Your technology partner for cost-effective machining

INNOVATIONS 2026/27

PRODUCTS, SERVICES AND SOLUTIONS

PRODUCTIVE COST-EFFECTIVE MANAGEABLE

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New requirements. New opportunities. New solutions.

Manufacturing requirements are continuously increasing. New materials, more complex components and greater demands for efficiency call for well-thought-out solutions. With innovations in tool technology, process design and services, MAPAL supports its customers in making their manufacturing operations fit for the future.

This brochure presents the latest innovations, extensions to the product portfolio, solutions for strategic components and turnkey solutions. All of these solutions serve one purpose: To make manufacturing processes more productive, more cost-effective and easier to manage.

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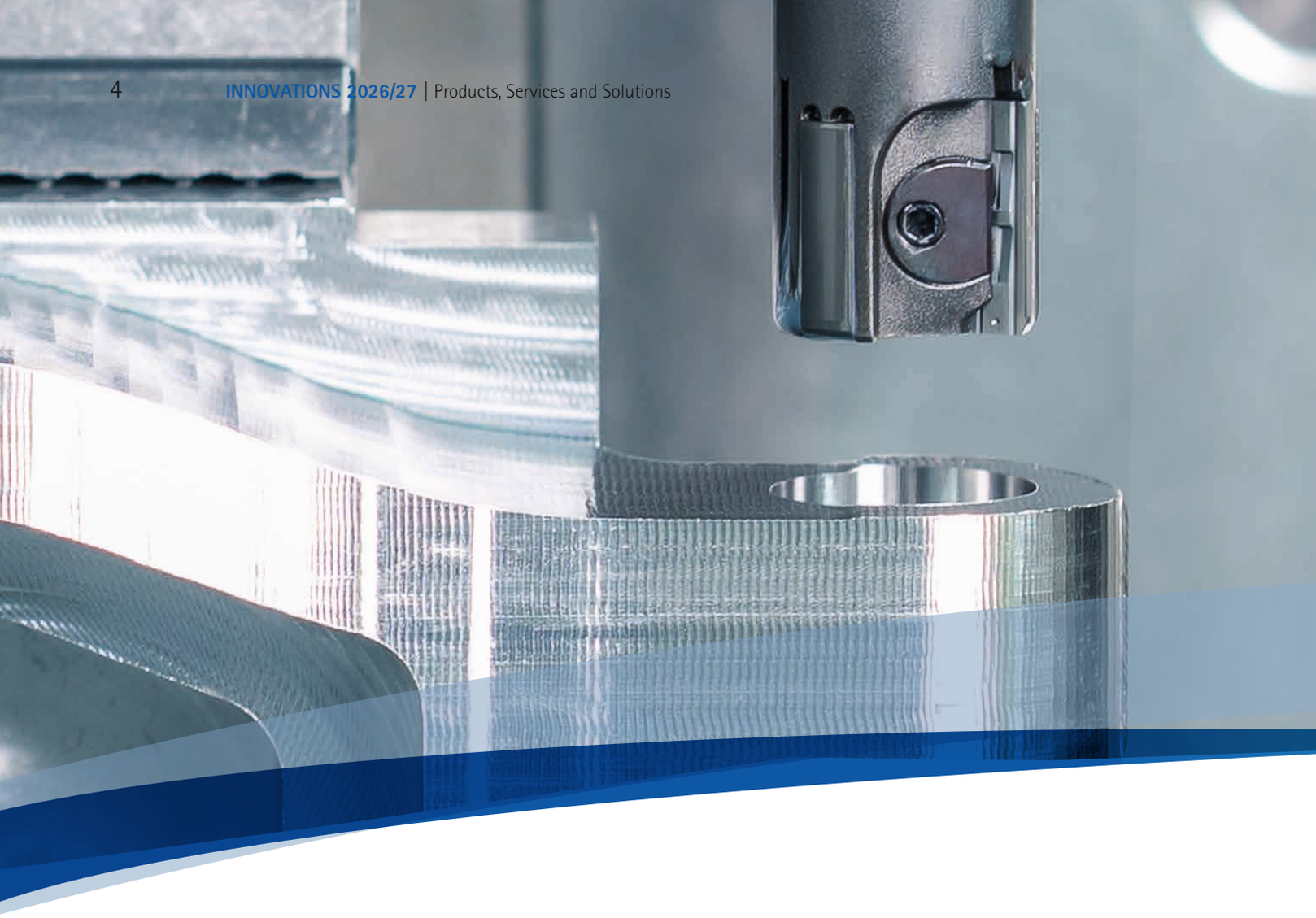


EA-Performance-System

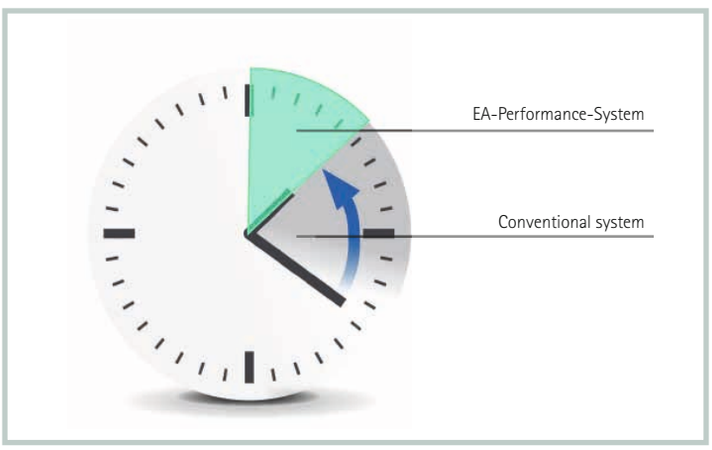
Precision fine boring in the small-diameter range with minimal setting effort

With the EA-Performance-System, MAPAL presents fine boring tools with simple, micrometre-accurate adjustment for diameters from 10 to 19 mm. The innovative system combines easy handling with high precision, process reliability and cost-effective fine machining.

MAPAL is setting a new standard in the fine machining of small diameters with the EA-Performance system. Where two adjustment screws and considerable manual skill and experience were previously required, the new system significantly reduces this effort: The back taper is structurally integrated, and the diameter is adjusted using just a single adjustment screw.

For the diameter range from 10 to 19 mm, the EasyAdjust principle could not be implemented structurally. MAPAL therefore developed an independent system with a newly designed indexable insert and precisely matched clamping jaws. The defined contact geometry ensures positive-fit, reproducible positioning and secure fixation of the insert and transfers the adjustment movement precisely, even under process loads.

