



Your technology partner for cost-effective machining

FLUID POWER: HYDRAULICS & PNEUMATICS

Markets and sectors

After many years of close cooperation with customers, MAPAL has acquired a profound understanding of almost all processes and applications in machining production. The fields of application in which machining solutions from MAPAL are used are found in a wide variety of sectors.

For the raw materials often used in fluid power such as cast iron, steel, stainless steel and non-ferrous metal, MAPAL provides economical process solutions due to great expertise in bore machining as well as milling applications. When it comes to demanding machining for hydraulic and pneumatic parts in different dimensions, customers have relied on MAPAL's expertise for many years.





Germany
Headquarters of the group of companies

Close to the customer – globally

The close dialogue with customers and thus the early recognition of technological requirements and approaches for innovations are essential pillars of the MAPAL company policy. As a result, MAPAL is directly represented with production and sales branches in 25 countries. This ensures close proximity, personal contacts and long-term partnerships.

In addition to the main production facilities in Germany, local production facilities in strategically important markets worldwide guarantee short delivery times. They are responsible for the manufacture of selected products as well as for reconditioning, repairs and repeat orders for the local market.

In addition to its own branch offices, MAPAL products are available through sales agencies in a further 19 countries.



No. 1

Technology leader for the machining of cubic parts.

Subsidiaries with production, sales and service in

25 countries.

Annual investment in research and development of

6% of turnover.

Over

450

technical consultants on the road.

More than

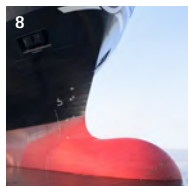
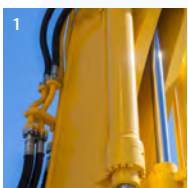
300

trainees worldwide.

Our most important asset: More than

5,000

employees worldwide.



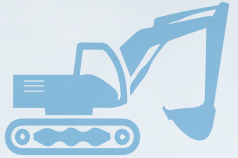
- 1 Fluid power
- 2 Automotive
- 3 Aerospace
- 4 Energy production
- 5 Electric mobility
- 6 Medical technology
- 7 Die & mould
- 8 Shipbuilding
- 9 Rail transport

Solutions for fluid power

Everything depends on the challenging key features. For years, MAPAL's expertise has been in demand for cost-driving machining tasks. For instance, in the spool bore. The accuracy of this bore affects the gap dimension with the spool, so that the hydraulic oil can flow in the desired direction without any leakage. This is very narrowly defined in modern hydraulic valves. Consequently, a great deal of attention is paid to the roundness, cylindrical form, straightness, and the surface finish of this bore.



AEROSPACE



CONSTRUCTION MACHINES





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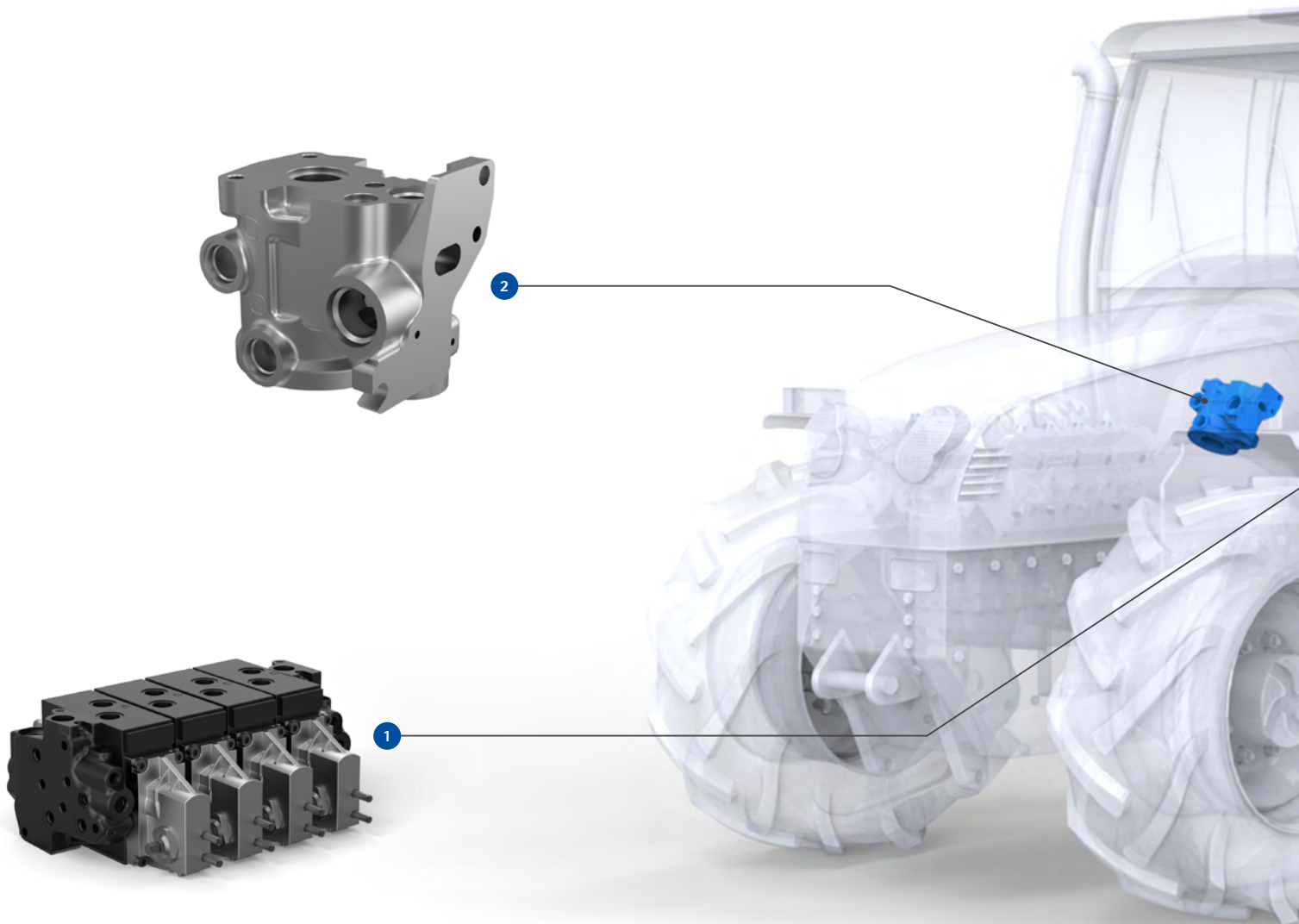
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Fluid power competence



SOLUTIONS FOR HYDRAULICS

1

Hydraulic valve housing

The valve housing is a core element of control valves. It directs the flow of liquid according to the performance and flow requirements to various machine functions.

[» More from page 8](#)

2

Steering orbitrol

The orbitrol is the central control element of hydrostatic steering systems.

[» More from page 20](#)

3

Control block

The hydraulic control block forms the centrepiece, which controls the individual functions of a hydraulic system.

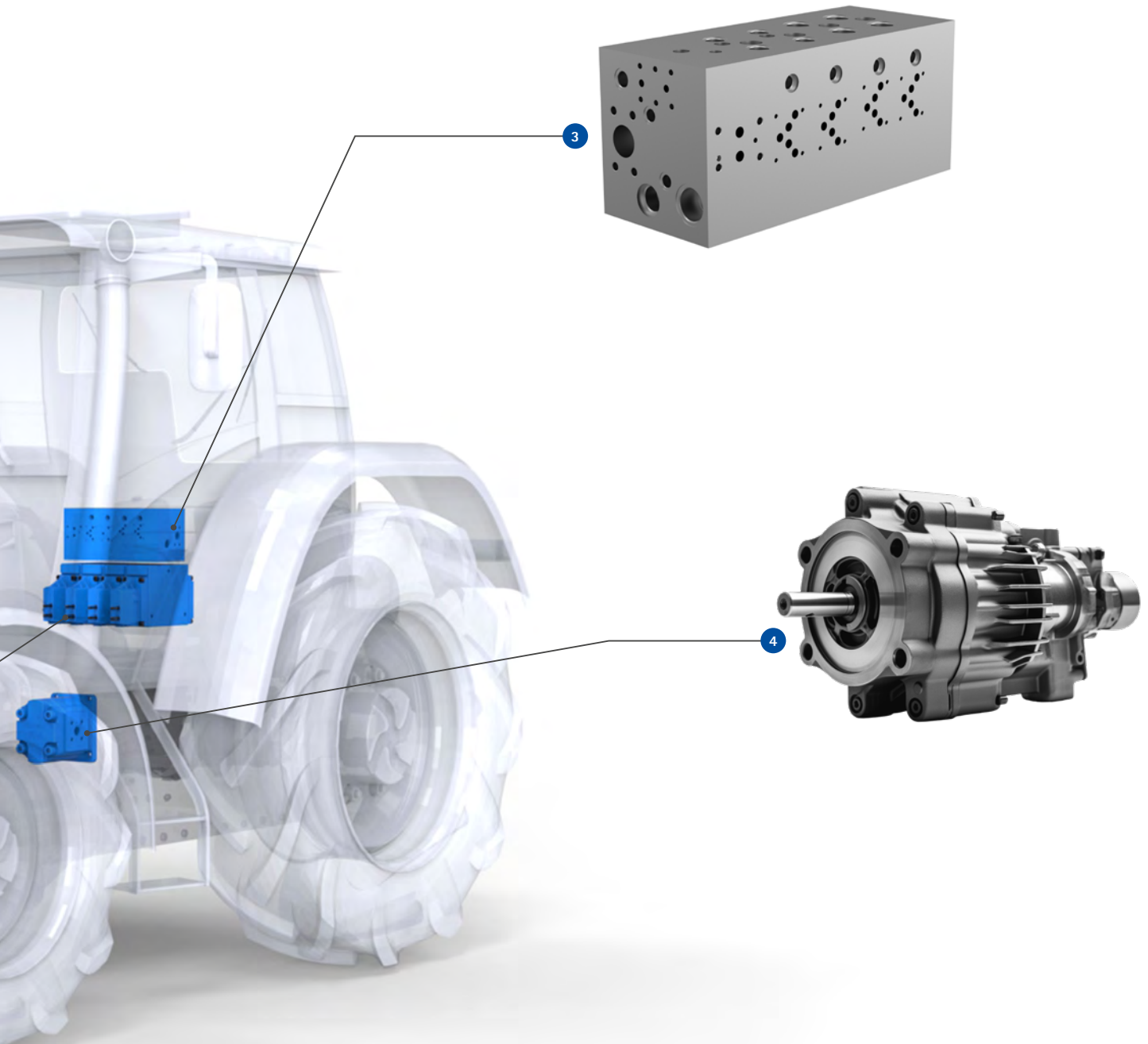
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4

Axial piston machine

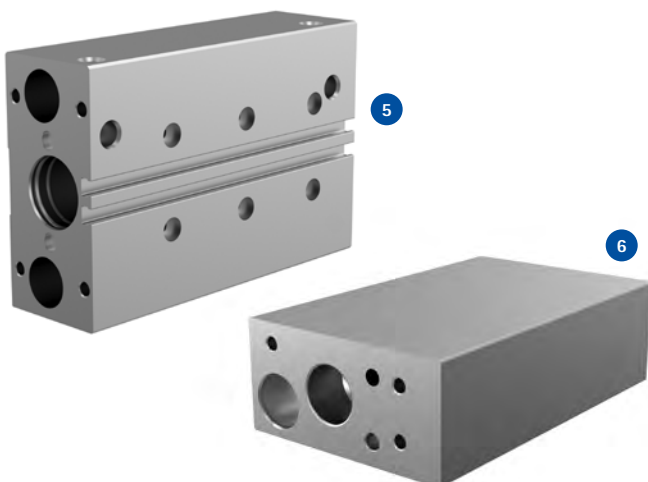
The axial piston machine is used for transforming hydraulic and mechanical energy.

[» More from page 24](#)



3

4



5

6

SOLUTIONS FOR PNEUMATICS

5

Cylinder

The cylinder is a mechanical fixture for moving heavy objects, primarily used in automated processes.

>> More from page 28

6

Valve housing

The valve housing is a core element of control valves. It directs the gaseous flow according to the performance and flow requirements to various machine functions.

