Your technology partner for cost-effective machining

# FLUID POWER
# PROCESS PLANT TECHNOLOGY

# 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.

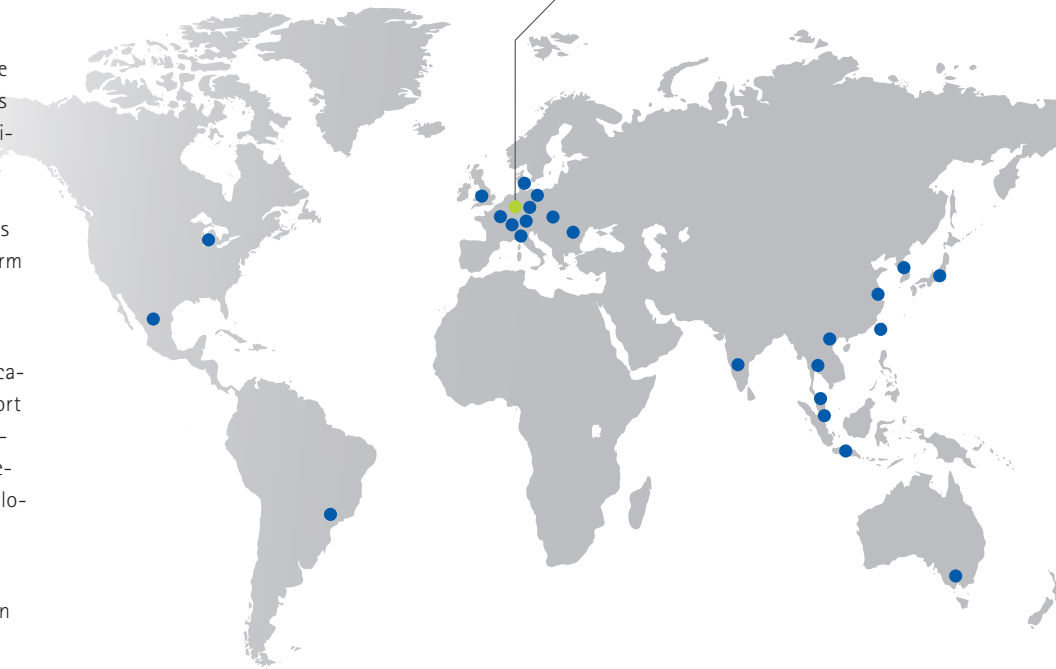
**Germany**
Headquarters of the group of companies

## 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.

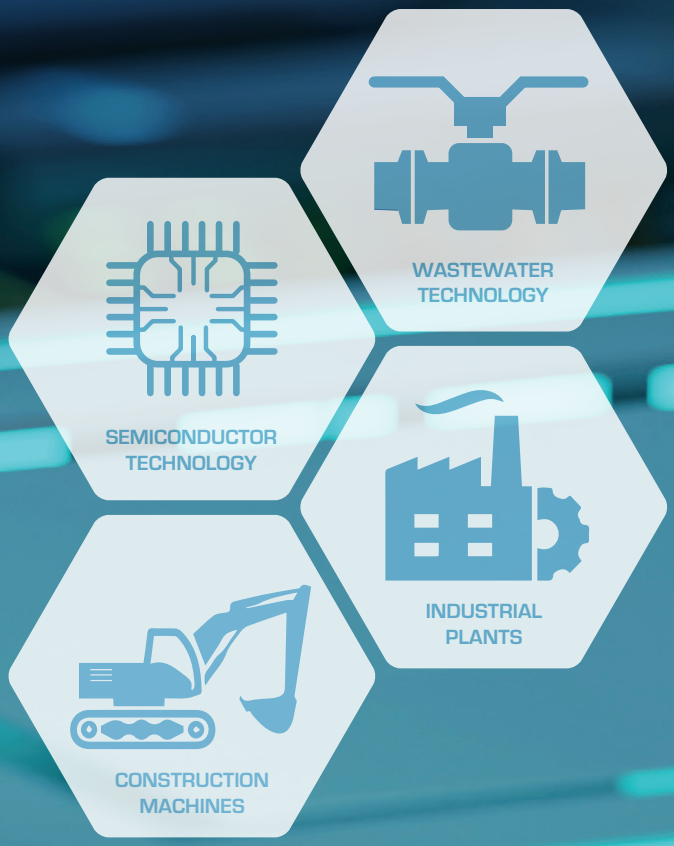
**Our most important asset: More than**
**4,850**
employees worldwide.

MAPAL sectors


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 process plant technology

As a technology partner working with fluid power, MAPAL specialises in providing machining solutions to control, regulate and move fluids. MAPAL develops bespoke processes for parts in processing plants and plant engineering that are critical to functionality. In view of the different quantities and the wide variety of parts, MAPAL offers a range of economical solutions suitable for both stationary and mobile applications. We are experts in delivering efficient and precise machining solutions that meet all demands to maximise the performance and reliability of plants.



# CONTENTS



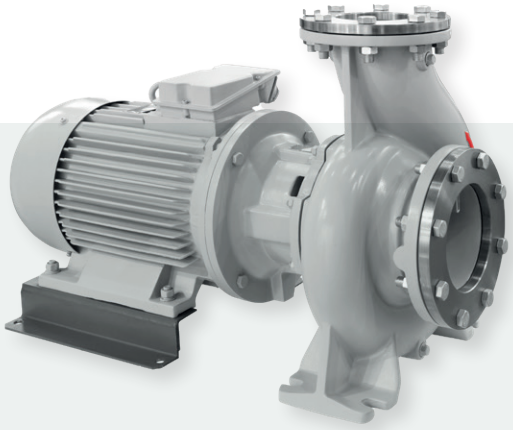
**Scan the QR code** to learn more about process plant technology.

# Process plant technology expertise

PUMPS

## Pumps

As fluid power machinery, a pump transfers input energy into the kinetic energy of fluid. With regard to this area, MAPAL focuses on providing economical end-to-end processes for the machining of centrifugal and displacement pumps.



### APPLICATION SOLUTIONS:

- Screw vacuum pump
- Rotary slide vacuum pump
- Claw vacuum pump
- Circulator pump

>> more on page 8

COMPRESSORS

## Compressors

As a component of fluid power machinery, compressors have the task of compressing various gases mechanically by increasing gas pressure and reducing volume. MAPAL specialises in providing efficient and comprehensive solutions for the machining of mobile and stationary compressors.

### APPLICATION SOLUTIONS:

- Scroll compressor
- Bearing cover

>> more on page 16

# Valves

Valves include all controls in piping systems which are used to block, control, regulate and secure fluid flow. MAPAL specialises in providing economical and comprehensive solutions for the machining of valves for industrial and building applications.

## APPLICATION SOLUTIONS:

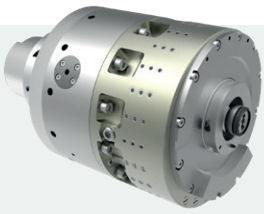
- Fitting
- Shut-off valve
- Actuating drive

>> more on page 20



Innovative service offering:

## ACTUATING



Actuating tools allow complex shapes with differing part dimensions to be flexibly machined using just one tool.

>> more on page 26

## MILLING AND CLAMPING

Milling cutters with indexable inserts and modern clamping technology enable high levels of machining efficiency.

>> more on page 28

## SETTING

Precise setting fixtures are crucial for ensuring accurate measurements and adjusting fine machining tools. This is fundamental for achieving high process reliability and component quality.

>> more on page 30

# Solutions for screw vacuum pumps

PUMPS

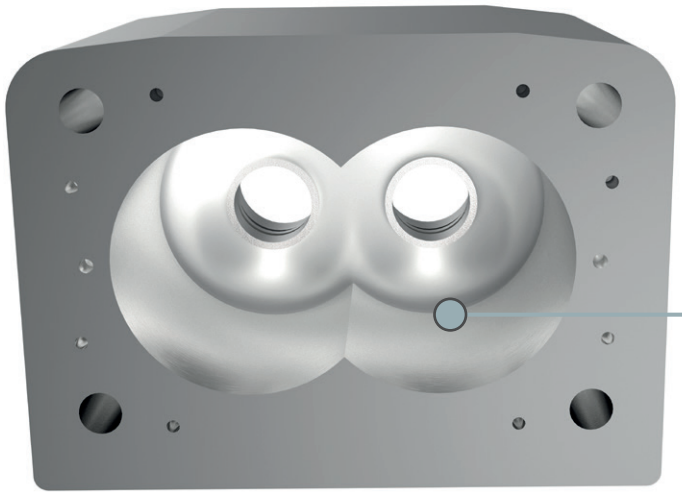
## Initial situation at the customer

### Pump housing made of EN-GJL-250

- High degree of effort with regard to project planning and process design due to large increases in quantity and a high degree of variation of parts
- Time-consuming machining of pump chamber bores due to complex shape and position tolerances as well as interrupted cuts
- Fluctuations in casting quality sometimes result in reduced process reliability in the inventory process
- Lack of qualified personnel for process supervision during series production

**Quantity**

**Accuracy**



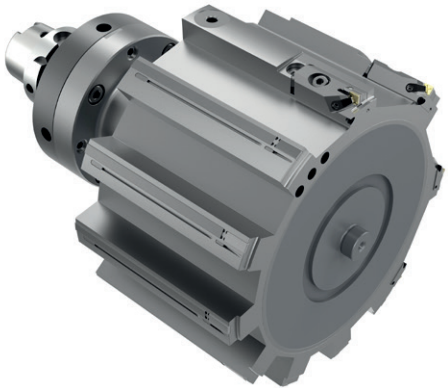
### ADVANTAGES

- Efficient end-to-end planning and engineering services from a single source
- Tools designed for flexible usage in cross-dimensional machining within a part family
- Safe overall process
- Digitalised MAPAL tool management services allow tools and processes to be seamlessly managed and continuously optimised
- Qualification of specialist personnel through training as well as on-site support