This enables the EA-Performance-System to combine ease of use with maximum precision and consistent machining results. It is suitable for a wide range of materials and, in particular, for high-precision fitting and bearing bores, such as those found in gearbox housings, cylinders, as well as crankshafts and camshafts. Fewer adjustments and corrections mean fewer errors, less scrap and greater efficiency in series production.



Comparison of adjustment times

1 Only one adjustment screw

- Simple, fast, micron-precise diameter adjustment

2 Newly developed indexable insert with defined contact geometry

- Positive-fit and stable insert fixation
- High process reliability in series production
- Fewer corrections and less scrap

MEGA-Deep-Drill-Alu (2nd Gen.)

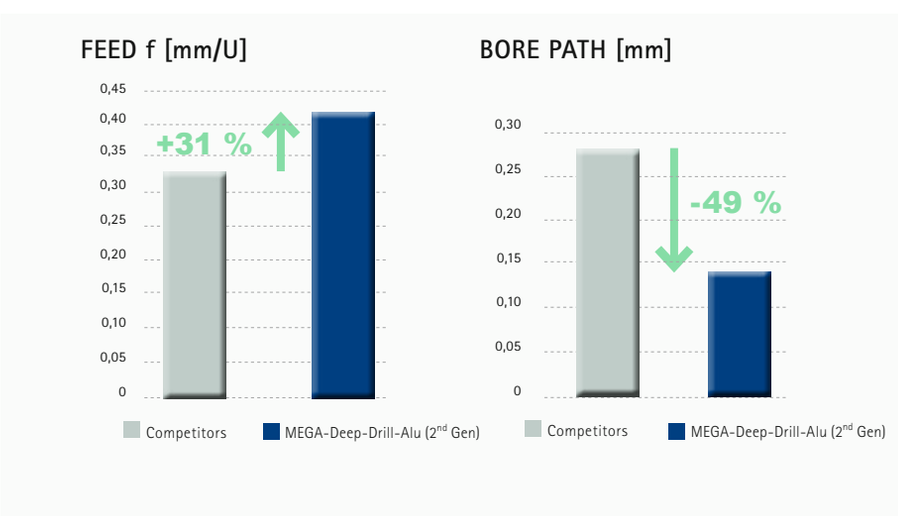
Deep drill for reliable machining of great drilling depths in aluminium

With the second generation of the MEGA-Deep-Drill-Alu, MAPAL takes deep drilling in aluminium to the next level. The new tool reliably handles the typical challenges of great drilling depths – stable processes, reliable chip removal and high feed rates.

With the MEGA-Deep-Drill-Alu, MAPAL combines a specially developed cutting-edge geometry, efficient cooling and a tailored cutting material concept in a comprehensive tool range for a wide variety of applications, from wrought alloys to high-silicon cast alloys.

A key differentiating feature is the cooling system: Newly defined cooling channels, enlarged by 20%, direct a maximum volume of coolant to the main cutting edge and cutting-edge corners. Compared with other solutions on the market with lower coolant volumes, they significantly improve wear behaviour, tool life and process stability. At the same time, stability, fracture strength and, therefore, process reliability are maintained. The improved cooling performance is particularly beneficial for deep applications and machining with minimum quantity lubrication.

The new MEGA-Deep-Drill-Alu is available for a range of aluminium alloys. The combination of stable tool guidance, reliable chip removal and efficient cooling enables high feed rates and cost-effective machining. The second-generation MEGA-Deep-Drill-Alu is a high-performance solution for demanding deep drilling applications.



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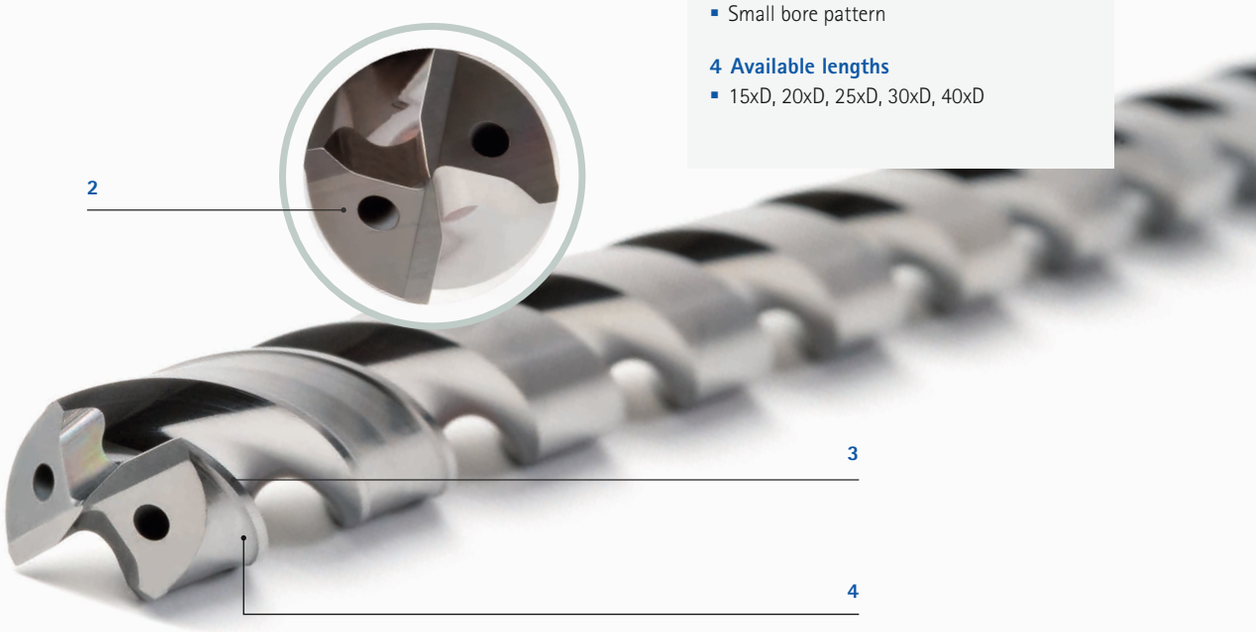
1 Wide range of applications
- AlSi1 to AlSi12 with configurable coatings
- Designed for high feed rates (up to 10% of the diameter)
- MQL-suitable

2 Efficient cooling
- Long tool life
- High level of process stability
- +50% coolant volume thanks to larger coolant channels
- Reliable chip removal

3 Optimised cutting-edge geometry with four margin lands
- Consistently short chips and maximum process reliability
- Small bore pattern

