A100. This means that hydraulic chucks can also be used in deep grooves with critical tool restrictions.

By the way: The UNIQ hydraulic chucks have already won several awards. Most recently they won the Good Design Award and the Green Good Design Award. ■

The revised trochoidal milling cutter OptiMill-Tro-Inox (left) and the OptiMill-Uni-HPC-Pocket in 3xD (right) have been added to the solid carbide milling cutter range.

UNIQ® - the triple award-winning hydraulic chuck from MAPAL.

Empower Your ALUMINIUM MACHINING

For many years now, aluminium materials have been becoming more and more prevalent in many industries. This trend continues unabated. While light-weight construction and corresponding materials and structures have always been an important aspect in the production of aerospace components, the use of aluminium to reduce weight in automobile manufacturing has increased steadily, and has really taken off now due to electromobility. MAPAL is a leading technology partner for machining aluminium components thanks to its many years of experience designing, producing and applying tools for aluminium machining.

MATERIAL KNOWLEDGE VITAL TO OPTIMAL MACHINING PROCESSES

Aluminium and aluminium alloys are in principle easy to machine. As the cutting forces are low, high cutting data and in particular long tool life can be achieved with appropriate process planning. However, aluminium alloys have some special features which must be mastered. The geometry of the component and ever-increasing demands on tolerances and process capability pose additional challenges when machining aluminium.

Aluminium alloys can basically be subdivided into the principal categories of cast alloys, wrought alloys and powder-metallurgical alloys, whereby mainly the first two play a role in machining. For cast alloys, various alloy elements and corresponding casting methods are utilised to create the desired properties of a component. When casting, it is important to come as close as possible to the component's final form to simplify mechanical machining. This "near net shape" technology has become established in mass production in particular.

When machining casted parts, the silicon content is decisive with regard to the alloy element as it has a powerful effect on wear and tool life. For wrought alloys as well, the desired properties can be brought about by the alloy elements. The silicon content is lower here, though, enabling chipless ductility. Other alloy elements are used here to achieve good strength and stability as well as fatigue strength. Cold- or warm-worked alloys are the result, which can be processed into wrought material and then be machined.

SOLUTIONS FOR PART MACHINING AND ASSEMBLY IN AEROSPACE

The aerospace industry deploys MAPAL tools both for part machining – i.e. manufacturing components that are assembled to form sections of the fuselage or wing – as well as for the final assembly where the individual sections of the entire aeroplane are put together.

When part machining aluminium parts, the part is frequently machined from solid material. Machining rates of over 90 percent call for an efficient volume machining to machine as much raw material in as little time as possible. Powerful tools are key here. They must meet a widely variety of requirements in final assembly. Aluminium is not the only material frequently utilized here, other light-weight materials like titanium and fibre-reinforced plastics are also machined in the same machining step. These so-called stacks are material combinations that pose a particular challenge as the machining characteristics of the combined materials are very different and the tools have to meet their varying requirements.

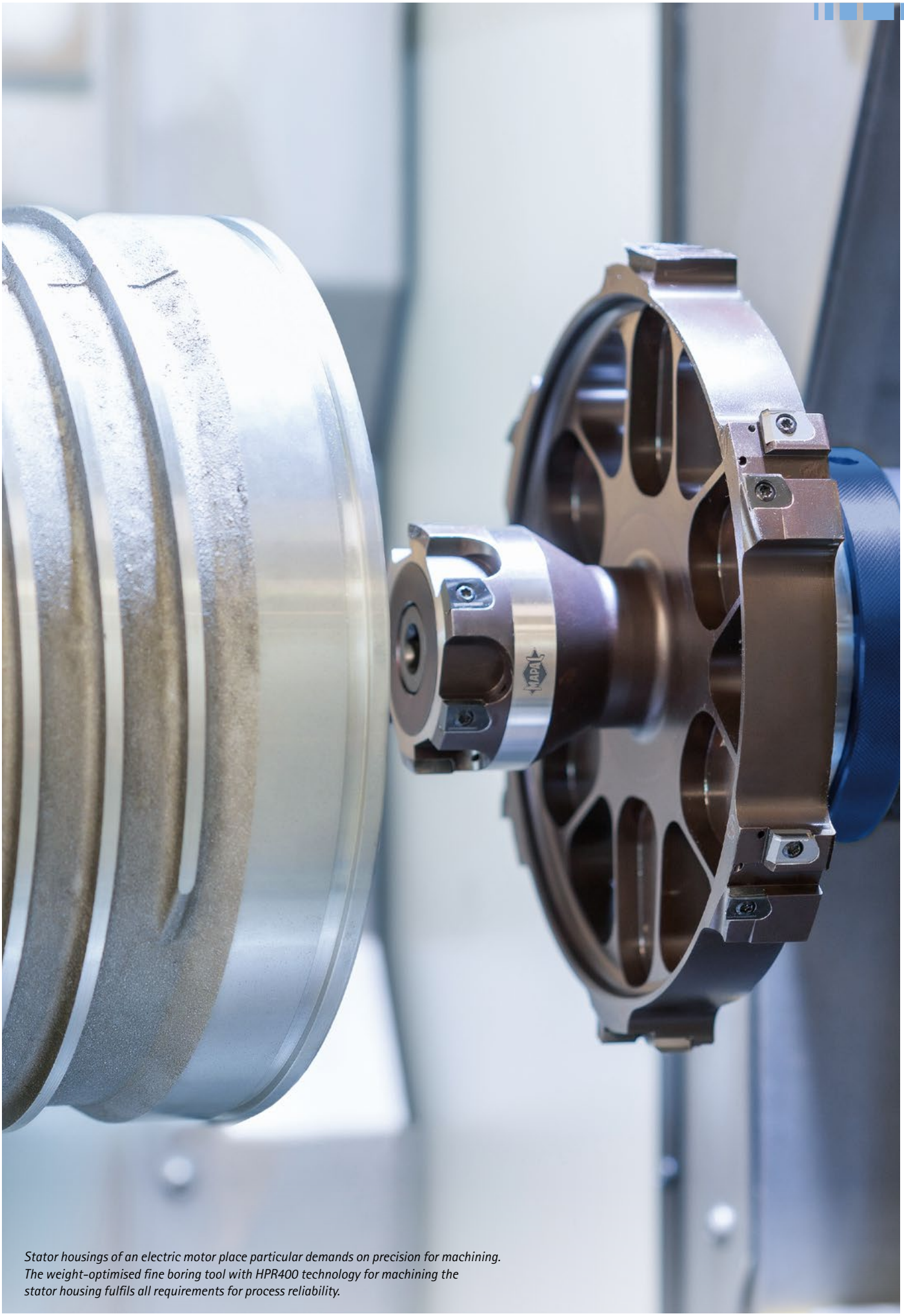
The aerospace industry has been using aluminium for many years to save weight. Besides the favourable relationship between stability and weight, this material also meets other requirements such as corrosion resistance, fatigue strength and low embrittlement. Therefore, there is high demand for machining solutions for aluminium in part production as well as in final assembly for aeroplanes.

