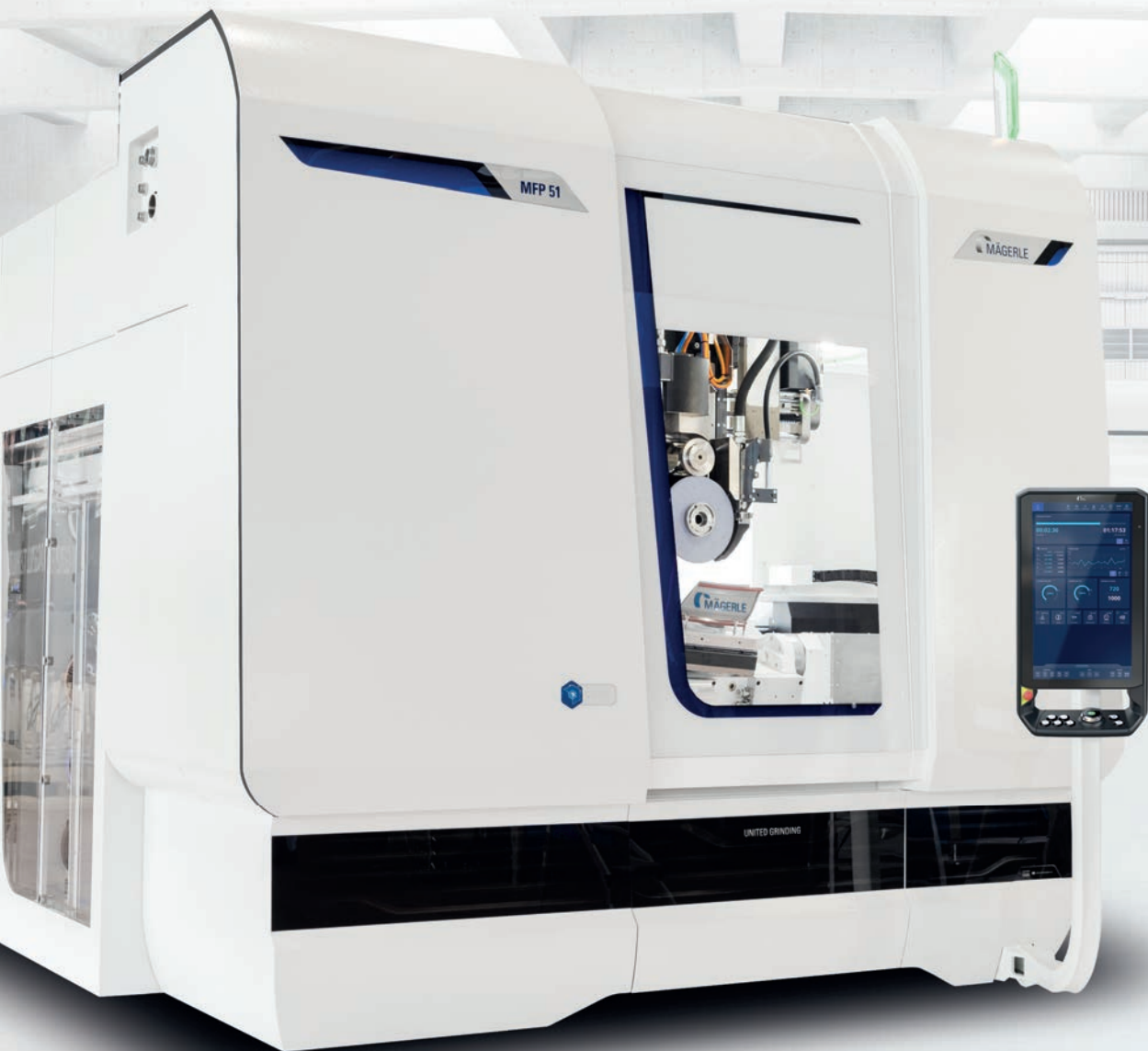


MFP 51

MAXIMUM PRODUCTIVITY
FOR COMPLEX COMPONENTS



C.O.R.E.®



A member of the United Grinding Group

MFP 51

HARDWARE

- Tool changer with 68 positions
- Simultaneous tool and dressing roll changer
- Automatic nozzle changer
- Tool identification system
- Continuous spindle power 25/50 kW
- Spindle speeds up to 12,000 rpm
- 5 or 6-axis system
- Grinding, milling and drilling in a single clamping
- C.O.R.E. panel

SOFTWARE

- Pre-programmed grinding and dressing cycles
- Intuitive operation
- Focus on work and production safety
- C.O.R.E. OS operating system

DIMENSIONS

- X-axis – longitudinal stroke: 500 mm
- Y-axis – vertical stroke: 650 mm
- Z-axis – transverse stroke: 650 mm

The sturdy grinding center comes with an integrated tool changer in a gantry design with 68 positions. The magazine can be flexibly loaded with various grinding wheels, diamond rolls, measuring probes and tools for drilling and milling operations. The large capacity of the tool changer enables efficient machining of several different workpieces without altering the tooling.

Very short process times are achieved with the high-speed spindle, which allows speeds of up to 12,000 rpm, and the overhead dresser integrated into the grinding support. The grinding wheels and diamond dressing rolls are exchanged simultaneously or individually with a double gripper for the individual machining steps. The compact tool holding fixtures allow an efficient grinding process and the continuously dressed grinding wheel enables high

removal rates with high profile accuracy over long cuts. The overhead dresser eliminates the dressing process after the grinding cycle and the movement times to the table dresser.

The NC table can be loaded from above and from the front, by crane or by robot. The simple rear and side access points for servicing and maintenance work supports the exceptional ergonomics of the MÄGERLE grinding center.

YOUR BENEFIT

- Large magazine for tools
- Automatic tool and dressing roll changer
- Process-optimized coolant supply with automatic nozzle changer
- Tool identification system
- Hydrostatic guideways
- Maintenance-friendly design
- Intuitive, user-friendly, and efficient operation
- Access to important information directly at the control panel (e.g. production progress, task details, etc.)
- Reduced programming when exchanging data between C.O.R.E. machines
- Use of UNITED GRINDING Digital Solutions™ products directly on the machine
- Fast support thanks to direct interaction with our Customer Care team on the machine



C.O.R.E. – CUSTOMER ORIENTED REVOLUTION

C.O.R.E. helps us make your production fit for the digital future.