4 Available lengths
- 15xD, 20xD, 25xD, 30xD, 40xD



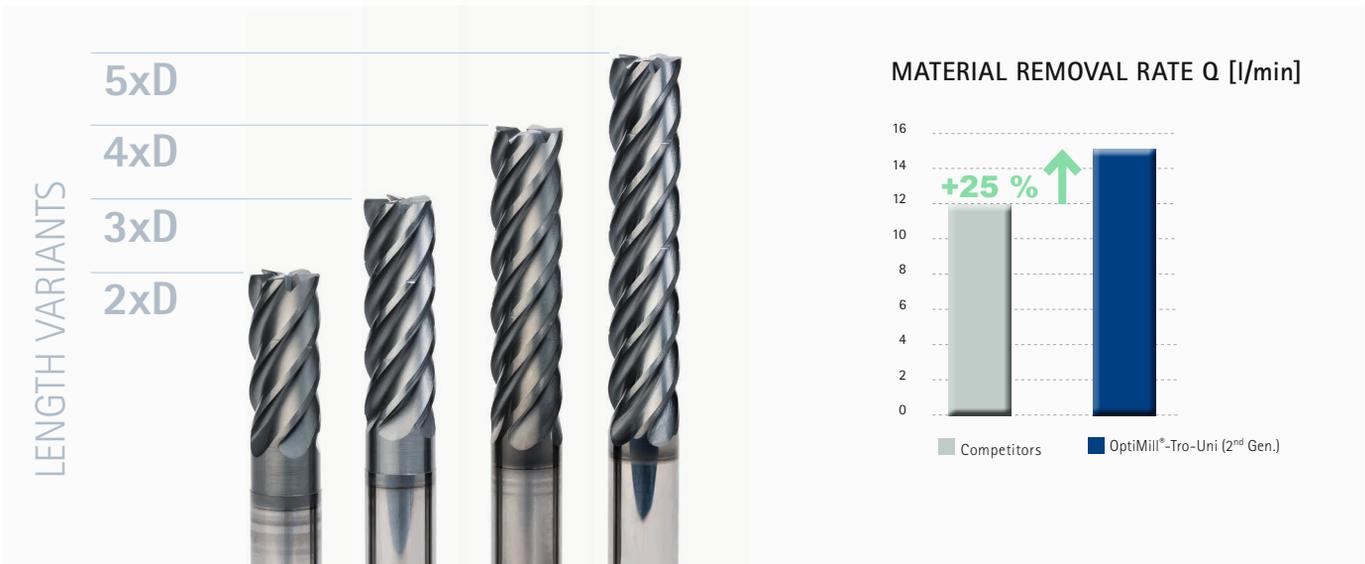
OptiMill®-Tro-Uni (2nd Gen.)

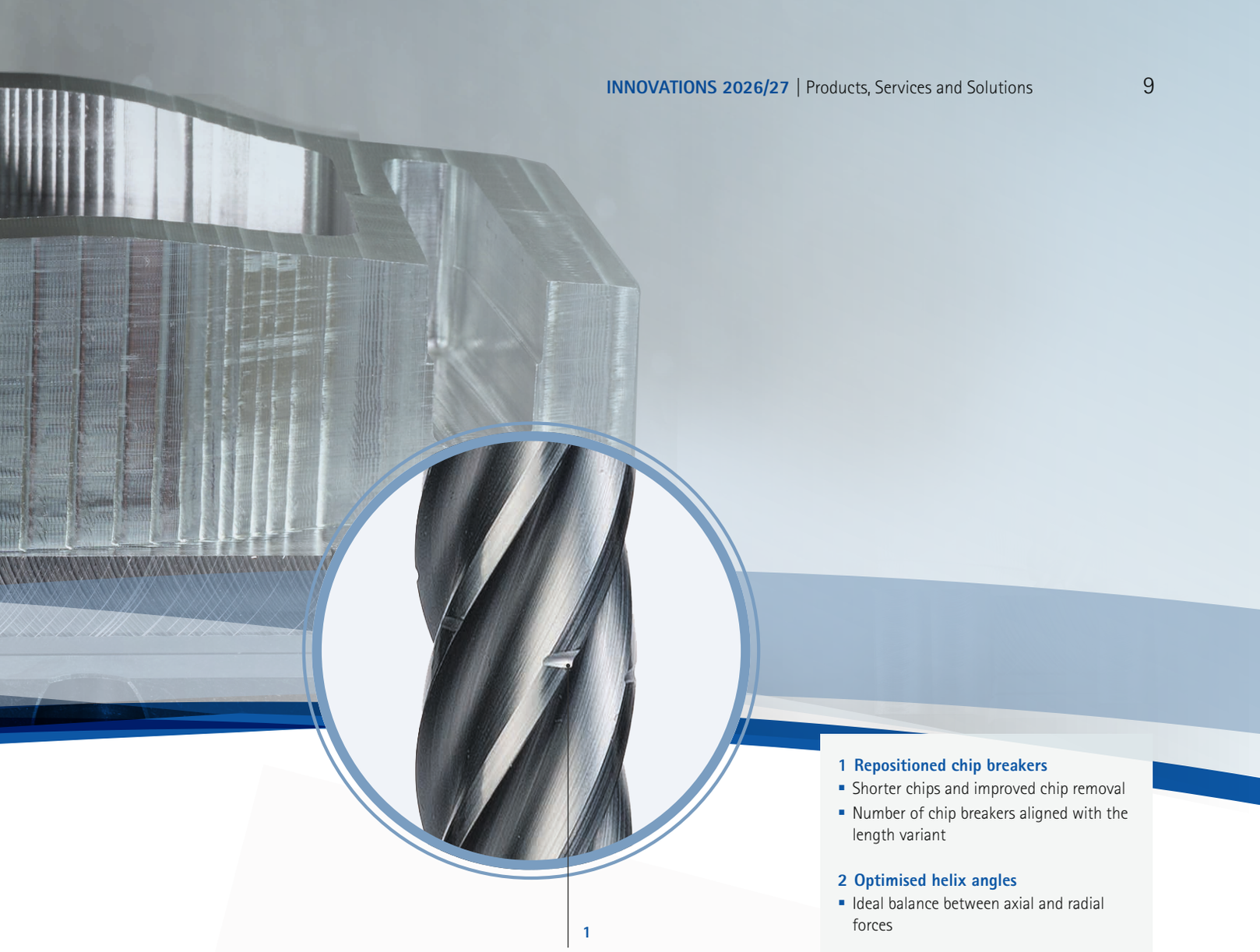
Trochoidal milling cutters for dynamic and reproducibly stable processes

With the second generation of the OptiMill-Tro-Uni, MAPAL has specifically developed its trochoidal milling cutter further to meet the requirements of modern machining strategies. The trochoidal milling cutter for machining steel and cast materials sets a new standard in process reliability and material removal rates, enabling consistently stable processes.