MORE RANGE WITH EVERY KILOGRAMME SAVED

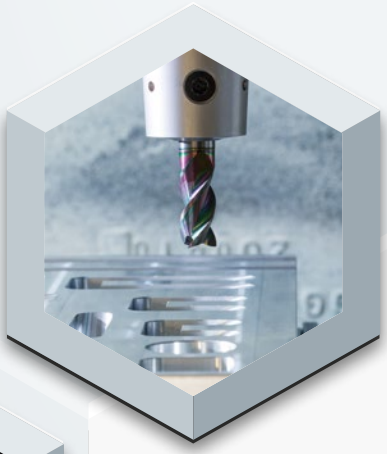
Weight reductions are a primary concern in the development of electric vehicles as well. After all, every kilogramme saved means more range and less CO_2. In mechanical machining for electric vehicles, established processes and tools are very good for machining some of the parts. However, there are inevitably new systems and components in e-vehicles that have to be redeveloped due to their function in terms of geometry and precision and/or material properties. Precision tool makers are especially called upon to deliver answers when it comes to scaling production volumes in the automotive industry and the habitual demands on process stability, consistent parts quality and attractive price levels.

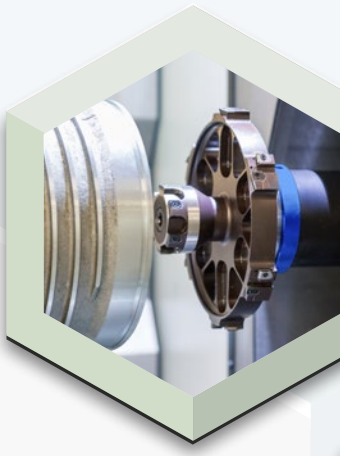
One example of special requirements are the electric motor housings. The large stator bore with a diameter tolerance in the IT6 to IT7 range as well as circularity and cylindricity of 20 to 30 µm or less, combined with other functional surfaces for accommodating rotors and transmission elements, requires the highest degree of precision with regards to shape and precision tolerances.

The large battery trays are another example. Their main structure consists of extruded profiles made of aluminium with low silicon content. The challenges here are to keep chip and burr formation

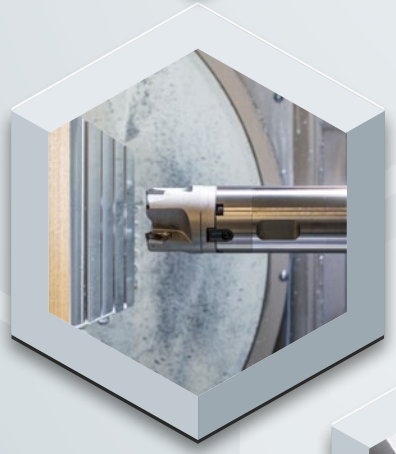


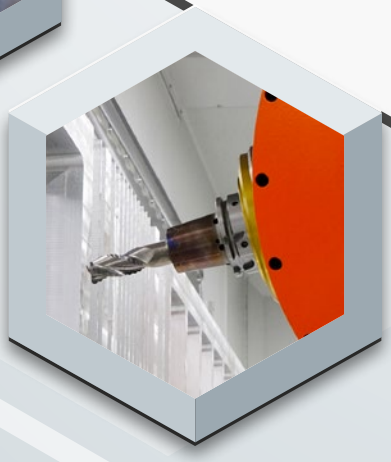
Stator housings of an electric motor place particular demands on precision for machining. The weight-optimised fine boring tool with HPR400 technology for machining the stator housing fulfils all requirements for process reliability.



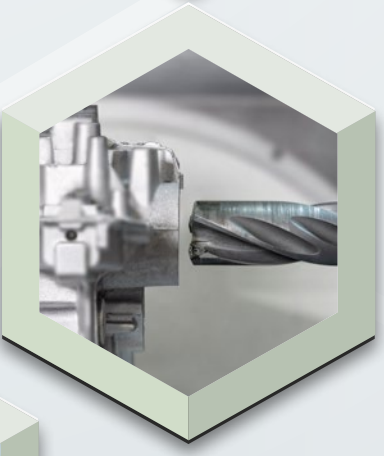


Empower Your
ALUMINIUM MACHINING





Matthias Winter, Global Head of Segment Management, in an interview with 'Voice of CNC' on MAPAL's innovative solutions for aluminium machining. (In German language)



under control and to machine the very large parts using economical cutting data without vibration. This also applies to the trend towards mega and giga casting where large-scale structural parts are no longer made of individual parts but are cast as a single piece. The components' large size and tendency to vibrate call for special tool geometries for low-vibration machining with a high degree of precision. New long-chipping aluminium alloys whose machining characteristics must be mastered represent a further, related challenge.

Aluminium is also used in many other industries thanks to its properties. Depending on production volume and number of variants, manufacturers use standardised machining solutions for parts where a significant amount of machining is required. Here too there are aluminium parts produced in high quantities, which require very sophisticated customised concepts. In fluid power, for example, parts like pneumatic valve housings and pneumatic cylinders are produced in large quantities. For industries with high variance and small quantity, standardised tool solutions make sense.