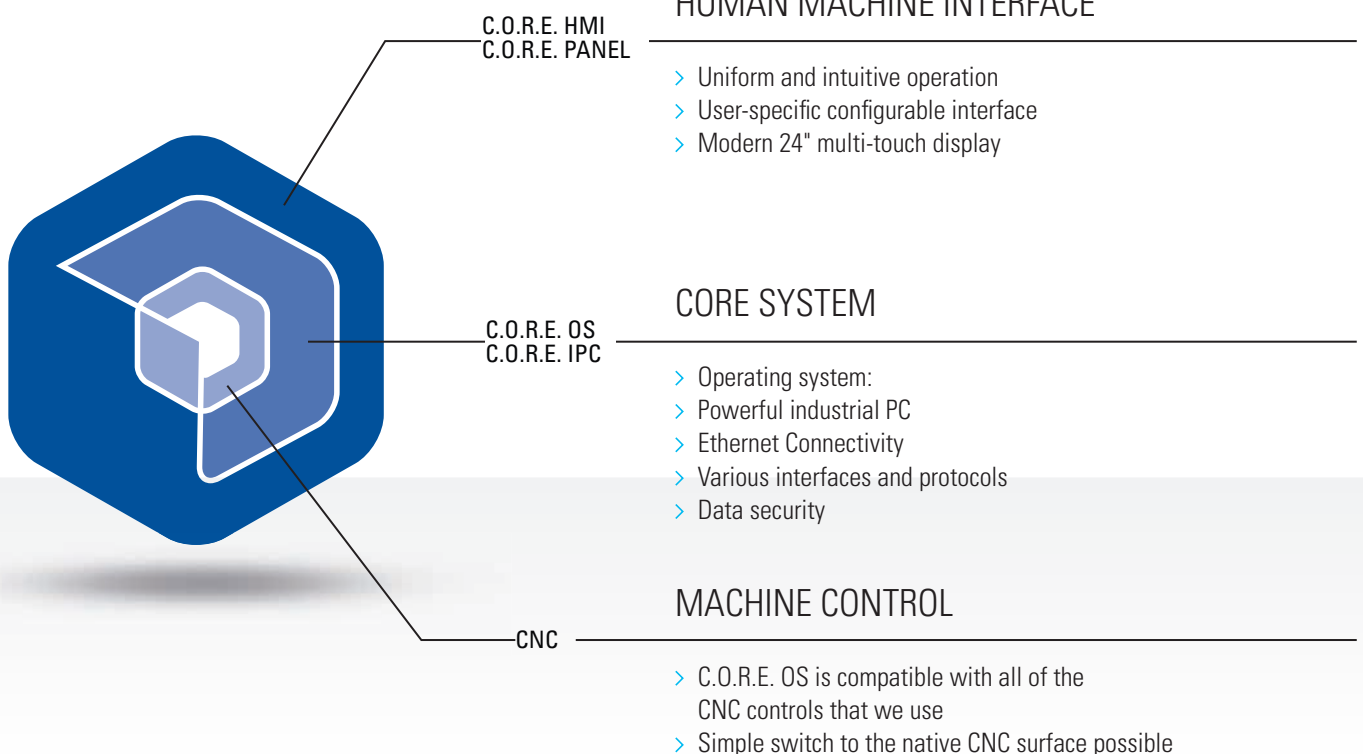
It's based on a new operating system, C.O.R.E. OS, that equips the machine with intelligence.

Thanks to the uniform C.O.R.E. software architecture, exchanging data between UNITED GRINDING machines is easy. The integrated umati API can be used to communicate with third-party systems as well. It also offers access to UNITED GRINDING Digital Solutions™ products directly on the machine. C.O.R.E. not only establishes the technical foundation for this and other IoT and data applications, it also forms the basis of revolutionary yet uniform operation.

What does this mean for you?

- The user-friendly, intuitive, and uniform operation makes work easier for machine setters, machine operators, and maintenance staff
- Standardized data collection and intelligent processing of data creates transparency and supports process optimization
- The uncomplicated and consistent use of modern digital software solutions is guaranteed - directly on the machine
- The technical platform for the use of modern IoT and data applications has been established

C.O.R.E. ELEMENTE



C.O.R.E. PANEL – THE FUTURE OF OPERATION

Intuitive

Thanks to intuitive design with self-explanatory icons, navigation through the machine menu and process steps is quick and easy. Instead of buttons, the user is presented with a modern and clearly arranged multi-touch display.

User-friendly

Each user configures their own user interface individually. This is called up automatically with the RFID chip after logging in. When the user leaves the machine, the panel switches to "Dark Factory Mode."

Production progress and the machine state are also clearly visible from a distance. And thanks to the ergonomic design, the panel can be tilted and individually adjusted easily.

Efficient

The uniform and intuitive operating philosophy reduces training time. The configurable and role-specific interface helps prevent errors and increases the efficiency and quality of programming. Information can be exchanged quickly and in realtime via the front camera and Bluetooth headset. UNITED GRINDING Digital Solutions™ products can be used directly on the panel.