>> More from page 30

Valve housing

Control valves

Control valves are mechanically or electronically actuated valves with several switch positions. Depending on the specified position of the spool along the control edges, a volume flow is set for operating the connected working equipment. The individual pressure compensator adjusts a constant load pressure drop via the supply control edge of the spool, so that a load

pressure-independent volume flow control is achieved across the whole adjusting range, also in parallel operation (load compensation). The system must be leakage-free, to prevent accidental dropping of the load, even with parallel operation.



MACHINING REQUIREMENTS

- Fluctuating cast allowance situation
- Heavily interrupted cuts
- Avoid ring formation during boring and ensure safe chip removal from the housing
- Avoid macroscopic flaws on the control edges in the boring process
- Very high demands on form and position tolerance
- Constant stock removal before honing
- Take part variance and limited tool storage places in the machining concept into account

Machining solution 1

Small and medium series with fixed tools

>> More from page 10

Machining solution 2

Large series with solid and adjustable tools.

>> More from page 12

Machining solution 3

Small lot sizes Reduced tool changes due to combination tools

>> More from page 14

Machining solution 4

Flexible honing on the machining centre

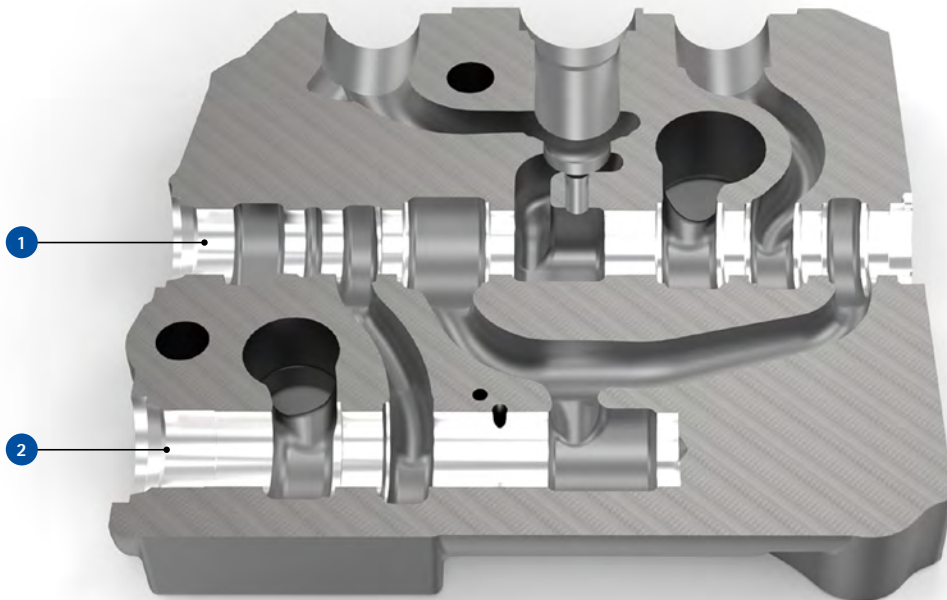
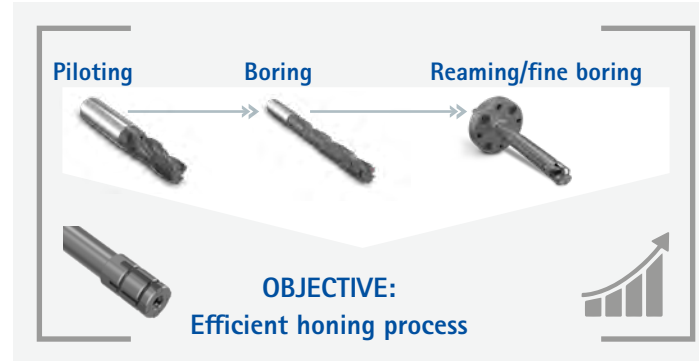
>> More from page 16

Basic procedure – analysis of the machining process

As technology partner, MAPAL supports customers with regard to complete process design. The experts pay particular attention to the cost drivers here, which can often be found in the function-relevant bores.

Based on the respective honing procedure, the part requirements and lot sizes, MAPAL designs the perfect machining strategy in dialogue with the customers.

One objective unites all activities: designing the most economic process, starting with piloting, boring and semi-finish machining up to the efficient honing process.



1 SPOOL BORE

The relative movement of the spool along the control edges controls the flow direction of the fluid.

2 COMPENSATOR BORE

Despite different loads on agricultural and construction machinery, the volume flow for the lifting and lowering speed on an excavator shovel, for example, must remain constant. If a low load is present, the spring-preloaded pressure compensator releases a smaller cross-section, to keep the volume flow constant. With high loads, a larger cross-section is released. The working speed of the hydraulic cylinder connected to the excavator shovel thus always remains the same.

ADVANTAGES WITH THE MAPAL SOLUTION

- Reliable achievement of the required accuracies for spool and compensator bores
- Increased competitiveness
- Ideal interplay of spool and bore on the part
- No leakage loss on the end product, safe operation and functionality of the end product (e.g. excavator shovel)
- Consistent load pressure ensures highest safety through highly accurate machining operations
- Consistently high machining quality
- Start-up support for new parts

Solutions for valve housings

Initial situation at the customer

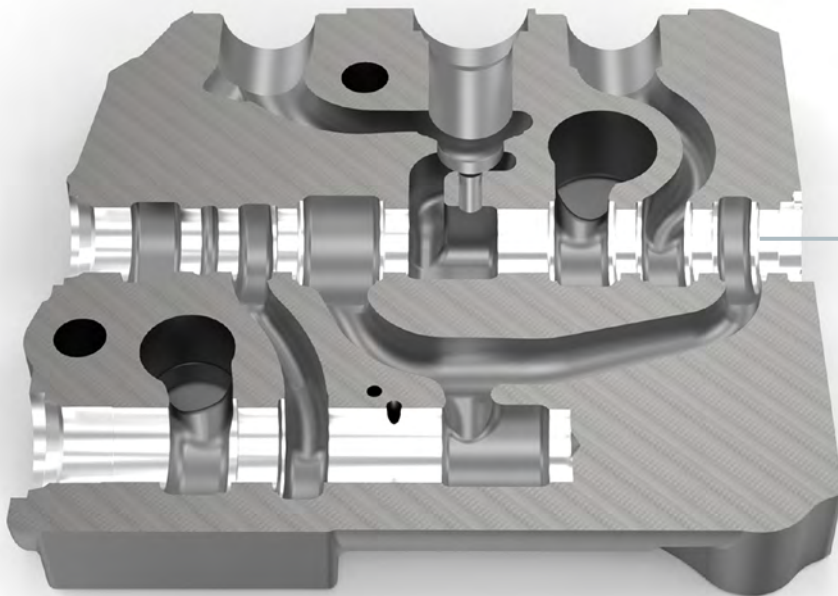
Valve housing EN-GJS-400-15 – spool bore

- Individual orders, smaller and medium quantities
- No option for tool setting
- Little lead time required
- High machine hourly rates
- Stable expansion honing process available
- Tool concept adapted to several part versions

Quantity



Accuracy



ADVANTAGES

- Minimal investment
- Low lead time
- High availability of the machining centre
- Low production costs
- No tool setting required
- Option for regrinding worldwide

Spool bore

1. Piloting

- Solid carbide-boring tool with six margin lands for perfect roundness and straightness
- Optimum chip flow and extended regrinding options through multi-cut technology and suitable coolant supply



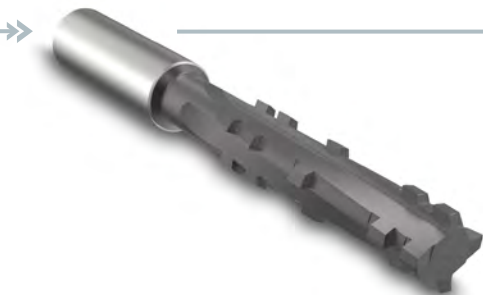
2. Boring

- Solid carbide boring tool with three cutting edges and six margin lands and special lead geometry
- Straight bore, ideal chip flow and guide across the entire bore length



3. Control edge machining

- Significant clock time savings with special solid carbide circular milling cutter
- Defined control edges without macroscopic flaws

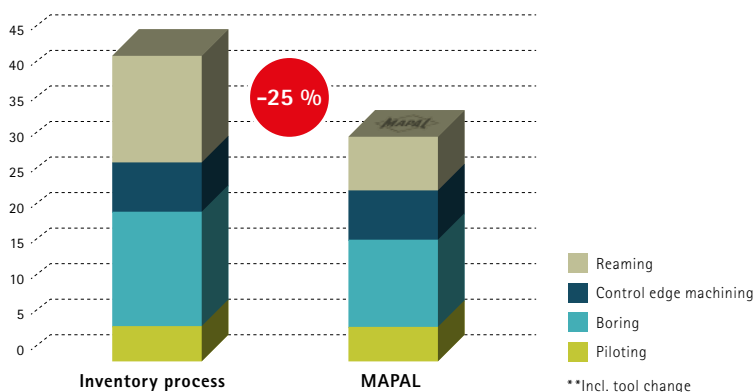


4. Reaming

- Multi-bladed reamer for high cutting data
- Perfect chip control due to left-hand twist and optimum coolant supply



MACHINING TIME PER SPOOL BORE [SEC.] *



SPECIAL FEATURES OF THIS SOLUTION

- No ring formation in the cavities due to special bore geometry → no costs for removal of rings
- Optimal results in pre-machining due to a coordinated piloting and boring process → Support of boring tools in the pilot bore = optimal straightness, position
- High productivity with perfect pre-machining quality → High cutting values – machining time is reduced

Solutions for valve housings

Initial situation at the customer

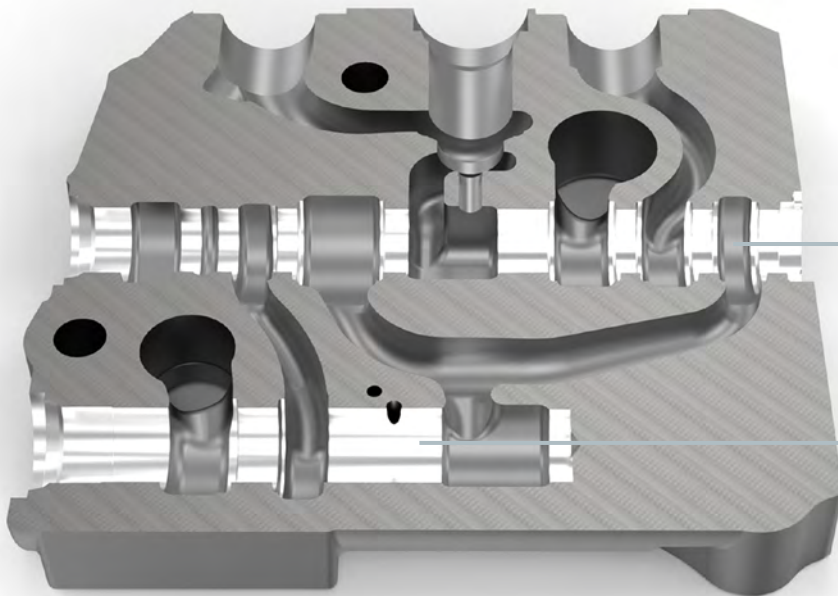
Valve housing EN-GJS-400-15 – spool bore and compensator bore

- Large-scale series
- Tool setting desired
- High machine hourly rates
- High costs for subsequent mandrel honing

Quantity



Accuracy



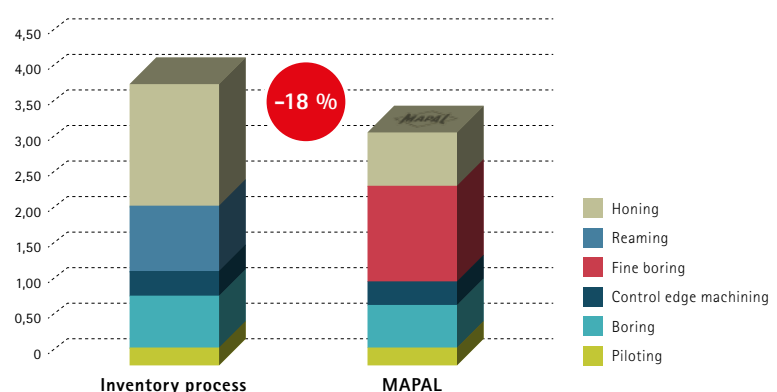
ADVANTAGES

- Expensive honing process shortened in spool bore
- Low tool costs per bore
- Shorter non-productive times due to clever engineering in cooperation with the customer
- Significant cost savings, as the honing process is no longer required in the compensator bore