WIDE-RANGING PRODUCT AND APPLICATION PORTFOLIO FOR ALUMINIUM

MAPAL has developed an extensive product and application portfolio thanks to many years of experience and countless proven solutions in the field of aluminium machining. The range includes established bore machining applications like fine boring, reaming and boring. MAPAL's guide pad technology for fine boring achieves the highest degree of precision for diameter, circularity and cylindricity. For tools with fixed blades for reaming and boring, MAPAL offers a one-of-a-kind range for PCD tools. It includes everything from tools for a single diameter with chamfer to very complex tools for multi-stage bore geometries. For drilling into solid, there is also a large selection of solid carbide drills and drills with indexable inserts. Deep drilling and dry drilling are a particular challenge as special geometries and expertise are required for both.

For the milling of aluminium, MAPAL offers a broad range that includes face milling cutters, high-volume milling cutters, end milling cutters and special designs. Series with cassettes, inserts or a fixed design are available for face milling cutters, for example. PCD and different varieties of carbide are used as cutting material and can be supplied for various cutting depths in combination with the required surface finishes and profiles. In this way special cross-cut structures can be created for sealing faces, for example. In addition to the universally applicable range ➔

MAPAL uses application-specific chip-breaking geometries for defined chip breaking of aluminium materials with low silicon content. In this way, MAPAL achieves good chip breaking and defined chip lengths and thus the highest performance and process reliability.

of end milling cutters made of solid carbide or with PCD cutting edges, MAPAL has products that cater to special requirements such as high precision, parts vulnerable to vibration or high-volume machining.

ENGINEERING FOR PERFECT ALUMINIUM MACHINING

The product range and extensive manufacturing expertise form the basis for optimal machining processes for aluminium parts. But the tool itself is not the only factor. Only through the art of engineering can the wide-ranging product and application portfolio provide the perfect solution. And this is where MAPAL's true strength lies. Considerable experience developing new solutions time and again for the production of aluminium parts make the tool manufacture a first-class solution provider in this area. And the customer takes centre stage here.

According to the MAPAL philosophy, the perfect solution can only be the one that is precisely tailored to the needs and requirements of the customer. The expectation is not over-engineering but rather machining processes designed based on requirements. MAPAL sees itself as a solution provider and technology partner and, as opposed to a conventional tool supplier, does not only consider technical aspects but also tries to put itself in the customers' shoes. This customer-centred focus is behind the "Basic - Performance - Expert" solution approach and enables MAPAL to tailor the tools to the customer's requirements. ■

Machining rates of over 90 percent are standard in part machining in the aerospace industry.
The NeoMill-Alu-QBig indexable insert milling cutter from MAPAL performs outstandingly in the volume machining of aluminium.

Machining solutions for scroll compressors

PRECISION TAKES SHAPE

MAPAL draws from its knowledge about components and the market to deliver optimal machining solutions to the automotive industry in the field of electromobility. Global developments, trends and drivers are incorporated into its solution portfolio for focus components like the scroll compressor.

The global automotive market will continue to develop in the coming years, with the biggest growth taking place in the realm of electric vehicles. As the share of hybrid and battery-electric cars increases, so does the share of vehicles with scroll compressors. This part is used to increase the pressure of the refrigerant in the thermal management system, which keeps the temperature of batteries in check, among other things. These have to be cooled in the summer and heated in the winter. The two spirals, orbit and fixed scrolls, form the heart of the component. They move eccentrically to one another so that the refrigerant is compressed between the spirals towards the centre.

MAPAL has defined the scroll compressor as a focus component in the field of electromobility: It has very high demands with respect to the machining quality and is required in large quantities. With specifications that are sometimes less than 20 µm, the form of the scroll spirals and perpendicularity have very tight tolerances. A surface finish with an average roughness depth in the single micrometre range is required for the flawless functionality of both spirals in relation to one another. ➔

Particularly close attention is paid to the pre-machining and finishing of the spiral shapes, which must render the form exactly while ensuring long tool life.

The machining process to manufacture the scrolls involves milling the surfaces of the spiral shapes as well as the top and base surfaces. The pre-machining process already comes very close to the final contour. A stepped milling cutter provides the finish for the face surface and spiral shapes during the fine machining that follows. In a single stroke, the tool moves inwards, turns around at the innermost point with the smallest radius, and then moves outwards again along the other side of the spiral shape. Special radii and transitions between the face surface and spiral call for extremely precise contours on the milling tool.

LONG TOOL LIFE DESPITE EXTREME SHARPNESS

A cutting edge for milling must be selected that can both provide the required precision of form and achieve a long tool life. A MAPAL finish milling cutter can manage more than 2,000 parts made of the aluminium alloys AlSi1 and AlSi12, which are the most prevalent currently. For pre-machining, the specialists in Aalen ensure that as little material as possible remains but as much as needed to ensure safe processing. The milling cutter machines the surface using low force, rather than pressing and deforming it.

Above all when it comes to finishing, there are many solution options available, which can be deployed based on requirements. MAPAL proceeds schematically in their project design according to the basic, performance or expert classification. "Basic" solutions are standard tools which can be used to produce and test initial prototypes. At the "performance" level, special tools with contour geometries for the component come into play. In addition to precise contour machining, the "expert" solutions concentrate above all on the longest tool lives for maximum process efficiency for large series. Special coating is used here. A tool

As a full-range supplier, MAPAL maps the entire process with all the tools for the compressor, including cycle time calculation and cutting data.

with three cutting edges and diamond coating represents the top of the line for aluminium alloys with high silicon content.

As a full-range supplier, MAPAL maps the entire process including cycle time calculation and cutting data. The tool package includes not only the milling cutter for machining the spirals but also all the other tools for the compressor. The tool manufacturer offers the corresponding clamping device depending on the machine and spindle connection – the hydraulic chuck with HSK-E is the first choice here.

Thanks to its knowledge of the market, MAPAL can keep an eye on future developments. New refrigerant specifications in the EU could result in the widely used R1234yf coolant being replaced with propane or CO_2. CO_2 in particular has substantial effects on the component: the displaced volume becomes much smaller, and the pressure increases significantly. Current developments thus point to the use of grey cast iron or spheroidal cast iron as the material of choice for the scroll spirals, which would correspondingly affect the machining process and tool concept. With its wide range of products and technology expertise, MAPAL is ideally positioned to react to these developments quickly and offer application-specific process solutions. ■

More sustainable machining with hydraulic chucks

LONGER TOOL LIFE, LESS ENERGY CONSUMPTION

It has become imperative for manufacturers to make production both climate-friendly and profitable. Process-integrated measures must be taken to minimise pollutant emissions and the use of resources, while at the same time protecting and easing the burden on employees – this is the only way companies can prepare for the challenges of the future. Hydraulic expansion technology can contribute to ecological, economical and social improvements for machining companies.