More powerful machines, dynamic CAM strategies and increasing cost pressures are placing greater demands on modern trochoidal milling cutters. With the newly developed OptiMill-Tro-Uni, MAPAL addresses these challenges through the coordinated combination of optimised tool geometry and application-specific process design. The result is stable trochoidal milling processes, even when operating conditions are demanding.

In addition to a geometry designed for high stability, smooth running and reliable chip removal, MAPAL provides application-specific cutting data for three levels of dynamics. This gives users precise, application-specific starting





1 Repositioned chip breakers
- Shorter chips and improved chip removal
- Number of chip breakers aligned with the length variant

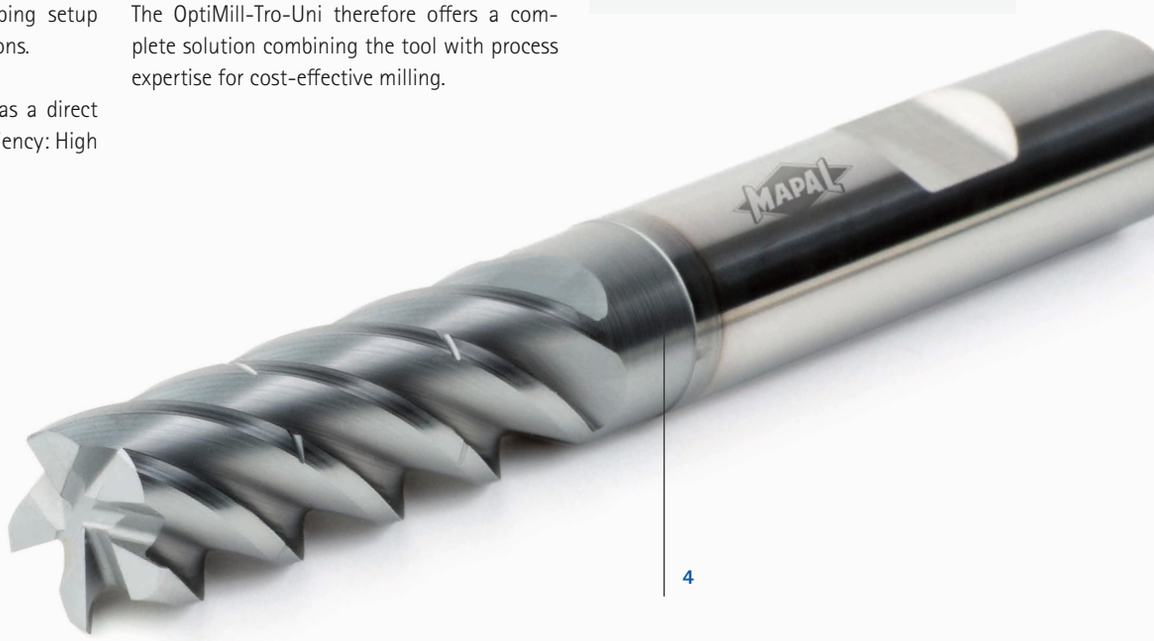
2 Optimised helix angles
- Ideal balance between axial and radial forces

3 Bigger core diameter
- Increasing from 4xD to 5xD
- Maximum tool stability

4 Cutting data for different dynamics and radial depths of cut
- Application-specific starting values for a wide range of applications

values for the respective machining situation, tailored to the machine, clamping setup and process conditions.

The new concept has a direct impact on cost efficiency: High material removal rates, long tool life and stable machining help to reduce component costs. The OptiMill-Tro-Uni therefore offers a complete solution combining the tool with process expertise for cost-effective milling.



OptiMill®-HPC-Pocket

New lengths for four-bladed version for greater flexibility in pocket milling

With new Z4 length variants, MAPAL is expanding the OptiMill-HPC-Pocket range for steel, cast iron and aluminium materials. For the first time, users can choose between "short", "long" and "extra-long" designs for the four-bladed versions, allowing them to select the tool length that suits their specific machining task.

The OptiMill-HPC-Pocket product family delivers high process reliability and long tool life and is suitable for a wide variety of applications – from pocket, groove and helix milling to fast plunging. Large chip flutes, wear-resistant coatings and the patented plunging face ensure reliable machining, even at high material removal rates.

While the three-bladed version has been available in different lengths for years, MAPAL now offers the same choice for the higher-performance Z4 designs. The additional cutting edge enables higher cutting speeds and longer tool life, particularly in circumferential machining.

The extended range of lengths follows the principle: "as short as possible, as long as neces-

OptiMill®-HPC-Pocket product family

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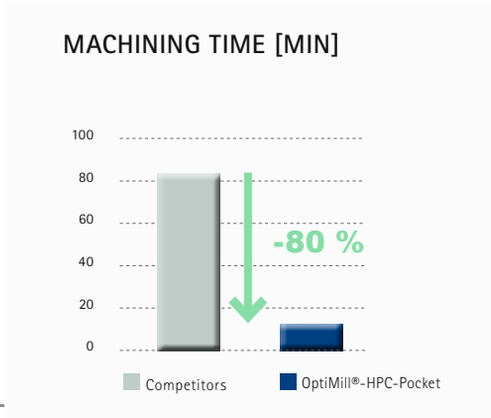
Z4 Z3



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1 New Z4 length variants
- The right tool length for every machining situation
- Higher cutting speeds and longer tool life

2 Patented plunging face with integrated drill tip
- Plunging up to 45°, grooving and helix milling with one tool
- High flexibility and shorter machining times when pocket milling

3 Large chip flutes
- Fast and reliable chip removal

4 Chip breaker from 3xD (Z4)
- Short chips with maximum material removal rates

sary". Users can reduce the carbide content to the required level, increase rigidity and choose the optimum projection length for their machining application. This improves cost efficiency and process stability, particularly in series production and automated processes.

UNIQ® DReaM Chuck

First hydraulic chuck with a 4.5° contour for small clamping diameters from 3 to 5 mm

With the new UNIQ DReaM Chuck designs, hydraulic clamping technology is now also available for clamping diameters from 3 to 5 mm. This makes MAPAL the first supplier to offer a direct hydraulic expansion chuck solution with the original 4.5° contour of a heat shrink chuck in this small diameter range.