INDUSTRIAL
MULTI-TOUCH DISPLAY

INTEGRATED
FRONT CAMERA

SELF-EXPLANATORY
ICONS

USER-
CONFIGURABLE
DISPLAY

STANDARDIZED
FUNCTION KEYS

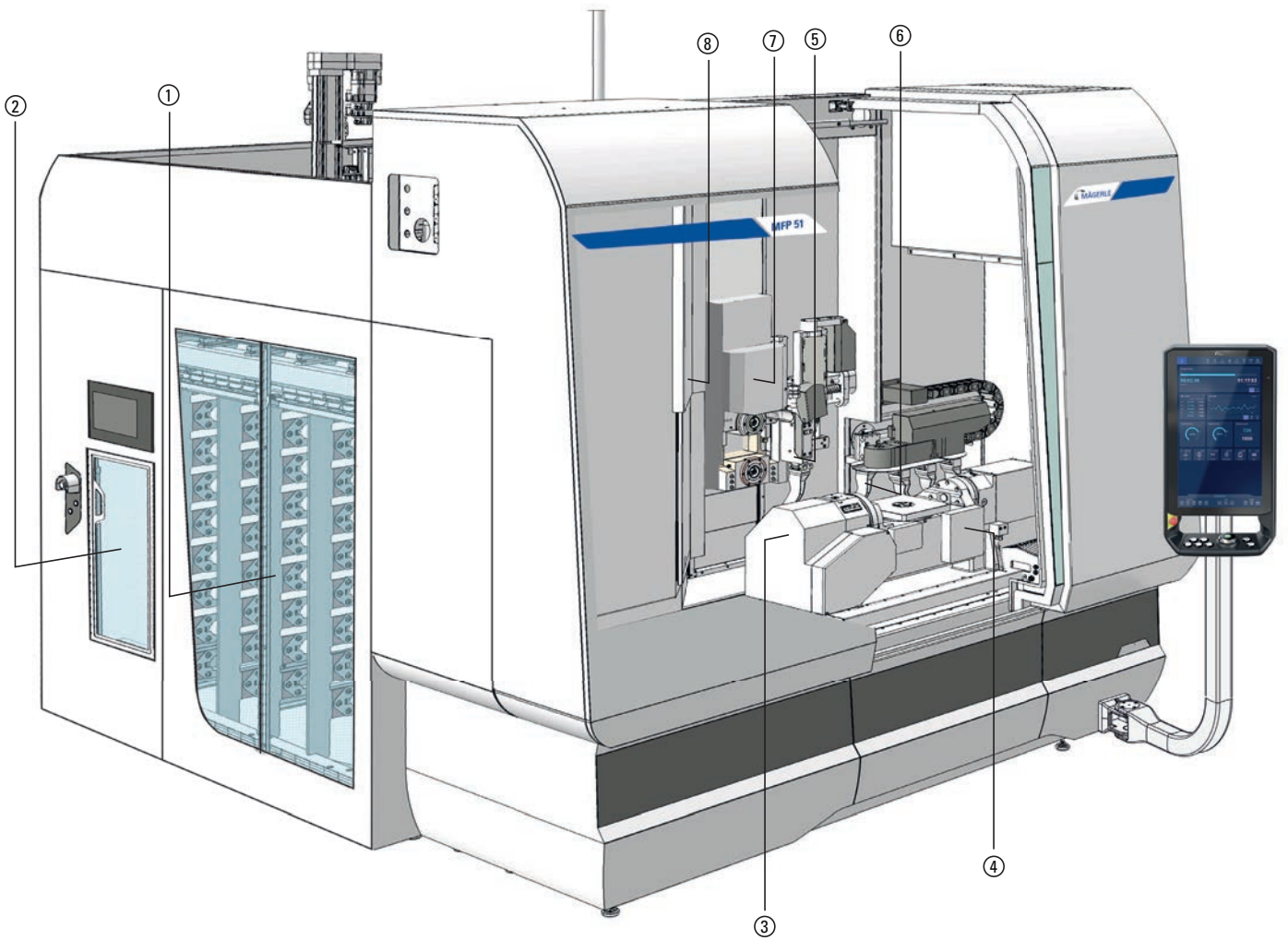
ERGONOMIC
OVERRIDE SWITCH



Technical Specifications

- 24" Full HD multi-touch display
- 16-position rotary override switch
- Electronic key switch (RFID)
- Integrated front camera
- Bluetooth V4.0 for headset connection
- 2x USB 3.0 ports
- Adjustable tilt

MACHINE CONCEPT



- ① Tool magazine
- ② Loading station with optional tool identification
- ③ NC indexing head
- ④ Dressing device
- ⑤ 2-Axis NC coolant nozzle
- ⑥ Optional coolant nozzle changer
- ⑦ Overhead dresser
- ⑧ Tool and dressing roll changer

LARGE MAGAZINE FOR TOOLS



Efficient machining of a variety of workpieces

The tool magazine for grinding wheels, diamond rolls and tools comes in a gantry design with 68 positions. All tools are transferred to the magazine safely and ergonomically by means of a loading station. Change over is carried out in just a few steps and can easily be performed during production. The large tool capacity makes it possible to machine recurring lot sizes without long downtimes. The 68 positions can be flexibly equipped with different variants.

- Example 1:
 - 24 grinding wheels
 - 24 dressing rolls
- Example 2:
 - 28 grinding wheels including sister tools
 - 14 dressing rolls
 - 3 tools
- Example 3:
 - 30 CBN grinding wheels with maximum diameter
 - 14 tools

Flexible loading options

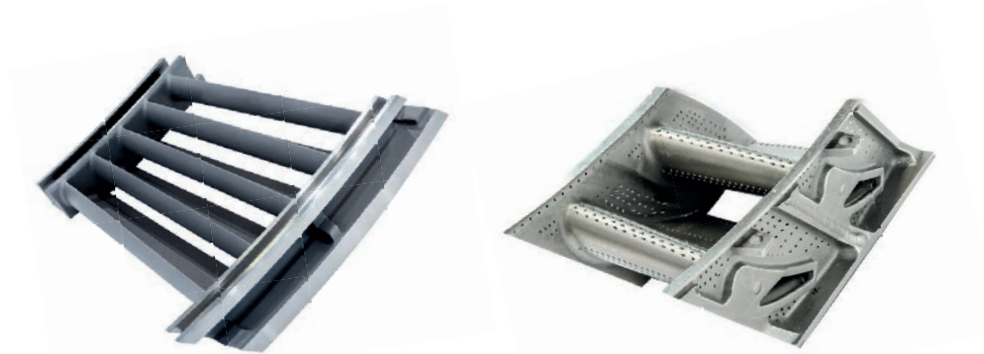


APPLICATION EXAMPLES AND MACHINING CAPABILITIES



Turbine vanes

Turbine vanes are ground on the MFP 51 with minimal downtimes and a high degree of autonomy. The combination of automatic tool changer and CD overhead dresser enables several profiles to be ground in a single workpiece clamping, as well as ensuring dimensional stability.



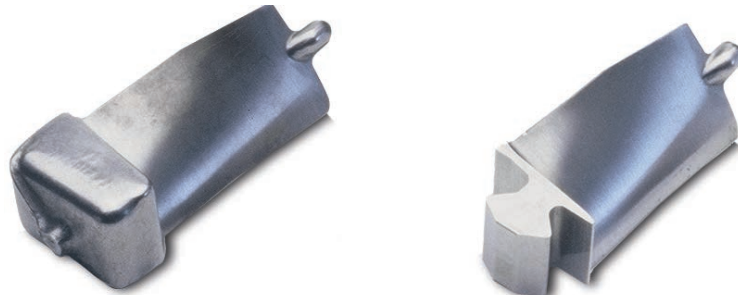
Turbine blades

The high capacity of the tool changer allows the machine to be prepared for several types of turbine blades. As a result changeover times can be significantly reduced. The compact tool holding fixtures enable wide machining contours to be achieved, together with high removal rates.



Compressor blades

Compressor blades for aircraft engines are manufactured from forgings, which comprise high-strength and in some cases also heat-resistant material alloys. The complete blade root profile is produced in a single clamping. The machine configuration with a 3-axis indexing head also enables the machining of radial root profiles.

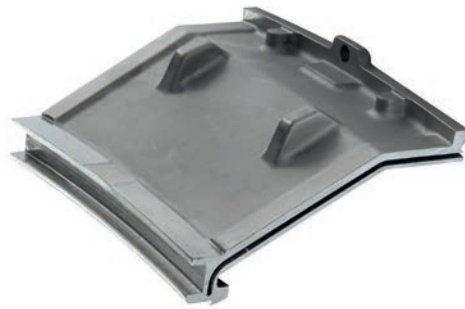


before

after

Shrouds

Shrouds can be completely machined in just a few clampings on the MFP 51, including milling and drilling operations. Each individual machining process can be optimized with different coolant nozzles.



Gear grinding

Gear grinding on challenging workpieces is enabled by a tailored system configuration. To ensure dimensional stability, external and internal diameter can be ground in the same clamping. The process-optimized coolant supply enables high removal rates with consistent production quality.

