

MFP 50

Highly flexible
for demanding applications



Key data

Maximum performance and productivity

Swiss-made precision

Wide variety of tools and process flexibility

Compact layout

Mägerle AG Maschinenfabrik

Precision, quality and flexibility are key attributes of the products manufactured by Mägerle AG Maschinenfabrik. A technology leader for high-performance surface and profile grinding systems, the company founded in 1929 primarily specializes in customized solutions.

At the heart of the international success of our high-quality Swiss machinery is the unique design principle of the MÄGERLE modular system. Thanks to state-of-the-art technology, MÄGERLE can offer customers from many branches of industry reliable grinding centers. The high machining precision of the custom special-purpose machines ensures that our customers remain competitive.

Alongside decades of accumulated expertise, our highly motivated and dedicated employees play a key role in the success of the company.

As part of the UNITED GRINDING Group, MÄGERLE is a strong member of the group of globally leading machinery engineering companies for grinding machines. All over the world, this gives MÄGERLE customers access to an extensive network of experienced service and engineering technicians.

MFP 50

Fast axes and tool change · Hydrostatic guideways ·
Maximum grinding and cooling performance · Process expertise for high process reliability · System integration expertise · Overhead dresser moveable in Z-direction

Characteristics

Dimensions

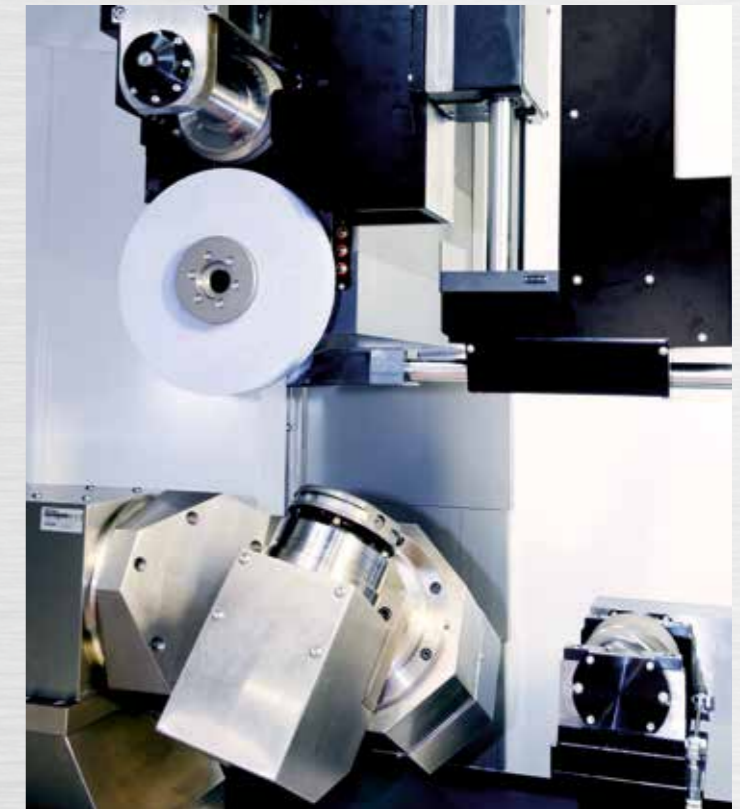
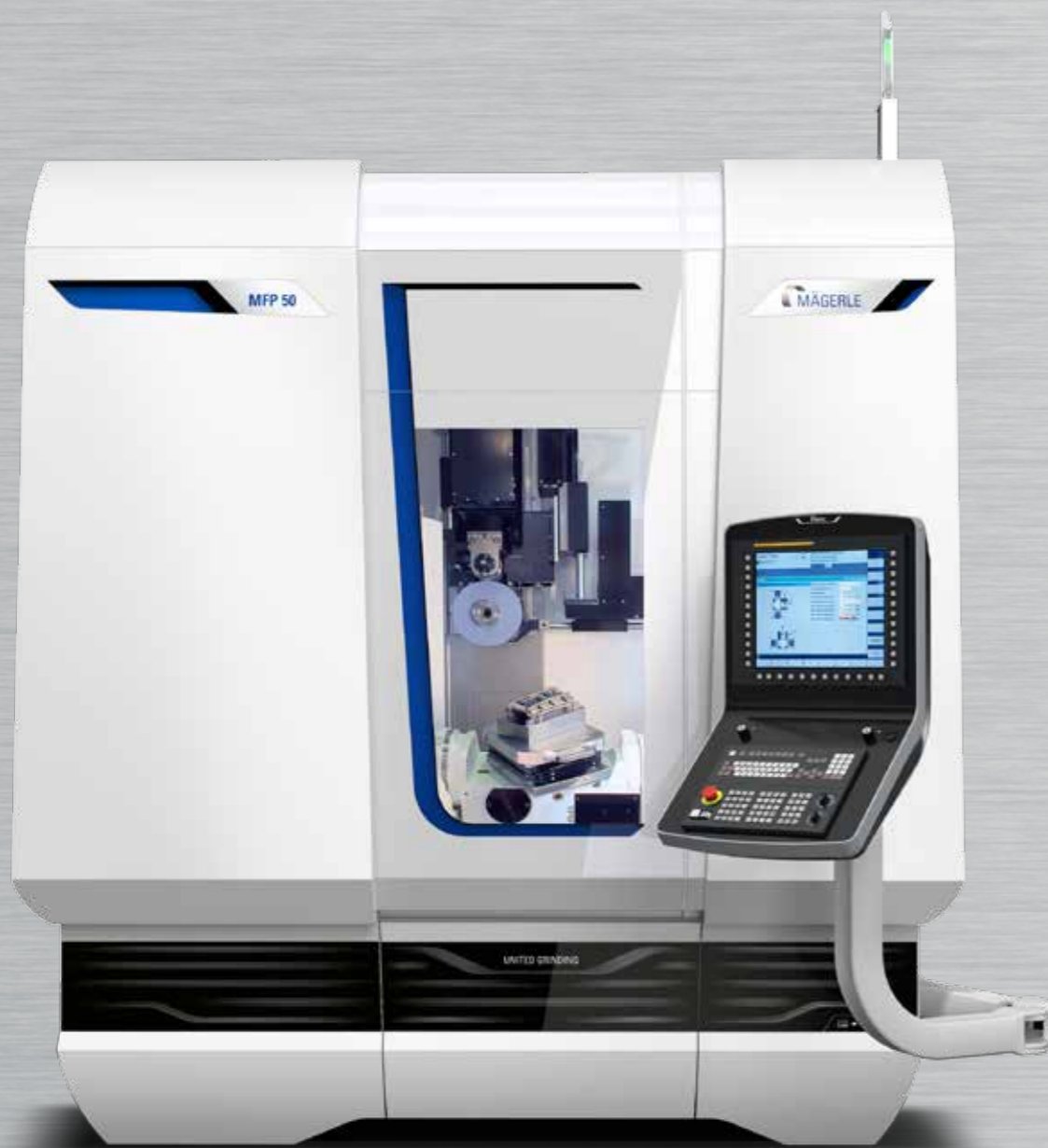
- Grinding spindle drive power: 25/50 kW
- X-axis - longitudinal stroke: 500 mm
- Y-axis - vertical stroke: 650 mm
- Z-axis - transverse stroke: 650 mm