The world of industrial production is changing. Decarbonisation is the long-term goal in all sectors of the economy and society. Along the way, products, processes and services will be tested for their resource conservation and climate neutrality. Ensuring future viability is one of the top priorities for companies. In ecological as well as in economic and social terms, the goal is clear: efficiency in all areas. Careful allocation of all resources is the only way to meet the enormous challenges of economic performance, environmental protection and social responsibility. It is imperative for manufacturers to produce all goods in a way that conserves resources and protects the environment's ability to regenerate.

MAPAL AND SCHUNK HAVE THE COMMON GOAL OF SUSTAINABILITY

For MAPAL, a technology partner for tools, clamping tools and machining solutions, and SCHUNK, a global player and holistic partner for automation and production technology, ecological, economic and social issues are the focus. The future viability of both employees and customers is the top priority. Both companies are committed to optimising user processes and making them more economical and more flexible – including in machining. For this reason, MAPAL and SCHUNK are working to grant users access to more sustainable machining and have investigated the beneficial effects of hydraulic clamping technology in production. The result: users benefit from the technological advantage of hydraulic clamping in ecological, economic and social issues. For reasons of sustainability, MAPAL and SCHUNK recommend that machining companies rely on the future-proof technology of hydraulic clamping in production.

A PLUS FOR THE FUTURE: HYDRAULIC CLAMPING TECHNOLOGY IN MACHINING

Many users in the metalworking sector have long been won over by this technology, which enables them to machine parts economically, efficiently and in a way that conserves resources. Hydraulic clamping toolholders are available on the market for every application. With this method, tools are clamped by a hydraulic mechanism where a screw is tightened to compress the internal pressure medium, causing the expansion sleeve to deform elastically. In this way, the tool shank is enclosed tightly. The high tension and radial rigidity make for a reliable hold and precise radial run-out.

SCHUNK and MAPAL each have decades of experience with this technology. Customised toolholder segmentation provides customers with the perfect hydraulic chuck for their specific requirements and application. All chucks are fine balanced as standard and are suitable for high spindle speeds. "Hydraulic clamping technology significantly supports companies in the machining industry on their decarbonisation journey", emphasises Matthias Brenner, Director Product Sales & Product Management Clamping Technology at SCHUNK. "Industry, the economy and society at large must meet the urgent demand for lower emissions, energy consumption and use of materials", Brenner says. "If the goal is sustainable production, you have to employ every possible measure to reduce your CO_2 emissions. This includes new climate-friendly products and services as well as lowering emissions in your own factory as well as along the supply chain."

"The use of hydraulic clamping technology contributes to sustainable production in ecological, economic and social terms", affirms Dennis Minder, Global Head of Product and Application Management Clamping Technology at MAPAL, adding: "When it comes to sustainability, a major advantage of hydraulic chucks is a much longer tool life. If you want to manufacture responsibly, then you should consider switching to hydraulic clamping technology. For new purchases, hydraulic chucks are your first choice from a sustainability perspective."

SIGNIFICANT INCREASE IN WORKPIECE QUALITY AND CHUCK TOOL LIFE

Hydraulic clamping technology features a design that stands for resource conservation and process reliability. The consistently radial run-out accuracy of a hydraulic chuck and effective vibration damping thanks to the inner oil cushion yield optimal workpiece surfaces, prevent micro chipping, protect the machine spindle, and result in longer tool life. This means that metalworkers benefit directly from cost savings and better quality. With hydraulic clamping technology, the radial run-out accuracy, clamping force and torque remain constant throughout the machining process. This process reliability protects both the workpiece and the equipment, especially the cutting edge. The overall result is a reduced need for follow-up steps, both on the workpiece and during machining setup.

Compared to shrink chucks, which are put under a significant amount of stress through constant warming and cooling, hydraulic chucks last much longer. As thermal stress is not a factor here, there is no material fatigue. "We at MAPAL have verified the longer tool life through comparisons", explains Minder. "While shrink chucks lose their initial part quality after about 500 clamping cycles, a modern UNIQ hydraulic chuck can withstand between 10,000 and 15,000 cycles, maintaining its quality for the user." This durability conserves resources, as metalworkers can use the equipment reliably for many years. Hydraulic chucks also perform well in terms of servicing and reconditioning thanks to the ability to replace installation parts and add hydraulic oil. This makes them ready for a second life and fit for another

Chucks like the TENDO Silver are an ideal entry point into hydraulic clamping technology. The precision allrounder is compatible with all tool machine spindles. ©SCHUNK

Pooled communication

As experts in clamping technology, MAPAL and SCHUNK are communicating together with the aim of further establishing hydraulic clamping technology as one of the most sustainable tool clamping methods in the machining industry. The technology enables resource savings, notable cost reductions and improved operational safety. With direct ecological, economic and social benefits, the use of hydraulic clamping technology has a direct impact on the transition to sustainable production.

Compared to shrink chucks, hydraulic chucks offer a range of advantages, such as higher accuracy and easier handling.

10,000 to 15,000 machining cycles. "Hydraulic clamping technology is a highly effective lever for economic efficiency and material savings", emphasises Brenner. Eliminating rejects directly reduces CO_2 emissions, as resources that should not be wasted are already bound up in the valuable raw material. "The throwaway mentality is coming to an end. Hydraulic chucks directly support this change, as they are designed for long-term use", says Brenner.