# Tool highlights for pump chamber bores:

## Roughing

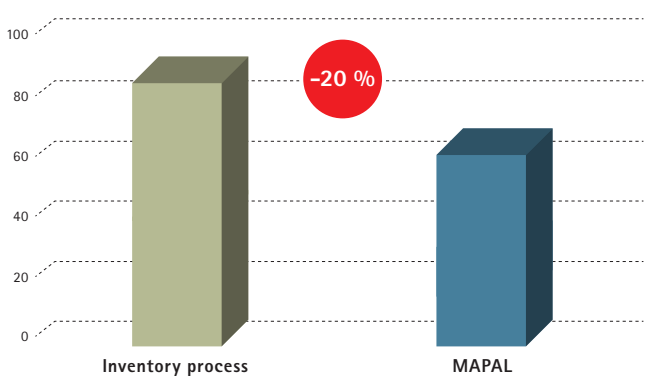
- Tangential boring tool with indexable inserts and cartridges
- Vibration damper and stable tool design enable a high level of rigidity
- The use of indexable insert technology ensures low cutting material costs



## Finishing

- Multi-blade fine boring tools ensure the highest degree of quality when machining interrupted cuts at highly critical length/diameter ratios
- Very cost-effective in series production thanks to TEC indexable inserts

### TOOL PROCUREMENT COSTS [€]




### SPECIAL FEATURES OF THIS SOLUTION

- Regulation of casting fluctuations through precisely tuned progressive die
- Subsequent tools guiding and avoidance of vibrations while machining with difficult length/diameter ratios
- Low cutting material costs thanks to indexable insert solutions
- Short cycle times and therefore maximum productivity as a result of multiple blades
- Reduction in tool procurement costs of 20% due to multiple usage in parts families

# Solutions for rotary slide vacuum pumps

PUMPS

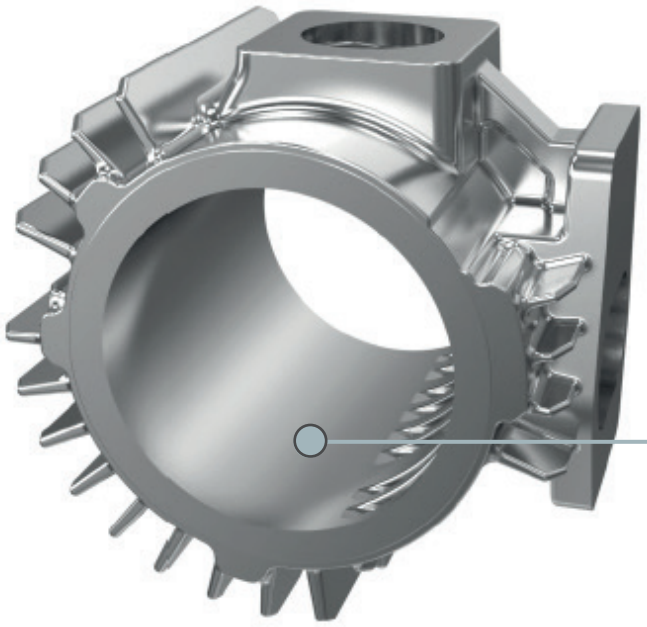
## Initial situation at the customer

### Pump housing made of EN-GJL-250

- Increasing production volumes necessitate optimised output as well as more process reliability
- High degree of effort when machining the stator bore due to pre-milling and finish-boring

**Quantity**

**Accuracy**



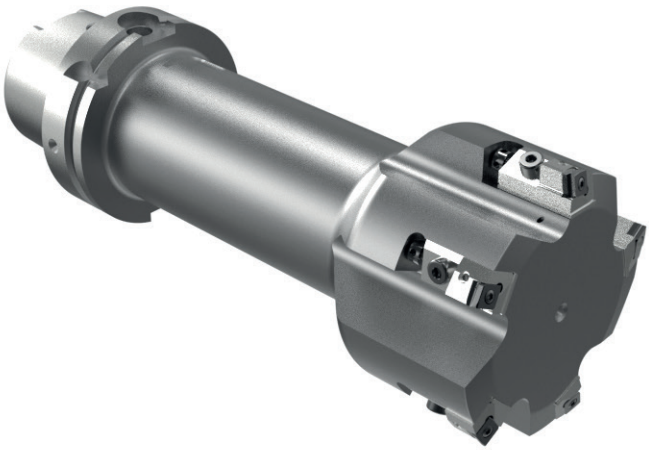
**ADVANTAGES**

- Process optimisation by means of cycle time reductions
- Significantly higher output
- Reliable machining of pump housing
- Setting part no longer required due to omission of spindle system

# Tool highlights for stator drilling:

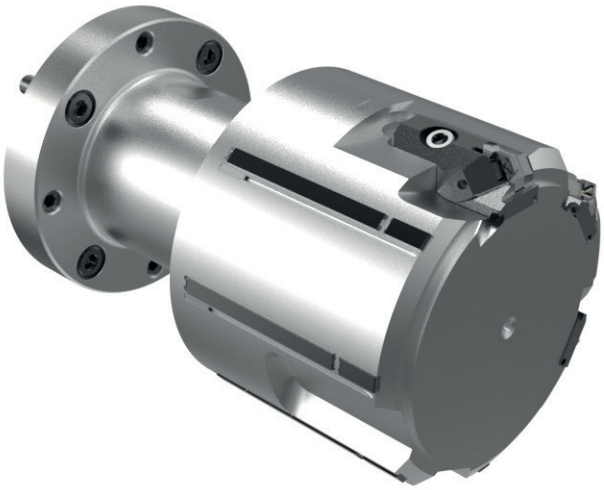
## Roughing

- Tangential boring tool with indexable inserts and cartridges enables optimal pre-machining with consistent stock removal
- The use of indexable insert technology ensures low cutting material costs

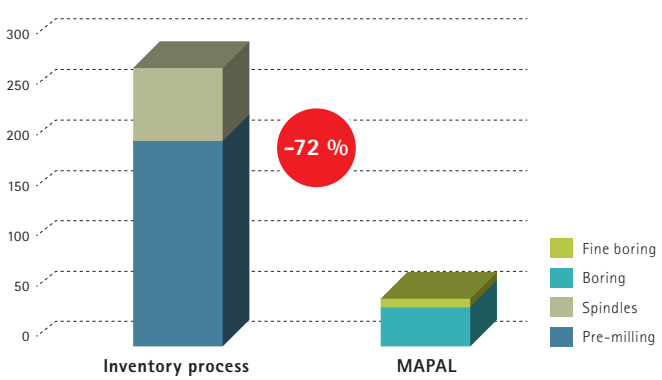


## Finishing

- Multi-blade fine-boring technology with EA system achieves maximum quality during interrupted cutting
- HX indexable inserts ensure low cutting material costs in series production



### MACHINING TIME PER BORE [SEC.]




### SPECIAL FEATURES OF THIS SOLUTION

- Short cycle times and the highest degree of economic efficiency thanks to multi-blade tool solutions
- EA system enables easy handling in the series production process
- Less frequent tool configuration for the fine boring tool due to long PcBN cutting material tool life
- Six blades per indexable insert result in low cutting material costs
- Broad range of cutting materials for optimal compatibility with cast material

# Solutions for claw vacuum pump

PUMPS

## Initial situation at the customer

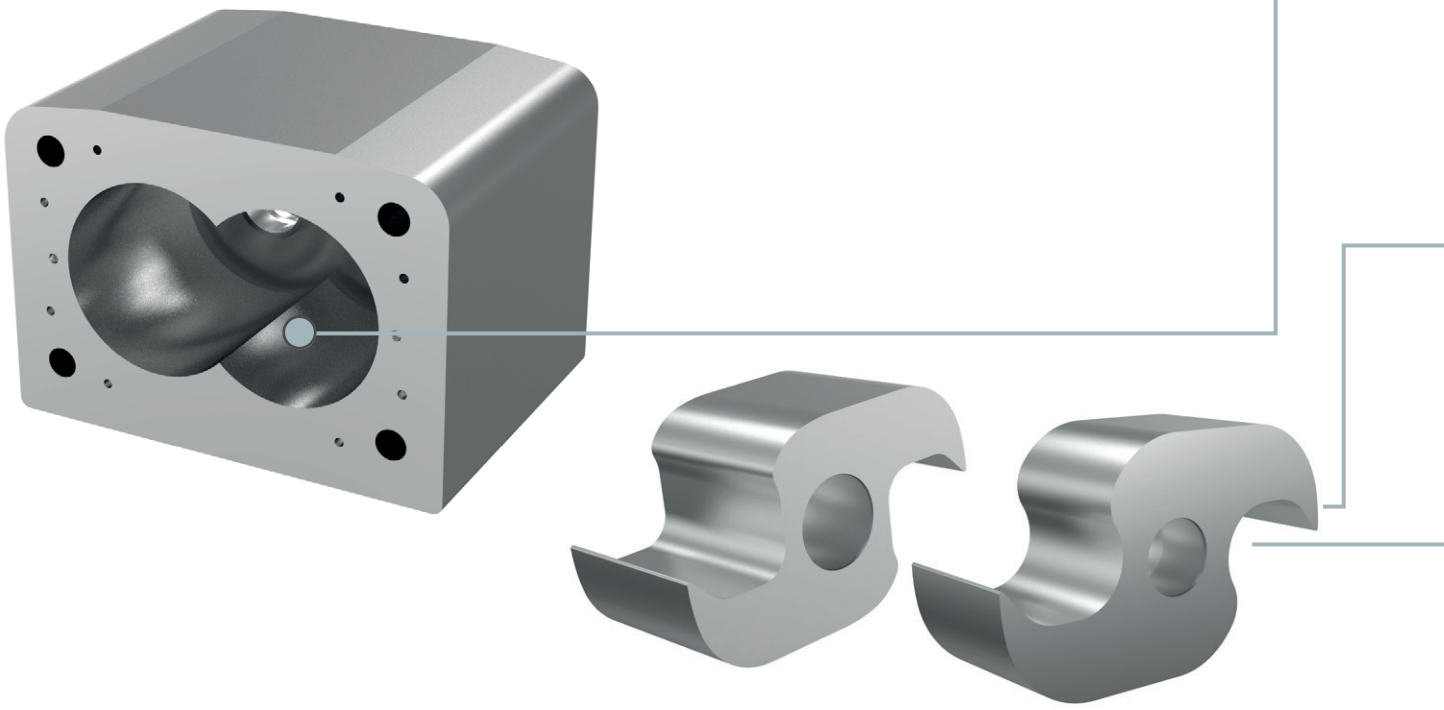
### Pump housing made of EN-GJL-250 | Claws made of 1.4021 (X20Cr13)