Hardware

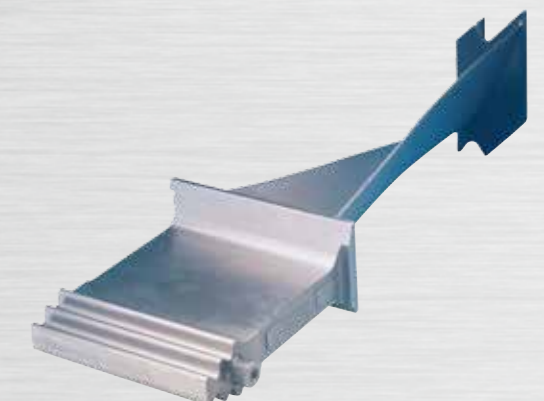
- 5 or 6-axis system
- Axis travel speed up to 30,000 mm/min
- Grinding, milling and drilling in a single clamping
- Wear-free hydrostatic guideways
- Water-cooled drive

Software

- User-specific programmable interface
- Innovative control architecture
- Intuitive operation
- Focus on work and production safety

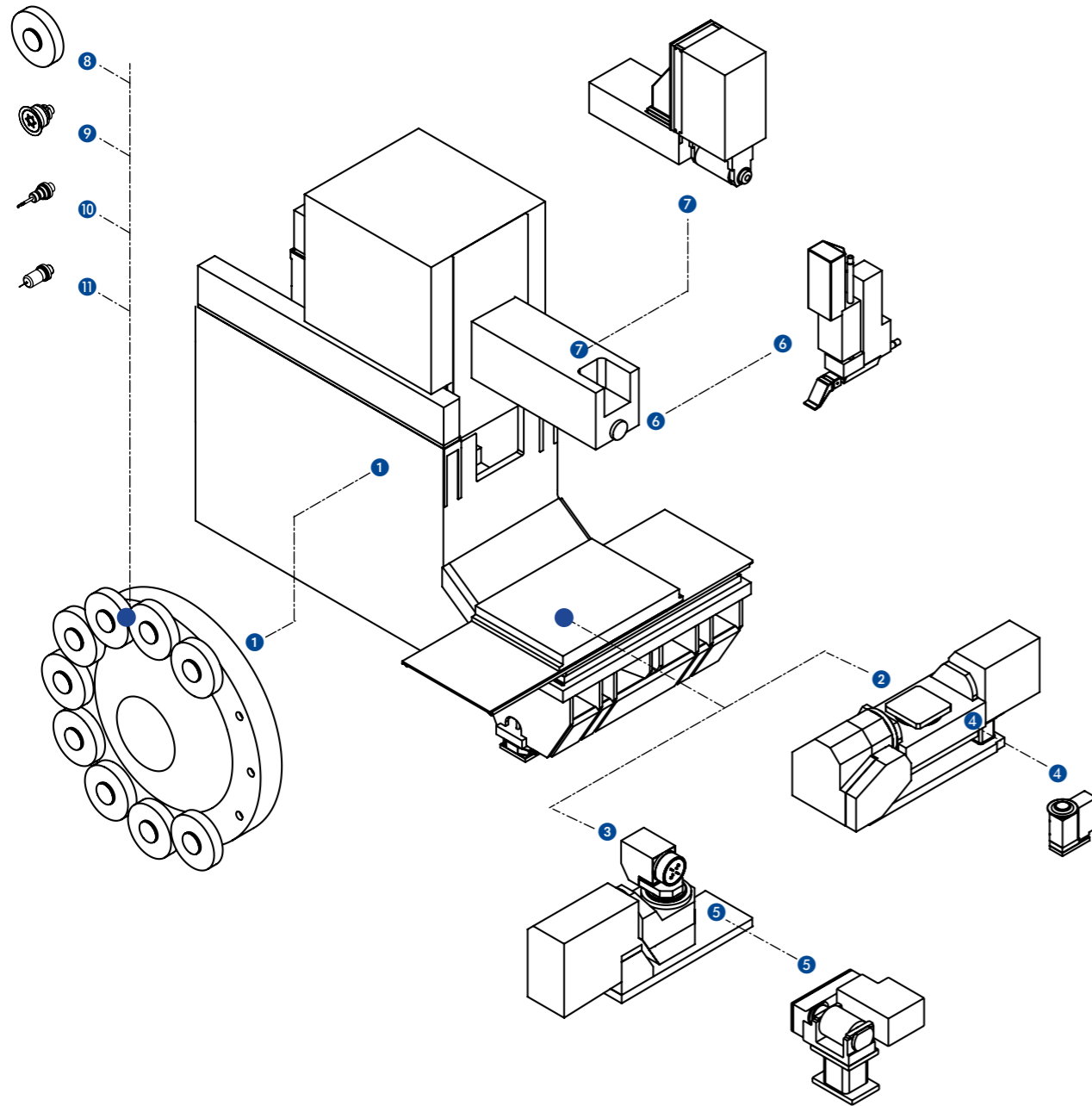


The MÄGERLE MFP 50 combines flexibility and performance in a compact design. As a 5 or 6-axis system, this CD grinding and machining center shows its top form when dealing with challenging workpieces. An intelligent design principle takes manufacturing quality, safety and cost efficiency to a new level. The coolant nozzle, controllable via two axes, allows unrestricted freedom of movement and precise positioning of the coolant jet. Spindle speeds of up to 10,000 revolutions per minute guarantee the highest machining precision. The grinding wheels are always mounted right at the front of the spindle, and the profile is changed through automatic positioning of the diamond rolls in the direction of the Z-axis. This allows a generous machining clearance, as collisions between wheel flange and workpiece are practically excluded. In the MFP 50 the grinding wheel diameter is used to the maximum, resulting in significant cost savings.