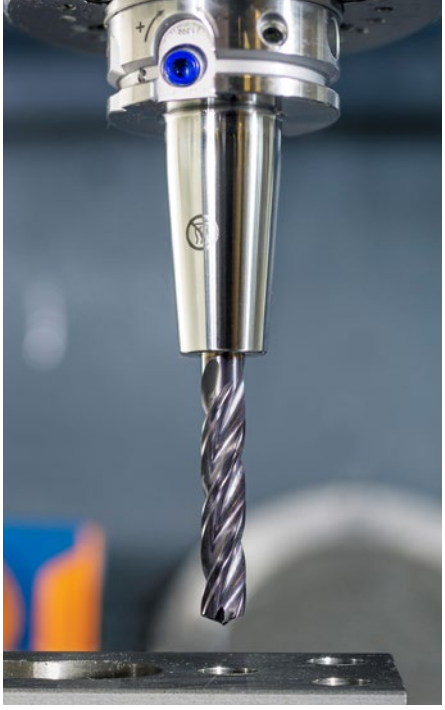
EASY PART HANDLING BENEFITS EMPLOYEE SAFETY

There is yet another argument in favour of hydraulic clamping technology: employee safety. Workers are thankful due to the easy, hassle-free handling of the high-quality chuck, which is as easy as chucking it and screwing it tight. All in all, it takes just a few seconds to change the fitting, and with micrometre accuracy. No additional peripheral devices are needed. The fast setup times and lack of follow-up steps directly improve productivity and lower labour costs. Furthermore, hydraulic clamping technology takes occupational safety in metalworking plants to a new level by eliminating burns on hot chucks. "Shrink units are not only cumbersome to handle, they are also a safety hazard", Minder points out. "That is eliminated with hydraulic chucks."

SIGNIFICANT ENERGY SAVINGS COMPARED TO SHRINK CHUCKS

In addition to long tool life, resource conservation and occupational safety, hydraulic clamping technology also offers greater energy savings compared to the use of shrink chucks. Unlike shrink chucks, hydraulic chucks require no energy, which directly translates into a significant reduction in CO_2 emissions. "A strong argument for switching to hydraulic clamping is the high energy requirements for shrinking", explains Minder. "Moving beyond heat shrinking eliminates all energy consumption, reduces CO_2 emissions and lowers energy costs", says the MAPAL specialist. "In our own factory, we ascertained that a shrink unit used in three shifts per day can consume between 10,000 and 12,000 kilowatt hours per year, making it a real power guzzler", notes Minder. "A hydraulic chuck is much more efficient. Every reduction in our energy consumption brings us one step closer to meeting our sustainability targets!"

The use of hydraulic clamping technology in machining processes touches on many of the dimensions of sustainable production – from conserving resources, starting with raw material and energy consumption, to improved working conditions for employees that lower their workload. Improving existing processes in the daily operations is an important lever for making product manufacturing in all sectors more resource efficient. It is imperative that operators look at all areas of resource use to identify and eliminate all sources of waste. Even small changes in the production process can have quick and noticeable results with little engineering effort. By using hydraulic chucks, users can directly reduce CO_2 emissions and meet their climate targets – during operation and without time-consuming re-tooling. The geometry of hydraulic chucks such as TENDO Slim 4ax (SCHUNK) and UNIQ DreaM 4.5° (MAPAL) is exactly the same as that of shrink chucks, so they can be replaced 1:1 without any programming. It's never been easier to make the change. ■



Metalworkers can reliably use hydraulic chucks, such as the UNIQ DReaM Chuck from MAPAL seen here, for many years.

All hydraulic chucks are very easy to use. Tool changes are done in seconds and with micrometre accuracy without peripheral devices. ©SCHUNK

CARPORT PHOTOVOLTAIC SYSTEM WITH A TOTAL OUTPUT OF 500 KWP PUT INTO OPERATION

The MAPAL Group has reached an important milestone in terms of sustainability: the largest carport photovoltaic system in the region has been put into operation at the Aalen headquarters. In total, the company has invested over four million euros in the sustainable expansion of the infrastructure at the Aalen site over the last two years.

The conversion of a large employee car park at MAPAL in Aalen is a clear sign of the company's sustainable development. Three photovoltaic carports, each measuring 74 x 11 metres, were installed there and produce a total output of 500 kW peak solar power. This is the largest system of its kind in East Württemberg.

"We have been working for many years to anchor sustainability at MAPAL worldwide," emphasises Dr Jochen Kress, President of the MAPAL Group. "Today we can put one result of this endeavour into operation here in Aalen. With the new plant, we are covering part of our electricity consumption and thus relieving some of the strain on the supply networks. Together with the investments in photovoltaic rows on the hall roofs and systems for the ventilation of production units, which ensure energy savings, we have invested over four million euros in the sustainability of the Aalen site." Another important aspect for the company is benefit the photovoltaic car park represents for its employees: Both electric cars and e-bikes can be charged here.

The PV carpark offers space for a total of 260 cars and 60 bicycles. Currently, 16 parking spaces are equipped with charging facilities, but this can be increased to 180. All bicycle parking spaces have sockets. The majority of the car parks are permeable to water.

Lord Mayor Frederick Brütting emphasised the importance of the construction project, which makes an important contribution to the attractiveness of the location and to achieving the city of Aalen's goal of being climate-neutral by 2035. "This can only be achieved if the companies in the city take their energy supply into their own hands and invest in corresponding projects. We are a production location and want to remain so. This is only possible if cheap electricity is available. I would therefore like to expressly thank the MAPAL company and the Kress family." ■

At the commissioning of the photovoltaic carport: from right, Dr Jochen Kress, President of the MAPAL Group, Markus Seyfang, Head of Facility Management at MAPAL, Frederick Brütting, Lord Mayor of the City of Aalen, architect Volker Gunst, Reinhold Geiger, planninc office for electrical engineering Geiger, and Wolfgang Steidle, First Mayor of the City of Aalen.

The photovoltaic carport from MAPAL in Aalen generates a total output of 500 kWp.

MAPAL tool management for DEUTZ in Spain

ENGINEERED IN RECORD TIME

During a team meeting, the MAPAL tool manager explains machining with the HPR400 reamer and the differences compared to the previous system. Standing left to right: David Castaño (MAPAL Tool Manager), Manuel Padilla Fernández (DEUTZ Manufacturing Engineering Manager) and Rafael Salinas (DEUTZ Project Manager).

Powerful diesel engines will remain indispensable for commercial vehicles in the near future. For a new project of the engine maker DEUTZ in Zafra, Spain, tool manufacturer MAPAL managed to pull off the entire engineering including tool design, cycle time studies and costing within two weeks.