With the MAPAL solution, the required tolerances are reliably achieved without additional honing:

Generated roundness: RONp under 1 µm
 Generated straightness: STRsa under 1 µm
 Average roughness depth: Rz 3.8 µm
 Material content (contact ratio): Pmr over 97%

PRODUCTION COSTS PER SPOOL BORE [€]



Spool bore

1. Boring

- Optimal results in premachining due to a coordinated piloting and boring process
- Optimal chip flow and extended regrinding options through multi-cut technology and perfect coolant supply
- No ring formation in the cavities due to special bore geometry => no costs for removal of rings

2. Control edge machining

- Solid carbide profile tool
- Highest accuracy and surface finish of control edges
- Defined control edges without macroscopic flaws

3. Fine boring

- Fine boring tool with EasyAdjust system and guide pads
- Reliable precision machining with easy handling
- Best cylindrical forms due to optimum tracking system



Compensator bore

1. Boring

- Solid carbide boring tool with six margin lands and special lead geometry
- Straight bore, ideal chip flow und guide across the entire bore length
- Reduced non-productive times due to two machining operations in one tool

2. Contour machining

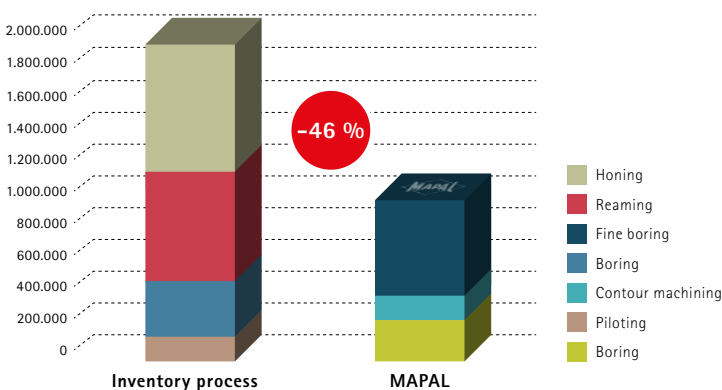
- Double edge boring tool with form cutting edges
- Reliable machining of the contour
- Easy handling with low cutting material costs

3. Fine boring

- Fine boring tool with EasyAdjust system and guide pads
- Reliable precision machining with easy handling without subsequent honing.
- Best cylindrical forms due to optimum tracking system



ANNUAL PRODUCTION COSTS OF THE COMPENSATOR BORE [€]



SPECIAL FEATURES OF THIS SOLUTION

- Ideally matched separate tools guarantee optimum preconditions for a reduced honing process
- The honing process can be eliminated with certain part requirements

Solutions for valve housings

Initial situation at the customer

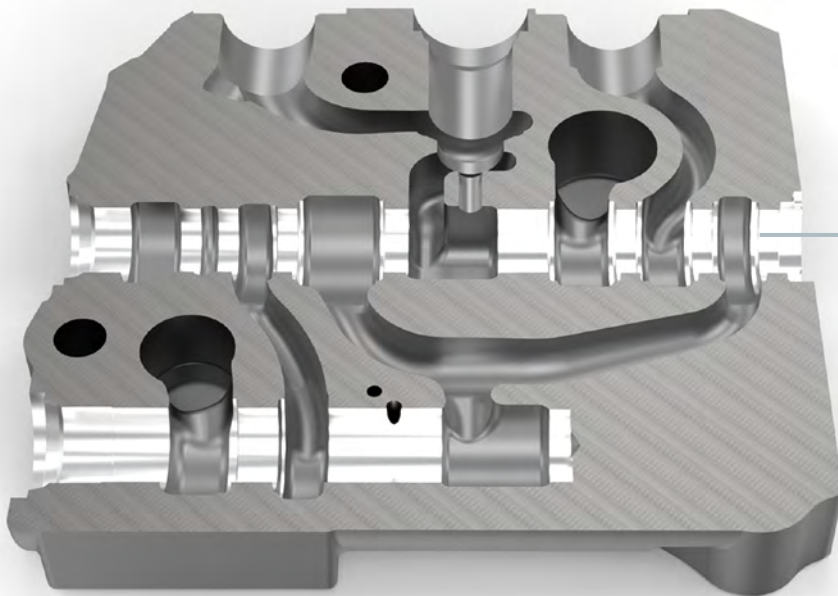
Valve housing EN-GJL-300 – spool bore

- Small lot sizes
- Option for tool setting available
- Too many/frequent tool changes
- High machine hourly rates
- High effort due to mandrel honing process

Quantity



Accuracy



ADVANTAGES

- Optimally matched process due to solution with multi-stage boring tool with indexable inserts, control edge machining and fine boring
- Best accuracy and process reliability
- Reduced effort when honing, resulting in cost savings

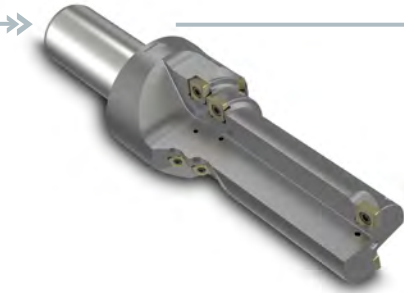
Spool bore

1. Piloting and boring

- Multi-stage boring tool with radial and tangential indexable inserts
- Premachining spool bores and completion of contours in one go

2. Control edge machining

- Solid carbide profile tool
- Highest accuracy and surface finish of control edges
- Defined control edges without macroscopic flaws

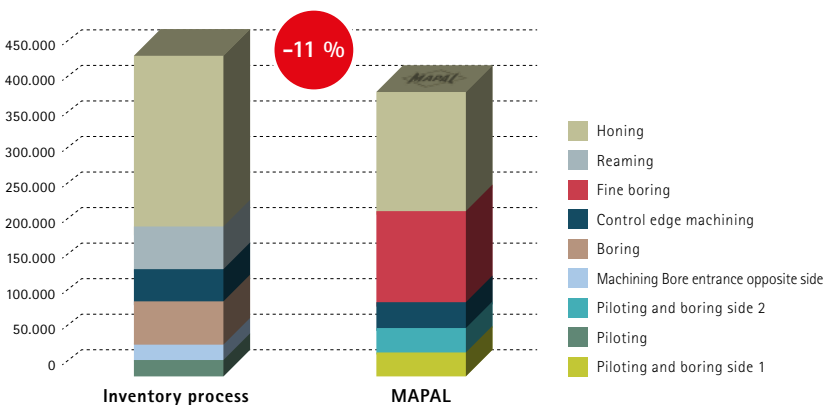


3. Fine boring

- Fine boring tool with adjustable inserts and guide pads
- Ideal for bar machining of highly accurate and long bores



ANNUAL PRODUCTION COSTS FOR SPOOL BORES [€]



SPECIAL FEATURES OF THIS SOLUTION

- Tool change reduced due to multi-stage boring tool with indexable inserts
- The contour can be completed in one "go"
- The fine boring tool creates highest bore quality and compensates the axial offset of the bores with premachining from two sides

Solutions for valve housings

Initial situation at the customer

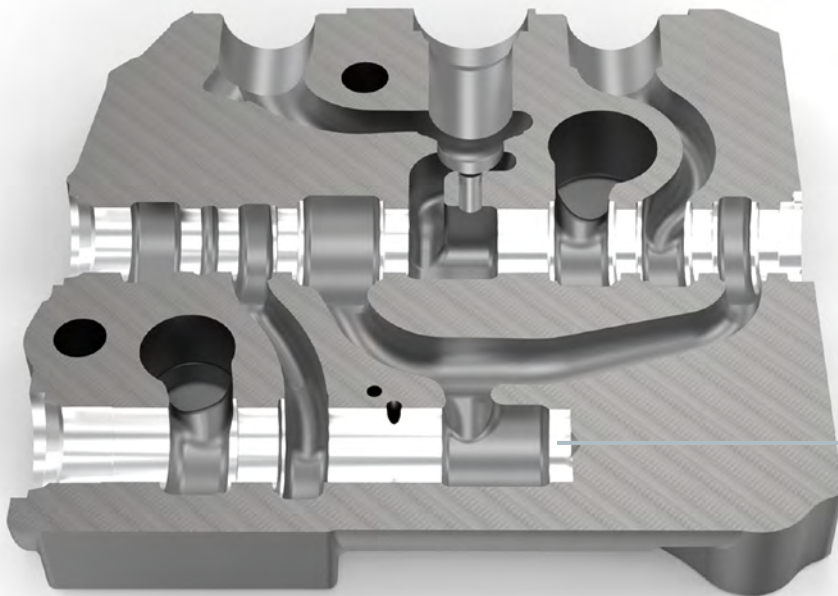
Valve housing EN-GJS-400-15 – Compensator bore / honing

- Request for reduction of ancillary costs
- Existing machining centre converted to TOOLTRONIC
- Honing for prototype manufacture, as well as small and medium-scale production runs
- Requirement for saving the honing process on separate machine

Quantity



Accuracy



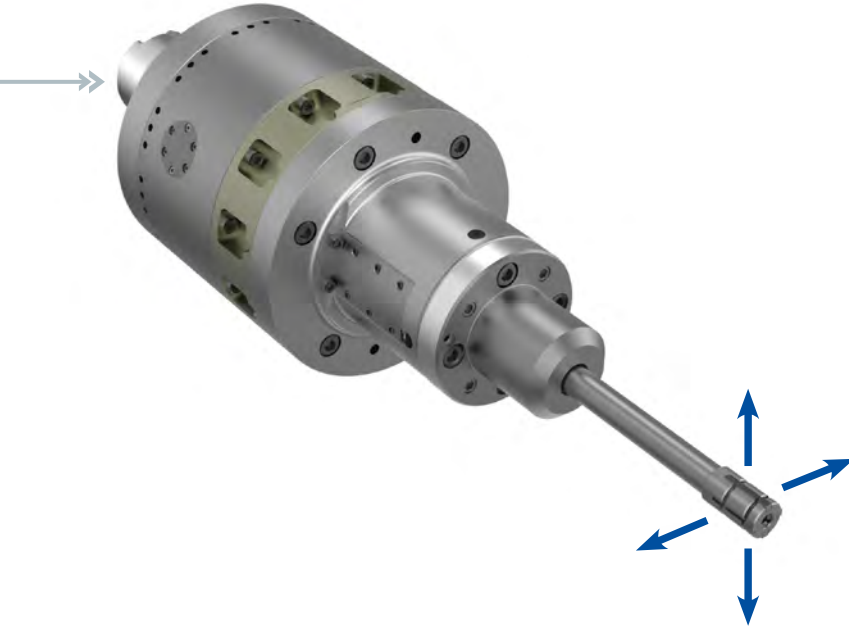
ADVANTAGES

- Tolerances to be achieved: Accuracy of diameter IT 6 and roundness $< 5 \mu\text{m}$
- Turning with the part clamped in a fixed position and stationary
- Burr-free, rounded transitions possible
- Reduced/low number of custom tools
- Low maintenance system with eccentric actuating tool (EAT system)
- Almost all machining centres can be converted to MAPAL TOOLTRONIC technology
- Reclamping error due to re-tooling to honing machine no longer applies
- Complete process of compensator bore can be mapped by MAPAL (highest economic efficiency & process reliability)

Compensator bore

1. Fine machining with honing

- Significant shortening of production and lead times
- Greater contour accuracy

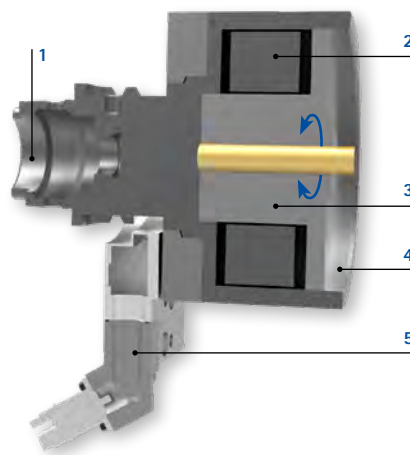


Honing with TOOLTRONIC

Machining with MAPAL TOOLTRONIC achieves high surface quality and dimensional accuracy with tightest manufacturing tolerances as well as high flexibility in manufacturing. Wear and tear of the honing bars is reliably compensated by a highly sensitive and precise actuating movement (EAT system).