Machine Configuration

MFP 50 machine concept

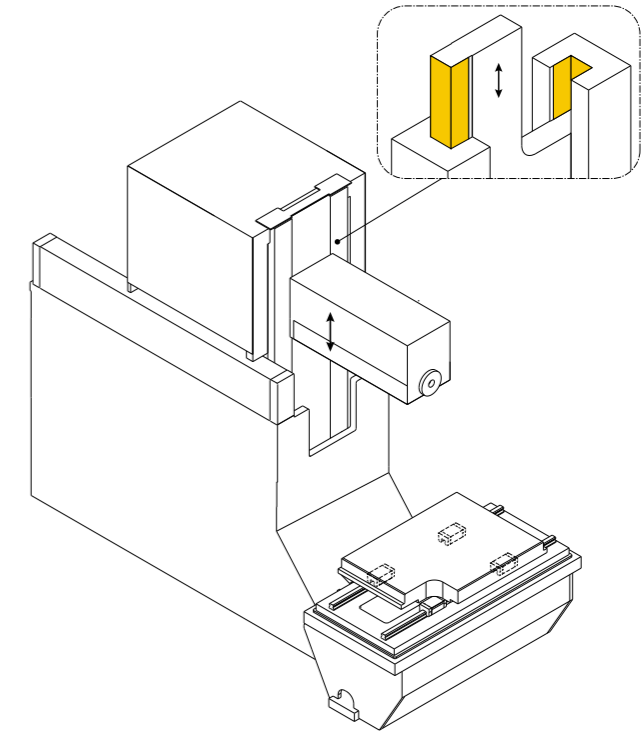


- 1 24-position tool changer
- 2 2-axis NC table
- 3 3-axis NC table
- 4 Dressing device
- 5 Table dressing device
- 6 2-axis NC coolant nozzle
- 7 2-axis CD overhead dresser
- 8 Conventional grinding wheels
- 9 CBN grinding wheels
- 10 Drilling tools / Cutting tools
- 11 Measuring probe

Hydrostatic and Powerful Grinding Wheel Drives

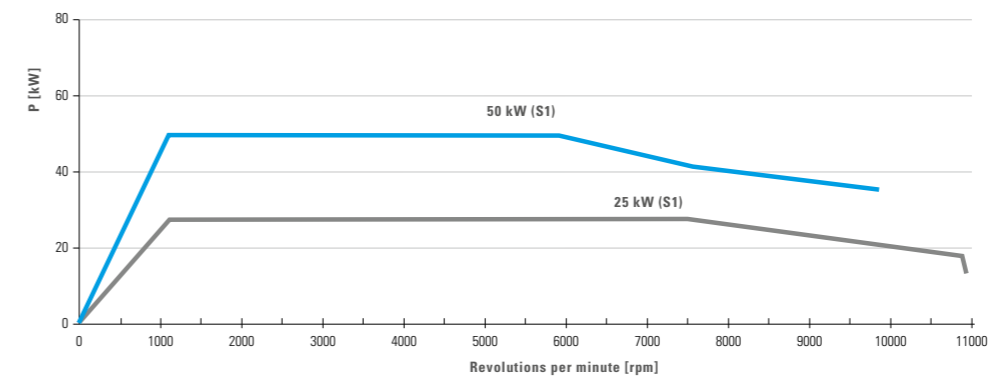
Wear-free guideway concepts

The whole quality of the MÄGERLE Grinding Centers is based on the unique design principle. The vertical axis is equipped with hydrostatic wrap-around guideways and completely separated from the upper part of the column by a thin oil film. Integrated oil chambers keep the process stable, irrespective of thermal fluctuations. As a result MÄGERLE grinding machines can withstand high loads without signs of wear - even in long-term use. The oil film has a vibration-damping effect and guarantees high-precision machining of simple or complex workpieces.



Power curves (S1)

Grinding wheel spindle drives



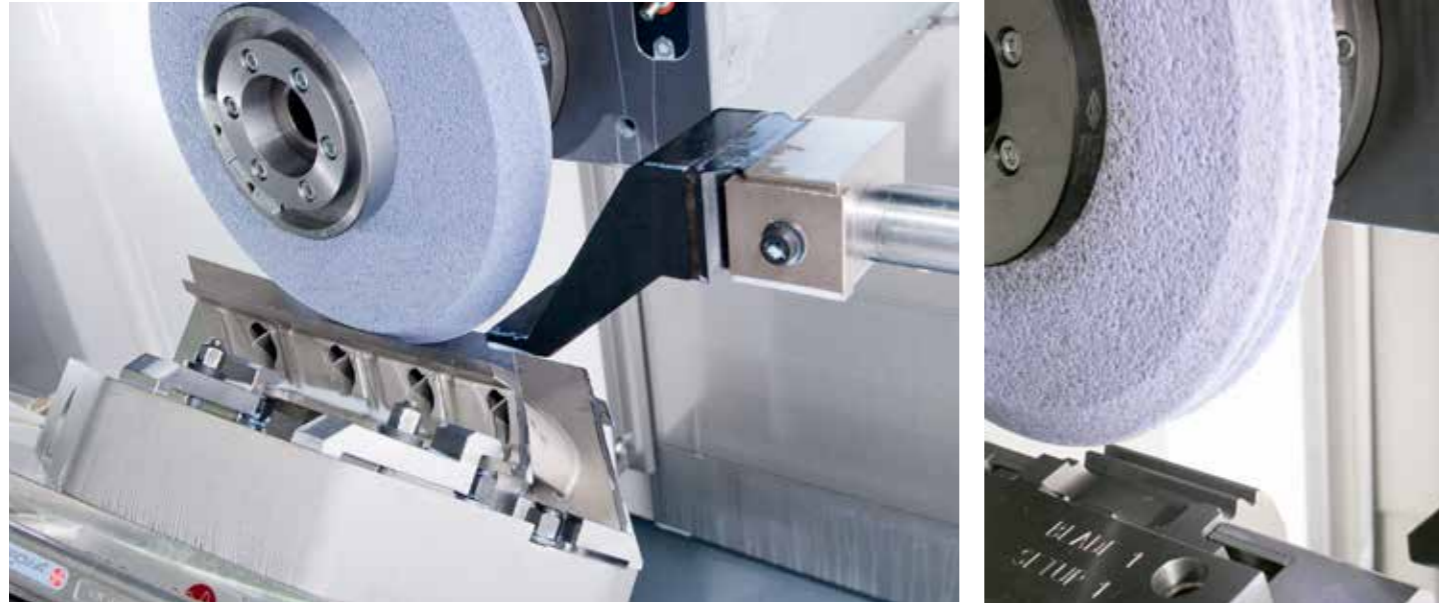
Precise and reliable down to the smallest detail **Front-runner in grinding power**

MÄGERLE guarantees precision and reliability down to the smallest detail of its grinding machines. Water-cooled direct drive motors for the grinding spindles ensure maximum performance in demanding continuous operation. The HSK tool mounting is the key to quick tooling change with absolute repeatability precision. An optional balancing system dynamically balances unequal forces in the rotating grinding wheel.