Engines were already being built in 1875 at the site in Zafra where DEUTZ today has its main factory for processing engine components. Engine blocks, cylinder blocks, connecting rods and gears are produced here by around 500 employees in modern manufacturing facilities for the Group's assembly lines in Cologne and Ulm as well as for other customers.

DEUTZ's new 3.9-litre diesel engine is mostly used in agricultural and construction machines. As an industrial engine, it is designed for long service life and is to be built until at least 2035. Series production is to start in the coming year after the current prototype phase. 50,000 units are to be produced per year. This engine, which will be available in a power range from 55 to 160 kW, represents an important future project for Deutz. As it is the same size as its 3.6-litre predecessor, it can be installed in the same vehicles where it will provide very efficient performance.

"Our engines are typically deployed in off-highway applications like agricultural and construction machines, which are in constant use and move heavy loads. We'll continue to need internal combustion engine to move those machines. For the time being, it will be in the form that we use today: the diesel engine. Synthetic fuels or hydrogen can considerably prolong their deployment", explains Alejandro Castilla De La Hoya, Zafra Plant Manager. He points out that the income from this area finances DEUTZ's investments in the green segment, which is dedicated to the mobility transformation. The 3.9-litre diesel engine is already set to run on gas or hydrogen in the future. "Based on today's design, this diesel engine can become a green engine in the long run", says Manuel Rodríguez López, Industrialization Manager. This is possible thanks to a package of small modifications, particularly to the cylinder head. However, the engine remains mostly the same otherwise. MAPAL is already collaborating on DEUTZ's first hydrogen engine – a whopper at 7.8 litres.

TWO WEEKS FROM DESIGN FREEZE TO OFFER

"Our clients' development periods for new parts are becoming shorter and shorter", explains Thomas Spang, Global Head of Tool Management at MAPAL. For tool manufacturers or complete suppliers like MAPAL, this represents a growing challenge. This is above all true if plans change at the last minute, while the deadline for

Compared to its predecessor, the HPR400 reamer for fine machining crankshaft bearing journals has three times the tool life and does not require resetting. Sergio Aranda (MAPAL Tool Setter) sees a clear difference.

The Zafra site in Spain is the main component plant for the machining of DEUTZ engine parts. © DEUTZ

the tool design remains the same. For the engine block of the new 3.9-litre diesel engine, MAPAL only had two weeks after the design freeze to complete a final offer.

An ardent team of experts in Aalen were able to complete this ambitious task on time. Well-tuned workflows proved advantageous for the team as did the many years of experience with the client's production methods. MAPAL has been conducting tool management for DEUTZ in Spain for 18 years. Several projects have been completed together over the years.

MAPAL already engineered the machining of the engine blocks for the predecessor 3.6-litre diesel engine, which meant they were able to draw on practical experience and didn't have to start from scratch. For example, the tool experts already knew which machines the engine manufacturer has from previous projects. DEUTZ has equipped its assembly line in Zafra with new five-axis machines over recent years, so they can switch to new products with relative ease.

When DEUTZ sent their request, the Tool Management department in collaboration with the Technology Expert Team (TET) in Aalen first gave some thought to the production process. "To be quick here, we don't concern ourselves with detail at this early stage, but instead pull together reference tools and concepts from previously completed projects", explains Harald Traub from TET. He is responsible for planning the entire process as Project Engineer. "In this way, we are able to specify an approximate budget and the rough scope of the tool package for the client."

ONE HUNDRED DIFFERENT TOOLS FOR AN ENGINE BLOCK

After this rough planning, the concrete tool design followed in the second week. MAPAL's offer for the series production of the motor block included almost 100 different tools in the end. Many of them are custom tools that achieve short machining time and thus high economic efficiency. Aside from these, standard tools are used for milling above all.

To produce prototypes quickly, a few close-to-standard tools were also used. Series production can then begin with the optimal set of tools. As part of their original delivery, MAPAL supplied consumable tools as well as the required tool holders and adapters to DEUTZ. All other consumables will be handled by the tool management on site. From this point on, the client no longer pays per tool but per completed part – i.e., the cost per part is billed.

The unit costs at first correspond to the price determined during engineering. Certain ratios have been agreed upon for the following years. The client receives an increasing percentage of rebate and therefore pays a bit less per unit every year. For this business model to work out, ➔

David Castaño (MAPAL Tool Manager, left) and Manuel Padilla Fernández (DEUTZ Manufacturing Engineering Manager) with the HPR400 reamer and the fine boring tool that was previously used.

MAPAL has to implement continual improvements to save costs. This is done with new tool technologies and corresponding optimisation. The costs per part are fixed over the term of the contract, after which a reassessment takes place. Such contracts, which run over four to five years, offer the client planning security.

"With our engineering expertise, we support DEUTZ beyond the tool-setting area and cultivate a close partnership", Spang highlights. After helping to build the prototype, it is the tool management's turn to shine on-site during series production. DEUTZ uses approximately 1,300 different tools in total. Thousands of tools are available from stock and have to be managed in Zafra. To keep inventory at an optimal level (i.e., avoiding bottlenecks while preventing unnecessarily high tool stocks), MAPAL uses its own warehouse management systems and digital solutions with the cloud-based software c-Com for tool management. The digital Tool Management 4.0 doesn't only handle procurement processes, which are initiated semi-automatically, it also acts as a reporting tool to analyse cost drivers and stocks.

TOOLS JUST IN TIME FOR THE ASSEMBLY LINE

Industrialization Manager Manuel Rodríguez López praises the good collaboration with MAPAL when it comes to tool management: "Over the course of our cooperation, we have developed extensive technological concepts, which go far beyond mere logistics. Besides achieving cost reductions, tool setting is particularly important for us. The MAPAL employees working on-site have a lot of know-how and ensure that production has exactly the tool they need at the right time."

MAPAL's tool manager on site is David Castaño. MAPAL also employs tool setters permanently in Zafra. They make sure that a dozen different parts are produced without a hitch. "It is very beneficial to have David here on-site with us", emphasises Manuel Padilla Fernández, Manufacturing Engineering Manager at DEUTZ, who works closely with the tool manager. "We can talk about any opportunities for optimisation directly at the machine. We don't consider David Castaño to be an external service provider but rather a part of our team. It's a very strong cooperation."