ADVANTAGES OF THIS HONING

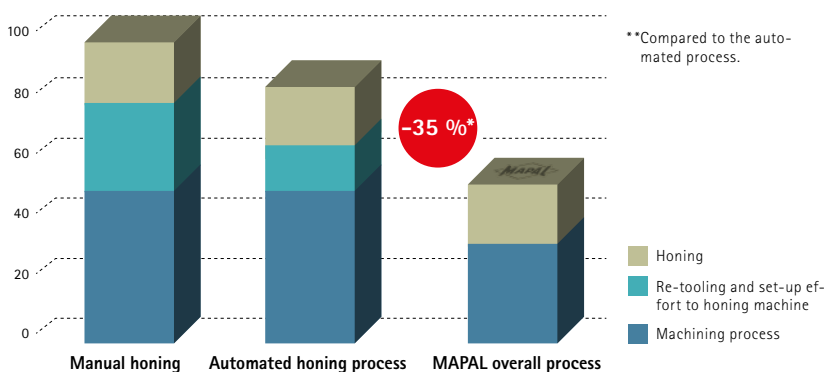
- Very tight manufacturing tolerances as well as flexibility in manufacture
- High surface quality and dimensional accuracy
- Major saving and quality potential for prototypes, small-scale and medium-scale series production runs
- Time-consuming re-tooling is not necessary



TOOLTRONIC design for machining centres:

- 1 Machine connection
- 2 Electronics
- 3 Motor unit with defined connection point
- 4 Modular connection
- 5 Stator (stationary unit)

PROCESS TIMES [%]

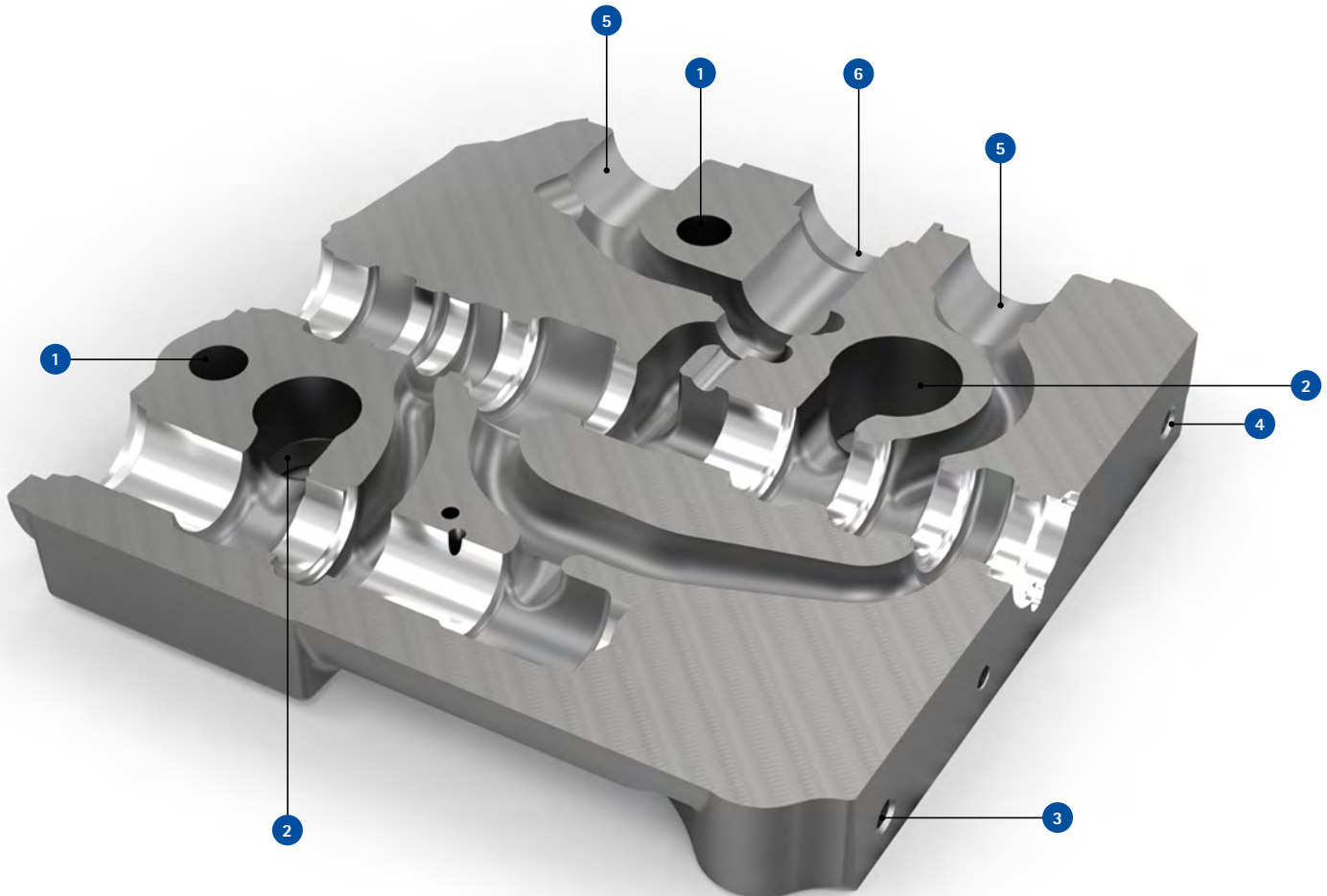


SPECIAL FEATURES OF THIS SOLUTION

- A full NC axis incorporated in the machine control system
- Shortening of production and lead times
- Improved surface quality
- Greater contour accuracy

Solutions for valve housings

Additional bore machining



1. Tie rod hole

Bore for tie rod, which keep the individual valve blocks together.

2. O-ring bore (O-ring hole)

Countersink for O-rings for sealing the plane surfaces between individual modules.

3. Oil bore (oil hole)

Oil channel for distributing the oil in the part.

4. Thread bore (thread hole)

Bores for attaching attachment parts.

5. Port hole

Bore for connecting the individual consumers to the valve block.

6. Check valve hole

Check valves for blocking a volume flow.

Pre-machining

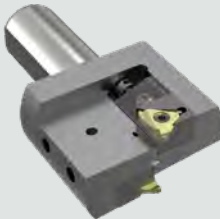
Finishing

Alternative finishing

1



2



3



4



5



6



The tool design is adapted depending on the part dimensions, workpiece clamp and quantities.

Steering orbitrol

Initial situation at the customer

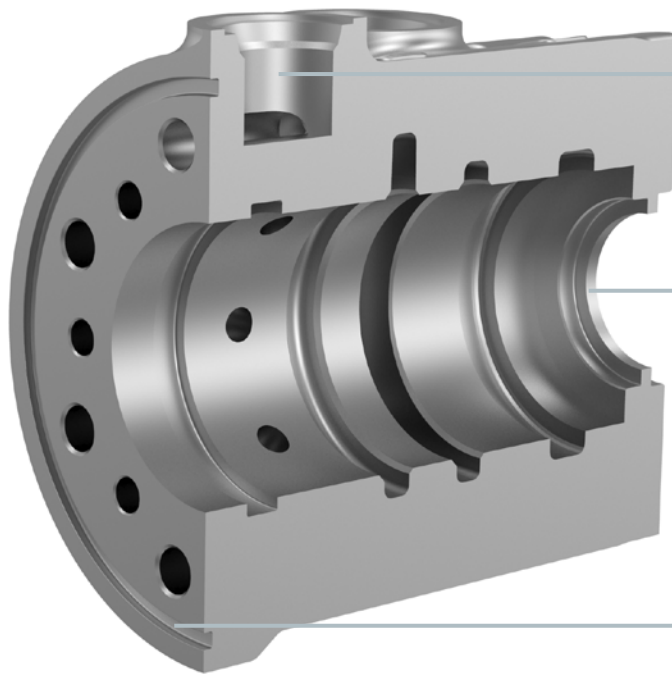
Steering orbitrol housing GG25

- High tool costs
- High costs for subsequent mandrel honing

Quantity



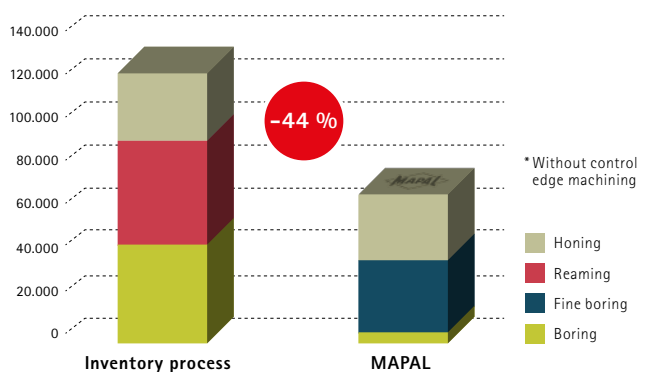
Accuracy



ADVANTAGES

- Expensive honing processes in the spool bore are reduced thanks to ideal premachining
- Tool costs significantly reduced for large part dimensions
- Tool solutions with multiple usage scenarios for various parts in valve and connection bores

ANNUAL TOOL COSTS OF SPOOL BORES [€]*



Tool highlights for steering orbitrol housing

Boring

- Boring tool with indexable inserts for efficient premachining of the spool bore in large dimensions
- Low cutting material costs even for large tool diameters

Fine boring

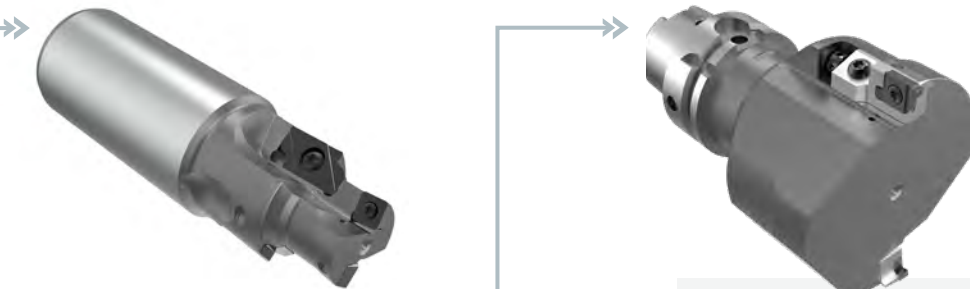
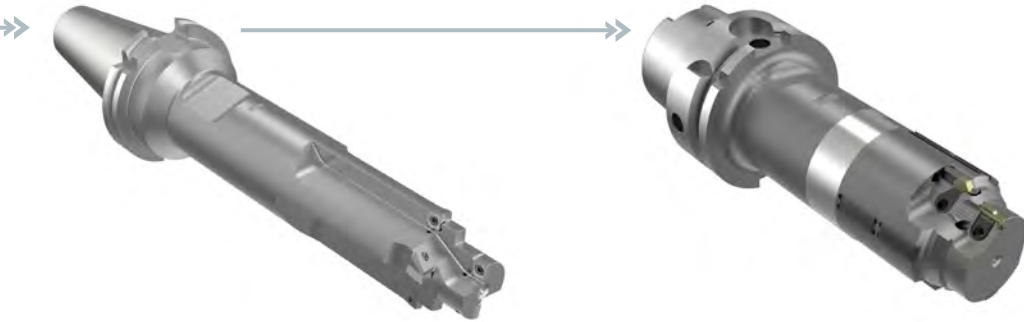
- Multi-stepped fine boring tool with ideal cutting edge usage for finish machining of the spool bore before honing
- Ideal bore quality and tolerances to one another prior to honing

Contour machining

- Boring tool with indexable inserts for economical machining of connection bores and contour machining
- Specially developed chip guiding stages ensure optimal chip flow and removal

Axial recess

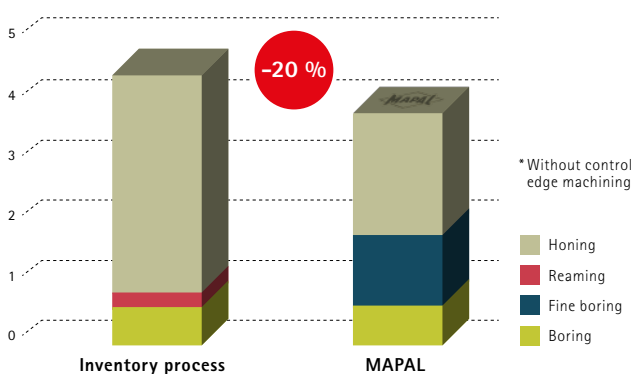
- Drilling tool with indexable inserts for easy handling when producing axial O-ring recesses
- Significant cycle time savings compared to milling operations



Based on the respective honing process, part requirements and batch sizes, MAPAL designs the perfect machining strategy in dialogue with the customer.