- Considerable tool costs due to individual tool solutions for each part in series production
- Massive cost pressure as machining makes up significant proportion of production


- Considerable tool costs due to individual tool solutions for each part in series production
- Massive cost pressure as machining makes up significant proportion of production


**Quantity**

**Accuracy**



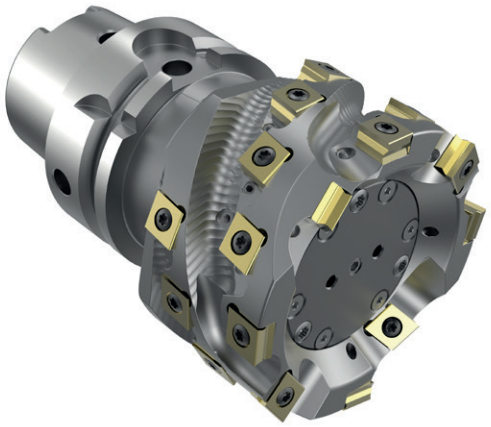
### ADVANTAGES

- High degree of flexibility for many variants – six different part sizes are possible using a single tool concept
- Reduced tool costs
- Machining time for claws significantly reduced
- Optimised, economical end-to-end process by MAPAL

## Tool highlights for pump housing:

### Circular milling

- Circular milling cutter with tangential indexable inserts
- High degree of flexibility for different part variants when roughing the pump chamber bores



## Tool highlights for claws (male and female):

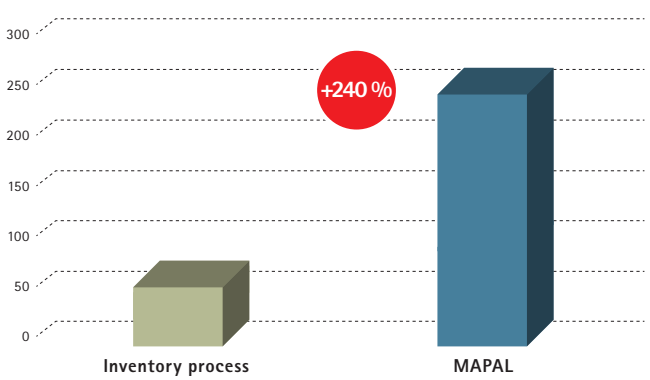
### Trochoidal milling

- Standard solid-carbide milling cutters: Opti-Mill-Tro-Inox and OptiMill-Uni-HPC-Finish
- Short machining times when roughing and finishing external contours

### Fine boring

- Multi-stepped fine boring tool for optimal form, positioning and diameter tolerances of the bearing bore

**CLAW TOOL LIFE – CONTOUR MILLING [MIN.]**




**SPECIAL FEATURES OF THIS SOLUTION**

- Large standard range of solid-carbide end milling cutters offers high cost-effectiveness for trochoidal milling of challenging workpiece materials
- Combination tools and MAPAL fine-boring technology ensure optimal process design and adherence to critical shape and position tolerances
- Low cutting material costs thanks to indexable insert solution
- Soft-cutting, tangential indexable inserts require less spindle power

# Solutions for circulator pumps



## Initial situation at the customer

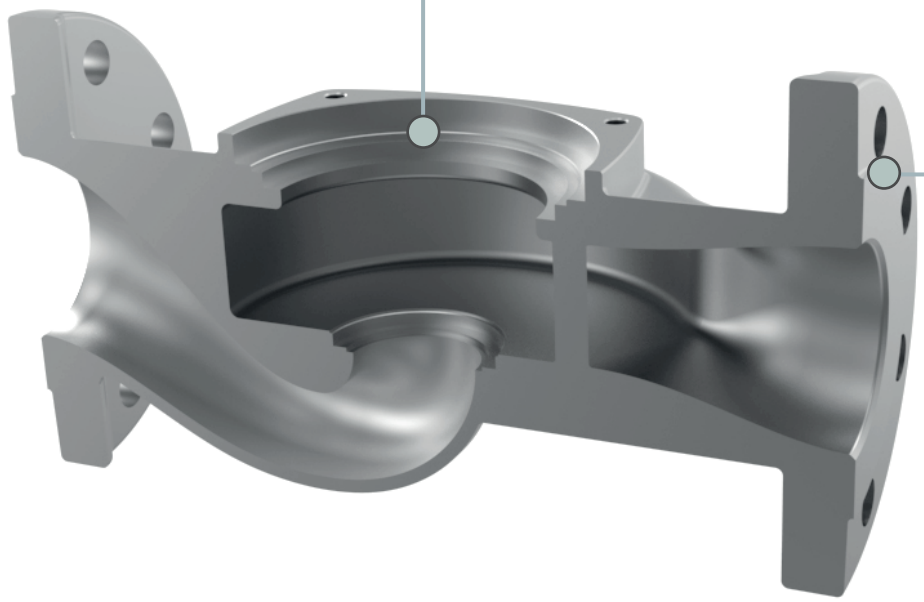
### Pump housing made of EN-GJL-250 / 1.4301 (V2A)

- Inflexible process: facing slide units on a transfer line
- Long non-productive times during tool and product changeovers lead to machine down-time
- Requirement: short cycle and product change-over times
- High degree of flexibility necessary as all part variants are machined on a single machine

**Variant**

**Quantity**

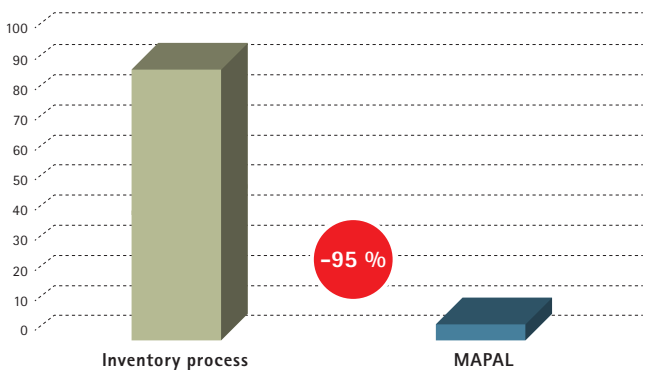
**Accuracy**



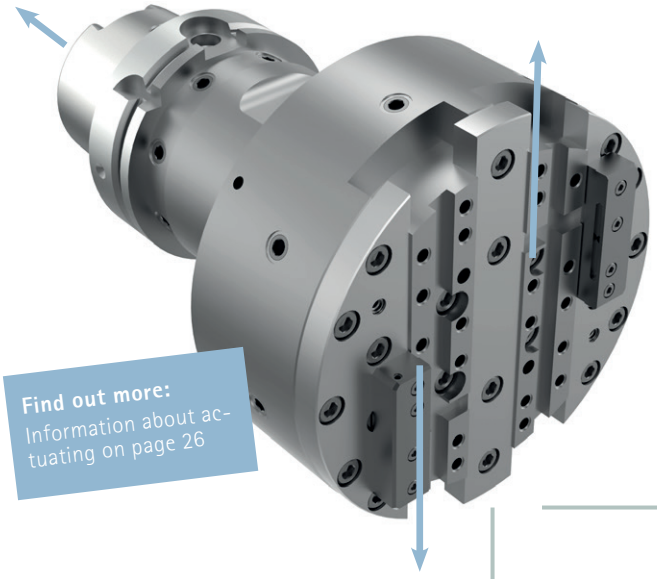
### ADVANTAGES

- Reduction of downtime during product and insert changeovers
- Considerable reductions of cost in series production
- Only one facing head with exchangeable mounting tools needed for the entire range of products
- Implementable on all machines with U-axles or TOOLTRONIC® drives
- Complete machining possible on one machine and in a single clamping setup

### DOWNTIME [MIN.] FOR PRODUCT CHANGEOVER



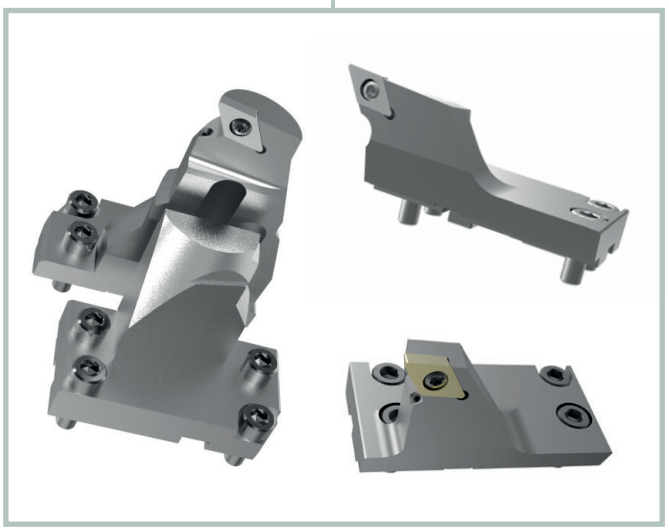
# Tool highlights for circulator pump housing:



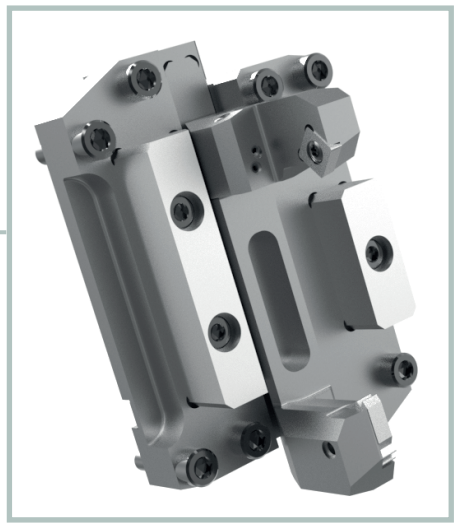
**Find out more:**
Information about actuating on page 26

- All part variants covered by four flexible mounting tools
- A wide range of indexable inserts allow machining of different workpieces
- TOOLTRONIC® is a full-fledged interchangeable tool axis enabling a broad spectrum of applications
- Designed as a single or double slide

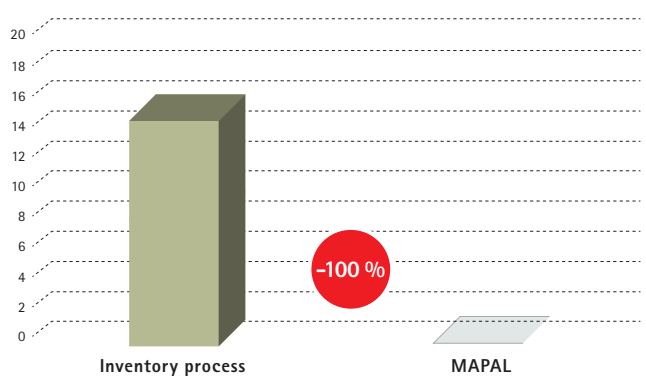
## Internal contour and facing



## External contour and machining of threads



### DOWNTIME [MIN.] FOR INSERT CHANGEOVER




### SPECIAL FEATURES OF THIS SOLUTION

- Automatic tool changeover possible
- Tool configuration does not affect machining times thanks to replacement tools
- Quick tool changeover
- Standard tools (e.g., drills and milling cutters) can be used in the same spindle
- Indexable insert technology lowers cutting material costs
- Shorter cycle times due to z=2 compared to machining on lathes

# Solutions for scroll compressors

COMPRESSORS

## Initial situation at the customer

### Scroll compressors made of EN-AW-4032 (AlSi12,5) & N-GJS-400-15

- Fluctuations in component quality when machining thin-walled parts
- Scroll parts made of cast iron with pilot run status


- Fluctuations in component quality when machining thin-walled parts
- Scroll parts made of cast iron with pilot run status


**Quantity**

●●●●●

**Accuracy**

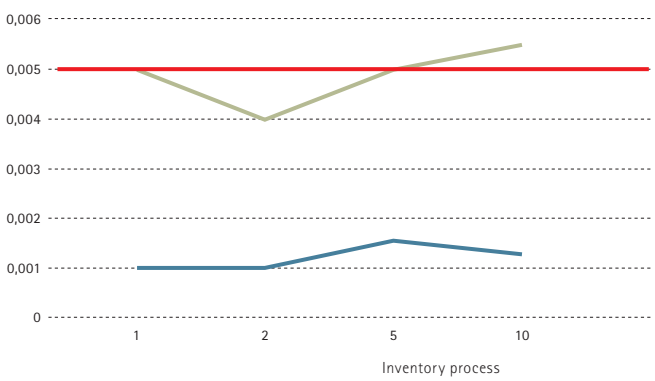
●●●●●

### ADVANTAGES

- By maintaining consistent component quality, complaints are prevented and costs reduced significantly
- Intense supervision of series production enables reliable end-to-end machining of aluminium and cast iron

**MEASUREMENT SERIES OF PROFILE FLATNESS IN PILOT RUN**

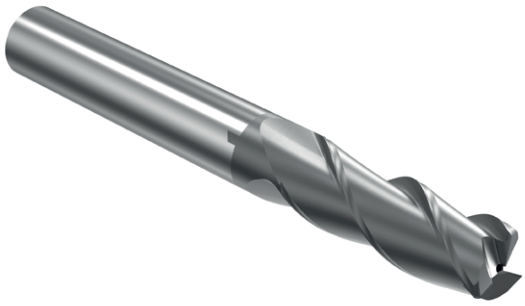
Casting: max. 0.005 mm



## Tool highlights for aluminium scroll:

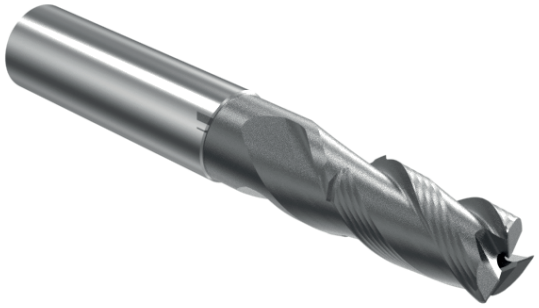
### Milling – roughing

- Coated solid-carbide step milling cutter
- Special coolant supply and geometry for optimal pre-machining of the scroll compressor



### Milling – finishing

- Coated solid-carbide form cutter with step for edge breaking
- High-precision finishing machining of the scroll contours



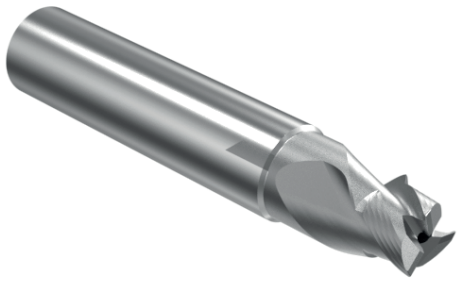
## Tool highlights for cast scroll:

### Milling – roughing

- Standard milling cutter: OptiMill-Uni-Wave
- Special serration and five cutting edges enable optimal cost-effectiveness and secure chip removal during pre-machining

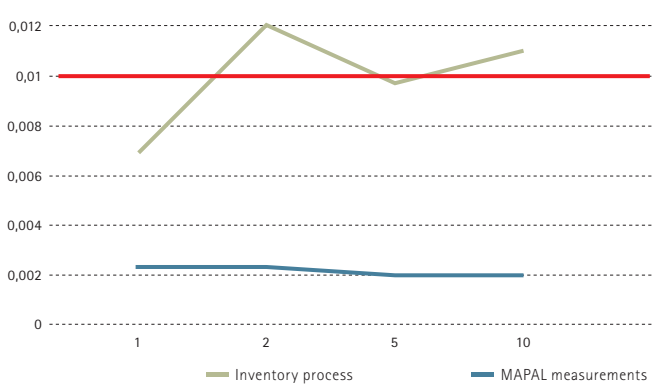
### Milling – finishing

- Solid-carbide form cutter with step for edge breaking
- Reliable finish machining for precise part contours



**MEASUREMENT SERIES OF PROFILE PERPENDICULARITY IN PILOT RUN**

Casting: max. 0.01 mm




## SPECIAL FEATURES OF THIS SOLUTION

- Specially developed standard geometries for aluminium materials
- Heat-resistant coatings ensure long tool life in mass production
- Implementation of high-precision part contours, parallel alignment and even surfaces
- Safe chip removal due to the special coolant supply
- Large standard range of solid-carbide end milling cutters

# Solutions for bearing covers

COMPRESSORS

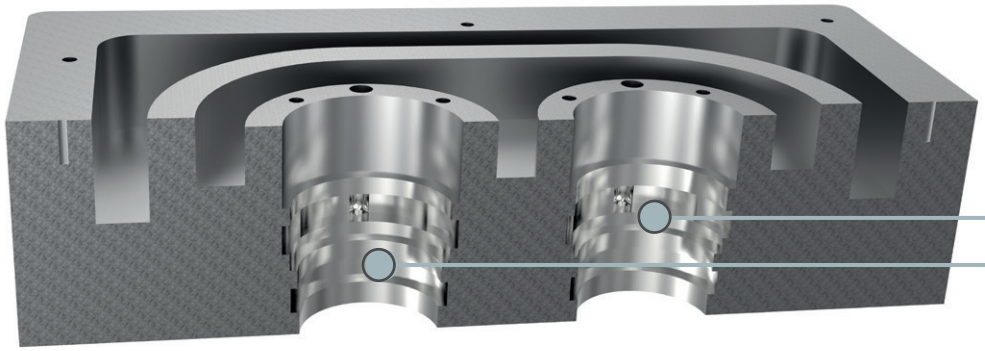
## Initial situation at the customer

### Bearing cover made of EN-GJS-400-15

- Higher quantities necessitate process optimisations
- Quality issues due to fluctuations in form and positioning of bearing seats
- Higher quantities necessitate process optimisations
- Quality issues due to fluctuations in form and positioning of bearing seats

**Quantity**

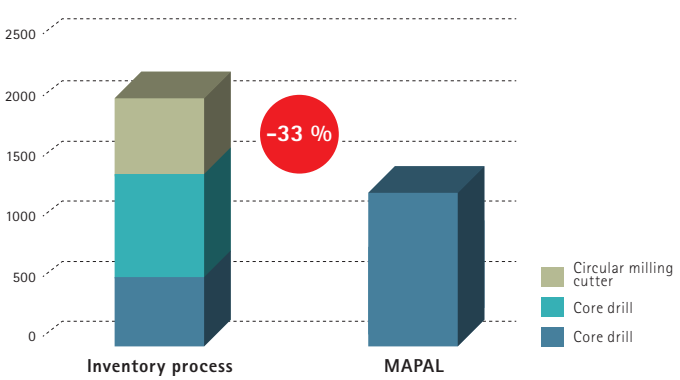
**Accuracy**



### ADVANTAGES

- Tool concepts adapted perfectly to requirements in terms of the quality and quantity produced
- More reliable component quality