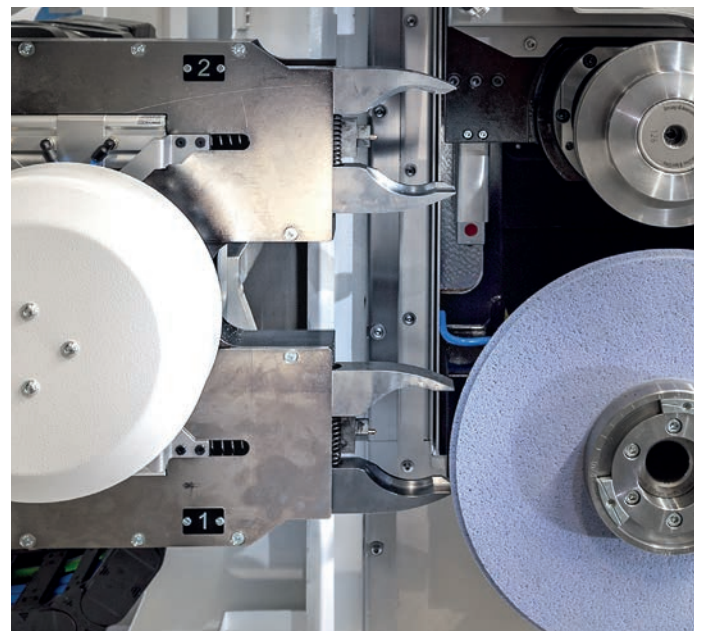
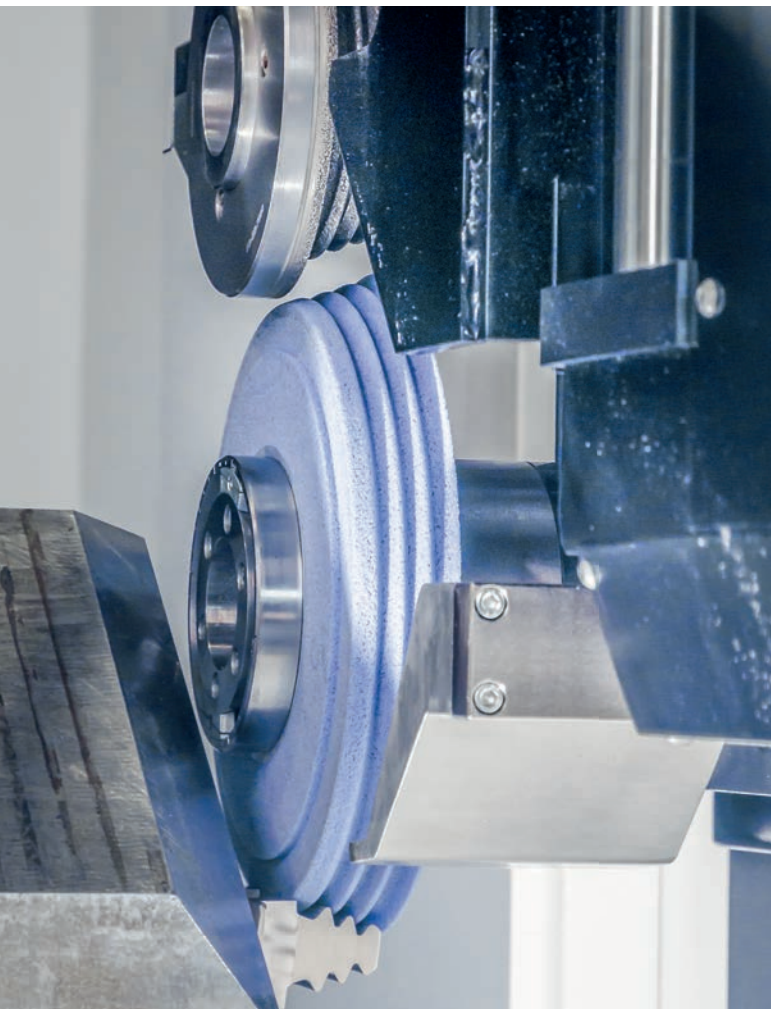
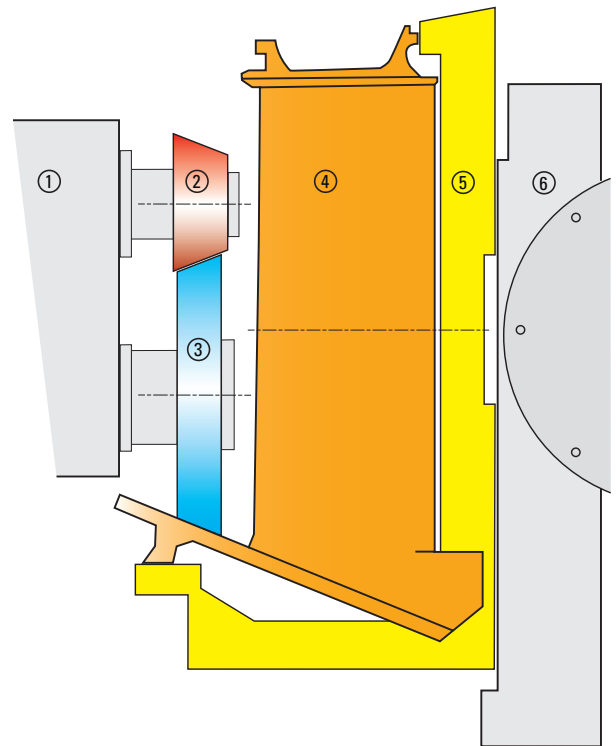


THE RIGHT DRESSING METHOD

Dressing system

The dressing of grinding wheels is a crucial factor for the cost effectiveness of a grinding process. With overhead and table dressing devices MÄGERLE offers professional solutions for the various requirements that can be placed on the process step. The overhead principle realizes its potential particularly in continuous dressing (CD). MÄGERLE uses servo motors for the drive; these can be freely programmed across the entire rpm range. The compact tool holding fixtures significantly reduce susceptibility to vibrations and the continuously dressed grinding wheel enables high removal rates with high profile accuracy over long cuts.

- ① Grinding support with 2 quick-clamping spindles
- ② Diamond dressing roll
- ③ Grinding wheel
- ④ Workpiece
- ⑤ Fixture
- ⑥ NC indexing head



Simultaneous tool & dresser roll changer

The grinding wheels and diamond dressing rolls are exchanged simultaneously or individually with a double gripper for the individual machining steps. This results in a significant reduction in auxiliary times.

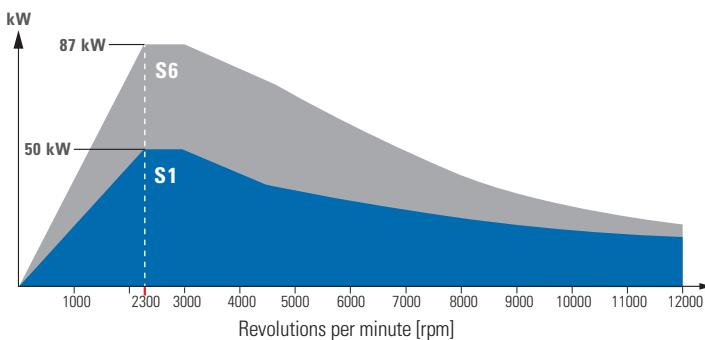
POWERFUL DRIVES AND HYDROSTATIC SYSTEM

High performance and high torque

The water-cooled direct drive motor for the grinding spindle enables high performance and torque in continuous operation across the entire speed range. This leads to outstanding results in terms of removal rates. The HSK flange mountings guarantee high rigidity, attributed to

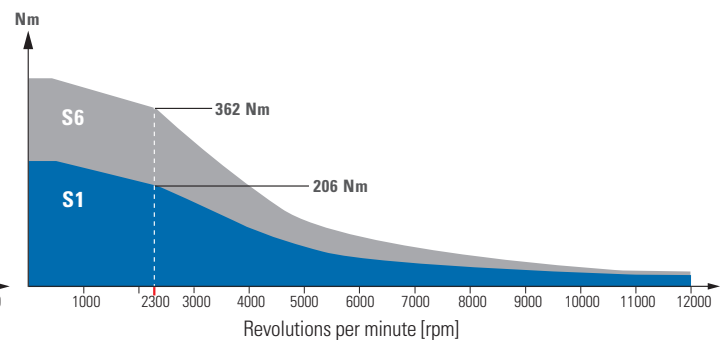
the generous support on the tool holding fixture via the collar. They are also the key to enabling quick tooling changes with absolute repeatability precision. An optional balancing system dynamically balances unequal forces in the rotating grinding wheel.