SPECIAL FEATURES OF THIS SOLUTION SPOOL BORE [€]*



SPECIAL FEATURES OF THIS SOLUTION

- Multi-stage combination tools → Reduces tool change and associated processing costs as well as machining time
- Quick renewal of cutting edges as inserts can be easily exchanged
- Various workpiece material can be machined with a single tool body → Insert solutions enable maximum flexibility for small lot sizes

Control block

Initial situation at the customer

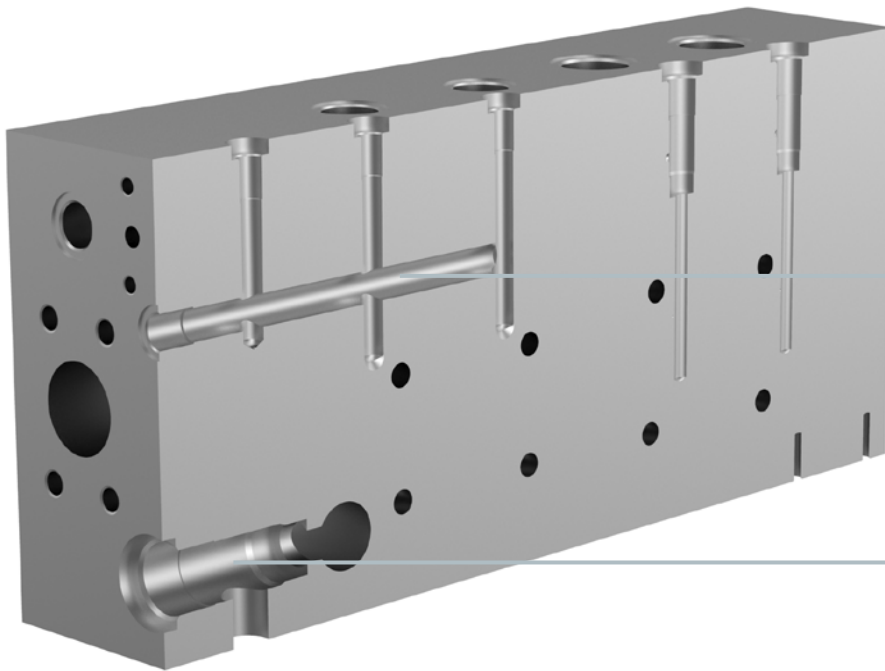
Control block 9SMn28k/EN AW-6082

- High degree of part and workpiece material variance
- Low lead time
- High quality requirements for surfaces and minimal burr formation

Quantity



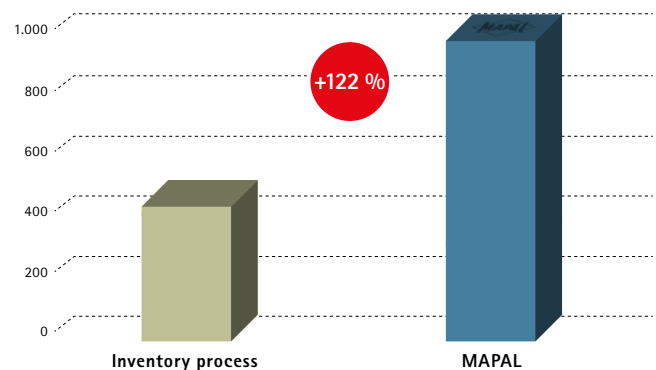
Accuracy



ADVANTAGES

- Ideal workflow ensures highest level of productivity and minimal lead time
- Combination tools replace other tools in the event of high part and workpiece material variances as well as a limited number of tool stations
- Tool solutions with multiple usage scenarios for various parts in valve and connection bores
- Large standard portfolio ensures simple and quick machining of small series and prototypes

TOOL LIFE OF OIL CHANNEL BORES [BORES]



Tool highlights for control block

Boring

- Multi-stage boring tool with indexable inserts
- Maximum flexibility
- Economical premachining for demanding valve bores in steel

Drilling from solid

- Solid carbide step drill with special coolant supply for challenging pre-machining applications in aluminium valve bores
- Multi-cut technology and stepped cutting edge correction for ideal chip control and enhanced regrinding capability

Boring

- PCD boring tool
- Process reliability while machining aluminium with minimal burr formation and the desired quality and surfaces for valve bores
- Special chip breaker geometry provides optimal chip breaking and chip removal from the bore

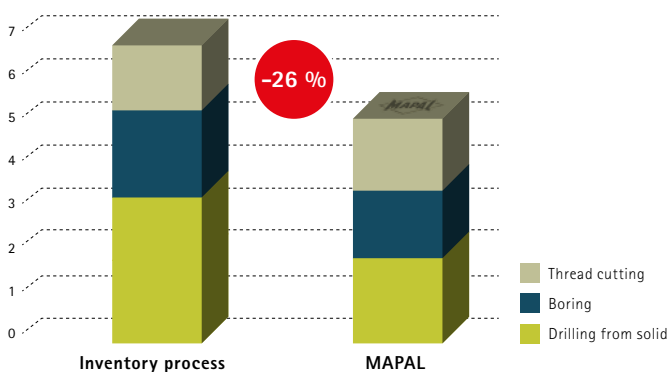


Deep drilling

- Solid carbide deep drill with stable cutting-edge form for reliable steel machining
- Ring guide ensures excellent guiding properties when drilling through cross bores



MACHINING TIME PER VALVE BORE [SEC.]

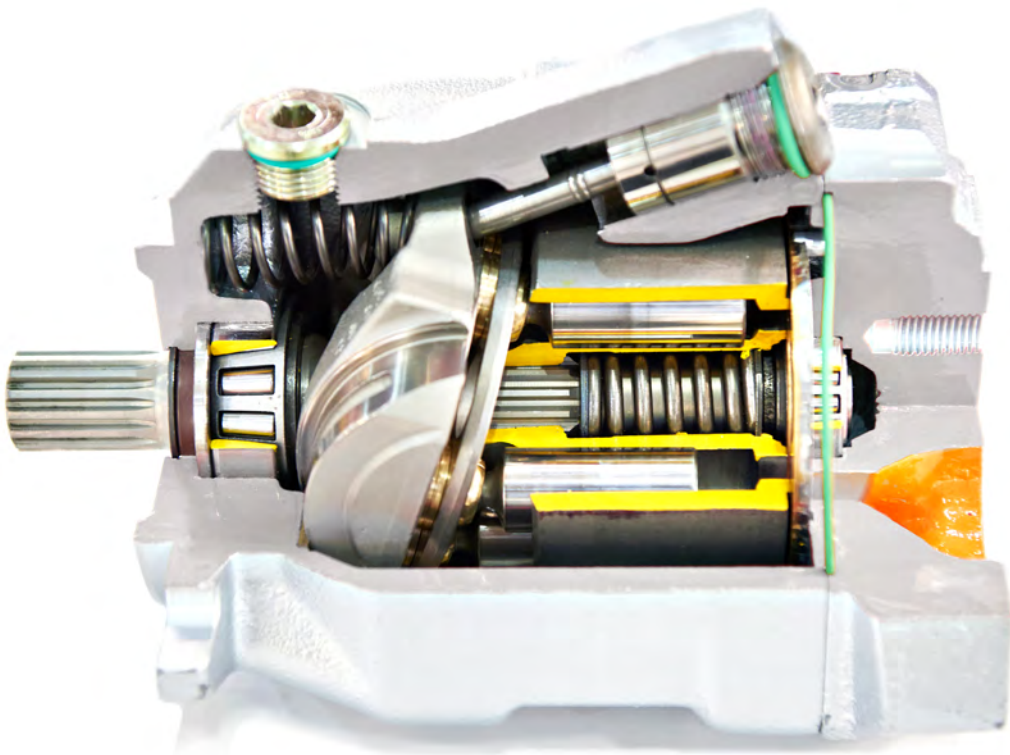


SPECIAL FEATURES OF THIS SOLUTION

- Different workpiece materials can be machined with a single tool body → maximum flexibility due to machining of small lot sizes
- Tool breakage avoided when producing overlapping oil channel bores
- Secure chip control when machining long-chipping material
- Efficient multi-stage tool → Reliable production of shape and position tolerances

Axial piston machine

Axial piston pumps and motors together are referred to as axial piston machines. An axial piston pump transforms mechanical energy into hydraulic energy and an axial piston motor transforms hydraulic energy into mechanical energy. Axial piston machines are characterised by a high degree of stability and good interior sealing, which allows high pressures.



Based on the respective honing process, part requirements and batch sizes, MAPAL designs the perfect machining strategy in dialogue with the customer.



MACHINING REQUIREMENTS

- When mixed machining various workpiece materials, cutting material must be optimally designed
- Interrupted cuts
- Challenging boring and pilot drilling situations



Cylinder block

The cylinder block is the heart of the axial piston machine. By regulating the pressure and suction properties, it ensures machine functionality.

Tool solution:

Solid carbide milling cutter processes pressure and suction kidneys using inclined plunging; step drill with titanium geometry for premachining of the piston bore. Tool with guide pad for fine machining with highest precision.

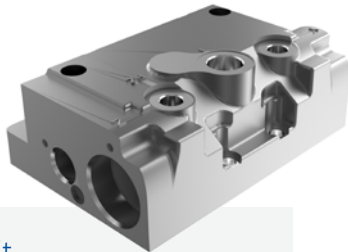


Port plate housing

The port plate housing is the axial piston machine's connection plate and thus the pressure and suction connection to further parts in the hydraulic circuit.

Tool solution:

Multi-stage boring tool for bearing seats and rotor bores.

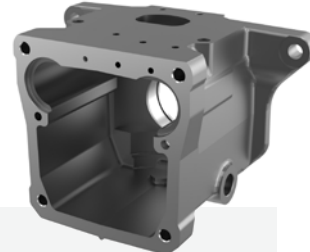


Adjustment unit

The adjustment unit acts as the axial piston machine's control instrument.

Tool solution:

Mostly standard tools, amongst others MEGA-Step-Drill for threaded bores and fixed reamers for fine machining.



Pump housing

The housing is the axial piston machine's protective casing, which ensures optimal functionality regardless of weather conditions.

Tool solution:

Modular boring tool with TTD replaceable head drill and indexable inserts machines the oil leak countersink.

Broad tool portfolio

For the machining of parts that are critical to function. The machines are composed of several parts, which are machined in medium to high quantities with high accuracy. MAPAL provides a broad portfolio of tools that balance economic efficiency with individual solutions.