DEVELOPING TOGETHER TO SOLVE PROBLEMS

If required, new tool solutions can be developed in Aalen via the local MAPAL team. That was the case in Zafra when it became necessary to optimise the tools for machining the bore in the crankshaft and camshaft. In cooperation with DEUTZ, a new machining concept from MAPAL with the HPR400 reamer was implemented. David Castaño is convinced of its advantages: "The tool life of the previous tool was 350 units and resetting was required every 100 units. With the HPR400, we achieve a tool life of 1,000 parts without resetting. The resulting machining quality is exceptionally good."

Besides the ongoing tool management, MAPAL conducts tests on the various assembly lines several times a year. The tests are carried out in consultation with DEUTZ and examine possible cost reductions, quality problems in production and issues related to cycle times. "To be effective, you have to plan well and set priorities for actions", López explains. We're pretty good at doing that together with MAPAL." Ultimately, optimisations gleaned here benefit both parties. ■

MAPAL has a multi-member team permanently on-site at DEUTZ in Zafra, Spain.
It includes the tool manager, engine block and cylinder head technicians, a logistics specialist and several tool setters.

Agustin Calado (MAPAL Tool Setter) inspects the HPR400 with new indexable inserts for fine machining crankshaft bearing journals on engine blocks.

Inspection of the machining quality on a prototype of the engine block for DEUTZ's 3.9-litre engine (left to right): Jorge Montaño (Process Technician), Juan Jesus Roldan (MAPAL Engine Block Technician), David Castaño (MAPAL Tool Manager) and Armando Gutierrez (Quality Engineer).

At the assembly line of the engine block for DEUTZ's new 3.9-litre engine (left to right): Jorge Montaño (Process Technician), Juan Jesus Roldan (MAPAL Engine Block Technician), Alba Prieto (Project Quality Engineer), Jose Vazquez (CNC Machine Operator), Armando Gutierrez (Quality Engineer) and David Castaño (MAPAL Tool Manager).

MAPAL tools at Krämer+Grebe

ADDED VALUE IN MOULD MAKING

To stay competitive in die and mould making, efficient production with a high degree of process reliability is vital for Krämer+Grebe GmbH & Co. KG of Biedenkopf-Wallau, Germany. Tool suppliers are also judged by their application engineering. MAPAL has earned trust in this respect with its reamers and high-feed milling cutters.

Over the course of its company history of over 100 years, Krämer+Grebe has reinvented itself time and again. The company was founded at the beginning of the 20th century together with a variety of specialised companies around the important ironworks in Germany's upper Lahn River valley. The focus was on classic model assembly in the early years. As time passed, machine engineering became more and more important. The company built foundry machines and prospered by producing meat-processing machines.

In the 1980s, Krämer+Grebe sold its machine engineering department to once again concentrate on its core competency, model assembly. Over time, this gave rise to today's die and mould making, which is exclusively done for the automotive industry. Clients include large car manufacturers, suppliers and foundries. To also serve their international sites, Krämer+Grebe pursued the path of globalisation and established a presence abroad.

FROM HANDICRAFT TO INDUSTRY

Since Katrin Grebe, the great granddaughter of the company's founder, took over the helm of the family business in 2000, the progress of change has accelerated – driven by new technical developments and market demands. The company has successfully transformed itself from a handicraft business to an industrial undertaking. The machinery is all state of the art. The 16 machining centres are predominantly from DMG and Hermle. On top of this, there is a deep-drilling tool, two lathes, three discharge machines and 3D printing. The production staff have a manufacturing space of 11,000 square metres at their disposal.

The company specialises in finding solution for complex geometries and particularly stringent requirements for the properties of castings. The process is defined by the requirements for each part. The product portfolio includes models related to the motor and power train. Core boxes, handling devices, gauges and low-pressure moulds are built in Wallau. For special castings in a lightweight design, pressure die cast moulds have been produced for several years. The transition to electric mobility is well underway. Krämer+Grebe generates 20 per cent of its revenue here – and this number is growing. The focus is on parts for the power train – such as the stator housing for the electric motor – for electric vehicles as well.

To remain economical in this competitive environment, manufacturing processes were redesigned and aligned to Industry 4.0. The workflow is entirely digitalised. A key role is played by the in-house R&D department, which collaborates with manufacturers to develop parts. Krämer+Grebe has been increasingly focussing its activities on service and no longer wants to merely build tools. Instead, they want to offer clients added value in the form of simulations of tools, wear and tear, series production and cooling. "We have also broadened our service and maintenance activities. Our teams are now available to our clients more or less around the clock", says Sebastian Schneider, Head of Order Centre and Production.

IT ALL STARTED WITH REAMERS

MAPAL only has a relatively small presence among mould makers in Wallau, but has already been able to ensure smoother processes, as confirmed by production. The cooperation between both companies has been ongoing for five years. It began with reamers from the MAPAL Multi-Bladed Reamer Centre of Competence. MAPAL was the only manufacturer that Krämer+Grebe could find that was able to produce these tools, which are up to 600 mm long, at the required high quality and deliver them by the desired deadline. The bores at H7 quality are needed to insert heating cartridges in low-pressure moulds. The tool manufacturer's application engineers left a lasting impression. They provided user training on site and helped commission the process on the machine, which was running very smoothly from both sides within a very short period.

As part of process optimisation, Krämer+Grebe parted company with some of its former tool suppliers – of which there were many. Dominik Gessner, Mechanical Manufacturing Process Optimiser, describes their selection criteria: "Today, the price of the tool is no longer the deciding factor. Instead, it comes down to a sensible collaborative partnership and above all application engineering. This is the alpha and omega for us and the knock-out criterion for a supplier. I don't just want a tool, I also want added value that I can apply to my processes." Gessner asserts that close cooperation with a partner is very important for continuous improvement.

After the good experience with the reamers, MAPAL also made his shortlist when it came to improving processes with high-feed milling cutters. Tools were needed with long tool lives that could generate large chip volumes during roughing, thus reducing production times. The milling cutters had to be extremely reliable to allow for multi-machine operation. "Usually one employee is responsible for two machines in our company – at best, they might be in charge of three", Schneider explains. Through optimisation, staff numbers were reduced from 200 to 130 within five years.

Krämer+Grebe uses a six-bladed NeoMill-4-HiFeed-90 for roughing moulds.