For small tool diameters, chucks with reducing sleeves are often used, but these can impair run-out and negatively affect surface quality and process stability. With the new UNIQ DReaM Chuck hydraulic chuck, tools with shank diameters from 3 to 5 mm can be clamped directly – a key advantage for demanding micro-machining applications.

A key feature of the new chuck is the combination of hydraulic clamping technology and the original 4.5° contour in accordance with DIN 69882-8. This allows users to switch from heat shrink chucks to hydraulic clamping technology without having to adapt existing processes or tool restrictions. At the same time, direct clamping ensures that the coolant reaches the cutting edge reliably and with minimal loss. For small and fragile tools, this makes an important contribution to process reliability. Finally, the optimised chamber geometry of the clamping system helps dampen micro-vibrations, ensures tools run more quietly, and has a positive effect on tool life and surface quality. Eliminating reducing sleeves and thermal shrink processes also simplifies tool changes and increases efficiency in day-to-day production.

Shrink chuck and hydraulic chuck with exactly the same contour.

2

1 Direct clamping of shanks with ø 3–5 mm
- Excellent radial run-out accuracy

2 100% coolant sealed system
- No pressure loss through reducing sleeves

3 Original 4.5° shrink contour
- No conversion required
- Directly interchangeable with no process adjustments required

4 Hydraulic clamping technology now available for the small ø range
- Only manufacturer on the market

With the UNIQ DReaM Chuck with 4.5° contour, MAPAL is currently the only manufacturer worldwide to offer a complete range of hydraulic chucks for diameters from 3 to 32 mm.

More information on turnkey solutions in practice:

Turnkey solutions

Complete solutions for cost-effective manufacturing processes

Efficiency through process responsibility

With its turnkey solutions, today MAPAL is offering a comprehensive range of services covering the end-to-end planning and implementation of manufacturing processes. From project analysis and tool and fixture design through to commissioning and production support, all components are perfectly coordinated and tailored to the customer's requirements – all from a single source.

PROJECT ANALYSIS & PROCESS DESIGN

Analysis of the manufacturing task and development of an efficient manufacturing process.

CLAMPING FIXTURE

Design and implementation of a reliable clamping solution.

TOOL PACKAGE

Development and provision of a fully coordinated tool package.

PERFORMANCE

SIMULATION & PROGRAMMING

Virtual validation and optimisation of the machining process.

PROCESS VALIDATION & PRODUCTION RAMP-UP

Verification of process capability and reliable transition to series production.

Complete process solutions – all advantages at a glance:

- **PERFORMANCE**
  Cycle time optimisation and 99% reduction in collisions between fixtures and tools
- **GUARANTEED RESULTS – CPK**
  Stability analysis of the production process
- **INVESTMENT OPTIMISATION**
  15–20% reduction in production costs through an optimally integrated tool and fixture solution
- **ONE PARTNER**
  For tools, fixtures and CNC programme development

Aerospace – multidirectional CFRP materials

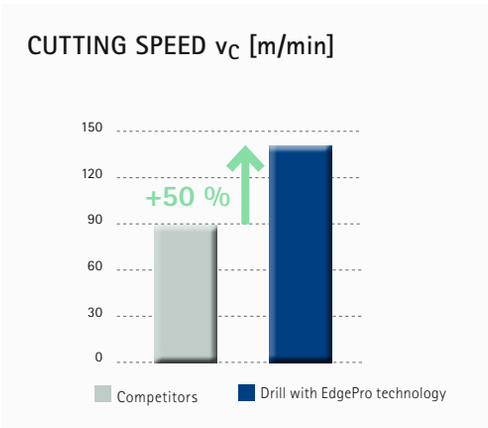
Self-sharpening EdgePro technology

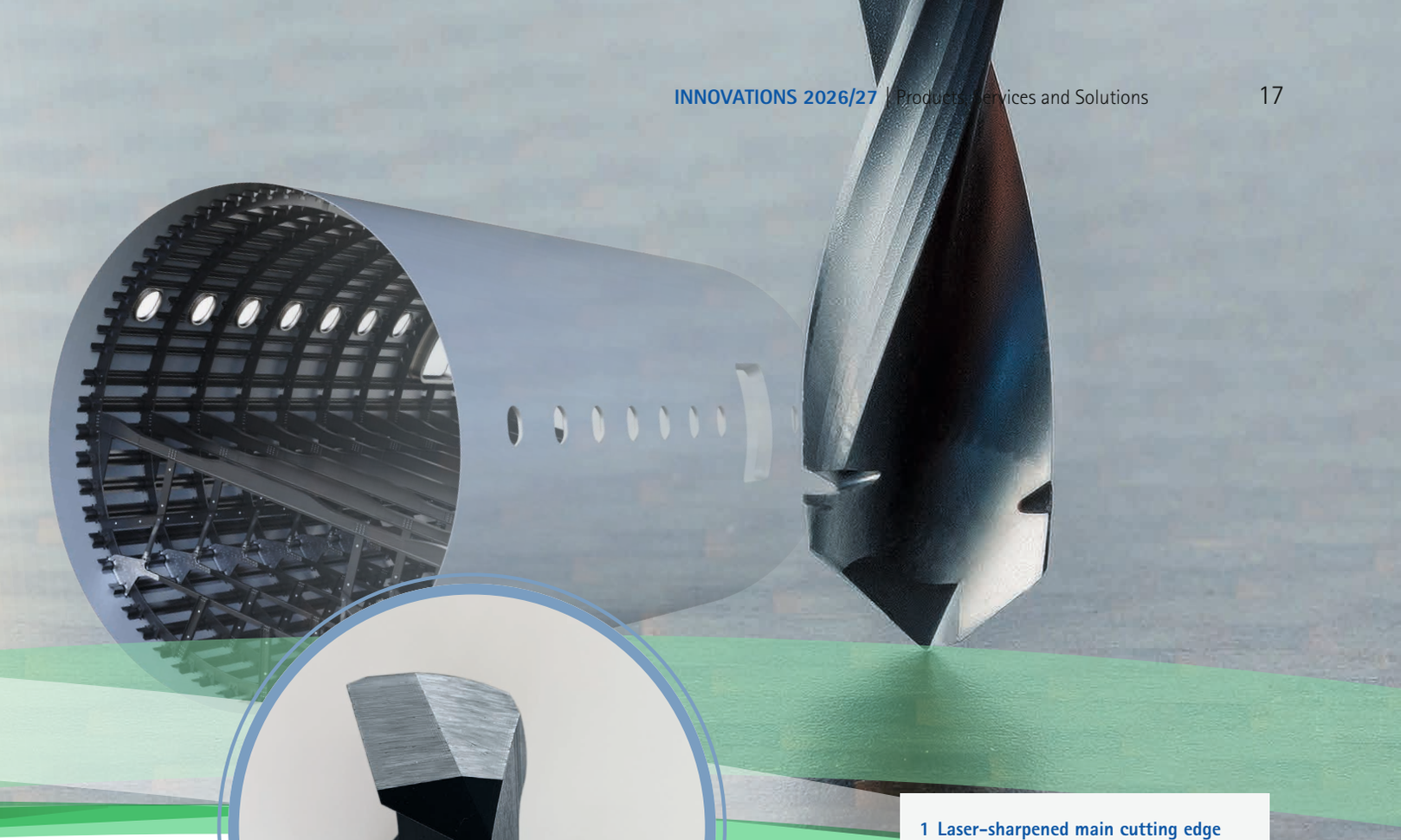
Multidirectional CFRP materials are among the most challenging materials in machining. The MAPAL MEGA-Drill-Composite-MD-EdgePro has been specially developed for these applications and combines maximum cutting edge sharpness for flawless CFRP bores without fibre pull-out with high hole quality, long tool life and fast cutting speeds.