Axial piston machine

Initial situation at the customer

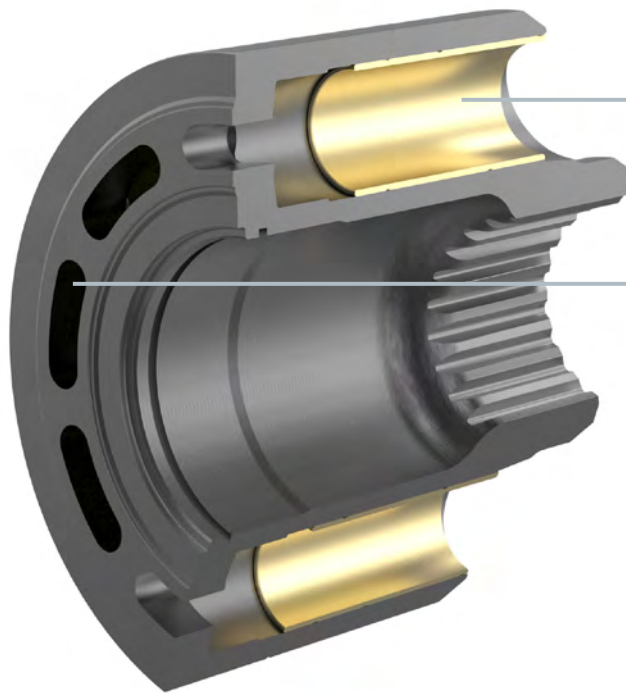
Cylinder block 42CrMoS4 / CuZn35Mn2Si

- High costs incurred when manufacturing defined surfaces and high qualities
- High fluctuation due to general lack of skilled workers with a simultaneous increase in production quantities

Quantity



Accuracy



ADVANTAGES

- Actuating technology allows efficient and highly automated "unmanned manufacturing" through automatic measuring and adjustment cycles during machining
- Reduced process and non-productive times
- Option for efficient multi-machine operation through high-tech tool solutions
- Actuating technology → significant saving of tool costs and machining time
- Precisely coordinated processes between pre- and fine machining

Tool highlights for cylinder blocks

Stepped drilling

- Optimal premachining of piston bores without additional spot facing by Tritan-Drill
- Deburring process of the bore bottom with sharp cutting edges no longer necessary



Fine boring

- Fine boring tool ensures perfect bore quality before pressing in brass bushes
- MAPAL HX inserts – six cutting edges for low cutting material costs and great economic efficiency



Actuating

- LAT facing head for precision machining of the defined surface specifications of piston bores
- Precision-fit machining of insertion contours of brass bushes without additional processing steps
- EAT eccentric facing head for applications with high spindle speeds to machine brass bushes efficiently (premachining and fine machining)

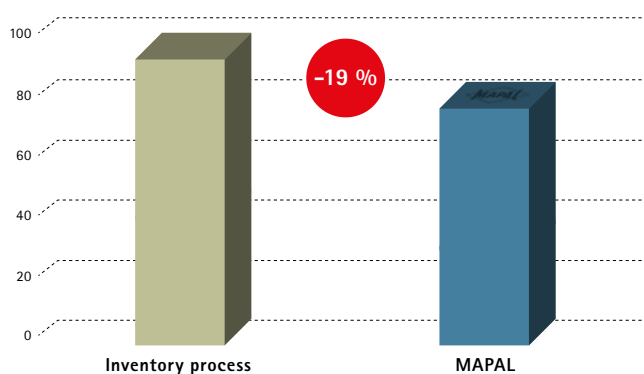


Milling

- OptiMill-Uni-HPC-Pocket supports the required drilling process using inclined plunging when machining inlet and outlet openings (kidney-shaped holes) on the cylinder block
- The production process of pressure and suction kidneys of the corresponding control plate can be performed efficiently and without further tools



MACHINING TIME PER CYLINDER BLOCK [SEC.]



SPECIAL FEATURES OF THIS SOLUTION

- Demanding parts quality met with certainty
- Reliable manufacturing of defined surfaces for the piston bore (defined R_z value as well as peak value)
- Spot face and boring processes no longer required thanks to Tritan-Drill and OptiMill-Uni-HPC-Pocket technologies
- LAT/EAT enable flexible implementation of the machining concept in other parts varieties

Cylinder

Initial situation at the customer

Aluminium guide cylinder

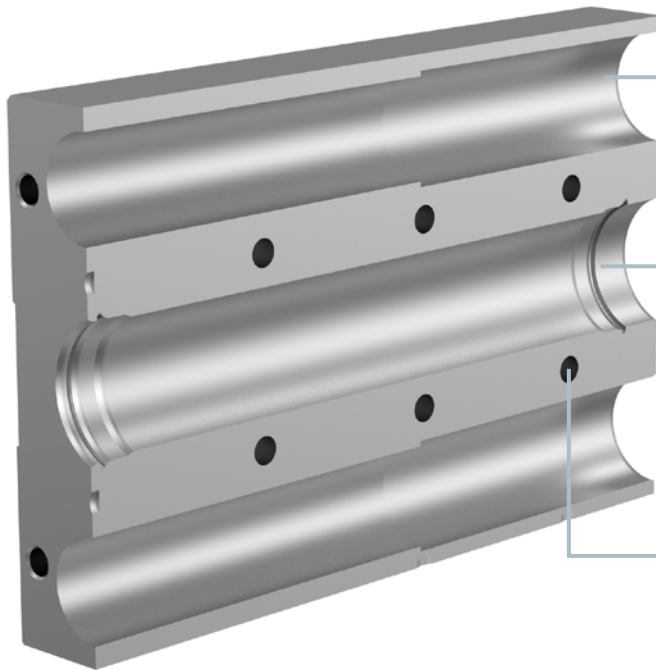
EN AW-6063 – T66 (Al Mg0,7Si)

- Varying hardness properties of continuous casting material
- Automated manufacturing
- High demands on parts (form and position, burr-free and surfaces)

Quantity



Accuracy



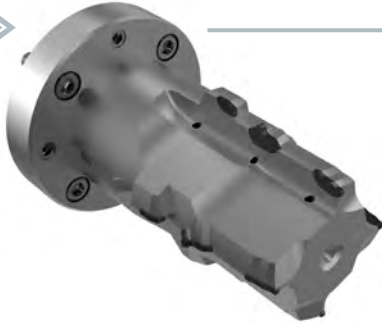
ADVANTAGES

- High process reliability and machining with minimal burr formation for medium to high parts quantities and a high degree of automation
- Combination tools save cycle times while maintaining part quality and functionality
- Perfect surfaces as well as form and position tolerance thanks to tool solutions tailored to client requirements

Tool highlights for cylinders

Boring + circular milling + chamfering

- PCD combination tool for complete machining of the piston bore's bearing seat with minimal scratching
- Boring and circular milling operations efficiently united in just one tool



Face milling

- PCD face milling cutter for economical face milling operations in series production
- Machining of cylinder housing with minimal burr formation for optimal functionality



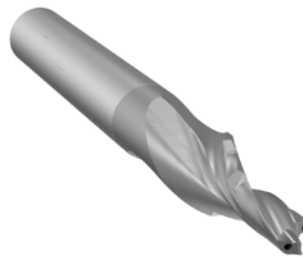
Boring

- PCD boring tool for finishing bearing seats in the pilot bore
- PCD cutting material combined with six inserts
- Very good form and position tolerance

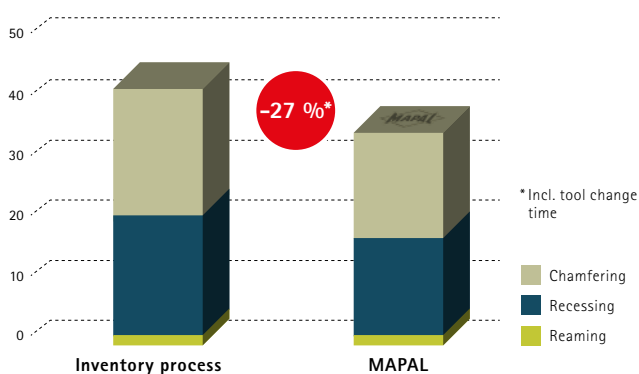


Drilling from solid

- Step drill made of solid carbide with special multi-cut technology and chip guiding stage
- Ideal chip control
- Frequent regrinding possible when machining air connection and fixing bores



MACHINING TIME OF BEARING SEAT [SEC.]*



SPECIAL FEATURES OF THIS SOLUTION

- Chip breaker adapted to workpiece material and machining solution → reliable chip control while machining long-chipping aluminium and varying hardness properties
- Long tool life and consistent quality for automated series production and varying degrees of workpiece material quality thanks to premium PCD tools
- Premachining with solid carbide → precisely aligned processes from a single source

Valve housing

Initial situation at the customer

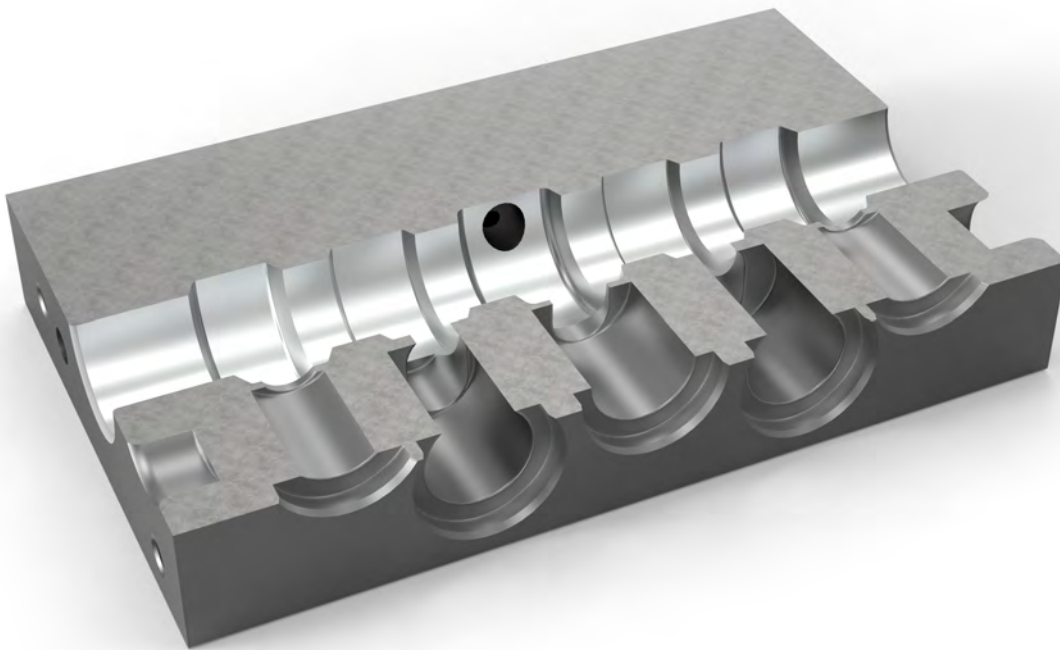
Valve housing AlMgSi-T6

- Very high quantities
- High cycle time requirements
- High hourly rates
- High demand for process reliability
- High demands on quality of surface, shape and position tolerances
- Burr-free / scoring-free machining

Quantity



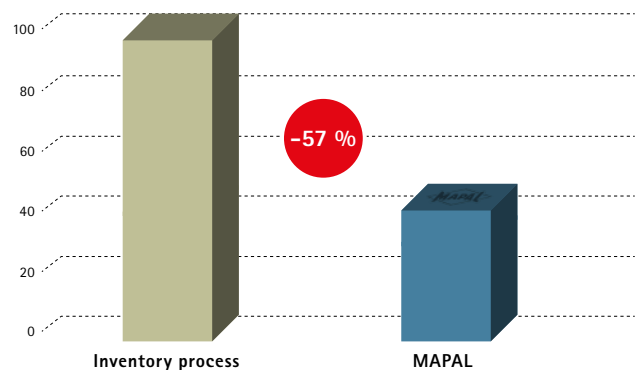
Accuracy



ADVANTAGES

- Precisely coordinated processes between pre- and fine machining
- Reduced non-productive times
- Cycle time saving with increased quality
- High process reliability in series production
- The long-standing experience with regard to the development and production of PCD or solid carbide tools enables optimum process design, whatever the requirements

MACHINING TIME PER PART [%]



Tool highlights for pneumatic valve housings

Stepped bores

- Solid carbide multi-stage tool that can be reground frequently with special multi-cut technology and chip guiding stage for ideal chip control



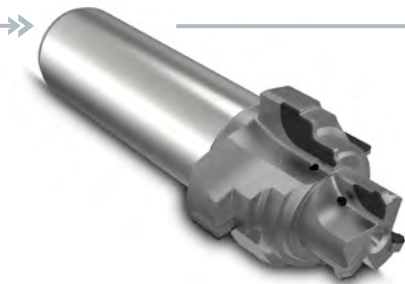
One shot solution for cone contours

- PCD step drill for the process-reliable machining of cone contours as one shot solution



Contour machining

- Multi-stage PCD combination tool
- Highest productivity as well as concentricity for highly complex contour machining

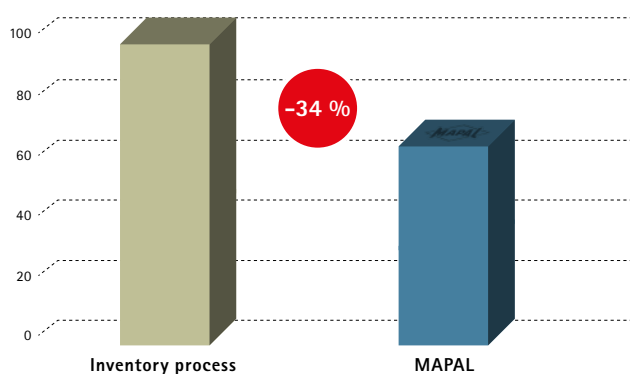


Control edge machining

- PCD circular milling cutter for highest surface finish and perfectly coordinated control edges



PRODUCTION COSTS PER PART [%]



SPECIAL FEATURES OF THIS SOLUTION

- Ideal chip breaking due to special cutting geometries
- Perfect surfaces and contact ratios due to high-quality PCD finish tools ($R_z = 1 \mu\text{m}$)
- Combination tool for optimum process design and cycle time reduction

Innovative tool technology

For additional machining requirements on parts that are critical to function

Milling cutters with indexable inserts

The radial NeoMill milling programme from MAPAL with its face, shoulder, slot, shell end face and high-feed milling cutters stands for maximum productivity and economic efficiency, especially in series production. The development was based on many years of experience with custom tools, which the industry uses to produce large quantities very efficiently with consistent quality. The face and shoulder milling cutter NeoMill-16-Face und NeoMill-4/8-Corner are suitable for machining operations of face surfaces on the valve housing.