Spindle capacity



S6 = 40% duty cycle

Torque

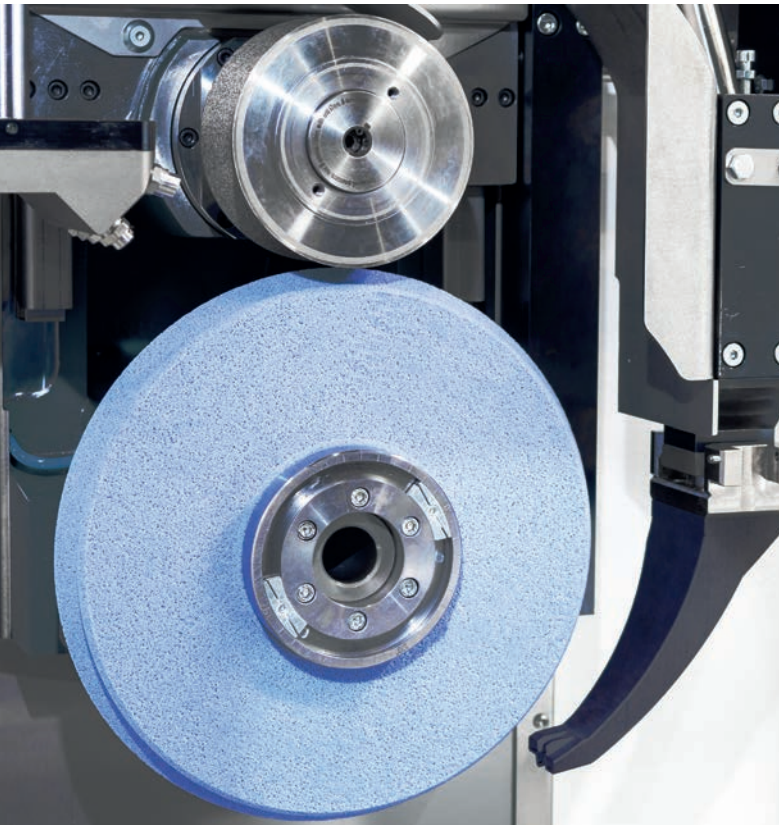


Wear-free guide concept

The unique design principle of MÄGERLE machining centers forms the basis for the overall machine quality. The vertical axis is supported by hydrostatic wrap-around guideways on a thin oil film and is completely separated from the column upper section. This principle enables the machines to withstand very high stresses free of wear, even in long-term use. The oil film also has a vibration-damping effect and guarantees high-precision machining of simple or complex workpieces.



COOLING INTELLIGENCE



Optimal grinding and machining results

The NC controls of the MÄGERLE grinding centers enable precise positioning of the coolant supply, taking into account the respective grinding wheel geometry. Nozzles are available on the grinding support for drilling and milling tools, and a coolant supply can be optionally provided through the spindle. Additional separate nozzles for the dressing process and cleaning of the grinding wheels ensure that optimal grinding results are achieved. 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.

Process-optimized coolant supply

The MFP 51 can be optionally equipped with an automatic nozzle changer with up to 6 process-optimized coolant nozzles. This substantially optimizes the grinding conditions for different profiles.



COOLANT CLEANING UNITS

The optimal solution for every application

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.



SAFE AND AUTONOMOUS OPERATION

Automation and machining cells

The MFP 51 is ideally suited for automatic loading and unloading. Flexible and efficient automation solutions are possible with a robot and linear system. The workpiece handling with robot technology is a quick and reliable step for increasing the capacity utilization and productivity of the MFP 51.

The integration of additional process steps such as cleaning and measuring is possible. MÄGERLE's expertise and experience with implemented automation solutions guarantee the highest productivity and quality and ensure your long-term competitiveness.