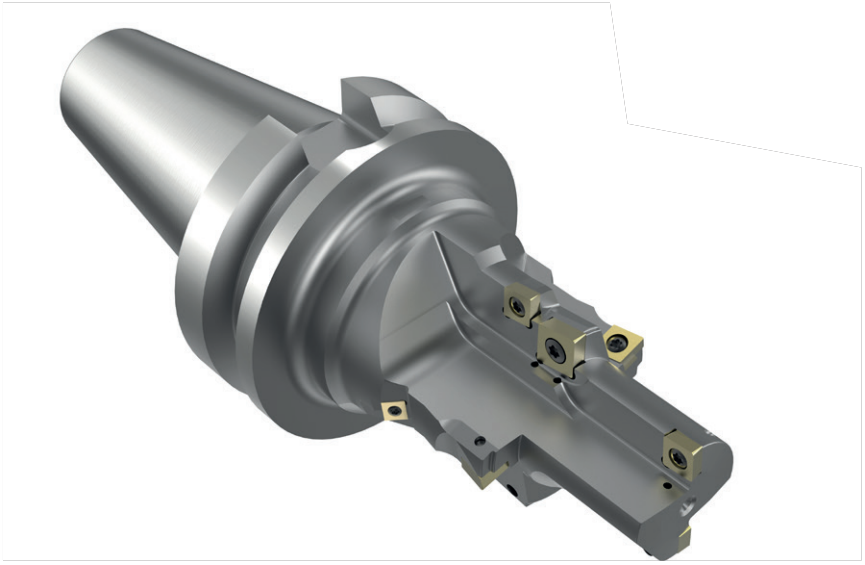
### ANNUAL TOOL COSTS – ROUGHING [€]



# Tool highlights for bearing seats:

## Roughing

- Multi-stepped combination tool for highest degree of cost-effectiveness
- Boring and chamfering in one step

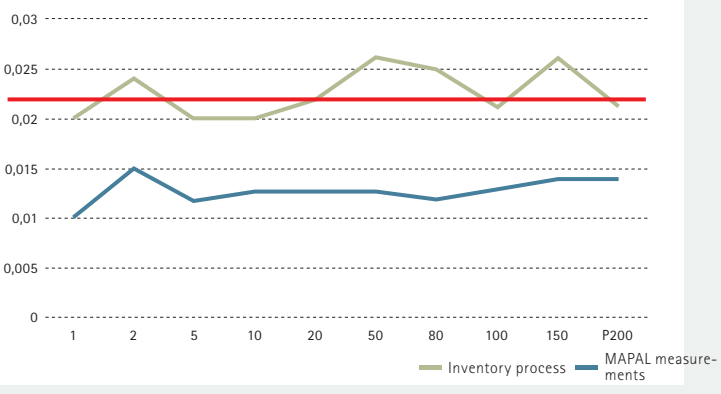


## Finishing

- Multi-stepped fine boring tool with indexable inserts for groove milling and reverse deburring
- Combination tool provides short cycle times and maximum economic efficiency

### MEASUREMENT SERIES

Concentricity of bearing seat: max. 0.022 mm




### SPECIAL FEATURES OF THIS SOLUTION

- Multi-stepped fine boring tool ensures optimal concentricity of the bearing bores in series production
- Soft-cutting, tangential indexable inserts require less spindle power
- Multi-stepped combination solution offers high degree of economic efficiency and reduced tool costs
- Low cutting material costs thanks to indexable insert solution

# Solutions for fitting



## Initial situation at the customer

### Fittings made of CuSi4Zn9MnP

- Machining on a rotary transfer machine
- Requirement: short cycle time and maximum productivity in large-scale series production
- Tool system must be preconfigurable outside the machine and flexibly pre-configurable to a variety of parts

**Variant**

**Quantity**

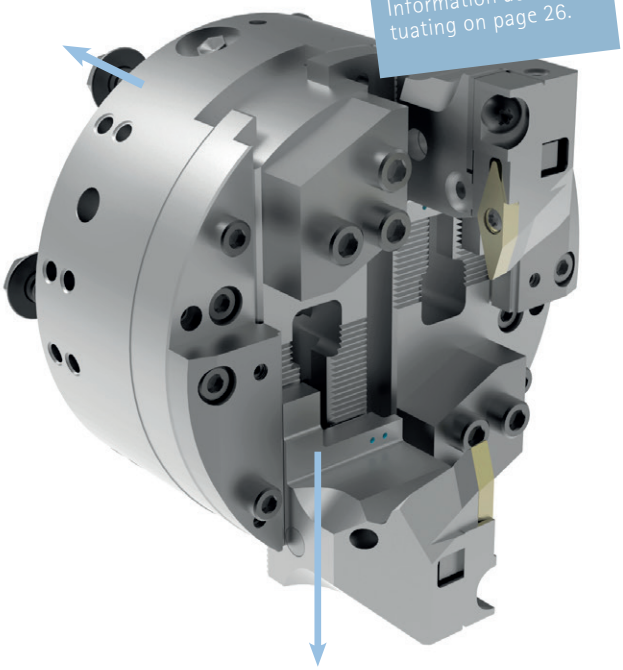
**Accuracy**

### ADVANTAGES

- Maximum productivity levels as a result of complete machining of inner and outer contours using only one tool system
- Double-edge tool solutions result in cycle time reductions of 35%
- High coverage of variants by machining all part variants using flexible mounting tools
- Maximum flexibility ensures rapid adaptability for changes with regard to component specifications required by REACH
- Less downtime during product and insert changeovers in series production thanks to the VTS connection

# Tool highlights for fitting:

Find out more:
Information about actuating on page 26.

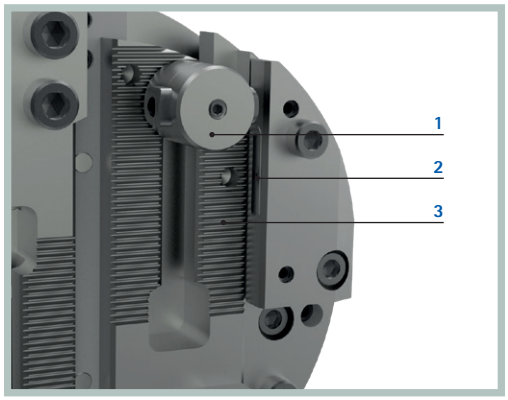


## External machining

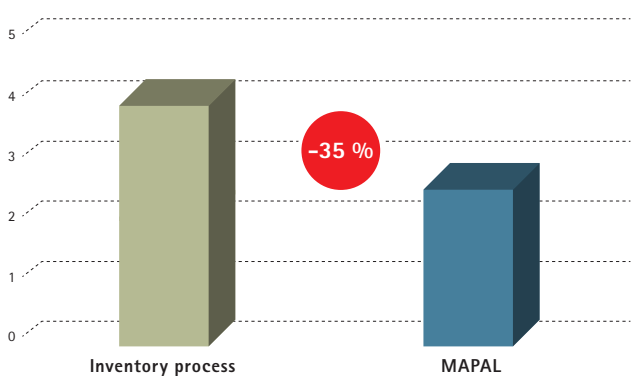
- Full machining of the external contour using only one tool
- Mounting tool quick and easy to exchange thanks to VTS connection
- The z=2 double slide ensures short cycle time and complete compensation for unbalance
- Optimal coolant supply directly via the mounting tool

**Facing head configuration:**

1 VTS pins
2 Coolant transfer
3 Serration




## CYCLE TIMES [MIN.]




## SPECIAL FEATURES OF THIS SOLUTION

- VTS connection enables modular tool system
- Quick-change mounting tool ensures short assembly times
- Mounting tool pre-configuration with adapter prevents machine downtime
- Indexable insert technology lowers cutting material costs

# Solutions for shut-off valves

VALVES

## Initial situation at the customer

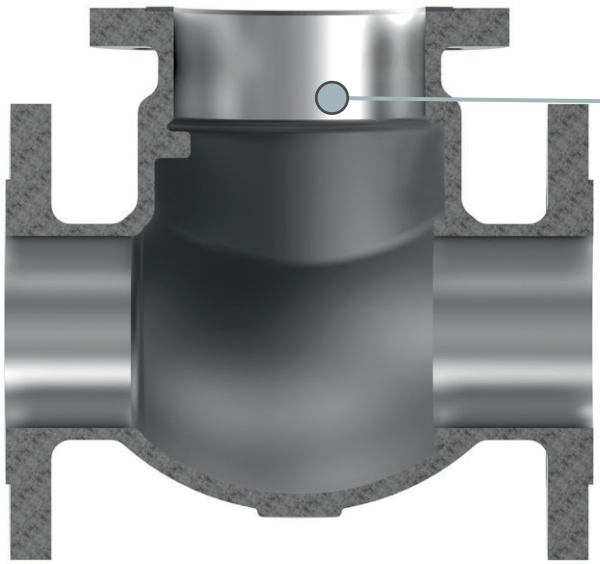
### Shut-off valve housing made of EN-GJL-250

- Machining on a rotary transfer machine
- Requirement: short cycle time and maximum productivity in large-scale series production
- Tool system must be preconfigurable outside the machine and flexibly adaptable to a variety of parts

**Variant**

**Quantity**

**Accuracy**



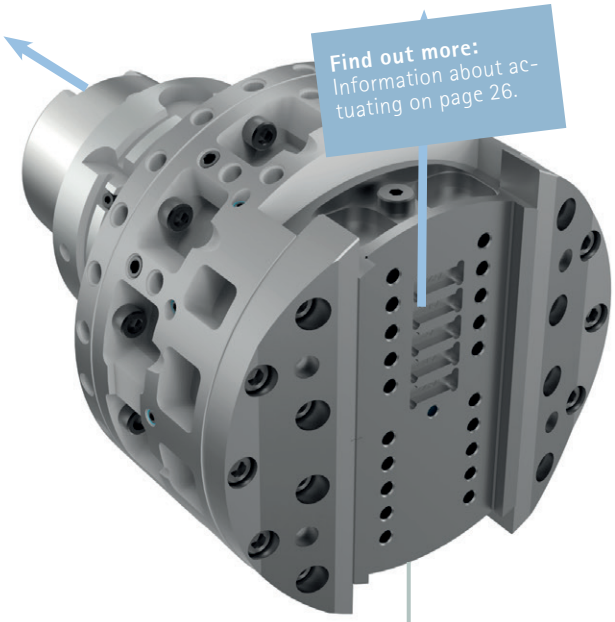
### ADVANTAGES

- Large variety of components covered by only one tool system
- Machining of flange surfaces and seat rings performed in a single clamping setup to achieve maximum levels of productivity
- Actuating technology enables burr-free contour transitions, defined surfaces and short cycle times
- High process reliability thanks to automatic wear compensation