Clean cuts in CFRP composite materials require extremely sharp tools. Their cutting edges are consequently susceptible to wear and are therefore CVD diamond-coated. However, the coatings increase the cutting edge radius, which in turn has a negative impact on cutting performance. MAPAL addresses these challenges with the new EdgePro technology: The main cutting edge is laser-sharpened on the first clearance face. This process produces an extremely sharp cutting edge to prevent delamination. The remainder of the cutting edge is protected against wear by the CVD diamond coating.

The cutting-edge corner of the MEGA-Drill-Composite-MD-EdgePro is also designed for high stability. An integrated fibre catcher reliably cuts off protruding fibres that form when the drill is withdrawn. The newly developed HC611 CVD diamond coating also ensures low thermal loads and long cutting tool life. In addition to high hole quality and process reliability in series production, the drill enables cutting speeds up to 50% higher than those of conventional CFRP drills on the market.

The self-sharpening feature – which is unique on the market – offers further key benefits for users: consistently high hole quality and at least 50% longer cutting tool life. The MEGA-Drill-Composite-MD-EdgePro can be used wherever CFRP is machined – from the wind power and leisure industries to general industry. However, it delivers particular benefits in the aerospace industry, where the highest demands are placed on bore quality.





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1 Laser-sharpened main cutting edge with self-sharpening feature
- Low process temperature
- Low cutting forces

2 90° point angle
- Clean and self-centring spot drilling
- High dimensional accuracy

3 Fibre catcher
- For delamination-free entry and exit
- No fibre protrusion

4 New CVD diamond coating
- Wear-resistant
- Low thermal load
- Ideal for abrasive materials
- Very long cutting tool life

2

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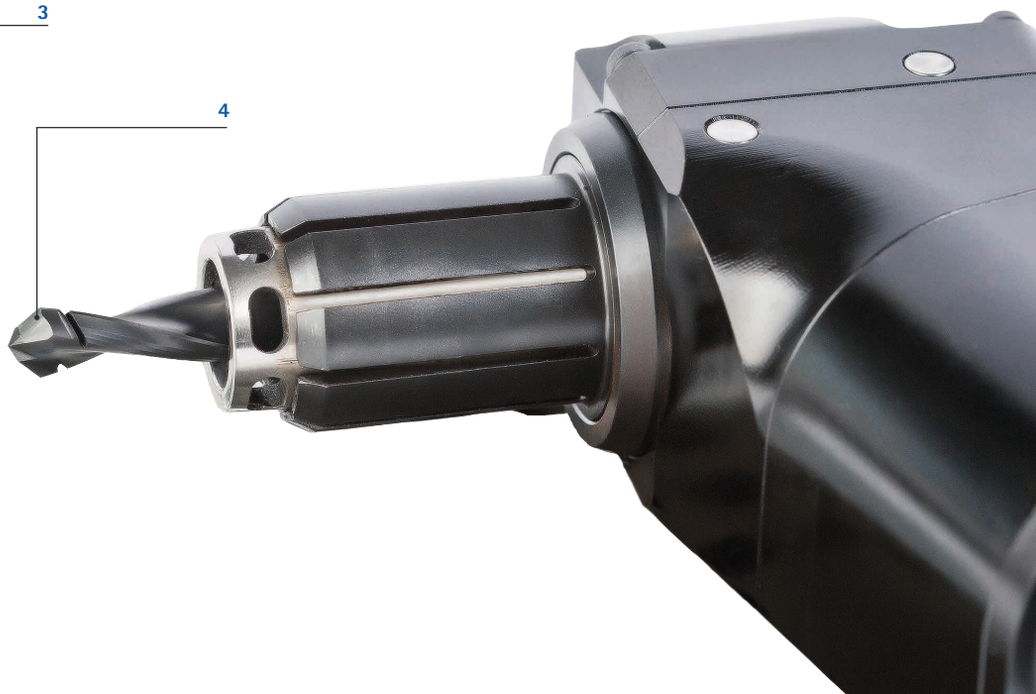

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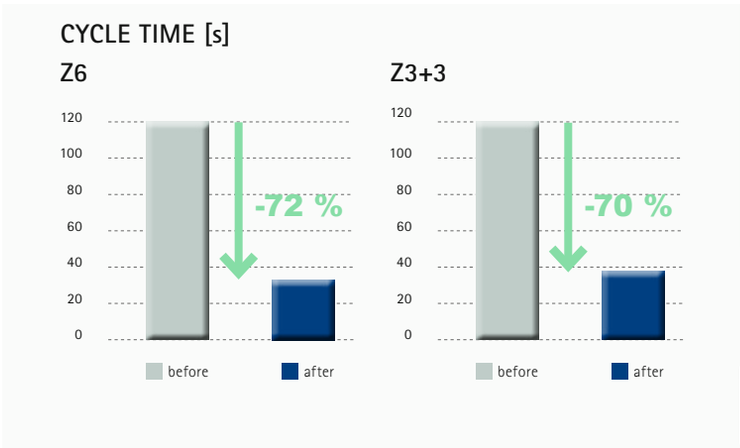
E-mobility – stator housing