Scan the QR code to learn more about the NeoMill milling programme!



NEOMILL-16-FACE

- 16-edge indexable insert / 45°
- First choice for cast iron and heat-resistant cast steel
- \varnothing area 63-200 mm / a_p max. 4 mm
- Low cutting forces despite a negative shape
- Maximum economic efficiency for face milling



NEOMILL-8-CORNER

- Eight-edge indexable insert / 90°
- First choice for cast iron
- \varnothing area 50-200 mm / a_p max. 8 mm
- Maximum economic efficiency for shoulder milling



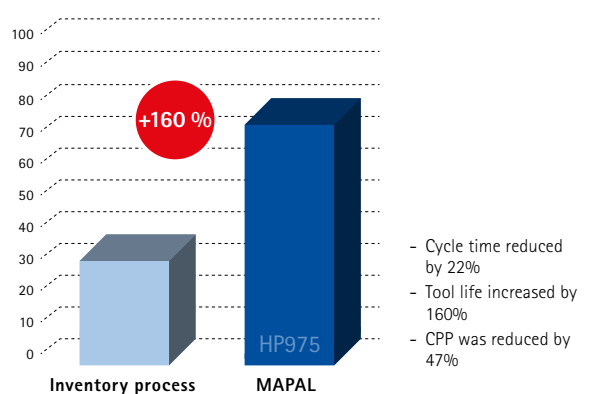
NEOMILL-4-CORNER

- Four-edge indexable insert / 90°
- Highly suitable for steel, stainless steel, cast iron and heat-resistant cast steel
- \varnothing area 25-100 mm / a_p max. 10 mm
- Multipass milling of high shoulder dimensions
- Very low cutting forces despite a negative shape

NEOMILL VALVE HOUSING APPLICATION EXAMPLE

	■	■
Workpiece material	EN-GJS-500-7	
Tool	Face milling cutter	Standard face milling cutter NeoMill-16-Face
Tool \varnothing [mm]	200	
Number of teeth z	12	14
v_c [m/min]	300	180
f_z [mm]	0.12	0.2
v_f [mm/min]	660	804
a_p (mm)	4	

MACHINED PARTS [QUANTITY]



Clamping technology

MAPAL's clamping technology range guarantees performance and process reliability as well as radial run-out and changeover accuracy for every application. Manufactured using the most modern technologies, our specialists are continuously developing our chucks further. In response to customers' requirements and situations, a large variety of systems have been made available in the standard range: from hydraulic expansion and shrink chucks to mechanical clamping systems for HB shanks and adapters.



Scan the QR code to learn more about the UNIQ chuck programme!

UNIQ Mill Chuck & UNIQ DReaM Chuck 4.5 °

Both hydraulic chuck series – UNIQ Mill Chuck and UNIQ DReaM Chuck – clearly combine the performance promise of quality and function in their new design. This is achieved through an optimal interplay of geometric and functional properties.



UNIQ MILL CHUCK

- High thermal stability of 80 °C even with very long milling cycles (over 240 minutes)
- For high-performance milling operations up to max. 33,000 revolutions per minute
- Highest process reliability



UNIQ DReaM CHUCK 4.5°

- Hydraulic chuck with the original dimensions of a shrink chuck (DIN contour with 4.5°)
- Application-oriented system design
- Maximum process reliability and tool life
- Faster and highly precise tool change



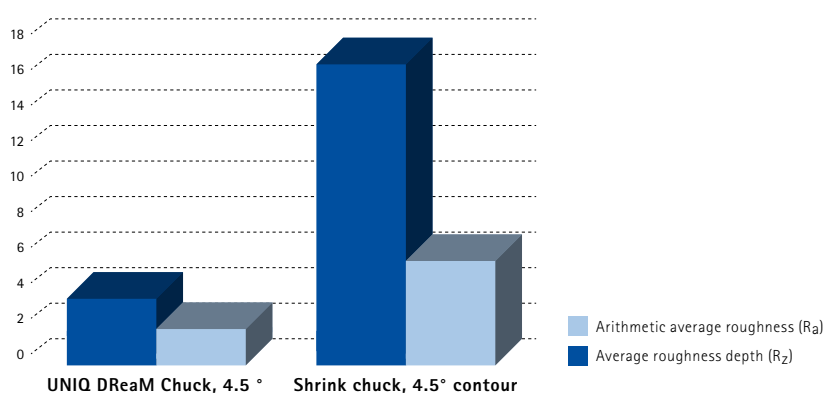
MILL CHUCK HB SIDE LOCK CHUCK

- Easy to handle thanks to use of a differential screw
- Maximum economic efficiency and precision
- Axial tool positioning can be defined using spring system
- Optimum positioning of profile tools for control edge machining

Mill Chuck, HB

The new Mill Chuck HB side lock chuck impresses with strong clamping, simple handling and a high radial run-out accuracy. Coolant channels parallel to the axis in the clamping range ensure an optimum coolant supply.

SURFACE FINISH [µm]



MACHINING DATA

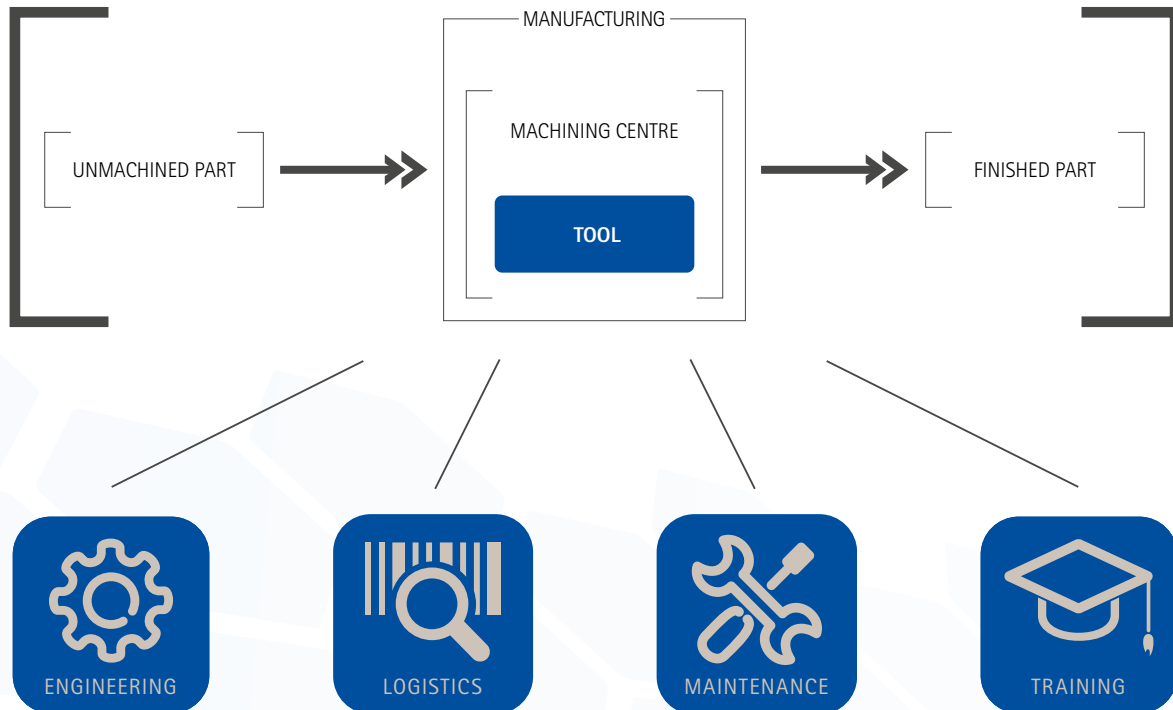
Workpiece material	K720 1.2872 90MnCrV8
Machining	Finish machining
n [rpm]	~ 7,500
vc [m/min]	140
fz [mm]	0.13
vf [mm/min]	1,950

Individual, needs-based service

MAPAL's roots lie in the manufacture of custom tools. The focus is therefore always on holistic advice and support for machining tasks and processes.

MAPAL provides support in all phases and areas of production with an extensive range of services. Regardless of whether a new production facility is to be set up, processes need to be optimised, new technologies need to be introduced, machines need to be converted to new parts, the tool inventory needs to be optimised or the know-how of employees needs to be expanded.





With the engineering service module, MAPAL guarantees fast, precise and safe manufacturing. Further savings potential can be tapped in the area of logistics and maintenance. And in the area of training, MAPAL ensures that the specialist know-how it has gathered is transparently and completely available to the customer – this gives customers a decisive lead over their competitors.

All of the services offered by MAPAL focus on optimal processes and comprehensive support on the way to Industry 4.0. The goal is to always significantly assist the customer in achieving smooth, productive and economical manufacturing.

ADVANTAGES

- Solutions for complete parts including tools, fixtures, NC programs and commissioning
- Complete process design and implementation from a single source
- Fast and flexible on-site support worldwide
- Efficient and cost-optimised tool technology
- Optimum coordination of tool, part, fixture and machine
- Highest product quality, process reliability and economic efficiency right from the start
- Fast throughput from planning to implementation with maximum planning security

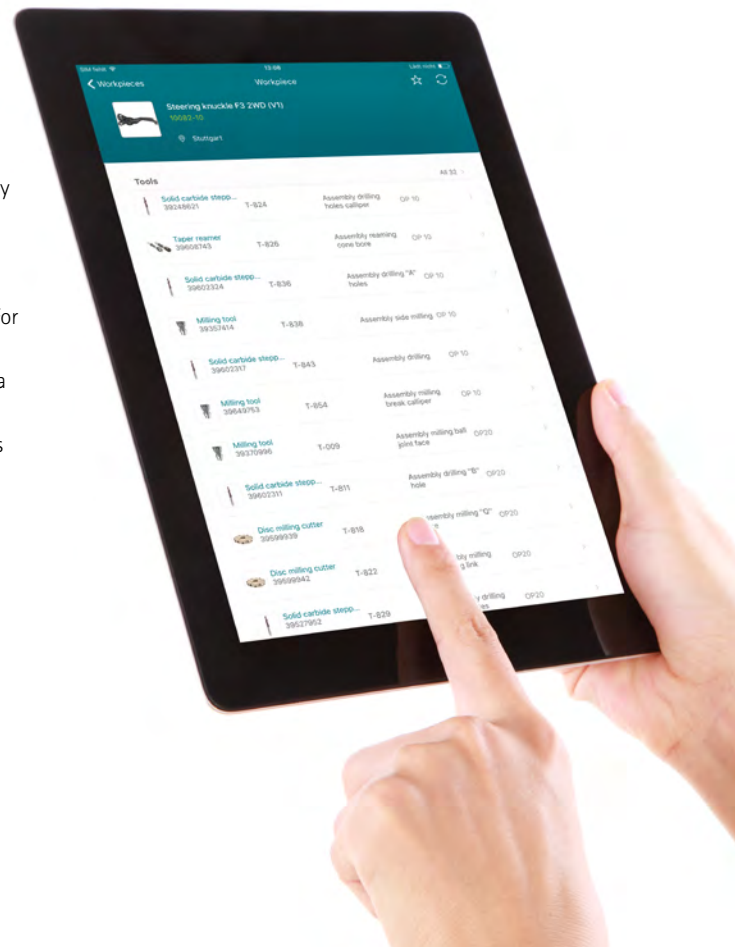
Investment in tool control

MAPAL's offering of logistics services ranges from the analysis of the tool inventory with suggestions for optimisation and the provision of tools to complete tool management by personnel on site.