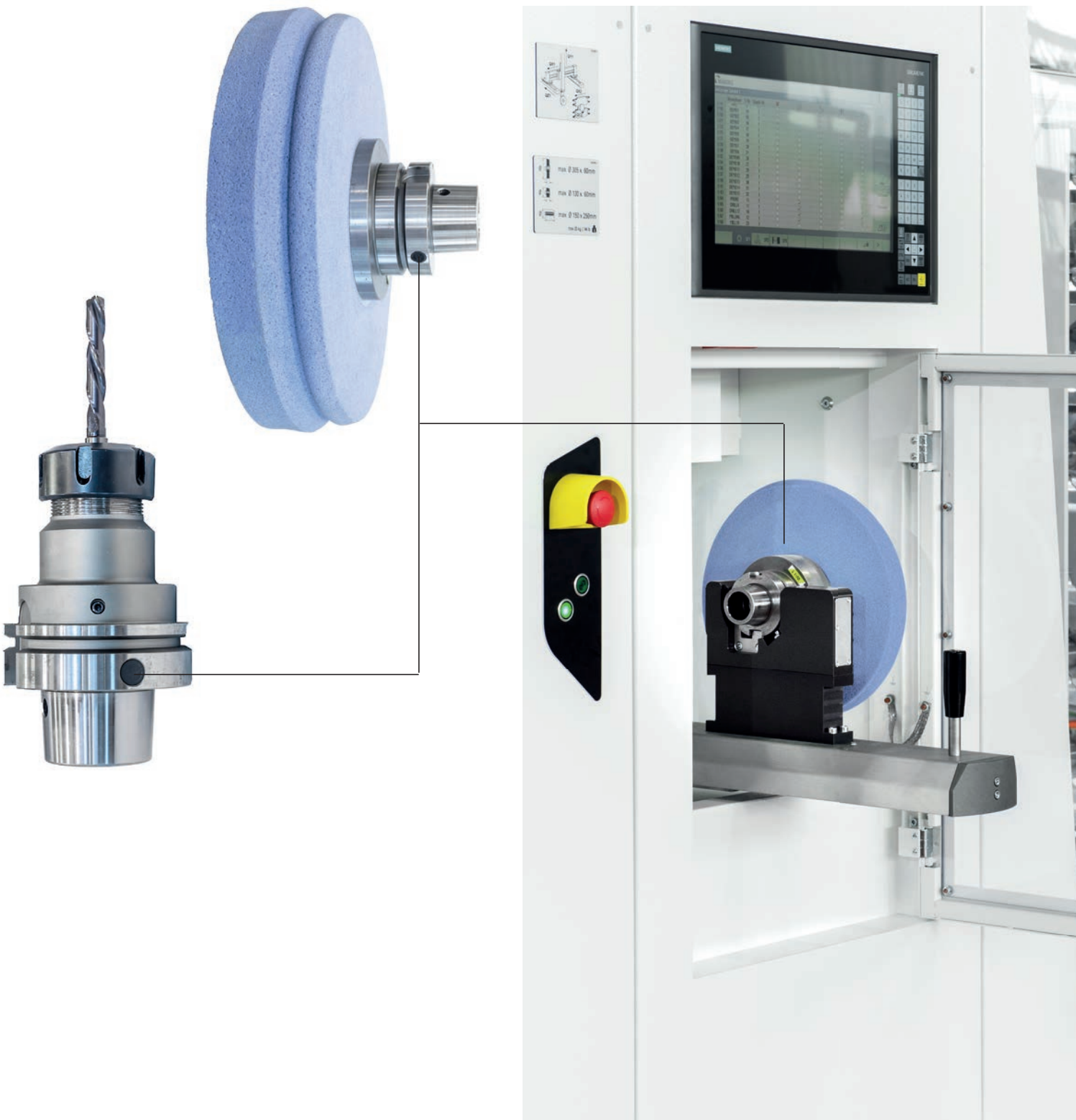


Tool identification

The MFP 51 can optionally be equipped with an identification system for grinding wheels and tools. The tool is inserted in the loading station of the tool changer. The data stored on an RFID chip is securely imported prior to the loading process. When the grinding wheel is removed from

the tool magazine, the system updates the chip with the current tool data.

This eliminates the probability of errors when entering the tool data on the machine and consequently also the risk of downtime.

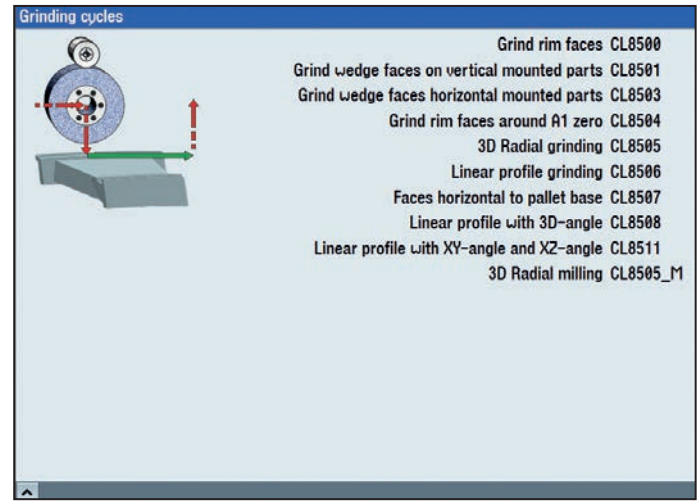
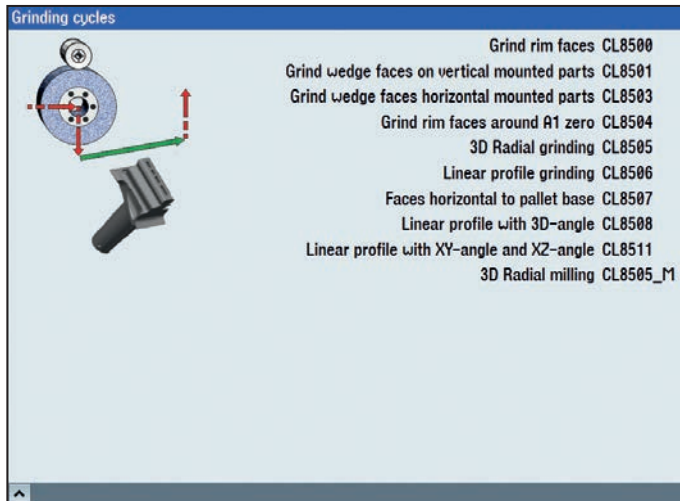




CAD/CAM CONNECTION

The grinding center is equipped with the SIEMENS Sinumerik 840D Solution Line control. Specially visualised and parameterisable grinding and dressing cycles are available for efficient programming of the workpi-

eces. In 5-axis machining, 3D grinding and auxiliary cycles can be programmed for milling and drilling operations.



A SIEMENS NX postprocessor is available for CAM process development. The generated NC programs take account of the Mägerle grinding cycles. As a result the programs can be easily edited on the machine

control unit via operator guidance. Mägerle provides a Vericut package for simulating and checking the programs.



WE ARE HERE FOR YOU!

BRAND products are designed to meet customer demands for as long as possible, they are intended to operate efficiently, reliably and be available at any time.

From «Start up» through to «Retrofit» – our Customer Care is there for you throughout the working life of your machine. For this reason, you can rely on competent HelpLines worldwide and Service Engineers near you:

- We will provide you with fast, straight-forward support.
- We will help to increase your productivity.
- We work professionally, reliably and transparently.
- We will provide a professional solution to your problems.



Start up
Commissioning
Warranty extension



Qualification
Trainig
Production support



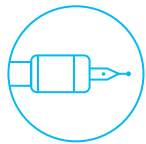
Prevention
Maintenance
Inspection



Service
Customer service
Customer consultation
HelpLine
Remote service



Digital Solutions
Remote Service
Service Monitor
Production Monitor



Material
Spare parts
Replacement parts
Accessories



Rebuild
Machine overhaul
Assembly overhaul



Retrofit
Modifications
Retrofits

UNITED GRINDING DIGITAL SOLUTIONS™

We develop solutions to support you in simplifying processes, boosting your machines' efficiency and increasing overall productivity under the UNITED GRINDING Digital Solutions™ brand.

Find out more about UNITED GRINDING Digital Solutions™ services on our website in the Customer Care section.



CUSTOMER CARE

EASE OF OPERATION AND MAINTENANCE

Operation

The machine is operated via the swiveling control panel with a view of the working area in the front of the machine. When the splash guard is opened, heavy workpieces including clamping fixtures can also be loaded from the top with a gantry or jib crane. The tools are provided to the tool changer via a separate loading station.

- ① Working area
- ② Splash guard opened at the top
- ③ Loading station



Maintenance

Access for maintenance of the respective units and components of the entire machine is centrally positioned and designed to make maintenance easy. Periodic maintenance activities can thus be efficiently performed.