Powerful motors drive the spindles on MÄGERLE grinding machines and lead to outstanding results in respect of removal capacity. MÄGERLE surface and profile grinding machines combine top quality with maximum productivity.

Application Examples and Machining Capabilities

Turbine stator and rotor vanes



Stator and rotor vanes are ground on the MFP 50 with minimal downtimes. The combination of automatic 24-position tool changer and CD overhead dressing enables several surface profiles to be ground in a single workpiece clamping, as well as ensuring dimensional stability.

Internal gear grinding



Internal gear grinding on challenging workpieces is enabled by the tailored system configuration. The optimized coolant supply enables high removal rates with consistent production quality.

Hirth coupling ring



Complete machining on Hirth coupling rings enables the gear tooth profiles as well as external and internal diameter to be ground in a single clamping. The MFP 50 can be configured with an additional spindle in a special design, which enables additional bore grinding with very narrow axial and radial runout tolerances.



MFP 50 in a special design with an additional spindle

Compressor blades

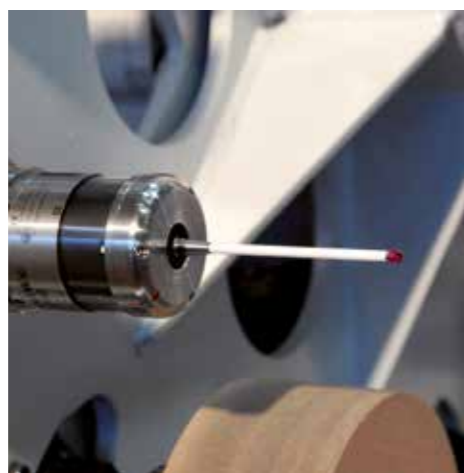


before

after

Compressor blades for aircraft engines are manufactured from forgings, which consist of high-strength and to some extent also heat-resistant material alloys. The complete blade root profile is produced in a single clamping. The machine configuration with a 3-axis NC table enables the machining of radial root profiles. Another example of the MFP 50's high removal capacity.

Tool Change System for Demanding Applications

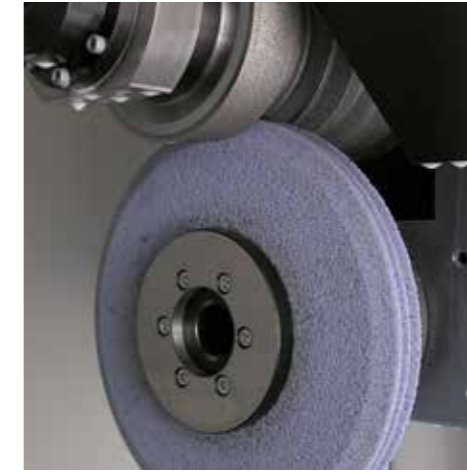
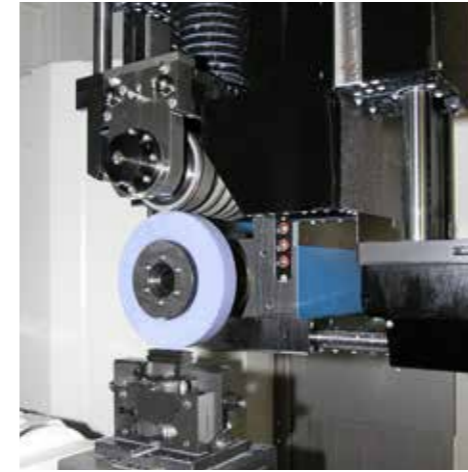


The MFP 50 is also characterized by its high axis speed, minimal auxiliary times and quick tooling change. Processes such as grinding, milling and drilling can be carried out to perfection in a single clamping.

The grinding process can be supplemented by drilling and milling, which enables a flexible machining clearance for complex workpieces. In a subsequent step a dimensional inspection with a measuring probe completes the fully automatic machining process. The measuring values can be automatically taken into account in the ongoing machining.

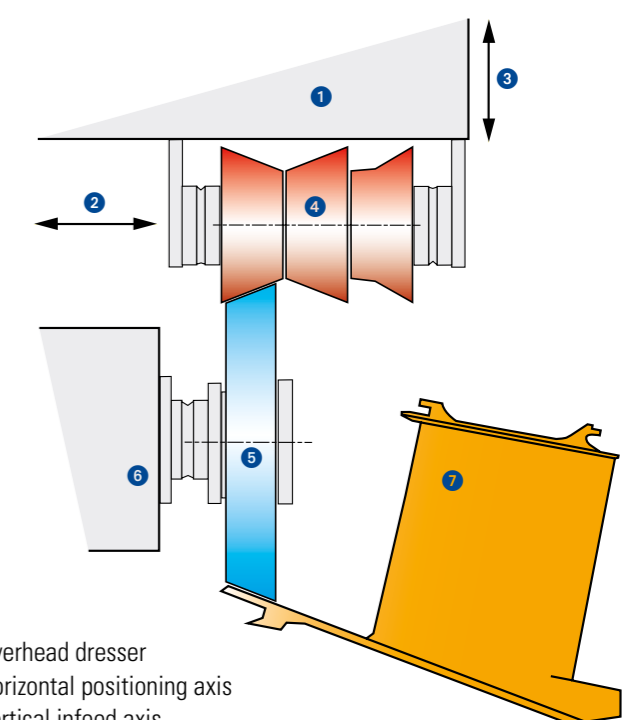
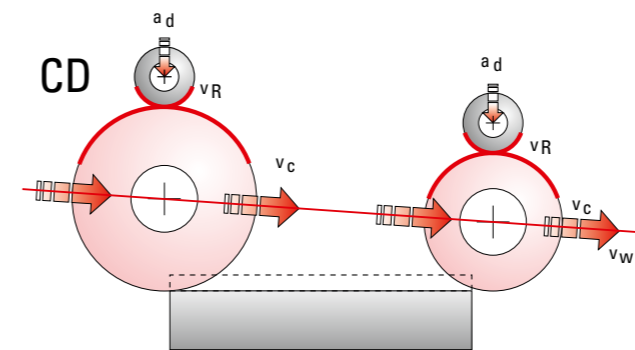
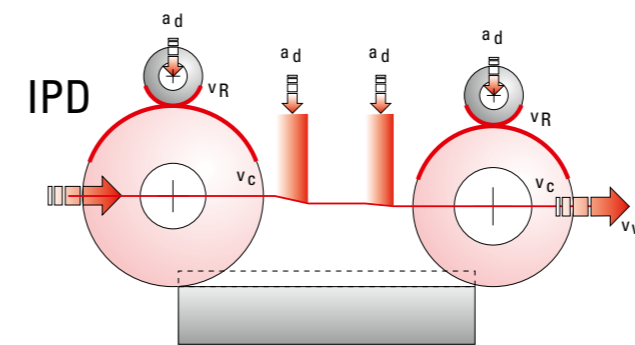
The Right Dressing Method