# Tool highlights for fitting:

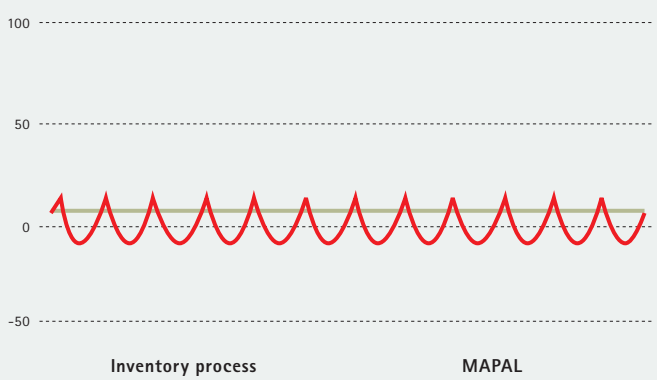
## External machining

- Full machining of the external contour using only one tool
- Mounting tool quick and easy to exchange thanks to VTS connection
- The z=2 double slide ensures short cycle time and complete compensation for unbalance
- Optimal coolant supply directly via the mounting tool



**Find out more:** Information about actuating on page 26.

### CYCLE TIMES [MIN.]




### SPECIAL FEATURES OF THIS SOLUTION

- VTS connection enables modular tool system
- Quick-change mounting tool ensures short assembly times
- Mounting tool preconfiguration with adapter prevents machine downtime
- Indexable insert technology lowers cutting material costs

# Solutions for actuating drive



## Initial situation at the customer

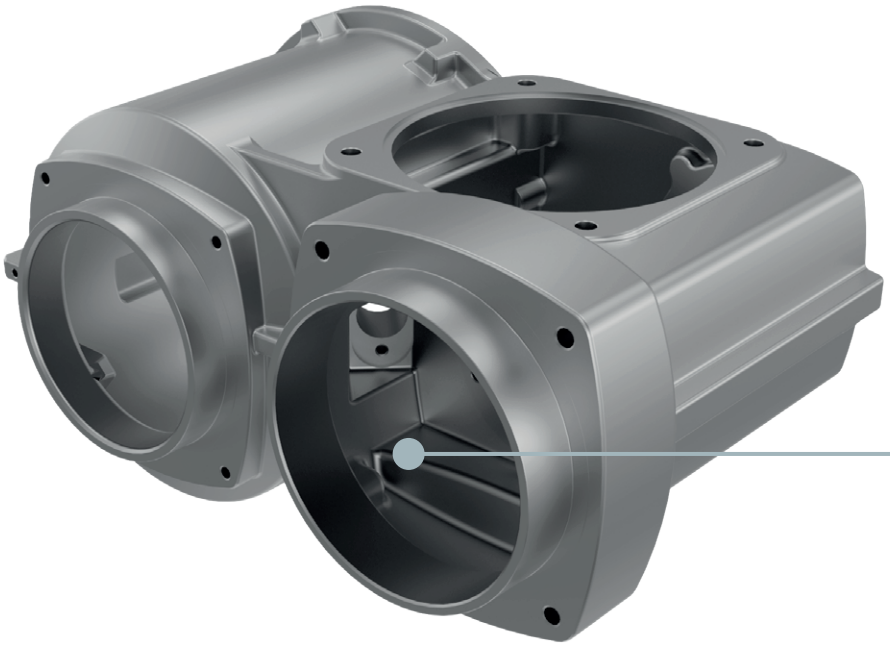
### Housing made of AlSi10

- Stipulation that complex contour be machined with one tool: face, chamfer and diameter machining as well as taper machining 1:50 (1.1146°)
- High requirements regarding geometric tolerances (form and position) and dimensional tolerances in accordance with IT8

**Variant**

**Quantity**

**Accuracy**



### ADVANTAGES

- Just a single tool system is needed to handle complex contours and required accuracy
- Low cutting material costs in series production since all component variants are machinable using two flexible mounting tools
- Maximum process reliability despite high variance as contours and taper shape 1:50 (1.146°) are freely programmable and correctable

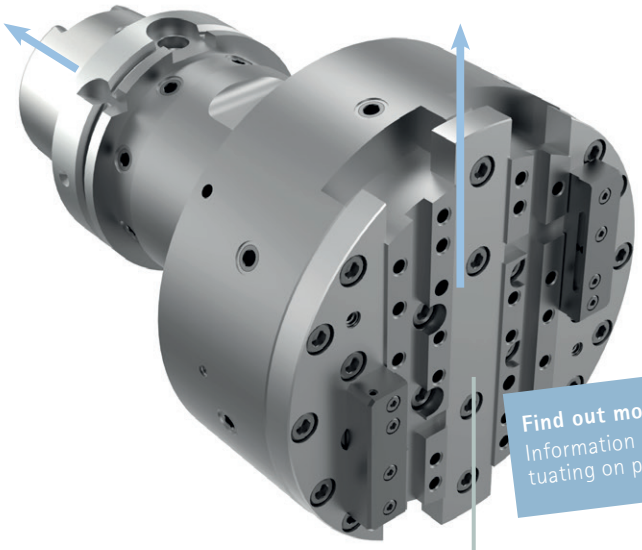
# Tool highlights for actuating drive:

## Roughing

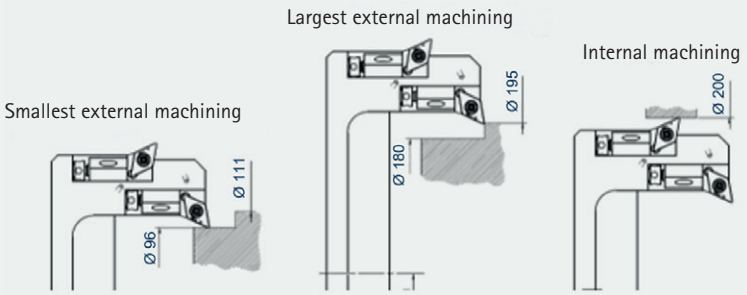
- Multi-stepped indexable insert combination tool with tangential cutting technology
- Boring and chamfering combined in one reliable process
- PCD cutting material ensures maximum productivity and quality of contours

## Finishing

- Automatic tool change ensures greater flexibility
- Mounting tools can be offset in five steps to cover a wide range of diameters
- Optimum coolant supply: coolant fed directly onto the cutting edge



**Find out more:**
Information about actuating on page 26.




## SPECIAL FEATURES OF THIS SOLUTION

- Internal and external machining can be performed reliably with optimal concentricity
- Automatic tool change possible
- Tool configuration does not affect machining times thanks to replacement tools
- Indexable insert technology lowers cutting material costs

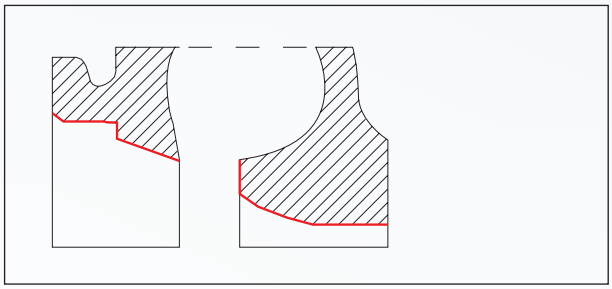
# Innovative service offering

## Actuating

**Maximum flexibility for high levels of parts variance in process plant technology**
With actuating technology, additional turning operations are no longer required. Complex contours can therefore be produced precisely and efficiently on machining centres, irrespective of the quantity or part size.

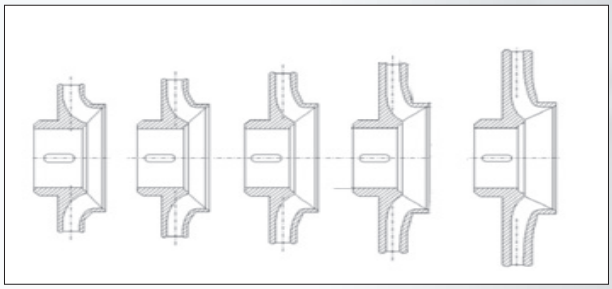
### 1 Complex contours – without a lathe

Cubic parts are machined directly on the machining centre to create turning geometries



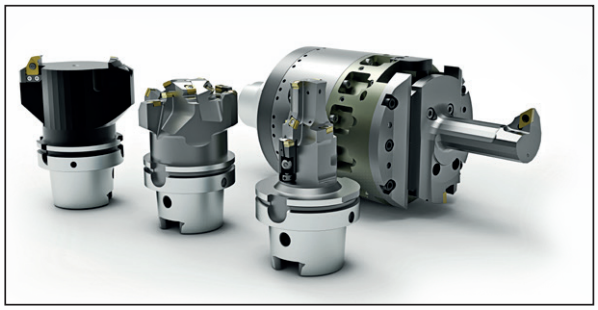
### 2 Different component dimensions

No need for additional tools



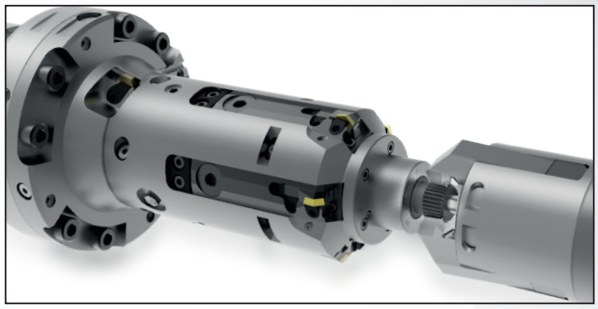
### 3 Complete machining on machining centres