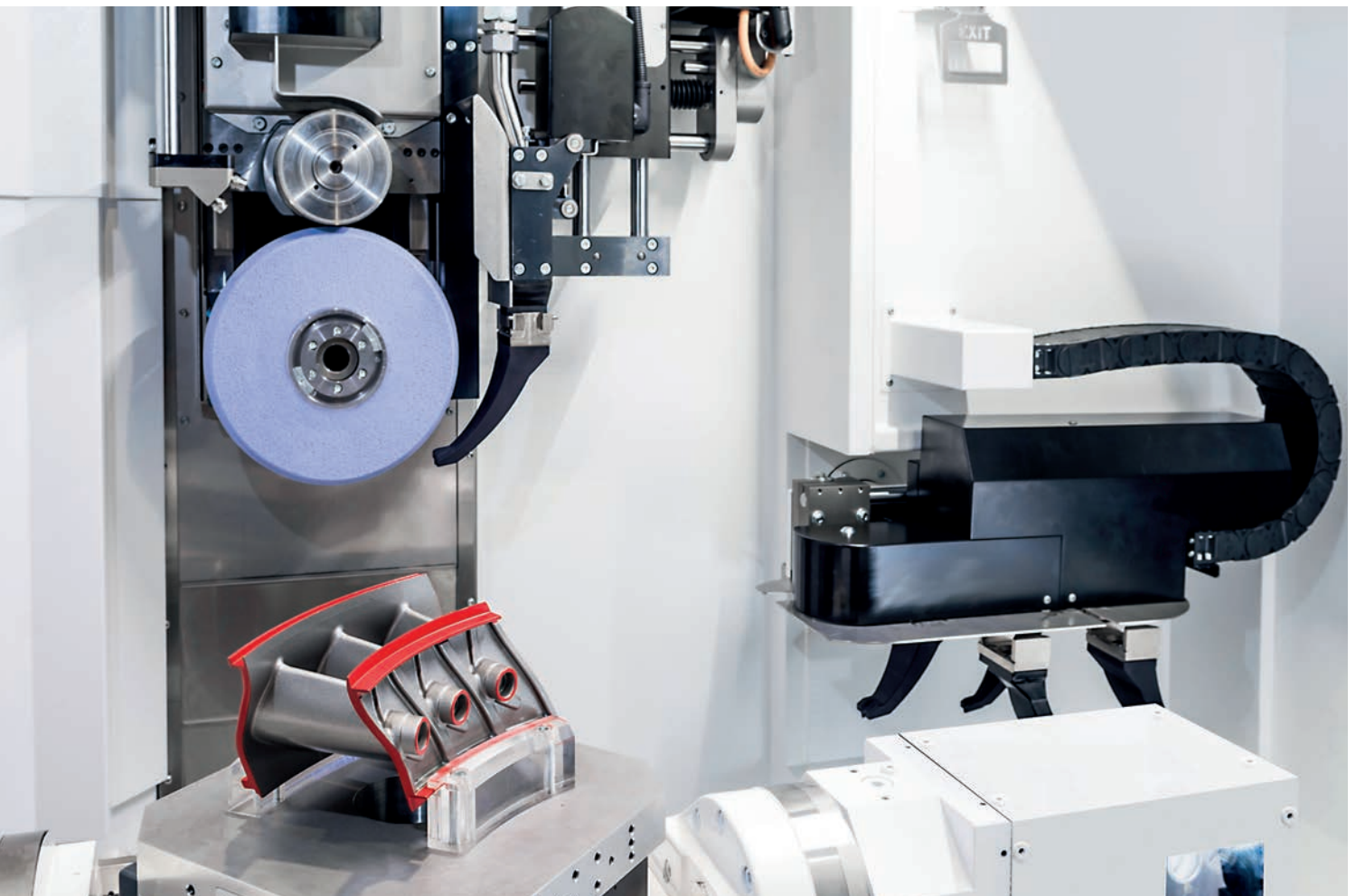
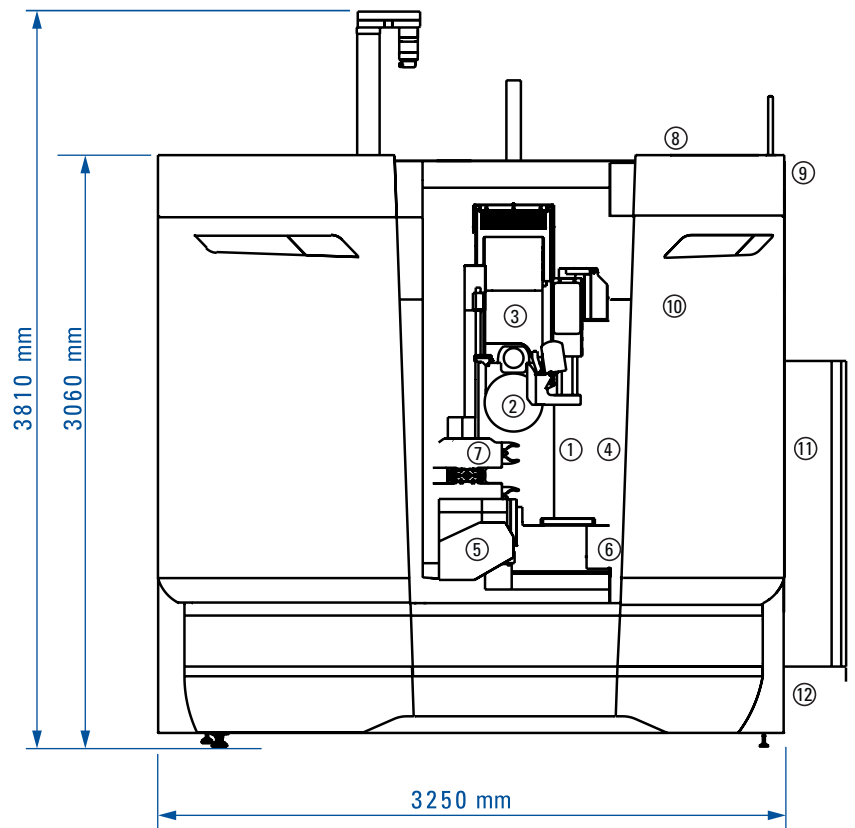


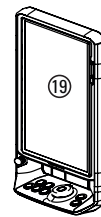
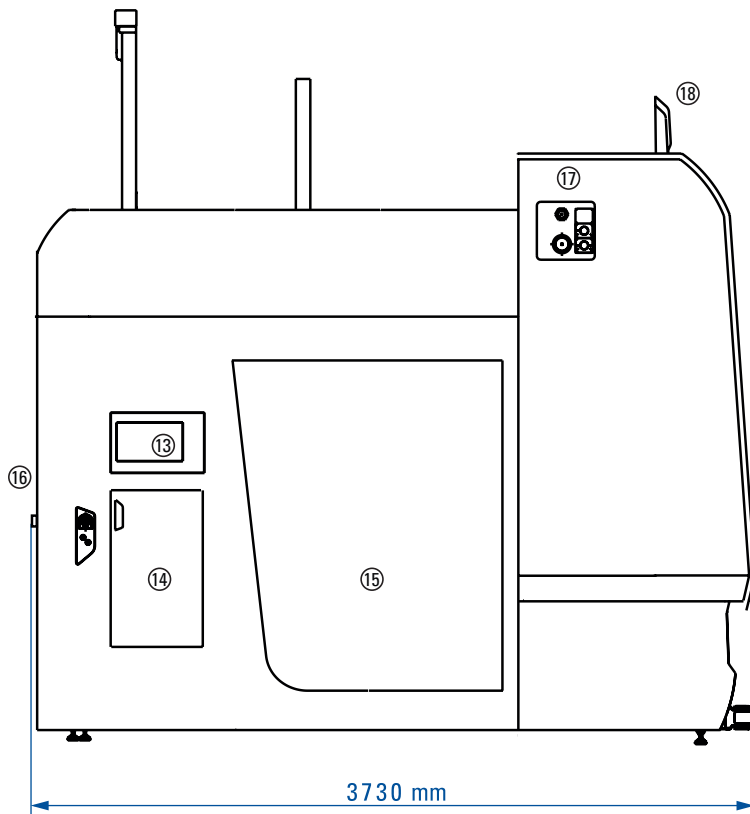
- ① Service access for tool magazine
- ② Central lubrication
- ③ Electric cabinet
- ④ Fluidics and pneumatics