MFP 50 dressing system



The dressing of the grinding wheels is a crucial factor for the efficiency of the grinding process. With overhead and table dressing devices, MÄGERLE provides professional solutions for the various requirements of this process step. The potential of the overhead principle is developed in continuous dressing (CD) and inprocess dressing (IPD). Table dressing devices are used for fixed or rotating dressing tools, where the rotating

principle produces optimal results in diamond full form dressing, crushing or CNC dressing. MÄGERLE uses servo motors for driving the dressing devices; these can be freely programmed across the entire rpm range.



- 1 Overhead dresser
- 2 Horizontal positioning axis
- 3 Vertical infeed axis
- 4 Diamond profile roll(s)
- 5 Grinding wheel
- 6 Grinding support
- 7 Workpiece

Cooling Intelligence

Perfect protection of the machining area, long working life of the entire system



Cost-saving cooling intelligence

The NC systems currently used in MÄGERLE Grinding Centers allow precise positioning of the coolant supply together with the respective grinding wheel geometry over 2 NC axes. An optional profile adjustment enables precise ap-

plication of the coolant to the workpiece zones for machining. Minimal coolant amounts thus provide maximum cooling capacity. Labyrinth seals with a sealing air arrangement protect all bearings in the machining area from impurities

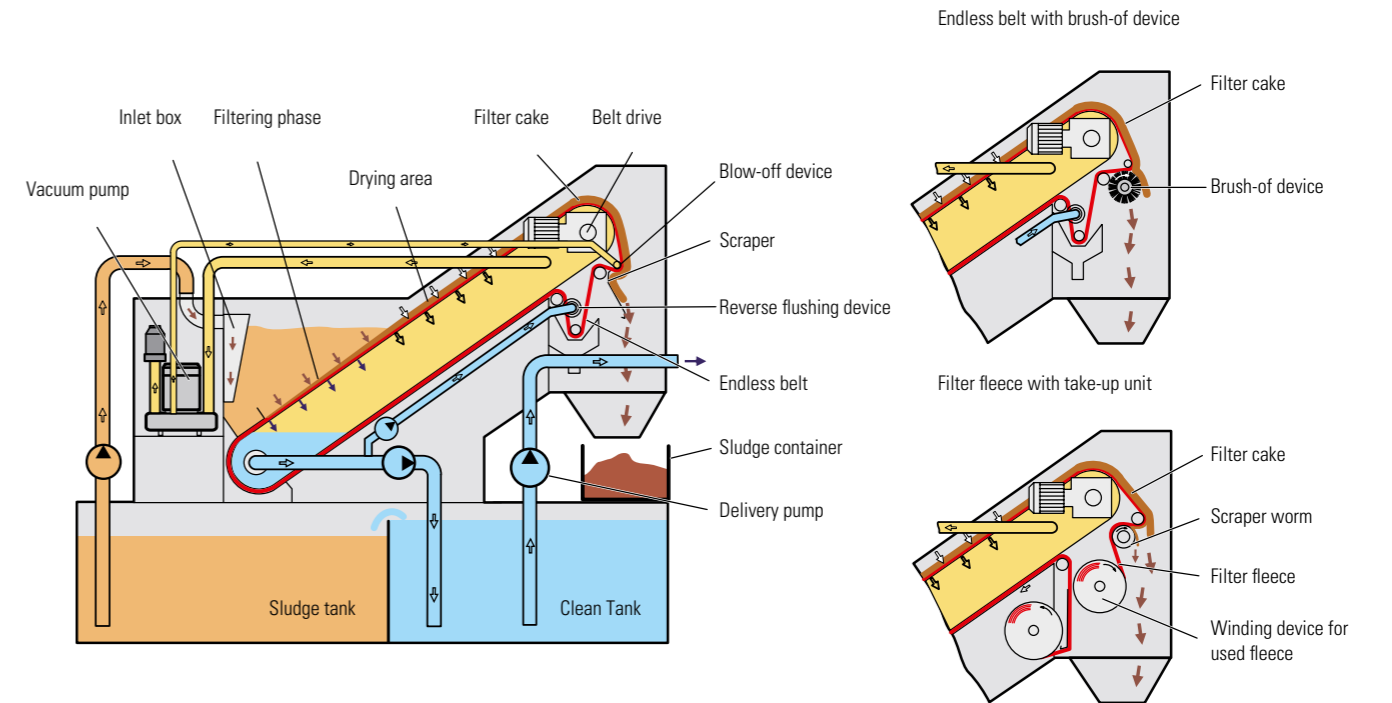
and contribute to the long working life of the overall system.