Irrespective of the scope: Customers benefit from high tool competence, more free capacities in production and focus on the core business. As a long-term technology partner, MAPAL continuously optimises all processes related to the tool and in this way increases your productivity sustainably.

Depending on the size of production and the way it is organised, the parts produced and the tool consumption, an individual, cost-optimised logistics concept is created. For maximum customer benefit and the biggest savings potential, MAPAL usually focuses on digital tool management 4.0. This means data and information can be provided in a much more transparent and consistent manner for all parties involved – manufacturing, purchasing, planning, tool managers and suppliers. In this way, the overall process is more efficiently structured.

This gives rise to a cross-functional and group-wide technology database for companies. Redundant structures are a thing of the past.



STARTING POINT

CLEAR ORGANISATION OF YOUR TOOL INVENTORY

MAPAL ensures clear organisation and optimisation of the tool inventory based on transparent data. This way, unnecessary machine downtimes and unnecessary capital commitment are avoided.

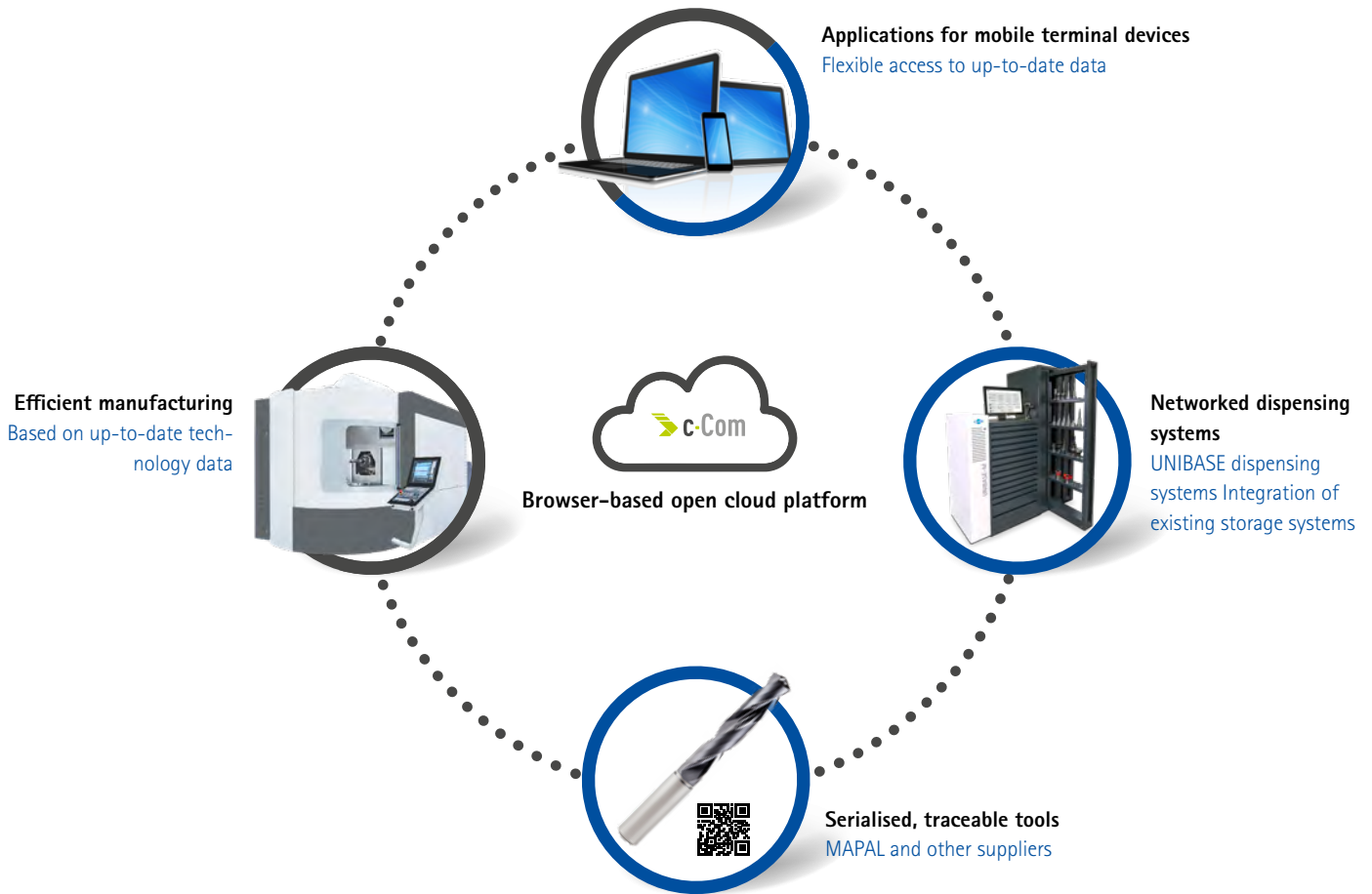
CONTINUOUS OPTIMISATION OF INVENTORY

Upon request, a MAPAL specialist is also available on-site who provides long-term support for customers and implements continuous measures for the optimisation of tool costs.

OUTSOURCING OF TOOL MANAGEMENT

In this case, MAPAL staff take over the complete procurement and management of the tools, including all tasks in the tool-setting area.

 CUSTOMER  TOOL MANAGER



With Tool Management 4.0, customers benefit from a comprehensive know-how as a complete supplier for machining. Along with leading tool solutions and services related to the machining process, MAPAL offers highly accurate setting fixtures, as well as intelligent dispensing systems developed in-house. The browser-based open cloud platform c-Com networks tool, warehouse and production and ensures you can access your data in real time from anywhere. This provides full control of all costs incurred at all times.

Technology data are entered and managed centrally. In this way, it is ensured that all employees at all sites have access to the same up-to-date data at all times. This way, all those involved benefit from the accumulated knowledge and know-how. As a consequence, manufacturing is more efficient and the costs can be reduced.

ADVANTAGES

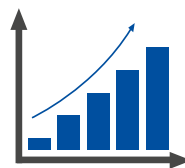
MORE networking



MORE transparency



MORE efficiency



MORE cost control



Solutions for tool management

Initial situation at the customer

Valve housing EN-GJS-400-15 – complete machining

- High inventories
- Processes in the tool-setting area not optimal, and there is incomplete data quality
- Cost transparency is not sufficient
- High fluctuation due to general lack of skilled workers
- Problems with tool breakage
- High tool costs

Quantity

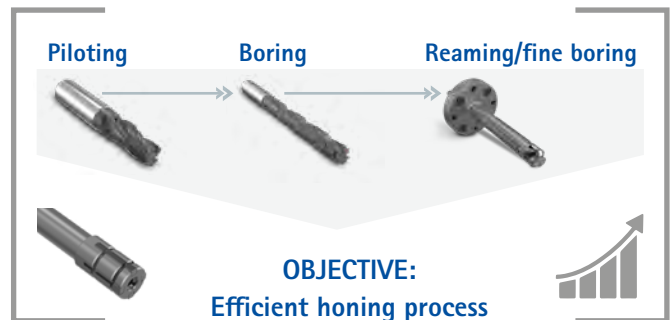


Accuracy



Tool management for the complete business process

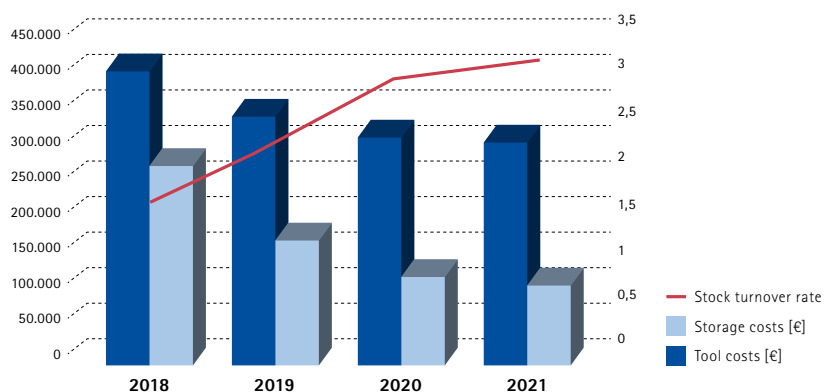
In one example, a customer transferred the responsibility for the complete tool management to MAPAL. The customer's goal was to reduce as far as possible the tool costs, and also the value of the inventory and the costs per part, and in this way to significantly increase the efficiency of his production. To further increase productivity, the cycle time was also to be reduced. Here, MAPAL's combined tool and process experience paid off particularly well.



ADVANTAGES

- Using up of excess inventory
- Cost transparency
- Latest tool technologies
- Reduced tool variety and standardisation
- Tools are provided on the machine by MAPAL personnel
- Constant tool use
- Predictable and consistent tool costs due to billing based on costs per part (CPP).

KPI DEVELOPMENT [€]





UNIBASE software

- Web interface for external access via an app
- Optional connection to the cloud-based open platform c-Com
- Comprehensive assessment possibilities
- Dispenses items in a few clicks
- Permanent, automatic stock monitoring
- Possibility of connection to existing ERP systems



UNIBASE-M

- Ideal storage system for tools, parts and accessories
- Limited dispensing for the targeted withdrawal of individual parts
- Variable drawer arrangement



UNIBASE-V

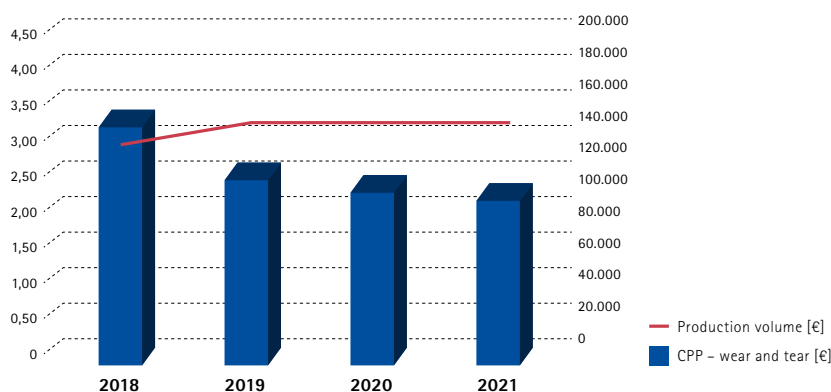
- Safe storage of completely assembled tools
- Storing long tools vertically
- No risk for the cutting edges
- Upright cabinets with roller-guided drawers
- Can be integrated into existing systems
- Proven in use for tool management projects



UNIBASE-C

- Single dispensing system
- Storage of small and individual parts
- Single dispensing increases theft protection
- Ready for use as a single solution or in existing systems

CPP DEVELOPMENT [€]



BILLING OPTIONS

After withdrawal

With this billing model, you receive one invoice with all the tools used at the end of the month. Your procurement effort and your financial bookkeeping are significantly simplified as a result.

Cost per part

You remain particularly flexible and are guaranteed annual savings. With this model the tool costs per part produced are calculated. This option ensures optimal cost distribution with fluctuating volumes.



Discover tool and service solutions now that give you a lead:

BORE MACHINING

REAMING | FINE BORING

DRILLING FROM SOLID | BORING | COUNTERSINKING

MILLING

CLAMPING

TURNING

ACTUATING

SETTING | MEASURING | DISPENSING

SERVICES

FOLLOW US