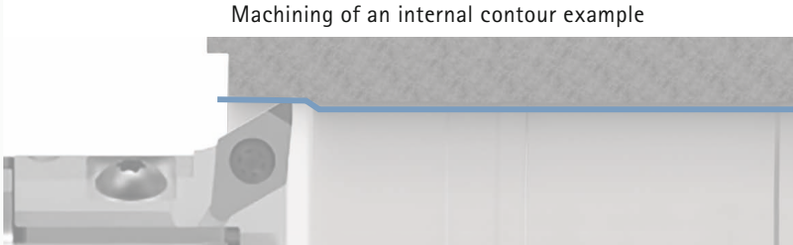
Maximum flexibility with six controllable slides

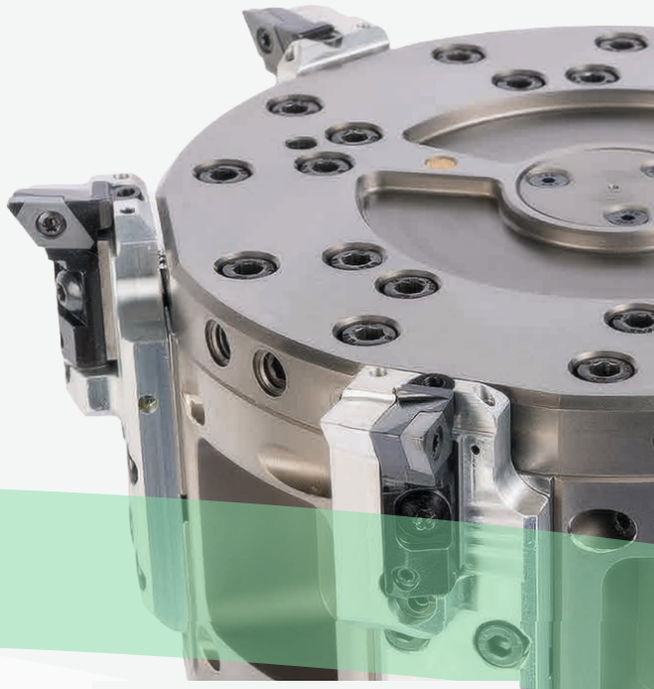
For machining complex internal contours in stator housings for electric motors, MAPAL has expanded its range of solutions with an innovative actuating tool featuring six slides for the first time. The increased number of slides that can be actuated simultaneously provides a significant boost in productivity: The first time it was deployed for a customer, the cycle time was reduced by more than 70% compared with the previous actuating solution with four slides.

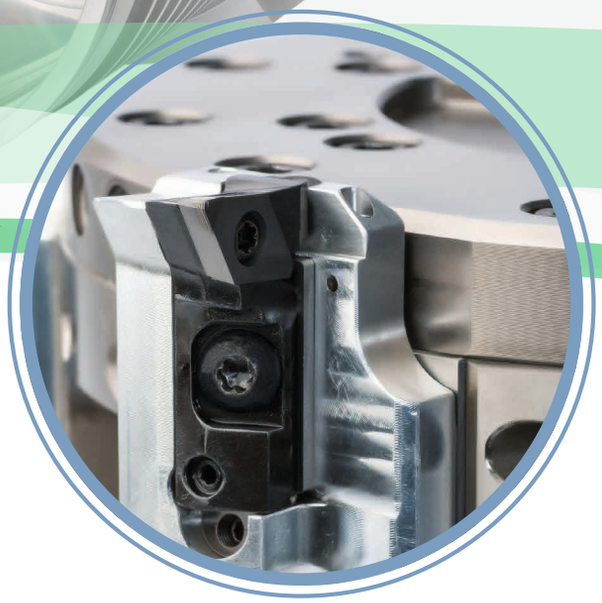
MAPAL has a broad portfolio of solutions for stator machining and continuously develops it in line with specific manufacturing requirements. An innovative actuating tool has now been added to the range to machine complex internal contours in stator housings for electric motors. Featuring six slides for the first time, it offers flexibility for different component variants. The decisive development step towards higher productivity lies in a fundamentally new slide actuation system. The previous installation space with four slides did not provide enough room for additional cutting edges. The tool's internal design was therefore completely reworked. By integrating the serration directly into the slides, the moving components were made significantly more compact and lightweight. This allowed the number of simultaneously actuated slides to be increased from four to six, while keeping the overall dimensions virtually unchanged. A patent has already been granted for this solution. Based on the new concept, MAPAL has developed two designs for different machining requirements. In the first design, all six slides are actuated simultaneously outwards, forming a six-bladed cutting tool. The second variant is designed as a 3+3 system, with three slides actuated outwards while three opposing slides are retracted. This allows a wide range of contours and process requirements to be covered in a flexible way. The benefits for users are huge: both vari-



Machining of an internal contour example







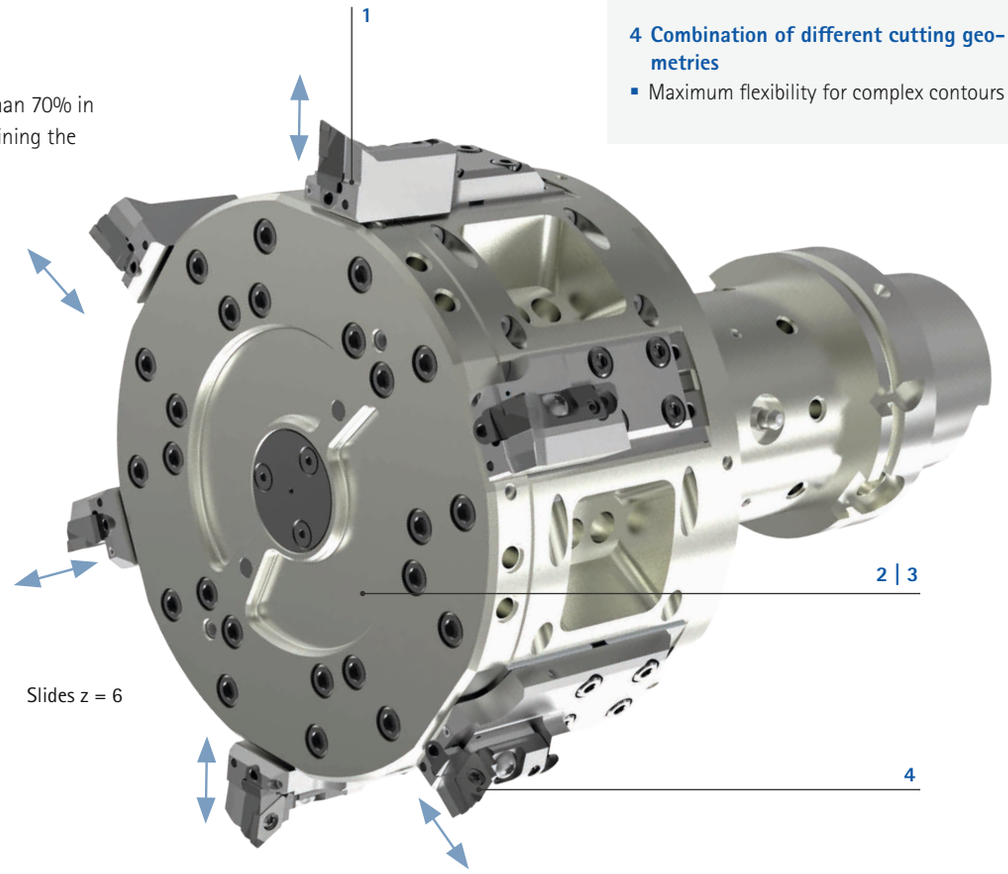
1 Six controllable slides
- Up to 72% shorter cycle times
- Simultaneous Z6 or counter-rotating Z3+3
- Optimised force distribution during the process