Applications



Coolant Cleaning Units

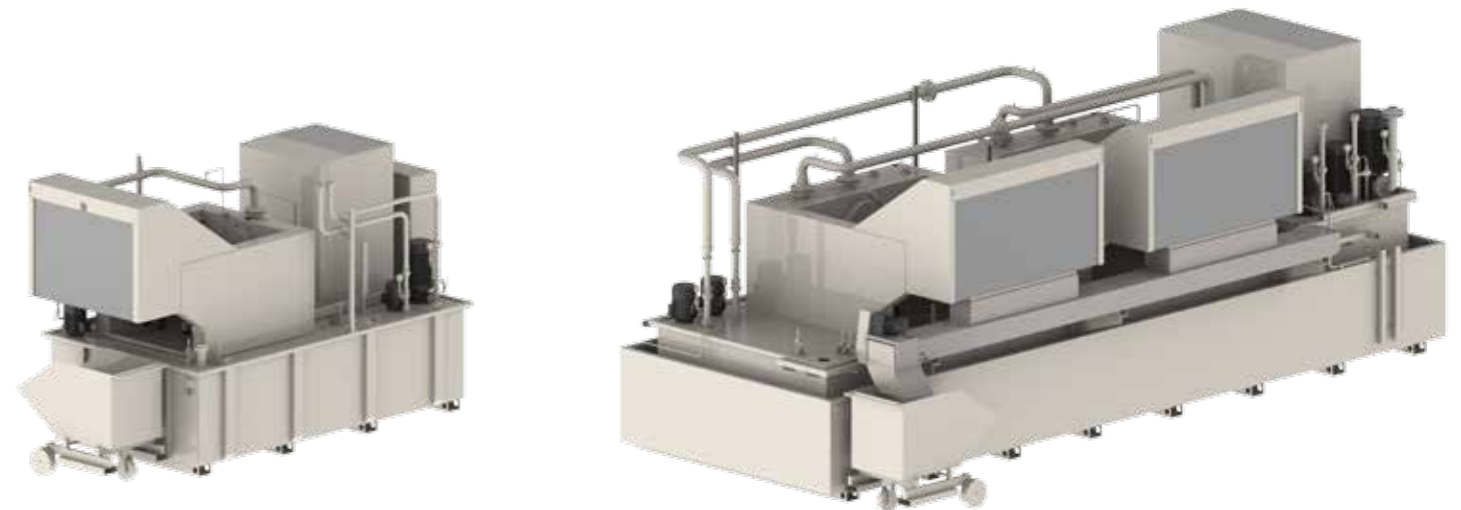
The optimal solution for every application



An eye on the big picture

MÄGERLE considers the grinding process as a system of different components and thus creates the necessary conditions for a high cost effectiveness. The system concept for coolant supply and cleaning is of central importance. Correct dimensioning is essential for utilization of the full coolant potential with low disposal

costs. Taking account of these economic and ecological aspects, MÄGERLE in conjunction with the coolant system supplier matches integrated solutions to the customer-specific requirements.



Efficient Automation

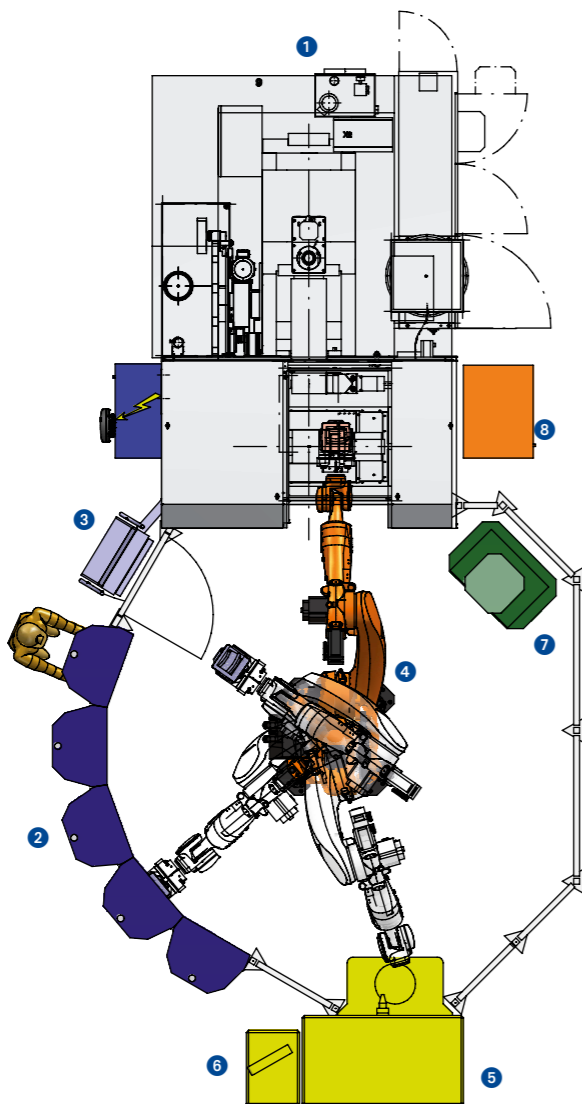
Automation and machining cells

The MFP 50 is ideally suited for automatic loading and unloading. Flexible and efficient automation solutions are possible with a robot or linear system. The workpiece handling with robot technology is a quick and reliable step for increasing the capacity utilization and productivity of the MFP 50. The integration of further grinding machines, tool magazines and additional pro-

cess steps such as cleaning and measuring are possible. MÄGERLE's expertise and experience with implemented automation solutions guarantee the highest productivity and ensure your competitiveness.