Productive and cost-effective

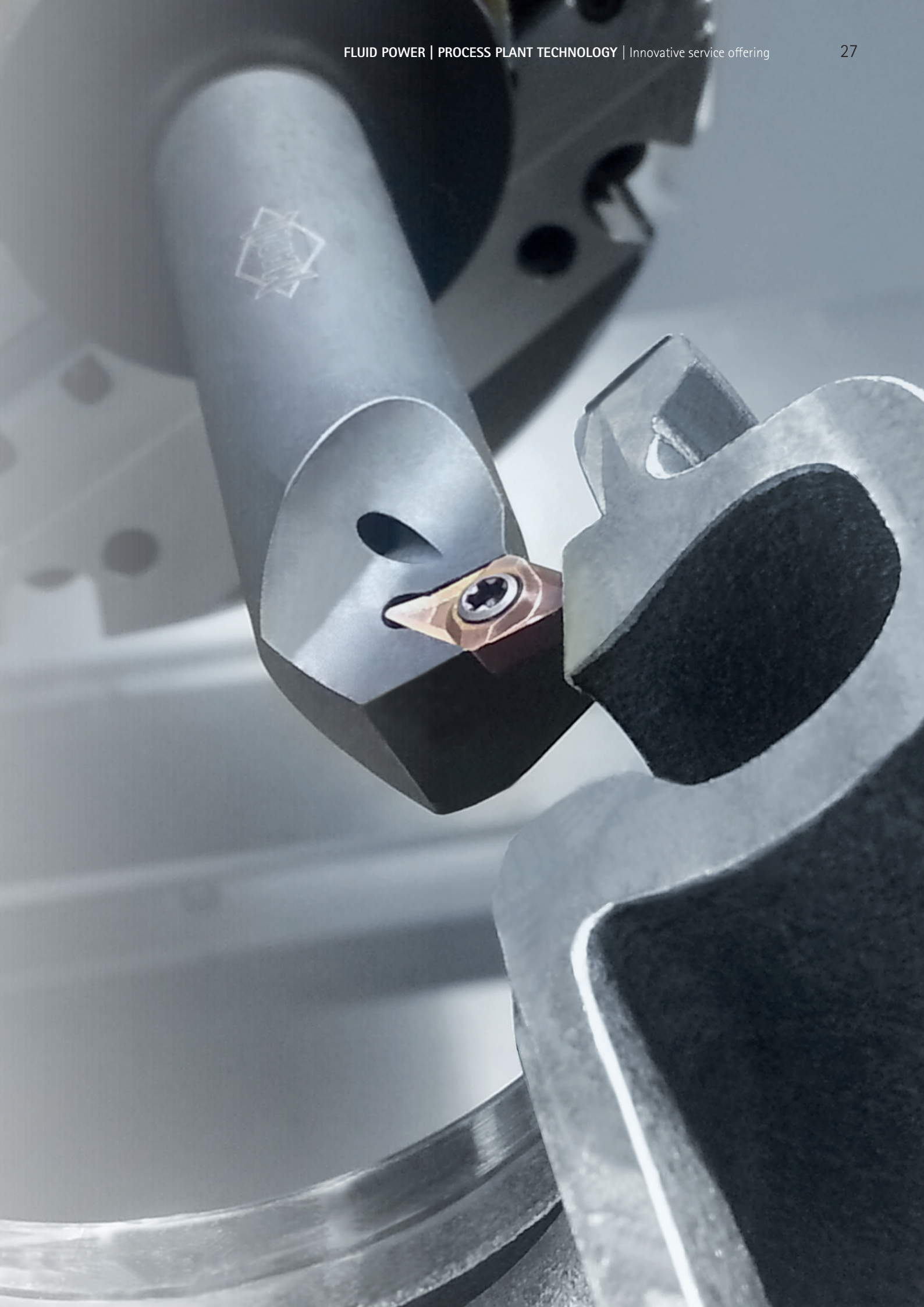


### 4 Cutting edge wear compensation

Flexible and reliable



**Scan the QR code** to learn more about actuating.



# Innovative service offering

For additional machining requirements on parts that are critical to function

## Milling | Milling Cutter 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.

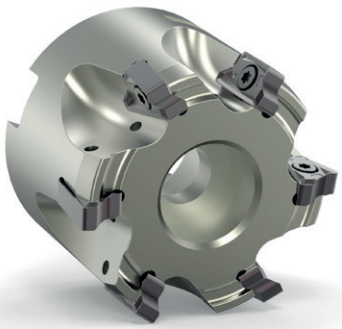
**Scan the QR code** to learn more about the NeoMill milling program!

### NeoMill-16-Face

- 16-edge indexable insert / 45°
- First choice for cast iron and heat-resistant cast steel
- ø area 63-200 mm / ap max. 4 mm
- Low cutting forces despite a negative form
- Maximum cost-effectiveness for face milling

### NeoMill-8-Corner

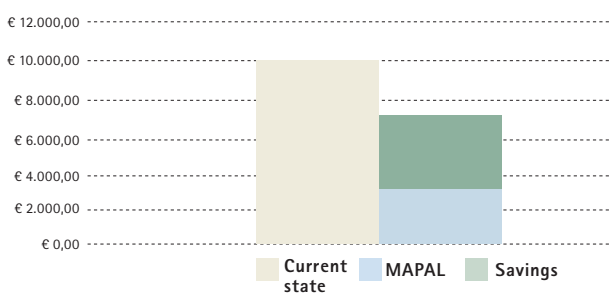
- Eight-edge indexable insert / 90°
- First choice for cast iron
- ø area 50-200 mm / ap max. 8 mm
- Maximum cost-effectiveness for shoulder milling



### NeoMill-4-Corner

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

**COMPARISON OF TOTAL COSTS (machine + tool)**
**Roughing – 1500 housing units p.a.**



# Clamping

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.

**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 – combine the performance promise of quality and function. This is achieved through an optimal interplay of geometric and functional properties.

### 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.

### 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

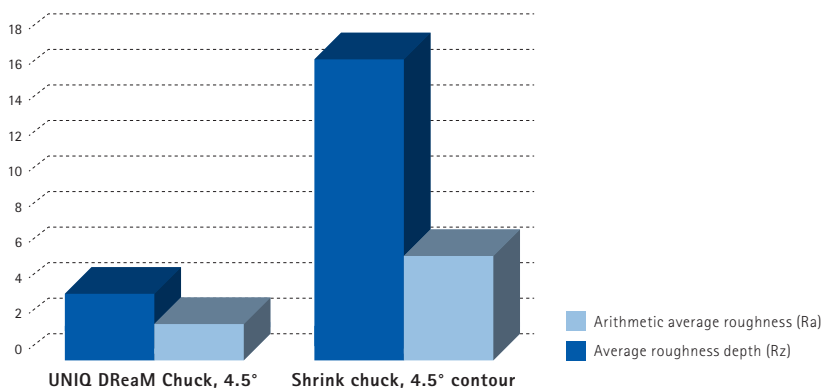
### UNIQ DReaM Chuck 4.5°

- 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

- Easy to handle thanks to 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

### SURFACE FINISH [µm]

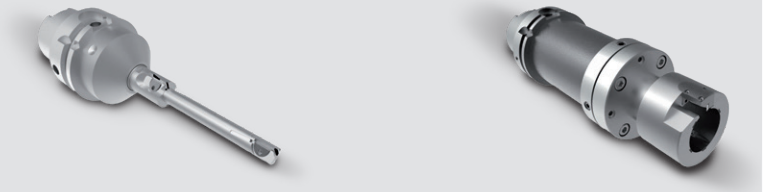


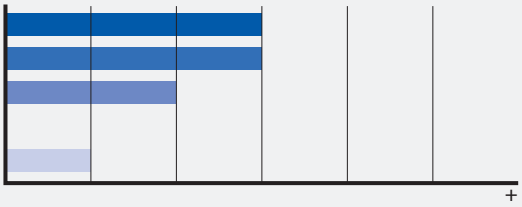
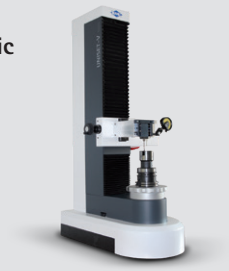
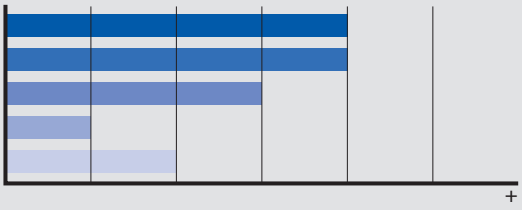
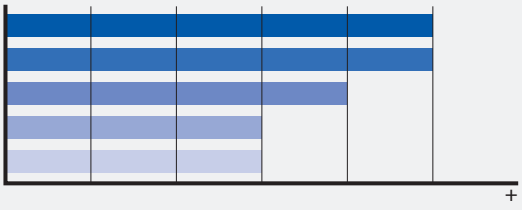
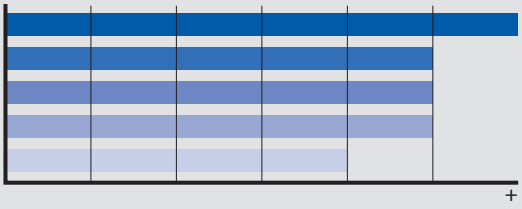
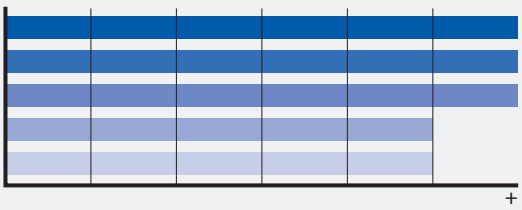