LAYOUT

- ① MFP 51 Working area
- ② Quick-change spindle for machining tools
- ③ Quick-change spindle for diamond dressing rolls
- ④ Automatic coolant nozzles
- ⑤ NC indexing head 2/3 axes
- ⑥ Dressing device
- ⑦ Dual gripper
- ⑧ Automatic door drive
- ⑨ Mist extractor (interface)
- ⑩ Safety splash guard cabin
- ⑪ Electrical cabinet
- ⑫ Hydrostatic/Hydraulic unit





- ⑬ Input station for tool management
- ⑭ Tool loading station with tool identification
- ⑮ Tool change magazine
- ⑯ Centralized lubricating system
- ⑰ Interface to coolant processing system
- ⑱ Machine status lamp
- ⑲ Operating panel

TECHNICAL DATA FOR MFP 51

X-axis	longitudinal stroke	mm	500
	travel speed	mm/min	0...50.000
Y-axis	vertical stroke	mm	650
	travel speed	mm/min	0...30.000
Z-axis	transverse stroke	mm	650
	travel speed	mm/min	0...30.000
Maximum continuous power grinding wheel drive		kW	25/50
Rpm range max.		min ⁻¹	0...12.000
V-axis profile dressing device, roll width, max.		mm	60
Tool changer positions		n/pos	68
Nozzle changer positions (optional)		n/pos	6
Quick-clamping spindles		n	2 x HSK-B80
Tool length max.		mm	250
Grinding wheel dimensions (D x T x H)		mm	300 x 60 x 76,2
NC-combination – rotary/swivel axes		n/axes	2/3
Integrated additional swiveling dressing device (optional)			
Measuring system with measuring probe (optional)			

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.



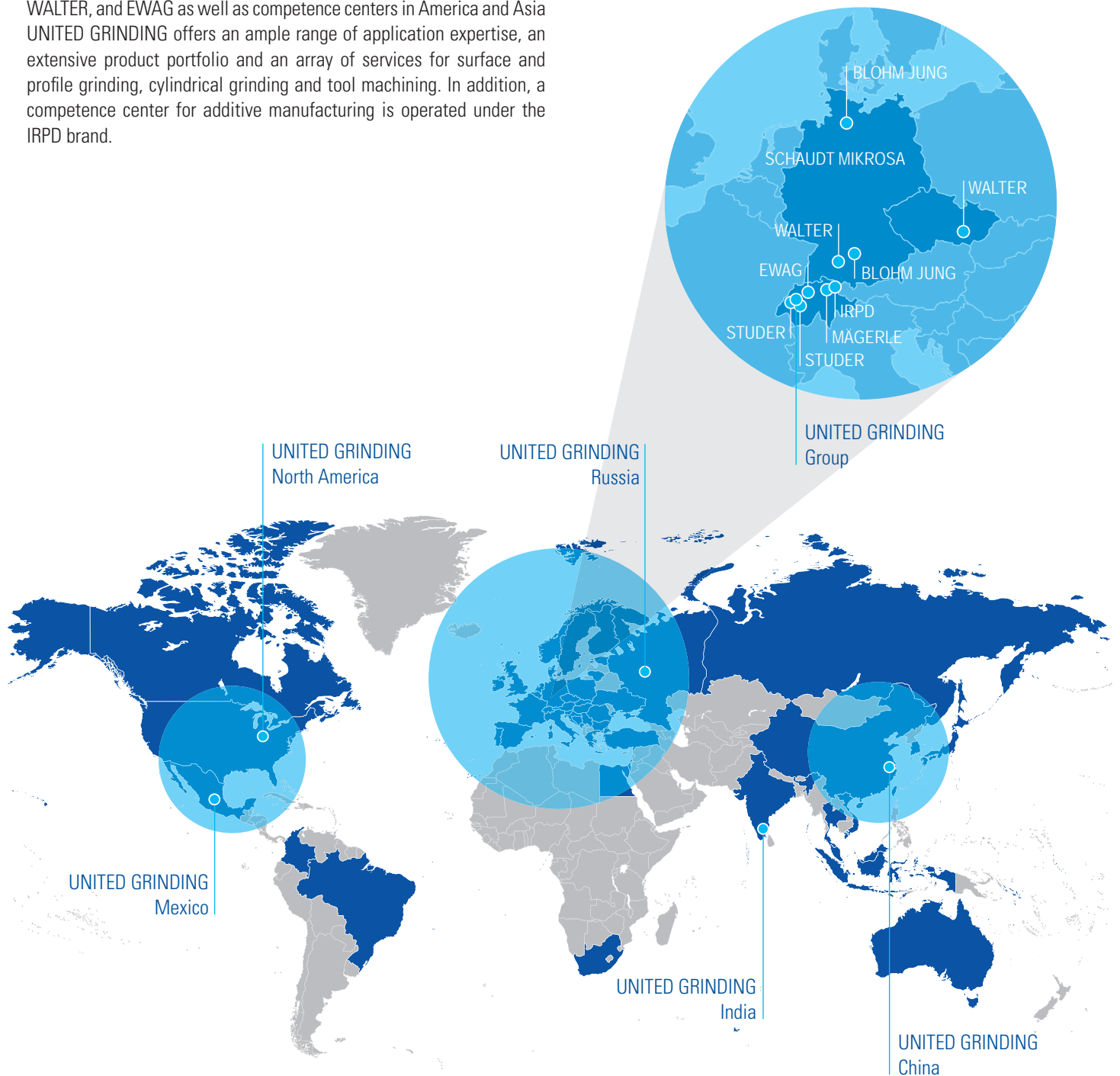
ABOUT US

UNITED GRINDING GROUP

UNITED GRINDING Group is one of the world's leading manufacturers of precision machines for grinding, eroding, laser, measuring and combination machining. With around 2,500 employees at more than 20 production, service and sales sites, the Group is organized in a customer-oriented and efficient way.

With its brands MÄGERLE, BLOHM, JUNG, STUDER, SCHAUDT, MIKROSA, WALTER, and EWAG as well as competence centers in America and Asia UNITED GRINDING offers an ample range of application expertise, an extensive product portfolio and an array of services for surface and profile grinding, cylindrical grinding and tool machining. In addition, a competence center for additive manufacturing is operated under the IRPD brand.

«We want to make our customers even more successful»





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