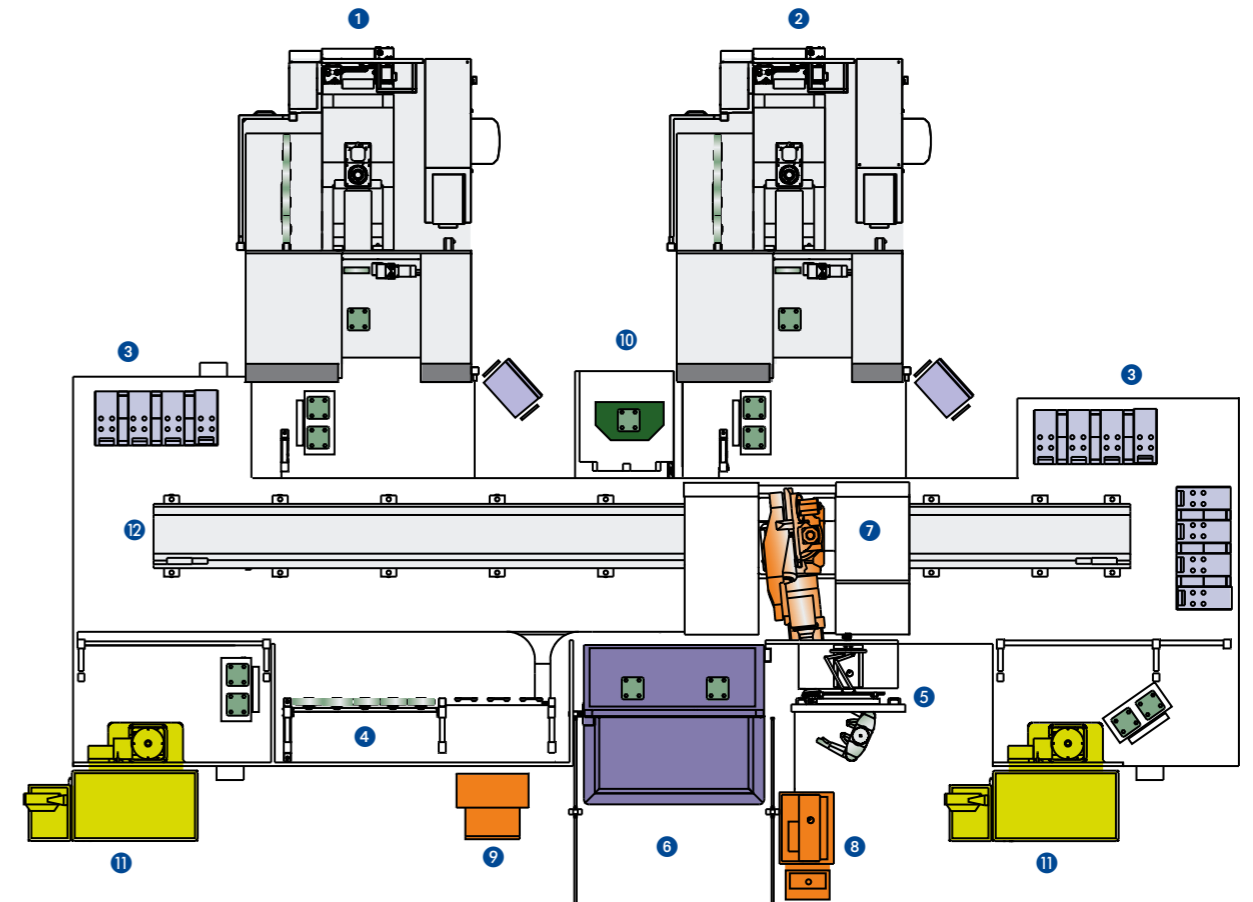
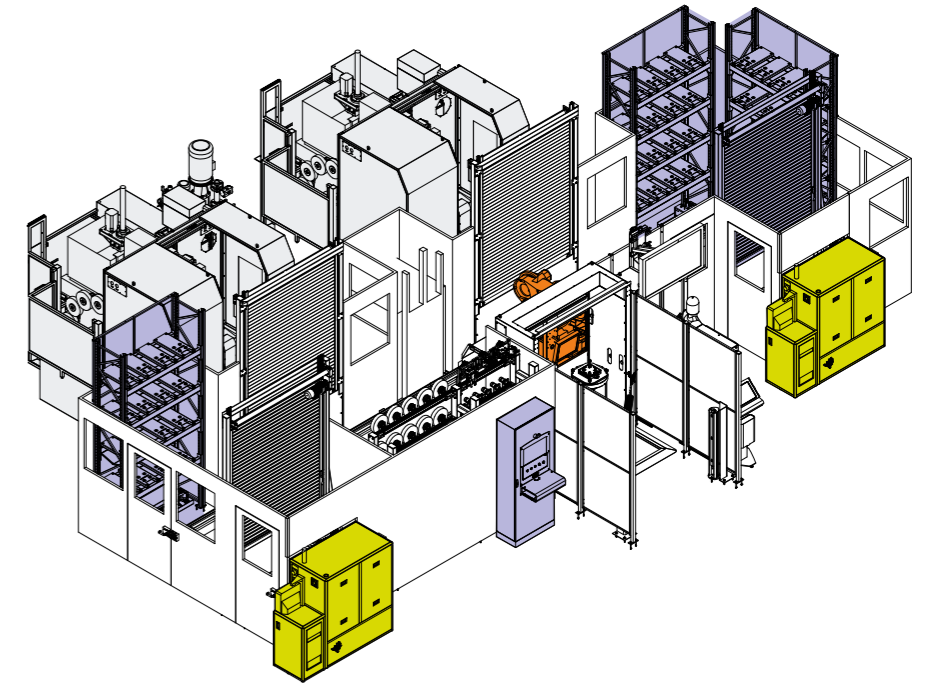
Example machining cell 1

- 1 MFP 50 grinding machine
- 2 Loading/unloading stations
- 3 Sinumerik 840D control unit
- 4 Robot
- 5 Coordinate measuring machine
- 6 Control unit
- 7 Cleaning station
- 8 Cell control unit