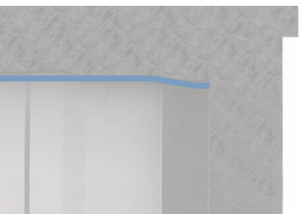
2 New slide actuation concept
- Higher productivity in the same installation space

3 Reduced mass of the moving components
- Higher rotational speeds and greater process reliability

4 Combination of different cutting geometries
- Maximum flexibility for complex contours

ants reduced cycle time by more than 70% in a specific application, while maintaining the same high level of precision and process reliability. In addition to significantly higher productivity, reducing the mass of the moving components enables higher rotational speeds and expands the process window. At the same time, a key advantage of using actuating tools is retained: Contours can be adjusted flexibly via the NC program without having to modify the tool design.





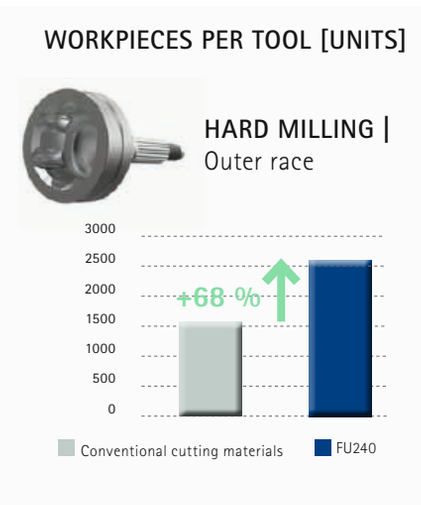
Automotive – constant velocity joints

New PcBN cutting materials for hard milling and hard turning

Machining hardened components places the highest demands on cutting material, tool geometry and process design – especially for safety-critical components such as drive joints. With new PcBN cutting materials and an optimised tool design, MAPAL takes the efficiency of machining these key components to a new level. Longer tool life, shorter machining times and reduced unit costs make production much more cost-effective.

Drive joints are highly stressed components whose ball tracks are hard-milled to the highest precision. In the same way, the requirements for form, surface finish and tool performance are extremely high. Here, the cutting material and cutting edge preparation have a clear influence on tool life, performance and surface quality.

In response to the specific requirements of hard milling constant velocity joints, MAPAL has developed new PcBN cutting materials specifically tailored to the applications in the inner race (ball hub) and outer race (outer housing), enabling more efficient hard machining. Compared with the previous solutions, the new FU240 (outer race) and FU290 (inner race) cutting materials achieve upwards of 30% more workpieces per tool at cutting speeds of 180 m/min and a feed per tooth of between 0.07 and 0.10 mm.



In addition, MAPAL has revised the tool design of its ball track milling cutters and introduced a new five-bladed design that reduces machining time by around 20% compared with four-bladed tools. With annual production volumes of up to 15 million components, this results in significant potential for reducing unit costs.

MAPAL is also introducing new PcBN cutting materials for the hard turning of drive joints. FP240 is designed for continuous cutting applications, such as on the shank of the outer race, while the ductile FP260 cutting material is used for interrupted cuts on the inner race or cage. Depending on the application, tool life can be increased by more than 40%.
The combination of application-optimised cutting materials and adapted tool design delivers lasting productivity gains and improves cost efficiency when machining hardened drive joints.

1 | 2

5

3 | 4

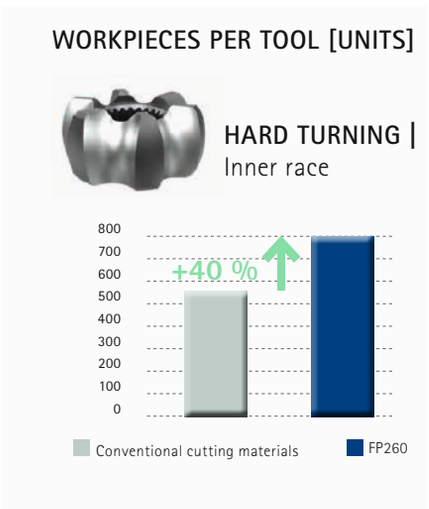
1 New PcBN cutting materials
- Upwards of 30% more workpieces per tool

2 Component-specific cutting material selection
- Optimised for inner race, outer race and ball cage

3 Optimised cutting edge preparation
- Highest surface quality of the ball tracks

4 Five-bladed milling cutter design
- Up to 20% shorter machining time

5 Perfectly coordinated tool concept
- Reduced unit costs in series production



PRODUCT EXTENSIONS

Targeted further development of existing solutions

Markets and manufacturing requirements are constantly evolving. MAPAL is expanding its existing product families to meet new manufacturing requirements and include new applications.

N

NeoMill®-Alu-QBig
New connections broaden the range of applications

N

Replaceable head drill QTD-Alu | Type 03
Enhanced performance thanks to an optimised design

UNIQ® Mill Chuck
SK50 diameter range expanded to 6–32 mm

P K

Boring edges with G tolerance
Bridging the gap between ground and pressed cutting edges: Close to H-tolerance accuracy at a price close to M-tolerance levels

P M K N

NeoMill®-T-Rough
New tangential milling cutter product family for roughing

Discover tool and service solutions now that will put you ahead:

BORE MACHINING

REAMING | FINE BORING

DRILLING FROM SOLID | BORING | COUNTERSINKING

MILLING

CLAMPING

TURNING

ACTUATING

SETTING | MEASURING | DISPENSING

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