### MACHINING DATA

| | |
|---|---|
| **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 |

# Innovative service offering

## Setting | Overview of setting fixtures

| Example tools and parts | | |
|---|---|---|
| Machining features:<br>- Valve bore<br>- Spool bore<br>- Cylinder bore<br>- Transmission housing bore |  | - Tools with guide pads<br>- Valve guide tools |
| Machining features:<br>- Valve bore<br>- Spool bore<br>- Cylinder bore<br>- Transmission housing bore<br>- Axle journal |  | - Tools with guide pads<br>- Valve guide tools<br>- External reamers |
| Machining features:<br>- Camshaft bearing bore<br>- Crankshaft bearing bore<br>- Cylinder bore |  | - Slender, long tools with guide pads |
| Machining features:<br>- Electric motor housing: Bearing/position bore<br>- Compressor housing rotor bore<br>- Cylinder bore<br>- Face milling/finishing |  | - Tools with guide pads<br>- Multi-stepped fine boring tools<br>- Small to medium-sized face milling cutters<br>- Cylinder drilling tool |
| Machining features:<br>- Electric motor housing: Stator bore; fine machining inner contour<br>- Transmission housing transducer bore<br>- Face milling/finishing |  | - Heavy tools with guide pads<br>- Large multi-stepped fine boring tools<br>- Small to medium-sized face milling cutters |

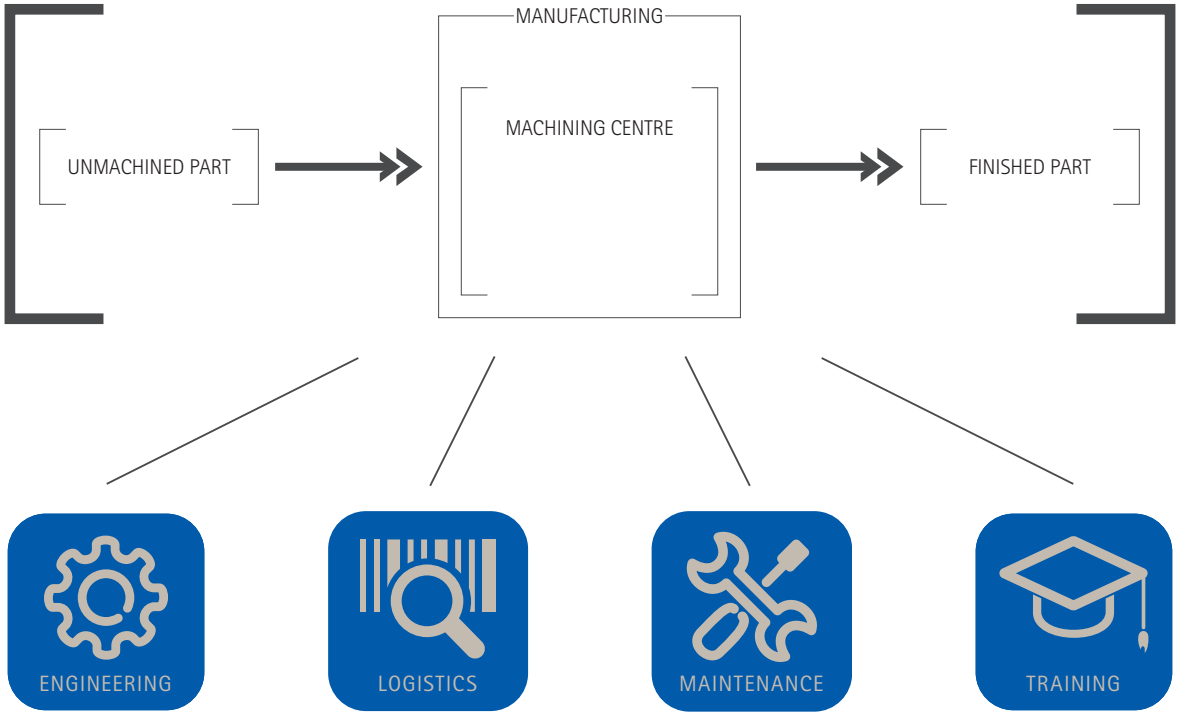
| Possible applications | Setting fixture | | Properties |
|---|---|---|---|
| | | | Process reliability/ handling · Tool flexibility · Setting · Measuring and inspecting · Investment |
| Setting and correcting close to the machine | **MASTERSET**  | MECHANICAL |  |
| Setting and correcting close to the machine | **UNISET-V basic**  | MECHANICAL |  |
| Series production for components in the automotive, e-mobility and fluid power field | **UNISET-H**  | ELECTRONIC |  |
| Series production for components in the automotive, e-mobility and fluid power field | **UNISET-V expert** – without tailstock  | ELECTRONIC |  |
| Series production for components in the automotive, e-mobility and fluid power field | **UNISET-V expert** – with tailstock  | ELECTRONIC |  |

# 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.

CUSTOMER MAPAL




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 advantage 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 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 the ability to focus on their core business. As a long-term technology partner, MAPAL continuously optimises all processes related to the tool and in this way increases their productivity sustainably.

Depending on the size of production and the way it is organised, the parts produced and the tool consumption, a cost-optimised logistics concept is created specifically for each customer. For maximum customer benefit and the largest 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 transparent organisation of tools. Networked dispensing systems provide relevant data in order to prevent machine standstills and capital commitment.

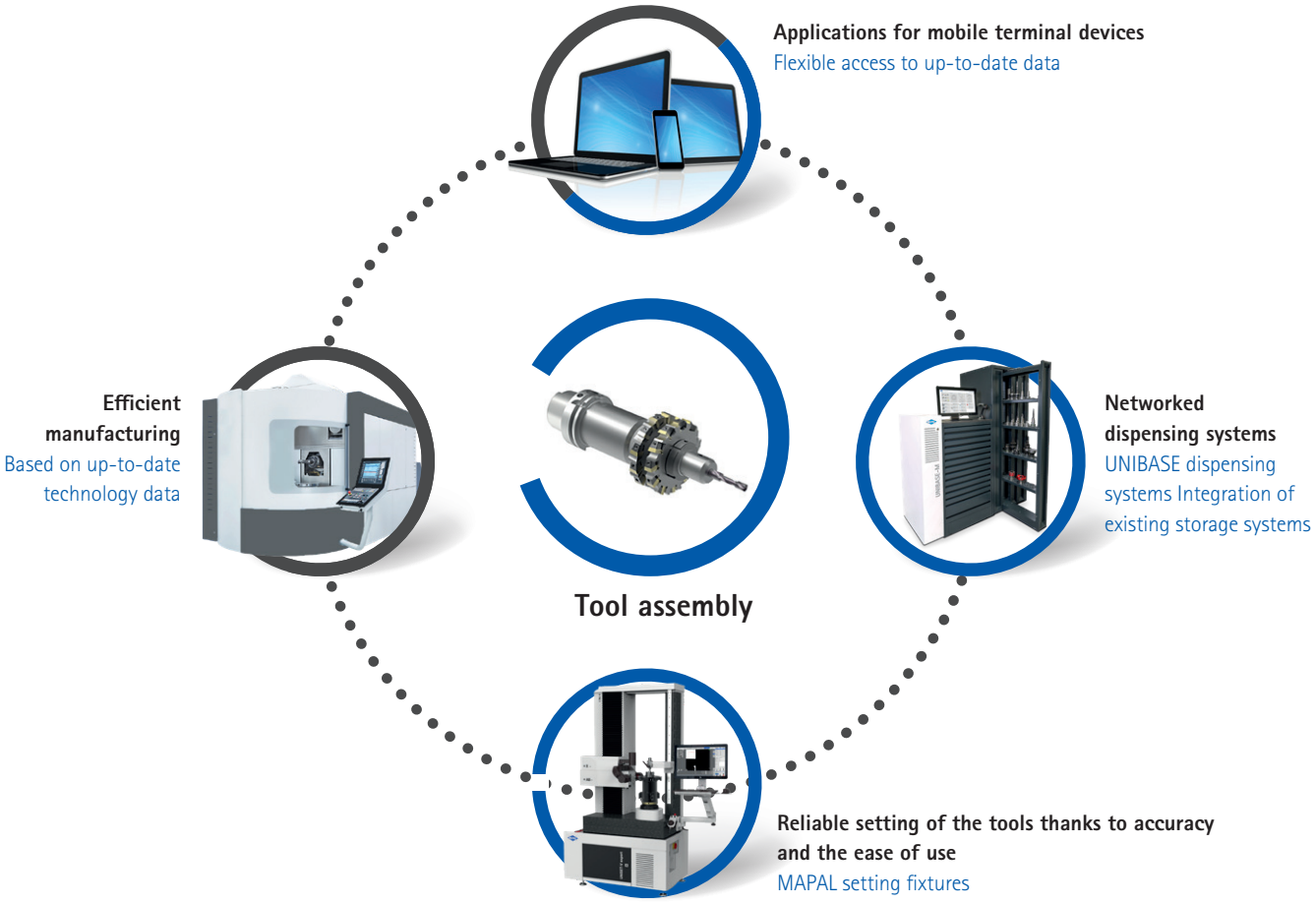
### TOOL MANAGEMENT OPTIMISATION

MAPAL can provide on-demand tool procurement that accounts for fluctuations in production. Orders are placed to meet optimal lot sizes.

### TECHNOLOGY PARTNERSHIP

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.

CUSTOMER TOOLMANAGER




With Tool Management 4.0, customers benefit from our 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.

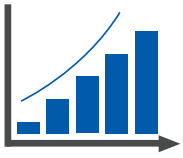
Technology data are entered and managed centrally. In this way, it is ensured that all employees at all sites have access to the same up-to-date data at all times. This way, all those involved benefit from the accumulated knowledge and know-how. As a consequence, manufacturing is more efficient and the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

## ADVANTAGES

**MORE** networking

**MORE** transparency

**MORE** efficiency



**MORE** cost control

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

SERVICES

**FOLLOW US**

Mat. no. XXXXXXXX | V1.0.0
Fluid_Verf-DE-PC-01-010-0126-VVA Printed in Austria. Technical data subject to change without notice.


Druckprodukt mit finanziellem Klimabeitrag
ClimatePartner.com/XXXXXXXXXX