Krämer+Grebe has 11,000 square metres of manufacturing space available to them in Biedenkopf-Wallau, Germany.

Inspecting the finished parts together (from left): Sebastian Schneider (Head of Order Centre and Production), Dominik Gessner (Mechanical Manufacturing Process Optimiser) and Uwe Rein (Business Development Manager Die & Mould at MAPAL).

THE BEST HIGH-FEED MILLING CUTTER IN THE PACK

Krämer+Grebe uses the high-feed cutting for pre-roughing before the parts are sent to heat treatment. The mould makers in Wallau took a systematic approach to finding the best tool for the job. They put all the high-feed milling cutters from potential suppliers to the test under realistic conditions. MAPAL entered the race with the indexable insert milling cutter NeoMill-4-HiFeed-90, a standard tool which the tool manufacturer offers in the diameter range from 16 to 200 mm. Krämer+Grebe picked the version with the milling cutter with six indexable inserts for the test.

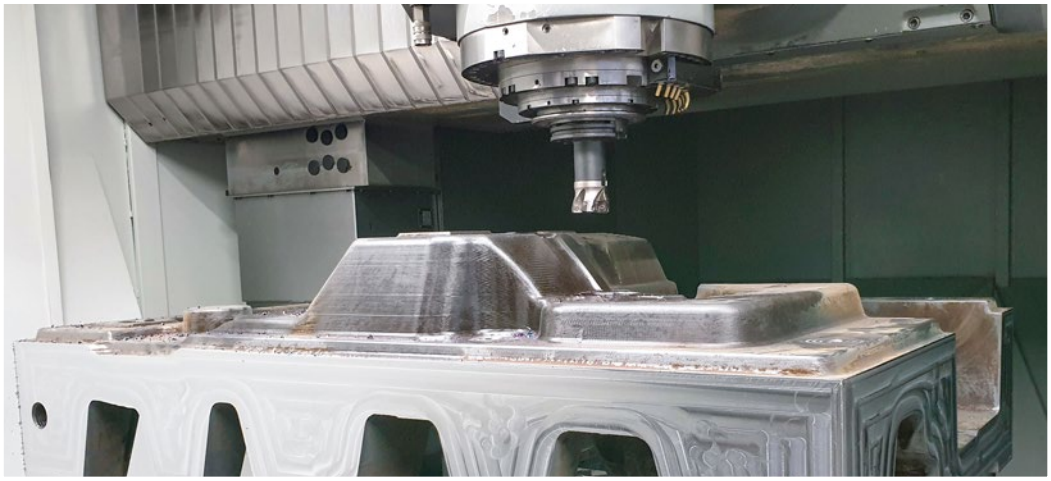
The results were pretty clear: the NeoMill milling cutter achieved the highest material removal rate and longest tool life. The mould makers noted uniform wear on the tool cutting edges without macroscopic flaws. "We found out that you can easily operate the machine for an hour and a half unmanned with MAPAL. This offers us the big advantage that staff can be deployed at another machine during this time", Schneider sums up. And so the mould makers found the high-feed milling cutter they were looking for and picked MAPAL.

Uwe Rein, Business Development Manager Die & Mould at MAPAL, really appreciates the strategy Krämer+Grebe has chosen: "Companies that make dies and moulds don't have a lot of leeway nowadays to reduce their lead time. However, this is precisely the deciding factor as to whether a company makes money or not. There is only a fine line in between. That's why every opportunity to increase productivity must be grasped." "It is also particularly important in individual part manufacturing to use the right strategy with the right parameters and the right tool from the start", Schneider adds. In his opinion, pertinent experience is key here. "We now focus on partners that also offer good application engineering and CAM support", Schneider says. "This continues to be our objective and we want to push this forward. We want to work with as few steady partners as possible. MAPAL is one of them."

For the tool manufacturer from Aalen, die & mould is a relatively new segment. They previously concentrated on the most precise and effi-

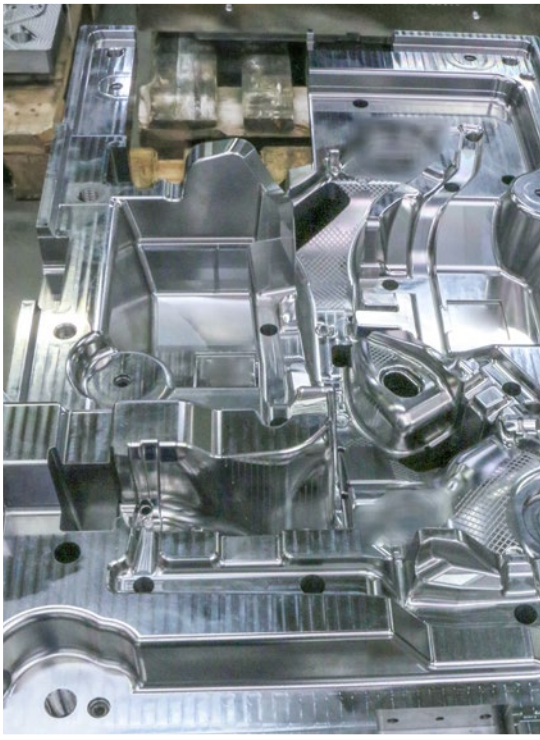
Advancing die and mould making in Wallau in a spirit of partnership (from left): Sebastian Schneider (Head of Order Centre and Production), Dominik Gessner (Mechanical Manufacturing Process Optimiser) and Uwe Rein (Business Development Manager Die & Mould at MAPAL).

For high-feed cutting, Krämer+Grebe uses the NeoMill-4-HiFeed-90 from MAPAL, which beat the competition in terms of performance and process reliability.



Machine operator Michael Lauber with the NeoMill-4-HiFeed-90 at a mould clamped and ready for machining.

Cooperation between Krämer+Grebe and MAPAL began with a 600-mm-long reamer needed to manufacture low-pressure moulds.



A typical Krämer+Grebe product: Car parts are cast in this mould.

cient machining of pre-cast parts possible. Now MAPAL is getting involved earlier on in the process and, together with mould makers, ensuring that the mould is produced optimally. "It is very interesting to be on board from the very start", Rein asserts. Both sides have already learned something new and ameliorated themselves by collaborating on the design of new parts. ■

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