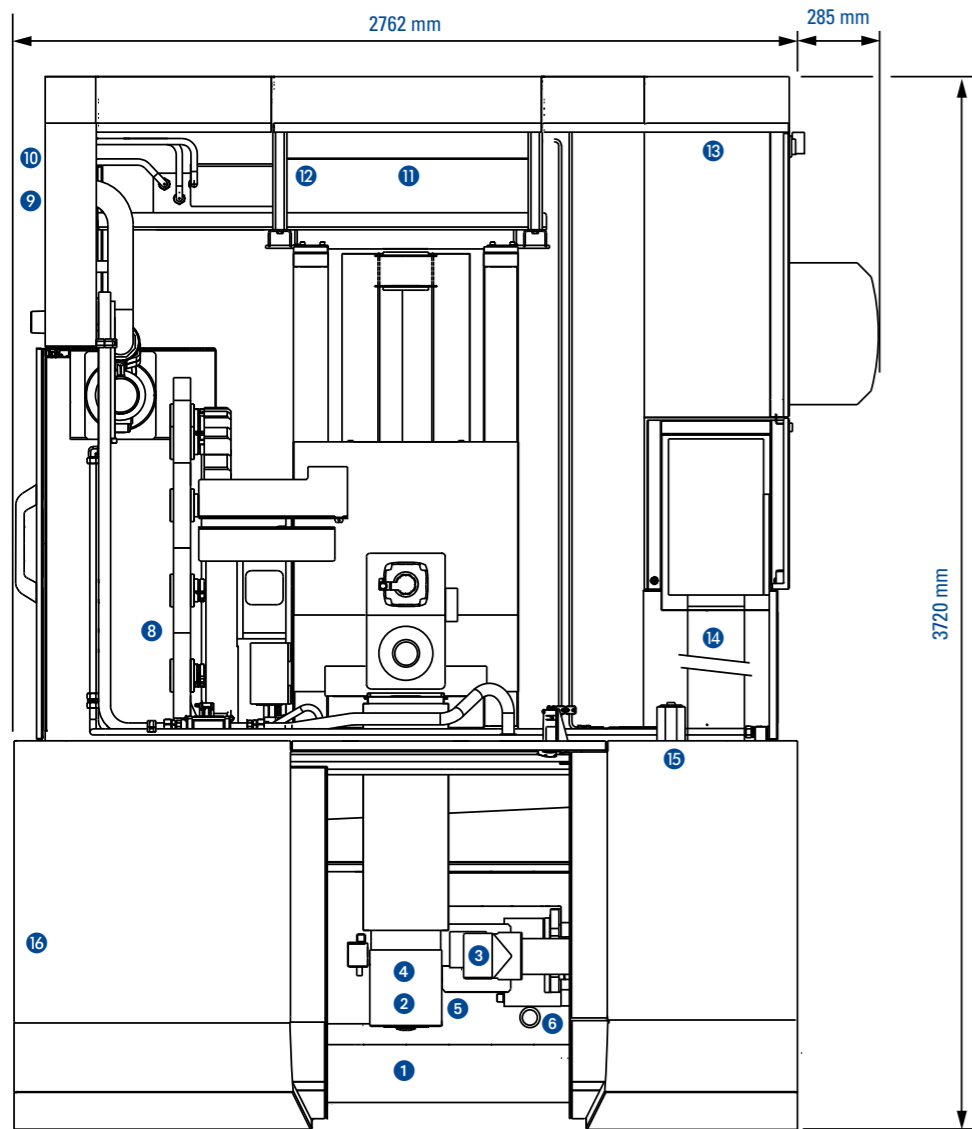


Example machining cell 2

- 1 MFP 50 grinding machine
- 2 MFP 50 grinding machine
- 3 Pallet buffer
- 4 Tool magazine
- 5 Tool loading station
- 6 Workpiece loading station
- 7 Robot
- 8 Robot control system
- 9 Cell monitoring
- 10 Cleaning station
- 11 Coordinate measuring machine
- 12 Rail guide for robot



Machine Layout

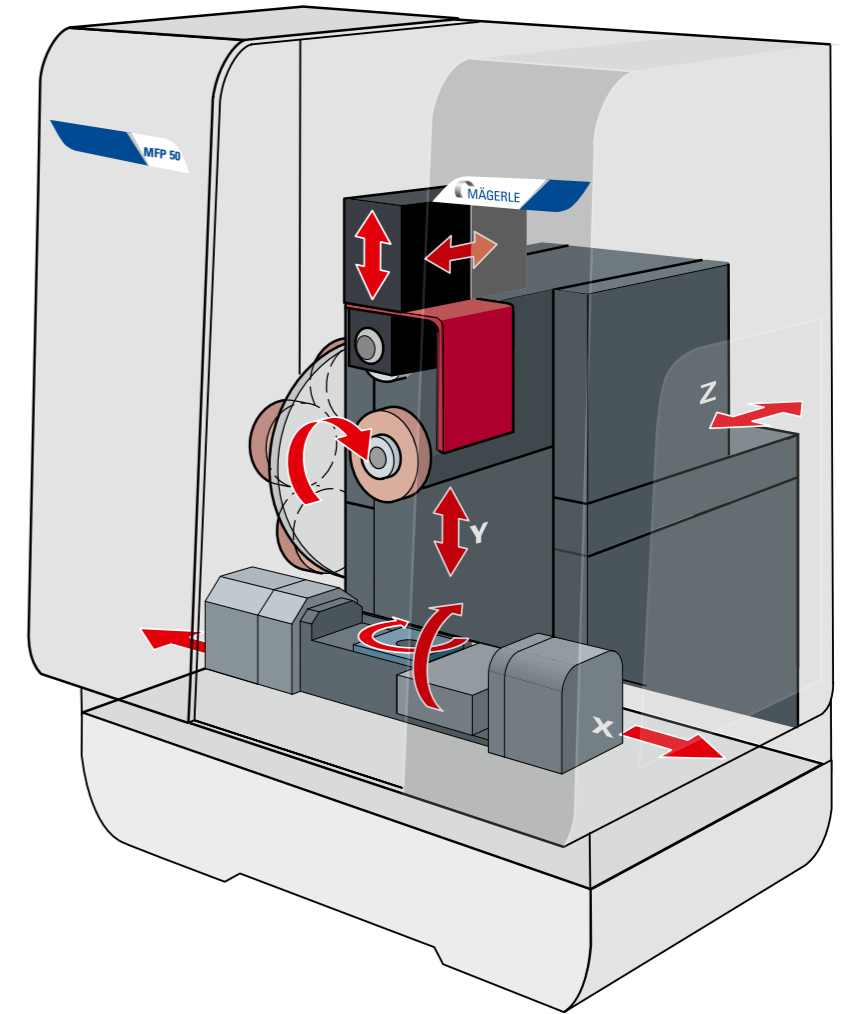


Height: 3480 mm

MFP 50 machine configuration legend

1 MFP 50 working area	9 Interface to coolant processing system
2 Quick-change spindle for machining tools	10 Cooling system for spindle drives
3 Automatic coolant nozzles	11 Hydrostatic/Hydraulic unit
4 Overhead dresser	12 Centralized lubricating system
5 NC indexing head 2/3 axes	13 Electrical cabinet
6 Dressing device (optional)	14 Mist extractor (interface)
7 Sinumerik 840D controller	15 Automatic door drive
8 Tool change magazine for machining tools	16 Safety splash guard cabine

Technical Data



Technical data MFP 50

X-axis - longitudinal stroke	mm	500
Travel speed	mm/min	0...30,000
Y-axis - vertical stroke	mm	650
Travel speed	mm/min	0...20,000
Z-axis - transverse stroke	mm	650
Travel speed	mm/min	0...20,000
Grinding spindle drive - max. power	kW	25/50
Rpm range max.	rpm	0...10,000
Grinding wheel peripheral speed	m/s	35
– switchable with key-operated switch	m/s	50
– with additional flange monitoring switchable up to	m/s	63
V-axis profile dressing device, roll width, max.	mm	215
Tool changer positions	n/pos	24
Tool length max.	mm	200
Grinding wheel dimensions (D x T x H)	mm	300 x 60 x 76.2
Tool holder		HSK-B80
NC combination - rotary/swivel axes	n/axes	2/3

We reserve the right to make technical changes



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